UNIVERSITY OF WINCHESTER

WHAT YOU SEE IS NOT WHAT YOU GET

Mafia Woman and Artificial Intelligence: a diagnostic enquiry of a lost femininity in the criminal justice system

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Doctor of Philosophy

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ABSTRACT

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Artificial Intelligence (AI) is a wide-ranging branch of computer science that enables smart machines to solve problems faster. The integration of AI in the legal field, e.g. through predictive algorithms, poses the question about fairness of these justice tools. AI-based systems are trained on available data which has been shown to contain unacceptable levels of gender biases. The gender data gap affecting the law enforcement and criminal justice system is of importance because of the silencing of women when collecting data. The invisibility stems from a deep-rooted patriarchy in society, especially within criminal organisations. In this thesis, the role of the woman in the Italian mafia is exposed as a case-study to identify and discuss consequences of her invisibility in AI integration.

A multidisciplinary approach is suggested to study how a male-dominated structure has shadowed women's presence, and to work towards less biased predictive systems. A mixed methodology was adopted comprising of Phase 1, which was a qualitative collection of female mafia profiles, and Phase 2 which quantified the gender bias through open- and close-ended questions to AI experts. The study then sought to reflect and explore with stakeholders the project's outcomes and confirm further research avenues.

As a result of Phase 1, 30 mafia women profiles were identified. Phase 2 recognised a pattern of bias raising awareness among those leading legal-tech changes of possible problems affecting the informatisation of mafia trials. The reflective chapter confirmed the validity of the multidisciplinary approach used as the benchmark to tackle gender bias during data collection and algorithmic integration.

The thesis suggests that a novel joint effort of socio-legal and tech expertise may be the preferred operational environment to address inequalities generated by automated legal tools. This research can represent a springboard to analyse possible corrections of wider justice systems for a fairer functioning of AI in predictive justice.

Keywords: Predictive Justice, Gender, Unconscious Bias, Artificial Intelligence, Judiciary, Mafia

LIST OF CONTENTS

LIST OF TABLES

CHAPTER 1 INTRODUCTION

1.1 Personal Motivation

'I wasn't allowed to go out… Once I had finished primary school, they told me I shouldn't continue studying because my role was limited within the house…' – Rosa N. (Italian Mafia Woman)

'The judges told me that I was a mere drug courier. This accusation is something that I cannot accept […] I have been giving orders and controlling others for my whole life. Such ideas would only pass through these judges' minds that have no clue about the law nor life' – Angela Russo (Italian Mafia Woman, Cosa Nostra, also known as "heroine grandma")

'For a long time, Cosa Nostra has depicted women not as 'persons'. In reality, they have always played an important role for the criminal organisation…' – Teresa Principato (Italian Mafia Prosecutor, 2016)

'In Sicily, women are more dangerous than shotguns.' – From the Motion Picture, The Godfather, Directed by FF Coppola, 1972

Ambivalent is the image of the woman that transpires through the above quotes: is she feminine and subdued like Rosa N.'s? Or is she masculine and powerful as Angela Russo? The Italian mafia originated in the South of the country in the 19th century, as a criminal organisation based upon the structure of the family. It is within this unit that a *mafioso* (a mafia person in Italian) is born, shaped and formed. However, within the family, there are two distinct roles: the masculine one and the feminine one; the man of the household holds the masculine role in a position of power and control over the woman's feminine role. The woman is his propriety (Arlacchi, 1983: 24). As Rosa's above quote shows: for years, the role of the feminine mafia woman has been seen as weaker and subdued to the rules of her husband; she has been portrayed as the perfect wife who would stay at home and look after the children.

While growing up in Italy, my personal educational journey through primary, secondary and high school was heavily influenced by the recurrent topic of the Italian mafia. I recall that even extra-curricular activities revolved around the learning of mafia and anti-mafia organisations and yearly school trips involved attending talks and conferences on the Italian most feared criminals and people fighting it. However, despite the recurrence of the same issue, which was presented to students mostly as the organisation being led by these terrifying men, there was always one dimension to this topic that has always caught my attention. Through the years of almost having no choice but to learn about these criminal organisations, I always wondered what the position occupied by women was within the mafia.

They were and still are mostly portrayed as taking a secondary or even invisible position within the criminal activities carried out by their fathers, brothers, husbands or at the forefront of fighting against the mafia after having a change of heart and collaborating with the state. Nevertheless, there has always been something in this smudged portrait of the mafia woman that has always intrigued me, which is why she has become a case-study in the thesis.

Concurrently, my professional journey into practising law at an international firm has fuelled my interest in the latest legal-tech developments. Having had the opportunity to be exposed to thought leaders that are driving changes in the legal system, a recurrent theme is one that focuses on making the practising of law more innovative, and makes an increasing use of Artificial Intelligence (AI).[1] However, the drive for change is obstacled by other issues, such as the possibility of these intelligent tools failing to meet the standards hoped for, and spiralling into making decisions on behalf of humans that are biased. Consequently, it flowed naturally to merge two areas of interest (the mafia and legal-tech) to explore how innovative advancements in the justice system could be pushed forward in a manner that that does not replicate or worsen existing faults.

1.2 Research Aims and Objectives

The research is interested in the issues surrounding AI, law and gender, specifically the problems deriving from gender biased data. Gender biased data is data that is not accurately picturing the reality and therefore could be discriminatory against groups of people (Alex, 2018; Leavy, 2018; Leavy et al., 2020). For the proposed research, the group is composed of mafia women used as a case-study to explore bias issues with possible wider applications. In particular, the juxtaposition of the organised crime and the image of the woman is symptomatic of a subconsciously accepted norm that criminal networks are a man's world (Diviák et al., 2020). However, in the last two decades the percentage of women offenders is growing globally, at a faster rate than male offenders. Such global increase raises the question as to the reasons behind gender differences in criminal behaviours. While gendered data continues to be insufficiently reported upon by law enforcement bodies, traditional or stereotyped gender norms are believed to play an important part in the gender gap in organised crime for several reasons. First, due to the gender influenced lens, law enforcement authorities fail to investigate women as offenders and continue to perceive them as victims or accomplices only. They are rarely seen as the

[1] The Oxford Dictionary defines **Artificial Intelligence** as the theory and development of computer systems able to perform tasks normally requiring human intelligence, such as visual perception, speech recognition, decision-making, and translation between languages.

criminals themselves and less so as being the organisers, leaders, traffickers or recruiters. Secondly, under the social gender roles and due to the nature of the mafia perceived to be a male world's only, women are possibly less interested in turning to the criminal activities. Consequently, the justice systems are possibly under-investigating and under-estimating the presence of women in organised crime, notably due to the gender bias, which arguably is replicated by predictive systems (INTERPOL, 2021). The mafia woman case-study draws attention to the common features of female offenders, and encourage law enforcement bodies and judiciaries to reconsider their approach, and ensure gender-related data are more increasingly investigated, and collected.

As the emergence of AI is changing many aspects of our lives, the law enforcement and the judiciary are not excluded from this development. In order to discuss the problems that we are envisaging today with the implementation of AI tools within these bodies, whether that is for criminal profiling, law enforcement and predictive justice in general, I use the specific example of the Italian mafia woman to show where things could go wrong when collated data is not representative of a specific reality, and ignores marginalised members of a community. The research further explores solutions to address biased data's effects on AI with the collaboration of those experts that lead the technological agenda.

The research does not intend to practically critique AI in the law enforcement or criminal justice system, but it is a socio-legal study seeking to support these technological developments. It is a theoretical and anticipatory critique, which focuses on bringing to light the issues on how the historical treatment of the mafia as a male organisation could be problematic if AI tools were to become the future in the judiciary (Stevenson, 2002). If the current technological advancements could create something that would assist the courts based on the historical data available on the mafia, the result would be an AI tool that would hold the man more likely accountable for the crimes rather than the woman (Solis and Evans, 2021). This is because the data existing on the mafia woman is unexplored, limited, and also challenging to access. Ultimately, the research contributes to showing the need to correct the gender bias and break down the overall tendency to continuously reproduce biased images of the woman. This is not limited to the judiciary, but could pave the way for further research in other aspects of the society where the woman is still invisible.[2]

[2] See other examples of gender bias challenges affecting AI due to historical data: virtual personal assistants (Adams, 2020), healthcare (Cirillo et al., 2020), financial services (Kelley et al., 2022), hiring processes (Raub, 2018), automotive industry (Smith and Rustagi, 2021), transport infrastructure and wellbeing (International Transport Forum, 2021)

Consequently, if AI advancements are being made to assist police officers and judges in making decisions, then a substantial effort is needed to ensure that the data that is missing or inaccurate of women is integrated into the AI system (Clemons, 2014; Tashea, 2017; Oswald et al., 2018; Oswald and Babuta, 2019; Tommasi, 2021). Therefore, what the research seeks to do is to firstly expose the active role of the mafia women, while emphasising the difficulty in finding the data, and the gaps encountered in the information collated. This point feeds the discussion with regards to the technological developments being hindered due to poor data. Examples are then shared of the changes brought by AI in the law enforcement and judiciary to offer a taste of how traditional systems are changing, adapting, and adopting such tools. An additional aim of the research is that of showing that the lack of emphasis and drive to ensure that data is collated fairly is because many groups that drive change, including thought leaders that create advanced tools, are disconnected in expertise and tend to work with like-minded people striving towards one goal. What is problematic is the lack of interdisciplinary work that would test and challenge one another to think differently, to think more inclusively (Leavy, 2018; DCMS et al., 2022a). Consequently, the mafia case-study practically shows the need for a multidisciplinary input that challenges the accepted norms and practices.

The objectives of the research are:

- To design a clearer representation of the women's sphere in the mafia;
- To assess the mafia case-study as evidence of gender bias;
- To develop a methodology to raise awareness of unconscious gender bias;
- To verify the benefits of multidisciplinary contributions in the drive of AI changes within traditional structures.

The aims and objectives of the research are particularly in line with United Nations (UN) Sustainability Development Goals (SDGs), which were developed in 2015 for the UNs vision of peace and prosperity for the world's future. The 17 SDGs address key themes with reference to bringing poverty to an end, improving health, education, climate change, promoting equality, and developing sustainable economic growth (United Nations, 2015). The implementation of AI could bring benefits to many UN SDGs directly and indirectly over time as sectors and population is changing to incorporate AI technologies. Predictive justice, which is the core of the current study, has potential in delivering UN goals number 5 and 16 on "Gender Equality" and "Peace, Justice and Strong Institutions" respectively. The combination of AI technology and human-in-the-loop expertise could possibly strengthen people's and institutions' trust in areas such as healthcare and medical diagnosis, interpretation and application of law, law enforcement

practices, and generally government institutions that can be rendered more effective, efficient, less discriminatory via AI technology.

The original contribution of the research, in summary, is a methodology which raises awareness of biases, applicable to different types of discrimination, whether it is gender, race, class. This thesis should function as an exemplary explanation of the gender gap identified in an enlarged/zoomed in issue of mafia women with the related effect of such gap in predictive justice tools. The research contributions could be generalised to a certain extent (see for instance, section 2.1 of the thesis which explores and calls for other criminal organisations where the gender data gap could be investigated through the proposed methodology). If the same acknowledgement and research methodology is lifted, dragged across to another area, and dropped to analyse that specific issue (e.g. racial data in the context of crime, or employment tools, gender and financial data for approval of mortgages, etc.), the detailed study may be able to reveal other spheres where there is a data gap, and offer a step-by-step process to address the issue. It is a go-to framework that can be applied in a multidisciplinary setting seeking to address where data gaps are identified for the better informatisation of AI tools.

1.2.1 The Other Side of the Mafia Woman: the active role

The case-study is in itself important for conducting the research since it is a vehicle carrying the observer beyond a limitation set to perceive the women in these groups as victims, suppressed, and consequently addressing it. The recurrent single-sided image of the mafia is the limit that has been shown to me throughout school and accepted within the Italian culture, but not limited to that. In fact, it is a restriction that is reflected also more widely as, for instance, current results that research engines like Google give when typing “mafia bosses” are thousands of images of men, in many black and white photos, mostly showing Italian features, middle-aged, and well-dressed. Women are nowhere to be seen within those results, although an increasing number of studies have looked into women’s participation in organised crime (Fiandaca, 2007; Fleetwood, 2014; Ingrascì, 2007a; Kleemans et al., 2014; Siebert, 1996), and more generally into the factors that lead them to be recruited (Brotherton et al., 2004; Requena, 2014; Salinas and Regadera, 2016; Van San and Sikkens, 2017; Varese, 2001).

However, for the past 15 years or so, the Sicilian mafia organisation, known as *Cosa Nostra*, based predominantly on masculine values, has allowed the entry of women. Despite their acceptance within the organisation, the power is still mainly held within masculine hands, and delegated to women in a limited way. Different is the situation in the *Camorra* (the mafia organisation in the Italian county of Campania) and *‘Ndrangheta* (in the Italian county of Calabria). For instance, mafia women in the

Camorra have undertaken important positions within the organisation, handling more power than men. It would almost be possible to talk about a *Camorra*'s matriarchy against the *Cosa Nostra*'s patriarchy. *Camorra* women have become real entrepreneurs, fully involved in criminal activities (Saviano, 2015, 2012). With regards to mafia women in the *'Ndrangheta*, it would not be possible to match their position to that of matriarchy in the *Camorra*. However, it would still be possible to depict them as women who have a career within the organisation in supporting male bosses (Siebert, 2007).

The aforementioned literature indicates that despite the Sicilian mafia women having won equal rights to their men in certain instances, they are still confined within a hierarchical system that places the man at the top. Consequently, *Cosa Nostra* women are not as free as those in the *Camorra* and the *'Ndrangheta*. Regardless of *Cosa Nostra* women's attempt to reach positions of power, they would in the majority of cases, be strictly controlled by men who would have an inclination of imprisoning her within the household. Therefore, an ambiguous situation is produced in which the patriarchal dynamic is reinforced: within the *Cosa Nostra*, the woman is allowed to have power in the way and quantity imposed by the male boss. Within the *'Ndrangheta,* recent literature has shed light on how women seek to break free from the organisation searching for love through social media (Lauricella, 2019a). Contrastingly, *Camorra* women are found to be leaders of the main two criminal groups in the cocaine market (Gribaudi, 2010). These various images of the woman are key for the innovative and technological aspect of the thesis, as these potentially affect and impede the efficient functioning of algorithms in modern courts that the justice system is working towards for predicting case outcomes or running risk assessments.

What I have briefly introduced here, is an ambivalent image of the mafia woman through the three main organised crime groups in Italy. One that shows that at times she is indeed subdued and limited in the feminine field of the household; but at others, from within her feminine field of the household and not, she finds herself capable and wanting to step over to the masculine field and juggle power and violence. Consequently, the question the research poses is whether/how this ambivalence and the female offenders that are exceptions to the main stereotypical woman is translated into AI systems, which in practice seem to produce biased outcomes. In fact, for years the Italian legal system and law enforcement had been unable to see through the apparent docile mafia woman because of the accepted stereotype that she was not associated with her husband's criminal organisation, but that she was a victim of his rules and choice of lifestyle (Longrigg, 1998:XIV-XV; Panzarasa, 2018:32). For a long time, the mafia took advantage of a system that did not care to admit that women were capable of

criminal behaviour (Longrigg, 1998:151). Wives of murdered judges by the mafia speak themselves about the 'blatant inadequacies of the prosecution service' and legal system (Longrigg, 1998:161). Potential ramifications of such stereotypes need to be considered, including the gap in data such practices may have contributed to. Moreover, the perpetuation of stereotypes is not limited to female offenders, but affects gender more generally. Wachter, for instance, explores consequences of Google frequently coding women working in technology as men, which could have skewed data about the readership of tech journals to look more male than it was in reality. As a result, assumptions may have been made by media sites that perhaps women care less about tech, therefore also affecting narratives behind reporting on gender gap in tech companies with a "focus more on the pipeline", and less on structural or cultural issues that would have obstacled women in tech (Wachter-Boettcher, 2017:128-129).

1.2.2 The difficulty in collecting the data

Digital technological innovations such as predictive algorithms are changing the infrastructure of private and public sector services across jurisdictions. This study focuses on the predictive algorithms (or predictive systems/predictive justice) that are growingly applied in justice systems for crime risk predictions. The algorithms assist to determine locational or recidivism risks in justice systems. Although the models, their uses and processes of implementation change, a common theme that links these technologies is that they are data-driven tools that predict crime risks, and increasingly inform high-stakes decisions from policing, to sentencing and parole. They also assist in deciding the intensity of probation and post-release supervision. Therefore, these predictive technologies are growing rapidly across justice systems with the potential to revolutionise the systems (Ugwudike, 2022:86).

These predictive algorithms use historical crime data (or historical crime statistics) to predict future events, or risks. Typically, historical crime data is used to build a mathematical model that captures important trends, and that predictive model is then used on current data to foresee what will happen next. However, crime data is not objective and reflects the practices, policies, and biases of a given department. Therefore, crime data is often incomplete or skewed (Richardson et al., 2019:24). In the UK, crime data is collected by the Home Office. Criminal datasets offer individual offence data from 1898 and individual offence data by police force from 1990. Detailed crime data recorded from April 2002 onwards are published through open data tables, which are reviewed quarterly and offer more detailed

breakdown of crime figures by police force area, and offence code.[3] In Italy, the historical crime data is managed by the National Institute of Statistics (ISTAT). In fact, the statistical data collated and presented in the Appendix is the result of requests lodged with the Institute to gain access to such statistics. Further data on mafia profiles (further crime data, case-law data) would be held by the Ministry of Justice, which had proved to be more challenging to access. However, for the original purpose of the current research, the focus was to bring forward recent analyses, historical data, sentences, trials information to show the inaccuracy of the female stereotype with the consequent confirmation of mafia women's centrally played role within the organisation along with their complete imputability as recognition of their identity as persons (Siebert, 1996). The United States was the first country to take serious action against organised crime with the Racketeering Influenced and Corrupt Organisations Act (RICO) in 1970. RICO made it a criminal offence to contribute to the general aims and profits of the mafia. The American legal development was echoed over ten years later in Italy when the Italian law *Rognoni-La Torre* was enacted in 1982 through which women could, for the first time, be charged with the crime of mafia association. However, putting this specific law into practice has proved to be difficult. Women would tend to get arrested for mafia association, but then they would be released shortly after because the stereotypical perception of the woman not being capable of undertaking powerful decision-making roles was the one that made sense in the society (Panzarasa, 2018:34). Moreover, when mafia women would be caught in mafia-related activities, they would be justified under Article 384 of the Italian Code of Criminal Procedure that states that: 'No punishment will be incurred if you give false testimony in order to save yourself or a close relative from a criminal conviction' ("European e-Justice Portal," 2020). In fact, two women from *Cosa Nostra* were acquitted after a trial held in 1983 in Palermo, as the court held that:

> *The family setting does not necessarily assist in identifying mafia subjects. It is not possible to confidently say that the woman that belongs to a mafia family could have reached a level of emancipation or authority that she could let go of her passive role that she has always carried out for her man, to the point that it would be possible to imagine her contributing to the events that form part of the masculine clan.* (Siebert, 1994:184-185)

It was almost unthinkable linking femininity to criminal deviance, which is mirrored in the technological advancements targeting criminality affected by "dirty data". "Dirty data" is a term used in the data research community to refer to 'missing data, wrong data, and non-standard representations of the

[3] See the Official Statistics published by the Home Office https://www.gov.uk/government/statistics/historical-crime-data [accessed 12 July 2022]

same data' (Kim et al., 2003:81). For the purposes of this research, the term "dirty data" includes data that is derived from or influenced by corrupt, biased practices, as well as data that is distorted by historical individual, societal and system biases as a result of the gender gap, and the lenient treatment of female offenders (Geppert, 2022).

An example of what is impeding the effective operation of predictive systems is the lack of transparency by creators of models about how their systems operate, what specific data is used in each jurisdiction that uses the technology, or what accountability measures the creator adopts in each jurisdiction to address possible inaccuracy, bias, or evidence of misconduct. Despite these obstacles, one certainty is that historical crime data is the main data source which informs these systems, and while the specific data categories will depend on the system, the data can include information on past crimes (type of crime, time, and location), arrests and calls for service. Some model creators exclude data that more obviously reflect biased and discretionary practices, but there is much less transparency about how they deal with categories of data where the embedded bias is less apparent, e.g. the questioning of female offenders' role, or investigations of female partners of a male offender. Unfortunately, there are limited examples in the legal field where the gender bias has been scrutinised in predictive systems, which is symptomatic of a lack of technical care and social awareness that crime data, from the moment of investigation, collection, management, must be diverse, and not over-represent nor under-represent particular groups. However, racial bias is the more recurrent theme of mistake such models fall foul of (as explored later in the thesis with examples like the COMPAS tool), but there is reasonable concern that predictive algorithms encourage the justice system to target the (unchallengingly) stereotypical offenders.

1.2.3 Biased Data Collection and Technology Development

The gap in data which is available for mafia women is not an issue that is specific and limited to Italy. As Caroline Criado Perez states in her book, the majority of recorded history on humanity suffers from one big data gap as little space has been left for women's role in humanity's evolution (Perez, 2019:XI). Instead, men's lives have been taken to represent those of humans overall, as for within the organised crime and when the focus is shifted to the other half of humanity, there is often silence. As Perez states, these silences are everywhere and the stories we tell about our history, present, and future are all marked by a female-shaped 'absent presence', which represents the gender data gap (Perez, 2019:XI). This thesis focuses specifically on the gender data gap in a historical phenomenon that has tormented and continues to torment the Italian humanity.

The woman's silence is not at all a new concept, but it is famously echoed in Simone de Beauvoir's *The Second Sex*: 'She is defined and differentiated with reference to man and not with reference to her; she is the incidental, the inessential as opposed to the essential. He is the Subject, he is the Absolute – she is the Other' (de Beauvoir, 1997:16). The interesting point is that the renowned quote is as valid today as when it was first made in 1949, if not more reinforced and perhaps what is different is its applicability in more novel and modern circumstances where the woman continues to be 'the Other', the atypical. In fact, if the focus is shifted to the Fourth Industrial Revolution[4] of which the founding pillar is Big Data[5] and its use to produce big realities through the use of algorithm models, the issue arises as to how corrupted this Big Data might be by the big silences. These gaps in data place at risk the efficiency of these models, by inputting (according to scientific vocabulary) garbage or dirty data, which as a result produce garbage as output ("Rubbish in, Rubbish out", Perez, 2019:XII), possibly taking the silencing of women even further.

Consequently, at the speed that AI technology is evolving in many fields (Barr and Feigenbaum, 2014), prompt action is required to minimise the gender data gap, whether that is in the use of AI in the medical sphere with diagnoses (Topol, 2019), recruitment processes with automatic scans of CVs or interviews, or the legal one in predicting sentencing outcomes or producing risk assessments. In fact, the need for auditing these technologies is being continuously emphasised in the field; frameworks are in progress to assist in the development of applications, creating a repository of best practices and self-assessment guides for judiciaries that are already implementing and developing AI systems (Solis and Evans, 2021).[6] These actions are also mirrored in the UK with the work done by the Information Commissioner's Office (ICO).[7] The General Data Protection Regulation introduced provisions to protect

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[4] The **Fourth Industrial Revolution** is the current and developing wave of disruptive technologies including Artificial Intelligence (AI), the Internet of Things (IoT), robotics, and virtual reality (VR), which are fundamentally changing and affecting societies' lifestyles. See: Klaus Schwab, *The Fourth Industrial Revolution* (Currency, 2017); The phrase **Fourth Industrial Revolution** was first introduced in 2015 by Klaus Schwab, the executive chairman of the World Economic Forum. In 2016, the Forum announced the opening of its Centre for the Fourth Industrial Revolution in San Francisco.

[5] **Big Data** is a commonly used term in the computing field to refer to large datasets that are analysed through computers to study trends, patterns, associations, specifically with reference to human behaviour and interactions.

[6] See: The Global Judicial Integrity Network at the UN Office on Drug and Crime (UNODC) as part of the Doha Declaration Global Programme. As an emerging field, the use of AI in judiciaries remains largely unregulated by specific guidelines and the Network hopes to draw on the expertise and good practices of its participants in the coming months to fill this gap. https://www.unodc.org/ji/en/knowledge-products/artificial-intelligence.html [accessed on 3 April 2021].

[7] The ICO is the UK's independent authority seeking to uphold information rights in the public interest, promoting openness by public bodies and data privacy for individuals.

the fundamental rights and freedoms of data subjects, including the right to non-discrimination. Consequently, suggestions made by the ICO include the need for those using AI systems to document the approach taken to biases from the beginning of any AI application lifecycle, so that relevant safeguards and technical measures can be taken into consideration and integrated during the design and build stage. Additionally, clear policies on the procurement of high-quality training and test data that is representative of the population the AI system will be applied to are equally important (Binns and Gallo, 2019).

However, as AI models adopted by different fields are not necessarily developed in-house (but outsourced), the lack of frameworks that ensure that the data procured is enough, balanced and clean challenges the reliability of the applications. Also, if the models have been trained on data that are alarmingly biased, at most times these are protected by propriety rights, creating therefore an additional level of obstacles that renders it difficult to check if the silences have been addressed in that particular model. In fact, in researching the co-funded project by the European Union, *Proton*, which aims at improving the available knowledge on the recruitment processes to organised crime and terrorist groups with the use of social and computational sciences, it is difficult to examine externally what "improving" means in the context of "available knowledge" on organised crime. It would be a question of looking at what this knowledge they hold is, and at what aspects they would be looking at improving, and questioning whether the woman's perspective was one of those they looked at in order to be inserted into the improvement of "available knowledge".[8]

The Italian mafia woman encapsulates a contrasting image of the woman; one that is feminine and motherly on one side, and masculine and deviant on the other; one that has intrigued and instigated the research into exposing the rigidity of the masculine and feminine dichotomy instilled in her, which affects the collection of data that would feed into a possible modernisation of the courts in the future. Current AI systems allow to impede violent crime via public data collection or to predict the likelihood of an offender to re-offend with risk assessments and so much more (Larson et al., 2016). However, in the case of the mafia, because the public data available is heavily male (Rakopoulos, 2020), the trained AI model may be biased and unable to detect the criminal mafia women as on the accessible public data, at a glance, women equal victims.

[8] See: https://www.projectproton.eu/ [accessed 29 September 2019].

The mafia woman is used as a pattern to diagnose how the binary construction of femininity and masculinity is dominant in the organised crime society. While we are moving towards an era of AI in law, it is further questioned how current AI systems might produce biased data and how it would be possible to reach an AI model that produces output data that is more accurate, less biased, and more efficient (see Appendix). The key is to ensure that the dataset of mafia women is fed into the AI system for its consideration and that this data is not lost in its output results. For instance, if the collated data presents a percentage of women that are likely to be associated with the mafia, then that data must not be rendered invisible and must be fed into the AI tool (Bidyuk et al., 2022).

As the founders of Women in Big Data state: "there cannot be equity in society without equity in data collection, curation, and decisions" (Women in Big Data Founders, 2022). In a world where it is likely that we will be overtaken by the works of data and where we are missing female population's information, then it would be no surprise that when the algorithm works on the basis of that data, it will simply just create unjust results. Caroline Criado-Perez confirms that there is a real gender data gap, which is "both a cause and a consequence of the type of unthinking that conceives of humanity as almost exclusively male" (Perez, 2019:XV). The solution is to increase female representation on every sphere of life through. This thesis should function as a model to explain unchallenged data gaps so to drill down other spheres and explore other types of data gaps, while following a step-by-step process to challenge potential biases, discuss processes of better inclusion of more representative data that better feeds AI tools.

Similar research together with organisations such as Data2x supported by the United Nations, will enable female lives and perspectives to step out of the shadow, be it looking at the gap in a wider sphere that touches women more generally, or specifically in organised crimes around the world.[9] However, the purpose of the thesis is to look at Italian mafia because it is the creator of Western mafia, and this thesis should pave the way for future investigations of the role of women in other organisations and the need for gender data gap filling.

1.2.4 AI and the Justice System

What provoked the pursuit of the research was the idea of testing the feasibility of a female algorithm (as designed in the Scheme in the Appendix) to counterbalance tools that have been created with

[9] Data2x's mission is to improve the availability, quality, and use of gender data in order to make a practical difference in the lives of women and girls worldwide. See: https://data2x.org/ [accessed on 5 April 2021].

historical data that has marginalised groups of people (e.g. women or female offenders). The most common and discussed tool that has revolutionised the way the justice system works is criminal risk assessment algorithms. The predictive tools foresee the likelihood of a defendant's recidivism or of the risk of them fleeing, which justifies their arrest or whether to be remanded in custody (Babuta and Oswald, 2020). The prediction results from different variables (or data) that are fed into the model. These may include, age, sex, social status, employment status, family background, etc. The result given would be a percentage that would indicate how likely it would be they would re-offend, or not present themselves in court for trial. These algorithmic outputs inform decisions about bail, sentencing, and parole (Tashea, 2017). Biased data can affect the results of the decisions so emphasis should be placed on streamlining processes of data collection and storage. For instance, if a court is developing AI models that carry out analyses based on data solely relating to the male mafia population in prisons, there will logically not be any specific considerations about the female mafia prisoners' data. Predictive justice is another example where the AI model assists the judge with a suggested result for a given case based on historical case data. For instance, a tool giving a percentage of probability of culpability of an alleged women mafia offender based on an algorithm trained on historical data that is rich of male offenders would be highly unlikely to hold the woman culpable. Consequently, if the case data is biased then the outcome is also going to be biased. See in cases of violence against women, if the women are not seen as credible witnesses due to biases, these would affect the results of the AI system (Solis and Evans, 2021).

Therefore, because AI applications are built based upon datasets and finding patters to provide analyses and solutions, the data that is fed determines the efficiency of the AI application. As Roberta Solis from the UN Office on Drugs and Crime states:

> *Gender-based discrimination, whether it is conscious or not, is a reality in every judiciary. The datasets that judiciaries use to develop the applications also reflect these historical biases. So, unless judiciaries are aware and recognize these biases, any application they develop would simply perpetuate or even deepen discrimination. This is not just true for gender but also for other forms of discrimination such as those based on race or poverty. If this is not addressed, then there could be grave consequences to using AI applications in the judiciary and any other sector* (Solis and Evans, 2021).

1.2.5 The Need for a Multidisciplinary Approach

Similar to the judiciary, the healthcare system has been an adopter of AI tools. AI methods have been assisting clinicians and surgeons with decision making procedures, to reduce errors in judgment and improve the choice of treatment and patient outcome. Instead of looking at AI as a replacement for the

doctor, it could be viewed as to creating an augmented physician, with expertise of specialists enhanced by AI (Di Ieva, 2019). Similarly, AI has increasingly been accepted in established systems such as the medical, or legal field. It is now more seen as a human AND machine combination, rather than human AGAINST the machine duo. However, when the "human" is brought into the sphere, care needs to be placed that a better job is done in not including just solo expertise that informs the machines. Recent literature has expanded the need to have multidisciplinary approaches at the core of informing, and scrutinising the work of the machine against a single expert doing all of the work. A diverse team has the potential to offer a more hierarchical, high-level, and complex system, compared to either one single expert (Di Ieva, 2019), or a group made of similar professionals.

AI algorithms are programmed to solve tasks, and computer scientists are clearly most skilled at writing such algorithms. Byrum states systems that are designed by narrowly focused technical experts (e.g. computer scientists, engineers, or mathematicians) can produce disappointing outcomes, as each professional would interpret the problem posed to him/her to resolve through the lens of his/her respective field of expertise. For example, mathematicians' go-to method to solve a problem would be via statistics. Although it may be natural to delegate the development of an AI to a scientist, efficient systems are usually built by rounded teams. An interdisciplinary approach can maximise a project's chance of success (Byrum, 2020). An example of a diverse approach is that of "Principal", which worked towards creating an AI-based decision support tool for financial analytics. The team found that the key for success in developing the system was having enough English graduates within the experts (Weldon, 2018).

When focussing on tackling gender biases fed into the systems, recent work (which is still young and developing) (Alex, 2018), has come to light on prevention of gender biases in the judiciary. In fact, the Global Judicial integrity Network at the UN Office on Drug and Crime won an award for its project focussing on preventing gender bias and discrimination in AI systems implemented in the courts. Predictive justice applications often perpetuate pre-existing biases based on historical data. The project aims to the development and upkeep of a practical framework of recommendations for the judiciaries in the world on how to best develop AI systems that do not replicate or worsen gender-based discrimination (Solis and Evans, 2021). These frameworks are needed because machines can discriminate in harmful ways (Buolamwini, 2019).

As it is increasingly questioned how apparently neutral technology has gone wrong, it is clearer how important it is to have diverse and inclusive representation in the design, development, deployment,

and governance of AI (Leavy, 2018). For instance, the underrepresentation of women and people of colour in technology, and the under-sampling of such groups in the data that informs AI, has led to the creation of technology that is optimised only for a contained portion of the world. To put this into practice, less than 2% of employees in technical roles at Facebook and Google are black; at eight large tech companies evaluated by Bloomberg, only around a fifth of the technical team at each are women. Buolamwini draws on the example of a government dataset of faces collected for testing that contained 75% men and 80% lighter-skinned individuals and less than 5% women of colour, which echoes the pale male data problem that excludes so much of society in the data that fuels AI (Buolamwini, 2019).

Consequently, the imminent future requires ethical and inclusive AI systems that respect and represent most humans. This is also in line with Principle 3 of the European Ethical Charter on the Use of Artificial Intelligence, explored in Chapter 2. If marginalised groups are engaged in the development and governance of AI there is hope that systems can be created that are less excluding. Consequently, a team composed of lawmakers, technologists, researchers, as well as storytellers who share marginalised aspects of the problem sought to be resolved, is the type of approach to aim for. This may be the way to challenge harmful assumptions, stereotyping and ignite change.

1.3 Outline of thesis

At this point I briefly outline how this thesis develops from here. Chapter 2 introduces the conceptual approach I take in this thesis. I outline how AI has increasingly become relevant in the criminal profiling and law enforcement fields, highlighting causes for debate. The literature reviews recently completed and ongoing research in predictive justice, exploring its benefits and pitfalls. I identify gaps in knowledge in relation to mitigating biases in algorithms that are supposed to promote equal treatment and not allow for female data to be rendered invisible. Chapter 2 seeks to highlight the issue of gender data gaps, and its consequences on the niche topic of mafia women, which has applicability in parallel fields, such as AI in medicine, AI in recruitment, and much more.

In Chapter 3, I present Mixed Method Research (MMR) as the methodology employed in this thesis and is reviewed in the context of the scope of this study. Briefly, MMR is a combination of qualitative and quantitative tools: Phase 1 contains a qualitative case-study review, and Phase 2 contains a quantitative step consisting of interviews. MMR in the present thesis shows that when multidisciplinary studies are involved, then mixing methodologies may be the much-needed fix.

Research findings and discussions are presented in Chapter 4. In Chapter 4 I draw the summary of findings from Phase 1 involving qualitative results including Tables 1 and 2 with the mafia women profiles and Tables 3 to 6 with the collection of data from the Italian National Statistics Office. Chapter 4 also sees the results and discussion of Phase 2. Table 2 bridges Phase 1 to Phase 2 according to the MMR. In Phase 2 I seek to quantify the unconscious bias in tech experts and thought leaders in the field of data, law and AI in the context of the Italian organised crime groups through the interviews. Phase 2 further draws the experts' attention to focus on gendered images and roles in organised crime through a pseudo-implicit bias test. Chapter 5 proceeds to explore results from the knowledge exchange step within the interview. Having made the experts aware of the issues related to stereotypical images inciting biases in our representation of the criminal mafia woman, and showing them implications of the data gap, anticipatory technical avenues are explored and confirmed in understanding which models of predictive justice could be of assistance.

In Chapter 5 I gather reflections from the experts' shared knowledge as to the relevancy of the gender data gap issue, exploring suggestions as to how to minimise consequences due to the feeding of biased data into potential AI led systems in the law enforcement and justice system. This supportive Chapter highlights the significance and need for multidisciplinary contributions which allow for issues to be raised from different standpoints, so to ensure that tools are scrupulously created, trained, audited, and a set process is implemented before they are deployed in public bodies.

I conclude in Chapter 6 by outlining the substantive and original contributions of this research. A discussion of potential applications and uses of this work is carried out. Substantively, this thesis provides a rare multidisciplinary insight into how a patriarchal system affects the collection of gender data, which in turn affects the problem of integration of technologies in the public sphere.

CHAPTER 2 LITERATURE REVIEW

The drive to reproduce socially accepted norms is deeply founded in neo-Latin populations, where the emancipation of women has been much slower than in other places (Laslett and Brenner, 1989; Cislaghi and Heise, 2019). This is particularly relevant to the Southern Italians who still have a tendency to strengthen the stereotypical images of the woman, despite being confronted with the modern, supposedly equal, world (ISTAT, 2018).[10] The problem lies in the forces of law and order accepting these widely spread notions, and coming to a conclusion that the weaker sex is unlikely to be responsible for crimes or not as responsible as men, consequently creating data gaps. It is not only limited to the mafia that women are simply forgotten to be included; history and modern phenomenon teach us that the need for narrowing the data gap goes beyond women's rights (Perez, 2019:XI). Filling the gap with data would have an impact on many spheres for women, whether political, social or everyday life (Perez, 2019:24).

As Perez points out, collecting the data in technology where women are not equally represented, there is the chance of excluding 50% of the population (Perez, 2019:25). This could cause to miss out on possibly transformative insights. Routinely missing to accommodate the woman in processes that produce results, whether that is in the technological, medical, employment or any other field, has made the world a less hospitable one for her. It has resulted in a world where women are not made to fit, but remain invisible (Perez, 2019:23-25). At a higher level, feminists believe that the failure to collect information on women and women's lives results in continuing to normalise sex and gender discrimination, while not acknowledging that these are acts of bias (Perez, 2019:XIV,66). According to their proposals, there needs to be a stop of passively accepting the woman being loudly present in

[10] The most common stereotypes about gender roles are: 'for the man, more than for the woman, it is very important to be successful at work' (32.5%), 'men are less suited to do housework' (31.5%), 'it is up to the man to provide for the family's financial needs' (27.9%). The statement with the lowest level of agreement is 'it is up to the man to take the most important decisions about the family' (8.8%). Without particular differences between men and women, 58.8% of the population (aged 18-74 years) have these stereotypes, which are more widespread as age increases (65.7% of those aged 60 to 74 and 45.3% of people aged 18 to 29) and among the less educated. The stereotypes are more frequent in Southern Italy (67.8%), especially in Campania (71.6%) and in Sicily, and less often in the North-East (52.6%), with the fewest in Friuli Venezia Giulia (49.2%). For further detail, please see report: (ISTAT, 2018).

contexts where she is abiding by socially conventional norms, and absent when she is placed in an unconventional role, such as in command of a clan.

Accordingly, the Italian mafia woman suffers from a cloak of invisibility forcefully posed on her by the patriarchal society she lives in, which is further strengthened by an equally antiquated justice system (UN Office on Drugs and Crime, 2021). Because Italian mafia is the creator of Western mafia, Chapter 2 reviews the role of women in the organisation and locates where the major data gaps and bias could reside.

2.1 Women in Criminal Organisations

The position of women within organised crime groups may differ from country to country. If other research on data gaps could be suggested to be conducted on a parallel within the organised crime sphere, ideas would include the Russian mafia (Gilinsky, 2007), Armenian mafia (Fox, 2014), Japan's Yakuza ("The secret lives of Yakuza women," 2020), Mexican cartels (Gutierrez Gonzalez, 2020), or Colombian narcotraffickers. It should be questioned if, where, how, the image of the woman has been rendered invisible within those groups, which as a result will have inadvertently created a data gap. As Varese points out, women are allowed to play a bigger role in the modern crime setting as they are seen as trustworthy (Varese, 2012:249), which is a value that is fundamental for these secret worlds.

Gilinsky offers an image of the Russian mafia woman seen through different perspectives – that of a mother, mistress, lover, or as "other female companions" (Gilinsky, 2007:). However, a recurrent theme is one similar to the Italian mafia woman, i.e. the female role not being as equal as that of males. However, there is evidence that Russian women have been in charge of clans. For instance, in the 1920s, Sonka the Golden Hand was a notorious woman that is remembered as the queen of Russian crime. She was arrested multiple times, as she was skilled at escaping prison (Gilinsky, 2007:231). When moving further East, women in organised crime in Japan are also relevant. Otomo states that as of 1999, the underworld was surveyed and out of the 83,100 members only a few dozen were female. She explains that the lack of statistical data means that law enforcement is unable to depict the exact number of women accused of gang association (Otomo, 2007:206). Otomo explains that there is, however, evidence of women who performed top-level roles in organised crime groups. Yoshiko Matsuda is an example of a woman that controlled two thousand gang members by herself. She led street fights in neighbourhoods of Tokyo with rival Taiwanese gangs to control the black market.

Argentina has the legendary “Mafia Flower”, Agata Galiffi. At only 21 years of age she was considered dangerous and seen to have a successful criminal career ahead of her. She participated in a homicide, and coordinated the counterfeiting of national and foreign currency. The “lady boss of all bosses” had international connections, she worked in a predominantly male world and was described as someone that liked seeing herself being respected by criminals, and enjoyed men kneeling at her feet showing them she had the most courage. Similarly to Italian mafia women figures, when Agata sat in front of a journalist for the only interview she ever gave, she depicted herself as a woman in love that was forced to commit crimes; she was a mere victim because of her weakness and naivety (Rossi, 2007:153-154).

Another famous example is Enedina Arellano Félix de Toledo. She is a drug lord leading the criminal organisation known as Tijuana Cartel which internationally traffics cocaine, marijuana, heroin and crystal meth from Mexico. She is depicted (also in the Netflix series Narcos Mexico) as a business minded woman, possibly due to her trained accountant background (Grillo, 2015). Sandra Ávila Beltrán is known as “The Queen of the Pacific” as a reminder of her operation of organising a fleet of boats loaded with ten tons of cocaine from Mexico to the United States (Franklin, 2016). Colombia has the “queen of cocaine” or the “black widow”, Griselda Blanco. She was one of the first to smuggle cocaine from Colombia to the USA and establishing in Miami a base for the cocaine trade in the 1970s. She is believed to have killed as many as 200 people (O’Connor, 2019). To underline the particular influence of Latin American female bosses, Javier Valdez, a Mexican journalist who interviewed female traffickers for his book *Miss Narco,* states that women that rise high in a trade where men ‘behave like animals’ requires women to be ‘intelligent, talented and brave’ (Grillo, 2015).

Overall, even though cultural differences logically affect the degree of biases affecting female bosses and transparency within the judicial sphere, all these figures share the same obscurity of Italian mafia women: the struggle to come through a heavily dominated male society that affects the process of data collection and analysis (which would eventually be fed into AI models). Even though the concept of this thesis can be applied to the abovementioned criminal women examples, the research focuses only on the Italian mafia as a benchmark for similar studies for other data gaps. Future projects can draw parallels to other cases from this study in the mafia, which the thesis does not pursue further. The next section offers a spectrum of the women within the Italian mafia organisation groups.

2.2 Women in the Italian Mafia

Kahn and Véron (2017) introduce one of the most recent books on the rare topic of mafia women by stating that the role of women within the organised crime has long been overlooked completely:

> *Silent and self-effacing, often reduced to the status of victims, they were believed to be subservient to men, marginalised in a world of domestic chores (Rossi, 2007).*

However, this section unfolds the female human dimension of the three main mafia organisations in Italy: *Cosa Nostra* (Sicily)*, 'Ndrangheta* (Calabria)*, Camorra* (Campania).

2.2.1 *Cosa Nostra*'s women

John Dickie writes a detailed insight into the *Cosa Nostra* and informs us that the criminal association has changed very little since its beginnings just over 140 years ago. He holds that there was never a good wave of mafia which became corrupt and violent, modern and business-minded. He states that the world has changed but the Sicilian mafia has simply adapted; it remains a sworn secret society that pursues power and money by cultivating the art of violence and not being punished for it (Dickie, 2015:26). However, more recent literature brings forward a different side to the *Cosa Nostra*'s story opening society's eyes to a different role to the woman, one that contrasts her much accepted traditional, domestic, passive role (Siebert, 1996; Longrigg, 1998; Fiandaca, 2007; Siebert, 2007; Kahn and Véron, 2017).

In order to understand why her passive role has been persistent through the mafia history, it would be useful to briefly refer to research fields that focus on gender deviance and some judicial practices towards female criminals (Harry, 1983). Siebert refers, for instance, to those hypotheses to justify the rate of female criminality more generally, which is historically lower than male's. The rate difference could be explained from two different perspectives: one that is emancipation-based, and another gender-based (Siebert, 2007:23). From an emancipation perspective, the lower female criminal rate is explained in relation to the subdued status of women in a patriarchal context. Although there is still to date a big difference in the data collated that represents male and female criminality, from the 1970s onwards the percentage of detained women has progressively increased. Siebert argues that this increase is related to women's battles towards equality more generally that have contributed towards the female criminality being explained using the same features normally used for the men (Siebert, 2007:23).

Mariangela Di Trapani is known as *La Padrona* (the female boss) and was arrested in 2017 with charges of having managed one of the most powerful clans (or *cosche* in Italian, i.e. families) of *Cosa Nostra* in

Sicily. She was 49-year-old and the link between those bosses in prison and those outside with the responsibility of re-strengthening the organisation after it had weakened due to the death of the boss *par excellence*, Totò Riina (Kington, 2017; Massaro, 2017; Tondo, 2017). Hers was the task of bringing back the heydays of *Cosa Nostra* and she was trusted to do it as she was considered to resemble a man in her behaviour. Salvino Madonia is her husband who murdered a businessman that had failed to meet an extortion demand from the mafia in 1991 and is currently serving a life sentence in prison.

Cosa Nostra (which in Italian means "our thing") is founded on a strictly hierarchical structure with its 'men of honour' (i.e. members), which has allowed the organisation to strongly impose itself throughout the island and beyond. A man of honour officially becomes one when it goes through the initiation ritual. The ceremony sees the new member reciting a specific oath, and an image of a saint is smeared of blood from the finger usually used to pull a trigger, which is then burnt and passed from hand to hand of the rest of the men of honour. The oath recited would say: 'May I burn like this saint if I ever betray the mafia' (Kahn and Véron, 2017:3). Gaspare Mutolo, became a repentant in 1992 and collaborates with the state against the mafia. He informs us of this life inside the *Cosa Nostra* and how women would be absent within the formal structure and would not be taking part in these initiation processes to become "women of honour", but informally they occupy a fundamental role (Kahn and Véron, 2017:8-9).

For instance, following the first two state witnesses' (*pentiti*) revelations made to renowned Italian prosecuting magistrate Giovanni Falcone, a lot about *Cosa Nostra* was exposed. People had no idea before those confessions that men of honour called their mafia *Cosa Nostra.* Those testimonies led to a historical trial known as the Maxi Trial of 1986 through which nearly 500 *mafiosi* (mafia men) were held in cells in a courtroom especially put in place for the trial. The trial was also the start of the world getting an insight into the role of the women and their influence within the mafia. In fact, when Vincenzo Buffa decided to become a repentant, seven women entered the court with fur coats and sat in the front row. There was Buffa's wife, the 18-year-old daughter, and his five sisters that all started to shout (Bolzoni, 1987) forcing the president of the tribunal, Alfonso Giordano, to suspend the hearing. The attack from the women was to ensure that the secrets of *Cosa Nostra* were kept as such, and they succeeded in that as Buffa, shocked by the reaction of all the women in his family who had turned against him, took back his confessions (Kahn and Véron, 2017:13). One of the comments his daughter made, once the women were forced to leave the court, was that her father never became a *pentito* (a *mafioso* that turns against

the mafia and cooperates with the state) and that they wanted him to go back to prison (Bolzoni, 1987). That is when the power of mafia women should have caught everyone's attention.

Unfortunately, researchers and jurists studying the mafia wave were very unreceptive of the other facet of *Cosa Nostra*, that was made of hiding women. As Kahn and Véron argue, this was a form of "judicial machismo", or an unchallenged acceptance of the mafia woman's stereotype sold to the common people by the mafia itself, that of the subdued weaker sex, unaware of her husbands' business, and solely devoted to the upbringing of her children and being the perfect wife (Kahn and Véron, 2017:16). It is, nonetheless, undeniable the surging key role undertaken by women, following the Maxi Trial that revealed insights into how women moved from simply acting as messengers for the mafia, to being accomplices to fugitives of wanted criminals, to becoming real role models within the organisations. When the Trial was coming to its conclusion in 1992, more women by then had begun to manage financial aspects of the mafia, collecting the protection racket payment recurrently demanded of businesses, allotting funds derived through extortion, fraudulently winning public-sector contracts and organising murders. Within 10 years, women charged with mafia association increased from 0 in 1989 to 77 in 1998, with the highest of 89 in 1995 (Padovani, 2009; Kahn and Véron, 2017:18).

Ninetta Bagarella is one of the women that was criminally ingenious enough to escape the hands of justice. She was the wife of the boss of the bosses, Totò Riina, who was responsible for the killings of hundreds of people (including but not limited to men of honour) (D'Emilio, 2017), and atrocities against the criminal justice system that were unprecedented in the Western world. He was behind the killings of Judge Falcone on the motorway pulverised by a half-ton of explosives, and 58 days later, the car bomb attack on magistrate Paolo Borsellino (Lardera, 2012). This was a war declared against the state by the mafia for being convicted for the first time, while all prior trials had ended in acquittals. Ninetta stood by the man that was the author of these and many more homicides. She never betrayed him, and accompanied him with their four children even when he was a fugitive until, on 15 January 1993, he was arrested and sentenced under Article 41-bis of the Italian penal code to a hard prison regime allowing very limited contact with the outside world for the rest of his life until his death in 2017 (BBC, 2017).

Even then, Ninetta's main aim was to keep her head high and return to their hometown of Corleone, and just her act was a statement that despite *Cosa Nostra* losing its boss, the legacy of the Riina family was as strong as ever. Journalist Attilio Bolzoni describes her as a mother that did not protect her children by always remaining faithful to the mafia. Letizia Battaglia, who is a photographer of the Sicilian

mafia confirms that Ninetta embraces the mafia's culture so deeply that she believes to be in the right (Kahn and Véron, 2017:22-23). In 1971 Ninetta stood before the Tribunal in Palermo, charged with being an accomplice and link between her husband and other members of the Corleone clan on the run. Her passport had been confiscated and she had lost her job as a teacher. While the prosecution was seeking a sentence of 4 years on house arrest in the North of Italy, she was able to portray herself to the eyes of the judge simply as a woman in love and avoided her guilty verdict (Kahn and Véron, 2017:21; Gauri, 2019).

Saveria Benedetta Palazzolo is the wife of the Bernardo Provenzano, the heir of Totò Riina's throne. As Ninetta, she was also acquitted of unlawful mafia associations as the magistrates' reasoning was that there was not proof that she was a full member of the mafia. However, what would a plausible explanation be that would justify how she had inherited over the years an asset that was worth several hundreds of millions in lira (Principato, 2005:12) if not through illegal activities. Through a similar reasoning, the outcome of Judgment Number 188/85 at the Palermo Tribunal, the women standing were Angela and Vincenza Marchesa, sisters of two killers from *Cosa Nostra*. When the police entered the family home searching for their brother who was a fugitive, the sisters hid a firearm under their clothes and although they were accused of possessing an illegal gun, the tribunal acquitted them on the grounds that it was not possible to prove beyond reasonable doubt that the women would hold high-calibre weapons, as the common criminal behaviour known to the justice system until then was that carried out by a man, while the role of the woman within the mafia was completely different (Principato, 2005:12).

The theory of the woman as the weaker sex deriving historically from Roman law, gave them a veil of protection, which was never needed to be put on a civil nor penal code. Prosecutor at the Tribunal of Palermo, Teresa Principato, stated that there is no doubt that the concept of *fragilitas sexus* (weaker sex), absence-presence through which these women have conducted themselves within *Cosa Nostra* has guaranteed a substantial impunity for the mafia. These women have been capable of using cultural prejudice, continuously replicated at judicial level too, to their advantage, creating for themselves a pathway to increasingly carry more power within the criminal business (Principato, 2005:11,13).

2.2.2 *'Ndrangheta*'s women

Similar to *Cosa Nostra*'s *cosca,* Calabria region's *'Ndrangheta* has the *'ndrina*, the organisation's main basic unit. As the Sicilian mafia, women are not officially allowed in, but in the 1970s women were

already handling responsibilities by taking care of the kidnapped people by the *'Ndrangheta.* Although back then, women's criminal role did not appear in court, today it is more often than not that when the police arrest a *'ndrina*, women would be arrested too. In fact, during "Operation Artemisia" in 2009, 34 *mafiosi* were arrested, including 6 women whose role was apparent to be a substantial one, led by Concetta Romeo and Donatella Garzo (Kahn and Véron, 2017:89). Concetta was responsible in the organisation of revenge operations against an opposing *'ndrina*, and Donatella was affiliated to the mafia by marriage. Although she was a respected woman and enjoyed some level of power, she was not allowed to contribute to the organisation's meetings.

An exception, however, is that of the *sorella d'omertà*, such as Maria Morello. *Omertà* is the code of silence of the mafia, and Maria was a "sister of *omertà*" between 1970s and 1980s in the North of Italy. These sisters become associated with the mafia, without the initiation rites men must go through and although she was not linked to the mafia by blood, she was recruited for her exemplar criminal history. The *'Ndrangheta* has different levels of ranking for members, and Maria had been able to reach that of *santista*, which is the highest a woman can get to (Gratteri and Nicaso, 2006:31; Serenata, 2014:71-72).

Although Kahn and Véron suggest that Maria Morello is the only certain example of *sorella d'omertà* which makes this whole concept questionable for the lack of data, it is right to question the existence of this image. However, perhaps the questioning should be along the lines of whether so many sisters may have been overlooked and missed through the years. Personal research has revealed names such as Mariagrazia Leone, Cinzia di Mauro, Giuseppina Bellotti, Cristina Orlando, who all worked around Giuseppe Pensabene, a mafia man that had relocated in the Northern county of Lombardy. Mariagrazia was the most trusted and responsible for money-laundering (Crippa, 2014).

Additionally, how does Aurora Spanò's image fit that of *sorella d'omertà*? She really is a symbolic representation of what the woman is capable of doing within the *'Ndrangheta.* Her strength was usury activity, through which with time she had taken control of many properties, commercial buildings and land in San Ferdinando. She charged interests of up to 30% on the total amount loaned to people, and if not paid on time, Aurora relied on her male children to intimidate, threaten, assault or kill the debtors. With state witnesses' collaborations, her role became even more clear; in fact, Maria Concetta Cacciola described her as being an absolutely dominating individual, talented at giving orders (Lauricella, 2019:134-140).

Aurora is a strong woman, thriving for a successful criminal career, chasing wealth and power. She has the whole of her town at her feet. She decides who rents what and the price, even when the properties may not be of her ownership; she leaves bills at restaurants worth over thousands of euros, and she is a professional at handling firearms. Her attitude has not changed while spending her jail sentence from where she proudly says she is the boss to her children when they visit her – 'when I entered the prison, everyone got scared!' she said. Her cell mates were ordered to clear her unit, to make her bed, to serve her lunch, and do back massages on her (Lauricella, 2019:135-137).

Aurora was a professional nurse who did not belong to a criminal family by blood, and it is surprising how well she was cut out to be a mafia woman. Her violent side flourished when she met Giulio Bellocco from the *'Ndrangheta* who fell in love with her. She was married to a man that had no previous criminal record and children and it is unclear how she had ended things with her former spouse. Giulio's family never accepted her, her children and their union. They were never allowed in Giulio's former town, Rosarno. Through her trial, she portrayed herself as a nurse, perfect mother that took away Giulio and her children from Rosarno's underworld to provide them a life with better values, away from the mafia. In reality, she was the leader of the San Ferdinando clan, taking decisions, and dictating plans and identifying criminal activities to be carried out, objectives to achieve and victims to bring down (Lauricella, 2019:139-140).

Unlike *Cosa Nostra* and *'Ndrangheta* where women remain invisible, the Campanian *Camorra* cannot be discussed 'without talking about its women', says a magistrate at the anti-mafia public prosecutor's office in Naples. He continues: 'They've always played a major role, right from the start'. Kahn and Véron state that these women have taken part in and/or manage illegal street businesses, including selling cigarettes, drugs, they control the clan's territory, but that it is rare for them to commit homicides personally, although they do order them (Kahn and Véron, 2017:139). However, could this be argued to be another gender data gap, as women such as Anna De Luca Bossa, Maria Licciardi, Assunta Maresca have actually committed, on occasions, even more than one murder? If most others may not be direct blood spillers, there is a substantial number of renowned women, even in the eyes of the justice system, that are not passive custodians of traditions and the code of silence, but actual main mafia personalities in their own right.

2.2.3 *Camorra*'s women

Camorra is the oldest of Italian mafias born at the beginning of the 19th century and by the end of it, women already played an active role within it, as aggressive usurers (Serao, 1901). In fact, 578 women were sentenced for violent crimes and intimidating behaviour, with the estimate of the criminologist Cesare Lombardo that around 3% of the women during that period were part of the *Camorra*. The membership was easier to be attained rather than in the Sicilian and Calabrian mafias due to the anarchy within the *Camorra*, which had a horizontal structure, with no "boss of the bosses" at the top, but different families running their own areas as they wished. On 17 September 1890, Sofia Proto was only 23-year-old when she took over the business from her imprisoned husband, and while in charge of collecting protection money in her residence area, she confronted Pasquale Esposito (renowned *camorrista*, i.e. *Camorra* man/woman) who refused to pay and after a fight, she was stabbed. The police promptly acted to arrest Pasquale in order to ensure that a duel amongst family would not break out (Kahn and Véron, 2017:141-142).

In 1891, two sisters ran a prostitution racket and ordered Anna de Santis and other owners of the area's brothel to pay a daily amount to keep their businesses open. When Anna refused to pay, Maria and Anna Abbate ordered one of their criminal colleagues to punish the owner with a *sfregio* (Kahn and Véron, 2017:141), similar to what it is thought that British Peaky Blinders would do around that same period when hiding a razor blade in the peaks of their caps. A *sfregio* is a razor cut on the face that would highlight on the streets those unfaithful women and rule breakers by leaving a mark until they died. This was a practice of the *Camorra*, when a dispute would arise in order to lower violence and actual killings (Verbatim Editor, 2020).

Around the 1950s, the organisation became strong in cigarette smuggling, offering employment for 100,000 people in Naples, including mainly women (Lucarelli, 2011). The famous Italian filmmaker Vittorio De Sica portrays this lady drug smuggler's image through Sophia Loren who plays the part of a dealer that uses her pregnancies to escape from law and order enforcers (Kahn and Véron, 2017:143). The 1970s were for the *Camorra* years of great success brought by drug trade, and with the rise to power of Raffaele Cutolo, he temporarily undertook the role of the *Camorra* boss, which did not last long due to the very nature and structure of the organisation based on families that were rebellious and did not want him as a leader. Raffele's effort in leading the organisation was mostly carried out behind bars from the 1970s onwards as he had murdered a man who had allegedly insulted his sister, Rosetta

Cutolo. That is how, Rosetta, was sentenced for mafia association in the 1990s as she took the delegated power from her brother to lead the modern *Camorra* that had enrolled over 4,000 young men (Vulliamy, 2008).

Following Cutolo's failed attempt to establish the organisation as the other mafias with a vertical structure, the *Camorra* returned to operate as before and between 1996 and 2005, 37 women were arrested being charged with mafia association in the region. Of these 37, 33 were from Naples, and 4 from the outskirts. Although most criminals are concentrated in the city, Anna Mazza was one of the leading criminals from outside of Naples since the 1970s. She was in power for more than 20 years in the Moccia family, through property development. She was against the drug business, but she was the author of many murder orders (Kahn and Véron, 2017:148). Her bodyguards were also women, and she ran a real matriarchy (Agence France-Presse, 2016). It is renowned that she handed over to her 15-year-old son a gun to seek *vendetta*, or revenge by killing his father's murderer (Iaccarino, 2010:102-104; Verga, 2010:91). However, due to lack of evidence, she was acquitted of the murder (Kahn and Véron, 2017:148).

Kahn and Véron also tell a story of a woman they call Maria to protect her privacy. Maria had been a drug dealer since she was 13-year-old and lives with her entire family, around 60 people. In the *Camorra*, it is the whole family that gets the business moving, and the women are joyful, ready to face anything, protective of their people, addicted to bingo and losing €1,000 per night which is nothing for them. Maria confirms that women are not only present in the drug business, but also in illegal lotto scams and imports, and usury. Like Maria, Patrizia Chiavarone is also a drug dealer. She was arrested at home in 2015 with her husband and sick mother who hid cocaine in the incontinence pad she wore. It was clear from the circumstances that Patrizia's husband had no say in anything at all, and she was the leader (Kahn and Véron, 2017:149-150). Her older sister was known as a *masculona*, a woman that looks masculine whereas a man that looks like a woman is known as a *femminiello* (Kahn and Véron, 2017:150;152).

It is clear that the *Camorra* is the least discriminatory of all mafias with women that are strong-willed and break down the typical woman-as-a-housewife stereotype. Names of daughters, mothers and grandmothers are known to the police. In fact, when in 2011 the Mazzarella family was brought into the police station, out of the 14 arrested, 5 were women involved in the selling of cocaine and covering others in the business from the police. The grandmother was 65-year-old who, thinking ahead, had

hidden the cocaine behind the toilet so to be able to quickly flush it down in case of an unexpected visit. The *Camorra* is also the least patriarchal system because it makes space for transsexual and gay members – Anna Terracciano, Angela Barra and Ugo Gabriele are all examples (Kahn and Véron, 2017:150-152; Squires, 2009).

Anna carried herself like a man and assaulted a person for which she was arrested. Angela was attracted to a hairdresser that refused her. Offended, she kidnapped her and made her brother rape her. The hairdresser managed to escape the apartment where she was locked up and told her story to her boyfriend who was killed by Angela's orders. Ugo, or Ketty, which was his transgender name, ran a drug dealing and prostitution business until he/she was arrested in 2009. Magistrate Giuseppe Narducci says that: 'Whereas in the *'Ndrangheta* we hardly know the names of the bosses' wives, in the Camorra in Naples we know them all' (Kahn and Véron, 2017:150-152).

Therefore, although it is still true that the mafia is mostly composed by men, the role of women (either overt or complicit) should no longer be undermined. The mafia women discussed above reveal the false dichotomy between men and women within its structure. Studies have addressed the role of women in different mafia groups and the women of *Cosa Nostra* (Dino 2010), *'Ndrangheta* (Capponi, 2009; *Ingrasci* 2010), and *Camorra* (Gribaudi, 2010) have been increasingly explored, which have unveiled the diverse dynamics of women's roles in different mafia organisations. However, many gaps remain as there is no systematic analysis of the involvement of these women in criminal activities (Cayli, 2016:36-37). Uncovering some of the mafia women's stories, this research will examine and offer perspectives in understanding the gender dynamics of the mafia. Through the use of the stories of different women, this research aims to shed light on the importance of acknowledging data gaps before proceeding to invest in predictive justice.

In fact, the Italian Department of Justice are somewhat aware of the women's role within the mafia. They are seeking supportive and inexpensive tools to curb organised crime operations as they are increasingly becoming subtle. Peroni discusses how modern criminals use novel tools to nurture their illegal businesses, and cybercrime is one example. However, it may still be early to think about "cybermafia", although not premature to prepare for such developments. Due to the European uptake of recent technological tools (e.g. *Proton*), Italy is also encouraged to implement changes with the integration of AI in the judiciary (Peroni, 2018). However, the lack of streamlined procedures allowing

for collection and integration of data hurdles the achievement. As the thesis pursues to advance the field, the next section analyses the international status of AI and law and its degree of implementation.

2.3 AI in Law Enforcement and Judiciary Systems

The section focuses on emerging legal technologies, their functions, and applications. It anticipates the positive potential of a diverse workforce (if engaged), which places a particular effort in uncovering gaps and breaking biases when progressing law-enhancing tools. In 1963, the American Bar Association published an article that questioned whether computers will revolutionise "the practice of law and the administration of justice, as they will in almost everything else" (Lawlor, 1963:337). Nearly sixty years later, technology is affecting many industries today, including the legal industry. Information technology enables lawyers to process large amounts of data in innovative ways and make predictions about legal outcomes, it streamlines and automates legal procedures, enhances law practice management, and provides modern tools for online dispute resolution. Many recent advances have made access to the law more affordable thanks to the tech-enabled innovations assisting the legal workflow.

Much of the recent focus has been on legal Artificial intelligence (AI), or computational law which is the branch of legal technology that is concerned with the automation and mechanisation of legal analysis. In general terms, there are two AI methods used in legal technology:

1. Rules-driven AI whereby legal knowledge is encoded so that a machine can conduct legal reasoning on a specific legal subject. An example of this approach would be tax preparation software where the system works with a computer-translatable representation of the tax code and applies it to a specific user's circumstances.
2. Data-driven, or statistical AI method, through which AI systems process large amounts of data which are then used to identify interesting patterns or make predictions on specific legal outcomes. For instance, an algorithm can scan an entire body of judicial decisions made by one judge, and then predict how that judge is likely to decide on the next case. Similarly, data-driven AI systems are being used to enhance contract analytics, or scanning thousands of contracts to identify potential hidden mistakes and risks. (Vogl, 2019)

The founding director of Standard Law School's Center for Legal Informatics (CodeX), Roland Vogl believes that there are five areas where technology is growing in importance for the practice of law:

1. Legal Research: where computers were used in legal settings for the first time. "Legal information retrieval" techniques bring legal knowledge to human decision-makers.

2. Big Data Law: where Natural Language Processing (NLP) and machine learning techniques are used to process hundreds of thousands of cases, contracts or other legal data to recognise patterns and anticipate legal outcomes.
3. Computational Law: where rules-driven or data-driven AI is used to mechanise legal decision-making. One of CodeX's projects focused on enabling legal experts to turn their expertise into tools by creating systems that perform certain regulatory procedures without requiring programmers.
4. Legal Infrastructure: provides innovative tools and platforms to connect stakeholders in the legal system. For instance, different platforms use NLP and machine learning methods to help link clients with relevant lawyers internationally.
5. Online Dispute Resolution: a range of different providers assist parties to resolve disputes, making access to justice more affordable rather than limiting it to the traditional route through the courts (Vogl, 2019).

In addition to the fields above, AI is being developed in the law enforcement and criminal justice system with predictive analytics using AI tools which have made predictive justice possible. Predictive justice involves the analysis of data to fuel AI-enabled technologies for predicting outcomes that assist in crime prevention, or judge-enhancing services assisting with the interpretation of the law, or in predictive legal outcomes.

The possibility for a machine to predict future legal outcomes depends on the quality of the data the system is fed. If accurate data was to be available, what is to come would not be indeterminate. Instruments described as "predictive policing", which are used before the judicial process or prior to a court referral are already growing rapidly. For instance, the no fly list is the terrorist watchlist that consists of a big data analytics application that collects and analyses data on possible terrorists to prevent attacks, or algorithms used to identify fraud or money-laundering (European Commission for the Efficiency of Justice, 2018:53).

In the adopted case-study of the mafia, the overall goal would be that of fighting the organised crime that is secretive. In order to do that, "a light needs to be turned on" as Davide Mattiello states. He is an antimafia activist and former Member of Parliament who believes that the "light" is data. Data is key, and when the historical investigations started, there was no internet, no e-mails, and the first mobile phones were becoming available. Today, advanced technologies are accessible that were not in the '80s which assist in penetrating the wall of secrecy of these organisations and collect information that may

become fundamental in the investigations. From the development of databases, to "sentiment analysis",[11] and predictive applications, extraordinary steps forward have been undertaken. He refers to software like "Molecola", "Mercurio" and "Sari" used by the Italian law enforcements to understand how investigators and judges work today (Mattiello, 2021). "Molecola" is a database which has been used since 2010 by the Italian Finance Police (*Guardia di Finanza*) and the National Antimafia Body (*Direzione Nazionale Antimafia)* to trace the movement of illegal monies and assets associated with the mafia (Reuters, 2010). "Mercurio" is an application developed for the use of on and off duty police officers to report any suspicious activity (e.g. the sign of illicit weapons and more) to the operations hub that allows the automatic localisation of the crime scene or vehicle (Polizia di Stato, 2018). "Sari" is a facial recognition software used by the Italian Scientific Police (*Polizia Scientifica Italiana*) historically to tackle terrorism, and later expanded to assist arresting criminals without a real ethical, regulatory and legal consideration of how its functions would affect citizens (Carbone, 2021). Mattiello believes that there will always be the need to the old ways of investigations, to rely on collaborators that come forward. However, he firmly believes that the future for preventing and fighting the secret organisations will be through AI. He acknowledges and appreciates the investments and work done in the technological field at a European level to establish ethical standards to protect citizen's fundamental rights in order to take the most and the best out of these emerging modern power of penetration into the lives of others (Mattiello, 2021).

A wide range of computer tools are being used to prevent the commission of criminal acts through identifying possible crime scenes or culprits or prosecuting them more effectively (Završnik, 2019:194).[12] The first group of tools includes "predictive policing" used to prevent certain types of offences that regularly occur such as burglary, street violence, theft from/of vehicles. These tools are developed based on the data that determines precisely where and when these offences could be committed. The information is then reproduced on a geographical map highlighting hot spots which are monitored live by police patrols. This process is called predictive criminal mapping, and is based on historical crime location evidence, such as police reports, as well as even more powerful innovative systems capable of

[11] Sentiment analysis is also known as opinion mining, or emotion AI. It entails the process of analysing online statements' emotional tone, i.e. whether they are positive, negative, or neutral. This helps to discern the writer's attitude towards a topic (e.g. in politics, Obama used it to examine the reception of policy announcements during his election campaign (see Brand24, 2021; Feldman, 2013; Medhat et al., 2014).
[12] See list in detail of various instruments used by police in the USA and Europe.

combining various pieces of data from different sources.[13] These tools have convincing rates of effectiveness, and are also held to have discouraging effects on the commission of offences in areas around hot spots, leading to an optimistic opinion of public policies (European Commission for the Efficiency of Justice, 2018:50). In fact, XLAW is a similar predictive algorithm which has largely been used in Italy and has proved to be between 87-93% accurate in Naples, 92-93% accurate in Venice, and around 94% accurate in Prato (Gennaro and Marselli, 2017:200). The achieved results are impressively promising, with theft crimes having reduced by 22%, while criminal charges and arrests at the crime scene have increased by 24% in Naples (Forgione, 2018). In Venice, where the software has been used since November 2018, crime has decreased by 43% with an increase of complaints and arrests of 26% (Il Gazzettino, 2018). In Prato, the tool has been in use since March 2018 and crime has decreased by 39% with an increase of charges and arrests of 54% (Santin, 2018; SMAU). Once XLAW concludes its analysis, the software uses a *WebApp* interface which enables the law enforcement to use it on their electronic devices, and act promptly to provide assistance for the safety of the wider public, and to strengthen operational strategies that obstacle possible criminals' *modus operandi* making them more vulnerable (Gennaro and Marselli, 2017:201). Inspector Elia Lombardo is behind the project that resulted in XLAW, which is the product of a long criminological study which today has proved to have also cut the costs for public safety, reducing policemen's stress and assisting them to focus on pre-identified crime scenes. Additionally, surveillance vehicles that used to drive around 180 kilometres per day have decreased to 24-30 kilometres per day, following the use of the software that identifies a specific area to monitor avoiding therefore to roam around less prone-to-crimes streets (Ferrucci, 2019).

However, despite the positive results of XLAW which focuses on street crimes, it should be noted that such predictive policing tools are based on systems drawing on inferences from patterns in collected

[13] For instance, the project "E-Security – ICT for knowledge-based and predictive urban security" (http://www.esecurity.trento.it/), was conducted in the Italian city of Trento between November 2012 and May 2015. A database was collated which gathered information on crimes reported to the police, surveys result carried out by the city hall on victimisation and real and perceived security by citizens, data on physical and social urban disorder from the police, as well as other variables relating to "SmartCity" (e.g. information relating to the socio-demographic context, urban setting, night lighting, the presence of surveillance cameras and public transport). It was created to better support crime prevention and urban safety improvement work. The project managers testified to the reliability of the techniques used, which were said to predict criminal acts with a success rate of approximately 60-65 % and which were said to help to better fight crime when limited resources were available. In addition, tests conducted in the United Kingdom as part of a pilot project to predict possible burglary, theft, and assault locations show that the software projections used, called PREDPOL, were accurate in 78 % of cases, compared to 51 % using traditional techniques [accessed on 31 January 2022].

data to forecast risks and inform police practices. A key feature of these algorithms is that they process volumes of data (i.e. arrest records, reconviction data) to analyse patterns of crimes and predict crime risks (Kaufmann et al., 2019). The missing step, which the current study proposes, is mainstreaming a gender perspective and therefore undertaking a process of assessing implications of such predictive policing systems for men and women at the stage of design, testing, implementation, monitoring and evaluation of these algorithms (UNODC, 2020).

Similarly, such mainstreaming processes are also missing in the big data analytics, which are increasingly being used in the prosecution of crime. In the judge-enhancing services assisting judicial reasoning, various tools have been developed over the course of the years. For instance, predicting legal outcomes sees the use of automated decision-making systems that use highly autonomous algorithms that emulate human intelligence through software that are increasingly more advanced to resolve various issues. The European Commission for the Efficiency of Justice (CEPEJ) states that predictive justice consists of:

> *systems* [which] *are designed for use by legal departments, insurers (both for their internal needs and for their policyholders) as well as lawyers for them to anticipate the outcome of litigation. Theoretically, they could also assist judges in their decision-making* (European Commission for the Efficiency of Justice, 2018:30).

Harm Assessment Risk Tool (HART) was developed in collaboration with Cambridge University and was the first AI system used in the UK to decide if criminals should be prosecuted or offered rehabilitation (Hymas, 2022). The technology is based on machine learning and was trained using Durham Police archives from 2008 to 2012. By learning from decisions made by police officers and identifying patterns, coupled with data on whether or not certain suspects re-offended, the tool is expected to be capable of assessing the level of risk of suspects' recidivism, based on around thirty variables, some of which are unrelated to the crime committed (e.g. postal code and gender). The risk result is marked as low, medium or high.

The Correctional Offender Management Profiling for Alternative Sanctions (COMPAS) deployed in the United States, was revealed to have discriminatory effects by the NGO ProPublica. The tool aims to evaluate the risk of recidivism when the judge must determine the sentence for an individual. The algorithm was developed by a private company and has been used by judges in 46 federal states (Mesa, 2021). It consists of varied questions which are answered by the defendant or the information is extrapolated from criminal records. The information collated refer, for instance, on the presence of a telephone at home, challenges to pay bills, family history, accused's criminal history. The algorithm

classifies the accused on a scale from 1 (low risk) to 10 (high risk). This is to assist the judicial decision-making, and its result is only one of the types of evidence taken into consideration by the judge when delivering his/her sentence.

However, African-American citizens were assigned a recidivism high-risk rate twice that of other populations within two years of sentencing. This discriminatory effect creates "false positives" without this result being naturally wanted by the tool developers. Contrarily, the algorithm offered results on white populations which seemed much less likely to repeat a crime. In short, the algorithm overestimated the risk of recidivism for black communities and underestimated it for white communities (the "false positives" were mostly of African heritage, while the "false negatives" were mostly Caucasian). It must be noted that similar misleading interpretations reveals the socio-economic fragility of some populations which are not criminogenic by nature (Larson et al., 2016; European Commission for the Efficiency of Justice, 2018).

Researchers at Dartmouth College have also shown that these algorithms do not produce added value because people without any criminal record can replicate the same evaluation by answering the questions. In addition, the lack of transparency in how the algorithm functions due to it being designed by private companies (that own the intellectual property) was also cause for concern. The developers take the source data from the state authorities, and their lack of accountability to citizens has major democratic ramifications. It is the case that wider society becomes informed about big data operations accidentally, when data breaches or errors happen. For instance, when ProPublica revealed the issues in the COMPAS algorithm after the owner company's refusal to share it, the NGO resorted to appeal to public authorities to access the data and hired its own scientist to assess the tool (European Commission for the Efficiency of Justice, 2018:53).

In response to ProPublica's allegations, NorthPointe, the parent company of COMPAS which rebranded as Equivant following the controversy, argued that white and black communities were equally represented when considering the "true positives", i.e. those who had actually re-offended (European Commission for the Efficiency of Justice, 2018:53). The issue of how to reconcile both the algorithm's accuracy in detecting recidivism and the need to avoid biases towards black populations has generated intense debate.[14] The issues raised also reflect the point on the legitimacy of a private company, which

[14] See Chouldechova A (2016), "A fair prediction with a disparate impact: a study on bias in recidivism prediction instruments", available at http://arxiv.org/abs/1610.07524; and also "Bias in criminal risks scores is mathematically

has no institutional supervision to decide between two opposite needs, i.e. the balancing of protecting society, on the one hand, and that of respecting individuals' rights, on the other.

Despite these predictive tools being scrutinised for being racially biased, further research is needed to focus on the possible gender discrimination of such tools as a result of the historical biases contained in the criminal history data (Ugwudike, 2022:92). There is a long history of men designing and leading research, and women being excluded, which makes the data not inclusive of the biological sex or socio-cultural gender differences between men and women (Lawrence et al., 2022). Hence why, the current research paves the way to explore gender bias within criminal justice systems through feminist data practices which help centering the voices and experiences of marginalised people, i.e. mafia women for the purposes of this research. Until there is awareness and recognition that long-established systems are not neutral, the sooner the data, and algorithms can be modelled through a more inclusive gender lens (Smith and Rustagi, 2021).

With AI now featuring in many aspects of our lives, society is adapting towards a smarter and technological future. Technology is developing quickly, but the law struggles to keep up to speed and ensure that society as a whole is able to be represented by AI-based algorithms. In June 2019, the Law Society's Technology and the Law Policy Commission published a report examining the use of algorithms in the justice system of England and Wales (The Law Society, 2019). The Law Society's decision to focus on this topic emphasises the importance of looking at the lack of explicit standards, best practice models, and clarity in the use of algorithmic systems in the English and Welsh criminal justice system.

Current research,[15] similar to that published by the Law Society, has raised awareness of what other countries have been doing with the technological developments. As Wachter et al. explore, literature has emerged on bias, discrimination, and fairness in AI and machine learning. Using this work in existing legal frameworks is key to create tools and methods that practically assist across divergent legal

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inevitable, Researchers say", available at https://www.propublica.org/article/bias-in-criminal-risk-scores-is-mathematically-inevitable-researchers-say [accessed on 31 January 2022].

[15] See: Kehl, Danielle, Priscilla Guo, and Samuel Kessler, "Algorithms in the Criminal Justice System: Assessing the Use of Risk Assessments in Sentencing" (Responsive Communities Initiative, Berkman Klein Center for Internet & Society, Harvard Law School, 2017); Ben Green and Yiling Chen "Disparate interactions: An algorithm-in-the-loop analysis of fairness in risk assessments." (*Proceedings of the Conference on Fairness, Accountability, and Transparency*, ACM, 2019); Aleš Završnik, "Algorithmic justice: Algorithms and big data in criminal justice settings." *European Journal of Criminology* (2019); Ric Simmons, "Quantifying Criminal Procedure: How to Unlock the Potential of Big Data in Our Criminal Justice System" (*Mich. St. L. Rev.* (2016)), 947; Richard Susskind, *Online Courts and the Future of Justice* (2019).

jurisdictions. While the majority of studies has focussed on an American legal perspective, Europe is catching up with the field, considering the wider effects and requirements of EU law, including privacy issues (Wachter et al., 2021). Similarly to what Wachter et al. explore, this thesis addresses the critical gap between legal, technical, and organisational notions of algorithmic fairness, but in the context of policing and courts. The research uses the example of Italy, which seems to have been missed from the focus in this field, despite important funds being invested in advancing the detection of criminal organisation through the use of technology.[16] Consequently, the study focuses on Italy and its organised crime, with a specific focus on the mafia and the woman within it. Although Italy seems to be at a more embryonic stage of these technological discussions, it would be sensible to ensure that further technical research championed by computer scientists, takes into consideration that data which is used may not necessarily reflect reality. It is, therefore, crucial that research is supported in order to highlight issues with tested AI models in order to tackle the problem of bias at an early stage. This way, it may be possible to avoid a situation where tools are created that strengthen the creation of bias, and instead these instruments could assist to clean "dirty data" and produce better results. The thesis aim is to ensure that countries that have recently embarked on the AI journey, such as Italy, in modernising the law enforcement and judicial systems are going to be aware of the common issues that have been encountered so to produce less biased and more efficient applications.

Terms such as "Deep Medicine", "Deep Patient" inspired by deep learning are now commonplace. Deep learning is a part of machine learning through which computers can be trained to work like the human brain.[17] Through these systems, scientists are now able to automate human tasks and have, for instance, personal assistants like "Siri". However, while models can be built, it is not possible to predict how they will work especially in those cases such as the "Deep Patient", where data from electronic medical records was used to predict the occurrence of seventy-eight diseases (Topol, 2019). AI is a black-box approach that provides a very limited explanation as to the reason for the prediction. These black-box models are created through data by an algorithm which means that the designers of the models, and

[16] See, for instance, EU funded projects like Proton: https://www.projectproton.eu/ [accessed on 2 April 2020].
[17] Machine Learning (ML) is a branch of AI focused on building applications that learn from data and improve their accuracy over time without being programmed to do so. For further info see: https://www.ibm.com/cloud/learn/machine-learning [accessed on 04 May 2021]. For further discussion see: Eric Topol, *Deep Medicine: How Artificial Intelligence Can Make Healthcare Human Again*; Ian Goodfellow, Yoshua Bengio, and Aaron Courville, *Deep learning* (MIT press, 2016); Ethem Alpaydin, *Introduction to machine learning* (MIT press, 2009).

humans in general, cannot understand or interpret how variables are used, combined to make predictions (Rudin and Radin, 2019).

Consequently, when the attention is turned to the law and the judicial system, recommendations made by the AI Now Institute are key. The most important was that any "high stakes" matters, such as criminal justice, education, healthcare should not be based on black-box AI (Crawford, 2019:6).[18] Moreover, the European Union General Data Protection Regulation requires that organisations give users a reasoning for automated decisions.[19] The legislation is at the core of the problem in law. Law firms, courts, the criminal justice system would be held accountable for decisions that machines might make, even if the algorithms used were strictly tested and considered fully certified.

The European Ethical Charter on the use of Artificial Intelligence in Judicial Systems and their Environment believes that the term "predictive justice" should be dismissed because ambiguous and misleading (European Commission for the Efficiency of Justice, 2018:57). Therefore, the original contribution of the thesis suggests a new notion of "Deep Justice" when envisaging predictive justice tools of the future that will have implemented a form of AI that is efficient, reliable, possibly more transparent and capable of producing less biased outcomes in the law enforcement and justice system. Predictive or not, these tools are founded upon approaches of analyses of case-law using statistics. Analytical discrimination is unlikely to be fully removed, but at least it must be addressed/identified, and the design and development process of the tool, together with its use must be set in a clear ethical framework.

On September 2021, the Secretary of State for Digital, Culture, Media and Sport presented to Parliament UK's National AI Strategy for the next 10 years, which aims to invest and plan for the long-term needs of the AI ecosystem to continue UK's leadership as an AI superpower; to support the transition to an AI-enabled economy and to ensure the UK gets the national and international governance of AI technologies right (Kwarteng and Dorries, 2021:7). Consequently, it can also be assumed that the UK's needs of backing diversity in AI and the launch of National AI Research and Innovation Programmes will support the progress of predictive justice (Kwarteng and Dorries, 2021:9). There are already many

[18] The AI Now Institute at New York University is an interdisciplinary research centre dedicated to understanding the social implications of artificial intelligence. AI Now was founded by Kate Crawford and Meredith Whittaker in 2017 following a symposium hosted by the White House under Barack Obama: https://ainowinstitute.org/ [accessed on 2 April 2021].

[19] Art. 22 GDPR, Automated individual decision-making, including profiling.

intelligent tools that are being used in the English and Welsh criminal justice system, such as digital forensics, scoring in the prison systems, and crime predictive tools for which there is a lack of explanation of how they work (Burgess, 2020). "Most Serious Violence" is a British government funded tool built to predict gun and knife violence. However, the police admitted that the tool was too flawed to use. Consequently, it did not meet ethical standards and was rejected by experts that reviewed it as predictions it made were revealed to be biased (Hamilton, 2020). Moreover, in the USA, algorithms have been proved to play a quiet, but harmful role (Marr, 2018) in the criminal justice system, from policing, bail, sentencing and parole. Hao explains how "AI is sending people to jail – an getting it wrong" as the criminal risk assessment algorithms are trained based on historical data which means that the systems may mimic the mistakes of the past (Hao, 2019). By relying on computers, many American states are putting citizens' fates before algorithm judges that may result in mathematical expressions of unconscious bias (Thompson, 2019).

With projects like *Proton* that are co-funded by the European Union, Italy has an opportunity to significantly contribute and inform the process of modelling the lead to organised crime and modernise the criminal justice system.[20] Professor Savona, based at the Transcrime Centre at *Università Cattolica Sacro Cuore* in Milan led the project that explored the use of new technological methods to virtually simulate social settings where organised crime would operate. The Department of Justice shared with the project 11,000 profiles and 200,000 crimes to allow it to assess the long-term impact of crime prevention policies. The data was used to create a rich database in order to fuel the creation of a mini-virtual society. A small town was simulated within a bigger city where an ordinary population and a criminal population would interact. It was then observed how the two groups would come into contact and organised crime members get recruited. The virtual setting allows for complex and non-realistic dynamics to be re-created and test fictional policies. For instance, it allows to simulate the consequences of removing parental authority within mafia families and of children from criminal settings so that they do not learn mafia values (Peroni, 2018). Italy could use the research to drive positive changes with authority and under a social licence that respects values and human rights, which are the founding pillars of the justice system (Calderoni et al., 2021).

The thesis is strongly aligned with the European Ethical Charter on the use of Artificial Intelligence in Judicial Systems and their Environment. In their report adopted in December 2018 by the European

[20] See: https://www.projectproton.eu/ [accessed on 1 April 2020].

Commission for the Efficiency of Justice (CEPEJ), which was followed by Italy's *Strategia nazionale per l'intelligenza artificiale* (National strategy for AI) undertaken by the Ministry of Economic Development in July 2019 (Ministero dello Sviluppo Economico, 2019).[21] Concerning the legal field, the main principles the European Ethical Charter presents are the:

1. Principle of respect for fundamental rights: ensure that the design and implementation of artificial intelligence tools and services are compatible with fundamental rights;
2. Principle of non-discrimination: specifically prevent the development or intensification of any discrimination between individuals or groups of individuals;
3. Principle of quality and security: with regards to the processing of judicial decisions and data, use certified sources and intangible data with models conceived in a multidisciplinary manner, in a secure technological environment;
4. Principle of transparency, impartiality and fairness: make data processing methods accessible and understandable, authorise external audits;
5. Principle "under user control": Preclude a prescriptive approach and ensure that users are informed actors and in control of their choices. (European Commission for the Efficiency of Justice, 2018)

More specifically, the first principle is relevant where it needs to be ensured that throughout the criminal process, the potential law transgressor's rights to have access to a judge, to a fair trial, and to judges' impartiality are upheld. The second principle ensures that AI systems are capable of revealing and monitoring possible discriminatory situations and of avoiding automated analyses. In fact, Fair Trials which is the global criminal justice watchdog, explain that AI systems should not undermine the right to be tried by an impartial and independent tribunal and, in line with existing EU laws, no individual should be subject to an automated decision that results in a criminal record (Min and Ferris, 2021). The third principle foresees that AI algorithms are traceable, memorisable and used in protected environments so to ensure the integrity and intangibility of the systems. The US Department of Defense recently developed and adopted "Ethical Principles for AI". These replicate the third principle of the Charter, by stating that AI capabilities are to be implemented so that relevant users have the appropriate knowledge of the technology, its development processes, and operational methods applicable to AI capabilities (Joint Technology Committee, 2020:9). The fourth principle is aligned to the freed access to the creative judicial process, the impartiality to the complete absence of bias and fairness in the protection of judicial rights. Finally, the fifth principle places importance on the system users' knowledge and full control of the choices that are made. Consequently, a question that flows naturally from this is

[21] See: https://www.mise.gov.it/index.php/it/strategia-intelligenza-artificiale/contesto [accessed on 25 March 2020].

whether the use of AI could strongly contribute to developing the operation of justice in a more efficient and fairer manner, respecting the principles.

As explored above, AI has been used to predict justice, foreseeing crime locations, or times where possible offences could be committed, assist lawyers in the interpretation of the laws and even predicting the outcome of cases. However, AI systems that deliver case outcomes and sentences are not as problematic for civil cases as much as they would be for criminal cases (Traversi, 2019), such as in the instances of mafia women. Traversi explains that if AI were to be used in criminal courts, those proceedings are based upon witnessing processes, and the prospect of AI predicting the validity of what would be said by a witness is challenging. Additionally, he says that AI systems are programmed to give clear results, and that is problematic when the threshold is to prove the culpability of a person beyond reasonable doubt. If the computer does not meet that threshold, that person would walk the streets (Traversi, 2019). The overdoing in automation of the criminal outcome could jeopardise the likelihood of the specific AI system not being able to abide by the European Ethical Charter's fundamental principles and breach efficiency, and fairness.

The starting point is that an AI system, as opposed to a human judge, may not be capable of evaluating with certainty the truthfulness of the witness statements despite advancement of tech-tools, and the law states that a culprit must be proven guilty beyond reasonable doubt. However, this standard of proof is challenging to be guaranteed via an algorithm. Nevertheless, the European Ethical Charter does allow the use of an AI system in the course of the criminal procedure, if under user control and limited to specific solutions (Traversi, 2019). Contrarily, the European Commission's proposal for an AI act introduced in April 2021 bans harmful AI practices, such as AI systems used by public bodies for social scoring purposes (Veale and Borgesius, 2021). The proposed legal framework would be a horizontal EU legislative instrument that would apply to all AI systems on the market or used in the EU (Madiega, 2022:3). As it is proposed, if the AI act (AIA) is enacted, it would primarily apply to AI systems providers established within the EU or a third country, but it would not apply to AI systems developed or used solely for military purposes, to public authorities in a third country, nor to international organisations or authorities using the systems in the framework of international agreements for law enforcement and judicial cooperation (Madiega, 2022:4). There has also been recent comprehensive analysis of the AIA, which reveals a more limited global impact than initially presented by EU policymakers (Engler, 2022). Moreover, countries like Spain, have unveiled plans to test the AIA through the setting up of a sandbox (i.e. a closed environment) where companies would test their high risk AI systems for law enforcement,

health or educational purposes under the proposed regulation and oversight of regulators (Goujard, 2022).

Therefore, despite the possibility of the AIA (if enacted) prohibiting AI practices categorised as unacceptable risks (Mantelero and Fanucci, 2022:13), it is still too early to cease explorations into how to create responsible AI systems advancing people's safety and upholding fundamental rights. In the current stage of debate, Members of Parliament and Member States are drafting and proposing various amendments to the law, which makes the present particularly interesting to have conversations, and lead research exploring different perspectives on how to strike the right balance between regulation and innovation. Under the sandbox scheme, Spain hopes to convince stakeholders leading AI change to be scrutinised by regulators so to inform and influence the future rules shaping the quality of data sets and human supervision (Mueller, 2022). The raised standard for using quality datasets even for training, validating and testing algorithms would also contribute to raising awareness for bodies that a better job needs to done to establish good data management practices as soon as possible, with no more hesitation. In practice, the quality requirement means that data must be relevant, representative, free of errors, and complete (Gaumond, 2021), which means that particular attention needs to be paid to biases, data gaps, and data shortcomings as the current research proposes.

In this ever-transforming context, it is imperative that hasty decisions are not made and time is taken to debate in advance the risks and practical applications of innovative tools for law enforcement and judicial systems, and to test them first. It is highly relevant to closely monitor how the AIA negotiations progress coupled with how the UK National AI Strategy will be influenced by such global advancements. A "Deep Justice" may, therefore, evolve to be a judicial system that keeps with its time and is capable of establishing, administering and ensuring genuine cyberethics for both the public and private spheres, and pursuing total transparency and fairness in the operation of algorithms, which could contribute to very high risk AI practices to become possible, and responsibly facilitate law enforcement and judicial decision-making in the future (Tavani, 2013).[22] The thesis seeks to use the particular case of the mafia women to provide an exploration of predictive justice uses, considering methodological precautions and identifying areas for additional scientific input to ensure the European Charter is adhered by, and

[22] Cyberethics is a branch of applied ethics that examines moral, legal, and social issues at the intersection of computer/information and communication technologies. This field is sometimes also referred to by phrases such as Internet ethics, computer ethics, and information ethics. See Tavani H, "Cyberethics" in Encyclopaedia of Sciences and Religions (2013).

explore possible issues dictated by incomplete, unrepresentative or inaccurate data as proposed by the AIA.

"Predictive justice", as the Ethical Charter holds, should be assigned to the field of research and further development in collaboration with legal professionals to ensure that they fully cater for the needs before considering to expand their use on a significant scale in the public sphere. The research emphasises the importance of embracing a multidisciplinary perspective in order to ensure the better functioning of algorithms in policing and courts so that these tools can better assist the justice system to detect, evaluate, correct biases. Wachter et al. suggest an 'early warning system' for AI tools that discriminate, which can be pursued by designing algorithms to automatically or consistently create the types of statistical data necessary for the justice system to make well-informed normative decisions, and for the humans-in-the-loop (or controllers) to systematically detect potential discrimination before it happens (Wachter et al., 2021:21). This is a particularly sensitive issue for criminal proceedings, which should not be ignored. What research such as Wachter's does not address is circumstances where biases are deeply rooted in historical statistical data, that a preliminary work of cleansing the data using different expertise is key. Moreover, in the light of the outstanding issues related to their compatibility with a certain number of fundamental rights, the use of algorithms to specifically calculate the potential risks of recidivism of an individual brought to justice should be considered cautiously. On the other hand, the processing of global quantitative data for crime prevention is an avenue to be further explored with these new techniques, taking into consideration known biases (e.g. performative effects, data quality, etc.). Similarly, the use of algorithms to form a better link between the type of community service available and an individual's personality may be a factor in the effectiveness of a measure of this kind.

2.4 AI and Gender Biases

Algorithms' efficacy depends on the interactions established in the developing stage and hence to their past. The content and quality of the data in the configuration of the calculations is therefore key to understand the outcomes obtained and to identify possible analytical biases. There are many challenges in these circumstances: in an exhaustive approach, the analysis of the richest possible set of data in relation to an activity will produce results and their meaning will have to be explained with reference to all the variables that have affected those results. In a narrower approach whereby incoming data is sampled, risks increase as a result of the trade-off biases required to select one data over another (European Commission for the Efficiency of Justice, 2018:35).

In terms of gender bias from algorithms, one of the initial stages of algorithm development is the selection of training dataset(s). For instance, when AI tools that evaluate creditworthiness train from historical data, they identify patterns of women receiving lower credit limits than men. They reproduce the same unfair access to credit along gender and race lines. Relatedly, the "Gender Shades" research project found that commercial facial-recognition systems used image datasets that lack diverse and representative samples (Buolamwini and Gebru, 2018). These tools misclassified women more often than men. In fact, darker-skinned women were misclassified at an error rate of 35%, compared to an error rate of .8% for lighter-skinned men (Smith and Rustagi, 2021).

It is highly relevant to understand the nature and significance of gender bias, so that meaningful steps could be taken to fill the gap. There is a common concern of women employed in AI and data science fields. Over three-quarters of experts in these areas are male in the world (78%); less than a quarter are women (22%). In the UK, this declines to 20% women (Young et al., 2021). According to Reuters, only around 20% of the technical experts in major machine learning companies is female (Dastin, 2018). According to WIRED and Element AI, only 12% of leading machine learning researchers are female (Fatemi, 2020). This blatant male supremacy results in a feedback loop shaping gender bias in AI and machine learning systems. It is also deeply an ethical concern of socio-economic justice, as well as one of value-in-diversity. The inclusion of a diverse range of individuals in the labour force has been proved to advance productivity, profit and innovation (e.g. Herring, 2009; Vasilescu et al., 2015; Tannenbaum et al., 2019).

Four years ago, the House of Lords Select Committee on Artificial Intelligence (2018) advocated for increasing gender and ethnic diversity amongst AI developers, and two years later the European Commission (Advisory Committee on Equal Opportunities for Women and Men, 2020:3) noted that it is "high time to reflect specifically on the interplay between AI and gender equality". Yet, there is still a striking scarcity of quality, disaggregated, intersectional data which is essential to interrogate and tackle inequities not only in the AI and data science workforce, but also its consequences in AI tools. More specifically, humans generate, collect, and label the data that goes into datasets. Humans determine what datasets, variables, and rules the algorithms learn from to make predictions. These stages can introduce biases that become embedded in AI systems.

Sadly, this may not sound like anything new, but the underlying issue is that, when those male technologists work on systems, they implicitly incorporate their own biases in the different phases of its creation, i.e. the data sampling stage, annotation, algorithm selection, evaluation metrics and the

human-algorithm user interface (Tolan, 2019). There are various renowned examples where the gender bias is unapologetically manifesting. Some of these include voice and speech recognition systems which have been proved to perform worse for women than men (Rodger and Pendharkar, 2004; McMillan, 2011; Tatman, 2016). The main reason why such flaws are manifesting is due to a predominantly engineering-centred approach to ethical issues (Veale, 2020). With the increasing effort directed towards the advancement of AI, the research calls for challenging thinkers, as Veale suggests, that are bold and sensitive to understand the way forward in these novel developments (Inkpen et al., 2019; Veale, 2020) without feeding into the further marginalisation of groups of people.

For instance, with the rise of research and projects implementing algorithm-driven systems that assist employers in the recruitment of people, the problem of gender data gap is set to get worse because there is every reason to suspect that bias is being unconsciously fed into the very code to which the decision-making is outsourced to. The concern is related to the recruitment processes that seem objective, but they actually were revealed to be covertly biased against women. Perez states that like teaching evaluations in use in universities today, these tests have been criticised as informing employers less about an applicant's suitability for the job and more about his/her possession of frequently stereotypical characteristics (Perez, 2019:106). In fact, recruiting tools such as Amazon's were discovered to be sifting through candidates in a non-gender-neutral way as the historical data collated over a 10 year period was predominantly made of men (Dastin, 2018).

Cathy O'Neil's example on employers using mathematically modelled ways to sift through CVs, 72% of American curricula never reach human eyes as robots involved in the interview process determine according to the posture, facial expression and vocal tone of the candidate whether to give him/her a green/red light. The algorithm is trained on the characteristics of top-performing employees (O'Neil, 2016). All this sounds extremely innovative, until one begins to focus on possible gap-ridden data. Questions arise as to whether engineers have ensured that this top tier of humans represent diversity and inclusion policies and, if not, whether the algorithms had accounted for this when churning results. Would the algorithms have been trained to account for socialised gender differences in the voice tone and facial expression?

Developers teach algorithms what variables to take into consideration when making decisions, but those variables and proxies may discriminate certain identities or communities (Lee et al., 2019). For instance, Gild (now acquired by Citadel), developed an online tech recruiting AI system to assist employers classify applicants for programming vacancies. Gild screened data from common sources such as CVs, and used

a “social data” proxy that included information on actions in the digital sphere to estimate how integral the jobseeker was to the online community. In this example, the social data was derived by sharing and developing code on platforms like GitHub.[23] However, what these codes are unable to do is to factor in data on tasks women are likely to bear, such as the societal expectations around unpaid care, which corresponds to women having less time to interact on platforms like GitHub. It is likely that women have a weaker digital footprint and therefore produce less of the required social data. Moreover, women may subscribe to communities behind fake male identities to avoid sexist, gender-specific security concerns (e.g. targeted harassment and trolling), or other types of bias (Wong, 2016). As a result, Gild’s recruitment tool was likely to penalise female candidates while ranking them lower than their male counterparts, instead of aiding employers to limit or remove human biases (Smith and Rustagi, 2021).

Data points are units of information and representation of snapshots of the lives we live, and the large gender data gaps partly results from the gender digital divide. For instance, around 374 million fewer women than men have web access on mobile devices; women in low- and middle-income countries are 15% less likely than men to own a smartphone (GSMA Connected Women, 2021:7, 18). These handsets produce data about their users, and because women have less access to them, datasets are inherently skewed. Additionally, when data is generated, humans collecting the data control what to collect and how. For instance, healthcare is a field where there is gender imbalance at leadership levels. Male bodies have long been the standard for medical testing, while women are missed from medical trials as their bodies are deemed too complex and variable (Jackson, 2019). Females are excluded in animal studies on female-prevalent diseases. This way of controlling what data is collected and how, nurtures a gap that is reflected in medical data.

Therefore, gender bias affects traditionally long established fields, such as healthcare, the judiciary (Miron et al., 2020), where there are policies and clear processes assisting doctors or judges to take sensitive decisions based on fair principles. Replacing those set procedures by the insertion of AI tools must follow best practices and smart evaluation strategies, which unfortunately are not yet fully in place. Data that is not disaggregated by sex and other identities paints a flawed picture, hiding important differences between people of different gender identities, and conceals potential

[23] GitHub is a platform where over 73 million developers shape the future of software, together. See: https://github.com/ [accessed 01 February 2022].

overrepresentation or underrepresentation. For example, few urban datasets track and analyse data on gender, so infrastructure plans often fail to consider women's need (Fleming and Tranovich, 2016).

Equally, even when representative data is available, this may have built-in bias and reflect prejudice in society. For instance, the consumer credit industry was based on marital status and gender to determine creditworthiness. Given their discriminatory nature, these processes were replaced by supposedly more neutral ones. However, by the time change happened, women had less formal financial history and had to bear the consequences from discrimination, which affected their ability to get credit. Data points tracking individuals' credit limits record these discriminatory trends (Bowdish, 2012).

Additionally, data labelling can be a subjective process that unconsciously implants harmful biases and perspectives. For instance, most demographic data is simplistically tagged on the basis of binary female-male categories. When gender categorisation follows dichotomies, it reduces the potential for AI to reflect gender fluidity and self-held gender identity (Scheuerman et al., 2019), which will require to be taken into consideration in the future development of tools. Prioritising gender equity and justice as a primary aim for machine learning systems can have a downstream effect on design and management decisions. It is clear that machine learning systems are not objective as even those developed for good, such as for fairer recruitment or creditworthiness assessment can be discriminatory, as their human designer. Social change as well as change to leaders at organisations that develop machine learning systems is needed to ensure that gender-smart tools are developed that advance gender equity.

More importantly, it is difficult to understand how bad the problem is in reality. As most algorithms created by coders are protected by confidentiality and proprietary rights, it is not possible to analyse how the decisions are being made and what particular biases they may be hiding and rendering invisible in the outputs. The only way it may be possible to know about the problem is if any of those coders, or whoever works with the AI model discloses that information openly. This creates a double gender data gap, firstly in the knowledge of the engineers creating the algorithm, and secondly in the knowledge of wider society about just how discriminatory these technologies may be (Perez, 2019:107-108).

Social change leaders can pursue include the use of feminist data practices to help fill data gaps, by analysing how power operates and using data to question unbalanced power structures, going beyond the gender binary, and giving space to different forms of knowledge, summarising various perspectives while prioritising local and Indigenous knowledge. Feminist data can assist to centre the voices and experiences of neglected individuals (e.g. women and girls). For instance, Digital Democracy is an

organisation that works in solidarity with marginalised communities to protect their rights through technology. By working with local groups such as the Commission of Women Victims for Victims (KOFAVIV) it has built a secure tool to collect gender-based violence data in Haiti. The system allowed local women to track, analyse, map, and share data (Smith and Rustagi, 2021).

Secondly, social change can be achieved by integrating gender expertise to the field of gender-equitable AI, and advocating for AI literacy training so that machine learning designers can be more informed about issues and solutions to mitigate gender bias. Thirdly, in considering or using AI systems to address gender gaps, careful thinking is required on who is represented on the team assembled to develop a particular AI model, as well as what data are used and how they intend to develop the algorithm. Despite its faults, AI is increasingly being used to tackle global development issues, including gender inequality, and wider public are getting on board (Jones, 2018). For example, Women's World Banking and *Mujer Financiera* are using machine learning to support financial inclusion for women. It is highly relevant to insist and support AI developers to focus on the voices of women and non-binary individuals in the development, creation, and management of these technologies (Stence and Woolnough, 2020). Continued assessment of potential AI systems for gender bias and the monitoring of unintended consequences is key.

In fact, researchers Buttarelli and Marr emphasised how big data need to be carefully monitored and protected (Buttarelli, 2015; Marr, 2016). Pasquale and Morozov advocate for the creation of transparent processes for the implementation of AI in the judicial field (European Commission for the Efficiency of Justice, 2018:61). In order to move forward, cyberethics' development must guide the code of conduct of stakeholders in the field so that it is possible to promote the principles of transparency, fairness and neutrality of the tool. For instance, the regular observation by independent experts should ensure that predictive justice instruments used to support judges in their decisions are not biased. Moreover, well-functioning systems could have their quality certified by an official label. These tools must guarantee total transparency and fairness in the way information is processed, both for professionals and for individuals, to ensure that situations such as those resulting from COMPAS are prevented. The involved experts that create the tool and the users must be closely involved to properly assess the risks and the impact of these applications on judicial systems. The clear regulation of such tools will earn an increased trust from society in the judicial systems (European Commission for the Efficiency of Justice, 2018:61).

Nowadays, experts that contribute to AI advancement, including researchers, engineers and computer developers, have unprecedented duties as their work could be associated with the strengthening of the

humanities. The departing point is the acknowledgment that data and algorithms are not neutral, and then proceed to resolve the issue, for instance, by collaborating with gender experts to implement feminist data aspect, diagnosing and addressing possible gender impacts of an AI model and overseeing the auditing process of the system through a gender lens, which is the objective of the current research.

The impact of the study is to propose that cyberethics should be accompanied by training stakeholders, from AI model designers, legal-tech firms to their users. Innovative multidisciplinary humanities should be offered to key players so that AI brings positive change for humankind. This is in line with what UNESCO guidance proposes which is gender-sensitive governance methods (e.g. an AI ethics board and head) for responsible AI. AI should be developed while critically thinking about how to incorporate justice and equity related to gender and other neglected identities (See UNESCO, 2020, the report offers guidance on implementing gender equality consideration into AI fundemantals).

When gender is not considered and gender-blind data is pursued, men automatically become the default creating blind spots that further nurture existing gender gaps and introduce new inequalities with their own negative consequences. For instance, the reason why cardiovascular issues are considered a man's illness despite it being the major cause of death for women over 65 years is because men continue to be the majority of participants in clinical trials. Certain health predicting systems are therefore more likely to diagnose a woman having chest pains and nausea with a panic attack or inflammation, whereas a man experiencing the same symptoms would be advised he may be having a heart attack and need to seek medical assistance immediately (Lawrence et al., 2022). Similarly, with flawed criminal data to support decision-making, gender-blind policy responses have the potential to roll back progress and further expand gender gaps around various fields, including the justice system with women being considerably underrepresented (Geppert, 2022).

Consequently, awareness of data collection gaps as well as adoption of a gender lens in analysing datasets which inform predictive systems can be a small step towards creating a gender responsive approach. However, the core of gender-disaggregated data may be a simple data collection and management step that allows the invisible to be considered. When made available, gendered data can allow for more bespoke solutions and informed decision-making because such data not only distinguishes between men and women, but it can also lead to the collection of new data fields and points to be investigated, that may not have been previously taken into consideration. Despite better information and outcomes, gender-disaggregated data is still lacking globally. Gender-disaggregated data practices continue to be the exception rather than a best practice. Arguably, making this a basic

prerequisite within data practices could lead to better results for all (Lawrence et al., 2022). The current research uses the mafia case study (and the *Proton Project* – see below) to show how poor data practices have led to historically focus on the collection of male data that is likely to be affecting a more neutral functioning of predictive systems that could be better designed to reflect the organised crime society, which recent research has revealed to include female offenders.

These actions are not exhaustive, but provide a starting point for building gender-smart machine learning that advances fairness. The proposed research fills a gap that remains still unaddressed by scholars that have been focussing on the impact of AI on individuals from a legal and human rights perspective (Mantelero, 2022). Although attempts have been made to provide holistic risk-based methodological frameworks to address the impact (Mantelero, 2022, 2018), the studies do not fully explore a step-by-step methodology that offers the possibility of identifying biases and challenging reasonings that may affect the building of AI tools, which the thesis proposes. There is an opportunity to re-think and revolutionise how developers perceive, design, and manage AI systems and thereby pursue a more just world today and for future generations. The above examples are only the tip of the iceberg of much more vast evidence that show how gender biases are baked into AI systems. In summary, as AI models mirror the biases of their creators, more women should be involved in the AI-decision making boardrooms, in the AI-creating processes, and more importantly a better job is required in the collection of the data used to train such models (Fatemi, 2020). The thesis advances an exploration of a context where predictive justice is evolving, and assesses the issues that will have to be overcome in the policing and judicial context with the mafia case-study that is used as representation of a marginalised community where the data gap concern is vivid.

2.5 AI, Crime Prevention, and Gender

The next section studies how AI is being implemented in assisting crime prevention, which is also obstacled by data gaps that lead intelligent tools to fail. Hao draws on the examples of how police departments use predictive tools to strategise about where to send their ranks and law enforcement agencies using face recognition systems to help identify suspects (Hao, 2019). These practices have garnered well-deserved scrutiny for whether they in fact improve safety or simply perpetuate existing inequities. Researchers (Buolamwini and Gebru, 2018) and civil rights advocates (Snow, 2018), for instance, have practically evidenced that face recognition systems can dangerously fail, especially for people from ethnic minorities. In fact, such systems have been proved to mistake US Congress members for convicted criminals because of their darker skin (Hao, 2019).

In crime prevention, facial recognition and risk assessment tools have been the most controversial models (Hern, 2020). The former supports surveillance in policing, and the latter functions on details of a defendant being inserted into the system, which then gives a recidivism score. The single number estimates the likelihood that he or she will re-offend. A human judge then takes the score in consideration when determining what kind of rehabilitation outcome would be best for the specific offender (e.g. whether they should be kept in prison before trial, and how severe their sentences should be, etc.). Logically, the lower the score is, lighter the punishment.

The motif for the uptake of such algorithms (COMPAS in the US, and HART in the UK) is that predictive criminal behaviour assists in allocating police enforcement resources accordingly in jail, or rehabilitation centres. In theory, it should also reduce any bias that could affect the process, because human judges are making decisions based upon data-driven recommendations rather than subjective and unconscious prejudices. However, these technological tools use statistics to find patterns based on historical data that may replicate mistakes of the past (Nilsson, 2019). In practice, if an algorithm found, for instance, that a certain postcode was correlated with high recidivism, then the risk is run that people within that area may have high criminal numbers and held as likely to re-offend. Consequently, groups of people (e.g. with low income and from ethnic minorities) that have historically been unfairly targeted by law enforcement risk being unfairly discriminated (Oswald and Babuta, 2019:2). Therefore, such tools could be perpetuators of biases with the capability of amplifying them the more it feeds results.

Moreover, the Centre for Data Ethics and Innovation (CDEI) in the UK commissioned a "Landscape Summary" on algorithmic decision making bias, which identified the challenge in scrutinising the tools because they are all closed-source software (Rovatsos et al., 2019). Although hundreds of civil rights advocates are speaking against the use of crime predicting tools (Hao, 2019), an increasing number of jurisdictions have turned to implementing the technologies that have the ability to automate time-consuming and resource-intensive data matching and investigative functions (Babuta and Oswald, 2020:5).

Italy is one of those jurisdictions that has relied on technological advancements to fight organised crime. *Project Proton* (introduced above), is a recent example of a European funded project. Because of its novelty, there is no critical literature available on the impact of the *Project* at the time of writing, so the only commentary available is that published by the *Proton* itself. The results of the project have been closely studied and are reported in the following paragraphs. When keeping the topic of biases at the forefront while reading through the publications, the lack of collection of specific gender data is easily

noticeable.[24] One of the reports produced by *Proton* includes an interview with a Dutch stakeholder who states that girls are recruited into organised crime through their affective relationships and they become victims, but also facilitators. The stakeholder specifically states in the report that:

> *When they are facilitating one of the members of the OC [organised crime] networks we also investigate their role… And many times **I have the feeling** that they are not in it voluntarily, but most times they don't want to talk about it, so it is very hard to get an idea about if it is their own idea or if they are forced to do certain things. So it's hard…. Many times we don't focus on girls as victims. (…) in our investigations in which we try to tackle the criminal networks we most of the time see them as also being part of the criminal network (…) Many times they get involved through boyfriends (…) we also see aunts that play a role… There are family ties and relationships (…) [When investigations come] Most times they keep protecting them (…) We sometimes think: 'well, we now find a girlfriend and we know that she has to know more, so we think: "let's go to talk to her and invest on a good relation with her". We hope that she would tell us very much... and trying to get out of the criminal situation in which she got involved in. But many times, I don't hope… **They don't choose for that**; they choose to keep on protecting the people **for which they work for**. (…) I think that they are really… they could be really important in providing us with information and also … And I think that in many times they are the victims too…* (Stakeholder, The Netherlands) (UCSC-Transcrime et al., 2017:83-84)

The bold and underlined sentences are the ones that are potentially problematic with stakeholders as such, as these could amount to human biases that could possibly further fuel gender data gaps (Terzis et al., 2019:13). The speculation and speaking for the women facilitators potentially contribute towards the absence of the woman to become a commonly accepted reality, which is however untruthful; it is these personal and age-old feelings that for years have potentially led the law and order forces to overlook women's contribution in these illegal groups (Rovatsos et al., 2019). It is hopeful to read that the stakeholder does not focus on females as victims because it goes to show that a glimpse of their potential criminality has come to their attention. However, the tendency to read her as a victim seems a more powerful discourse as the stakeholder states that these girls choose not to betray who they are subdued to "work for". That action is translated into the girl being forced to do something and not as that choice itself being an act of wanting to be criminally associated and be bad (Morrissey, 2003). This is further strengthened by other quotes in the report from the Netherlands and the UK providing that:

> *We see… in one of our biggest investigations, or projects, we had a special focus on women because we thought that we are always focused on males, so let's see and try to get a better view of what women are doing and then we see that many of these guys who are in these types of organisations have girlfriends who play a certain role and who also… quite seem to like the more*

[24] *Project Proton*'s Resources are accessible at https://www.projectproton.eu/public-deliverables/ [accessed 5 April 2021].

> *type of violent male to be with (…) What we begin to see is that they [girls] many times facilitate also… So many times their rooms or houses function as special locations for drugs, or arms or other items used for the crimes. For example, one of these guys had to threaten or even shoot someone and he leaves his motorbike and the jacket he was wearing at his girlfriend's place…. For example… So we know for sure that she knows a lot more about what's happening and what he is doing… We are pretty sure that there are a lot of girls out there who know a lot about the criminal networks (…)* (Stakeholder, The Netherlands)
>
> *(…) I have never meet anybody who would have their girls sitting with the team. If you have been in this game long enough you see…* (Stakeholder, UK) (UCSC-Transcrime et al., 2017:84-85)

The repeated notion of having the women who are accomplices that know information, or women not sitting at the same violent table of men with stakeholders refusing almost to accept an opposing reality is what causes the collection of data on gender a challenge. If those leading research do not accept that a radical change is needed in the way the issue is addressed, which must come from different and uncomfortable and unprecedented perspectives, then we might as well give up on the process of narrowing that data gap now (Bidyuk et al., 2022).

The women taken as focus on the *Project Proton*'s report are those, as they define it, "revictimised ones", being victims and facilitators within the groups. A specific interviewee focuses on how women are subdued to the criminal men and most times they are unchallenging their status. The report identifies that there is a predominant violent model of attraction and when looking at these structures, it may seem like feminism has never happened and struggles to place these lives in the modern world. The UK stakeholder says that they want to challenge "this stuff" and they are "keen to do more" (UCSC-Transcrime et al., 2017:87).

Italy is perhaps doing that "more" for crime prevention, for instance with Palermo where schools are organised as "Learning Communities" to reduce early school leaving in an area that is strongly affected by mafia presence, but this type of "more" may not be enough. An Italian end-user acknowledges that many parents of many children are in prison and many women are on house arrests (UCSC-Transcrime et al., 2017:93), showing consequently how at fault the justice system could be in other spheres rendering women invisible, which consequently questions how blameable AI systems' results could be with unrefined data being inputted.

When looking more specifically into the systematic review carried out by the *Project Proton* of the social, psychological and economic factors with regards to criminalisation and recruitment to organised crime, the notion of mafia is recurrent, but that of women within it, is almost inexistent (UCSC-Transcrime et

al., 2017:37-41). As Professor Savona observes, literature on women and mafia deal with female roles when they are in relation to male roles, so as mothers, wives, daughters, sisters, etc. The same literature rarely speaks of female roles in leading positions, but draws them into the criminal setting when they support their men in their activities. Consequently, he argues that the literature on mafia women matches cultural perceptions of the gender role divide that seem to prevail in mafia models. Professor Savona questions whether the dichotomy of roles between women with operational and supportive roles and men with powerful roles mirror the real situation or constitute a stereotype fed by the lack of data, considering that information is steered by the stereotype (Savona and Natoli, 2007:103-104).

The answer (or rather the lack of it) to Professor Savona's question could be found within the report of *Project Proton* he led just over a decade later. In fact, section 3.3 of the report is dedicated to "Recruitment across types of Organised Crimes Groups" and chapter 4 is on "Recruitment into Mafias: Criminal Careers of Mafia Members and Mafia Bosses". Through these chapters, the image and data on women within mafia is still missing and, arguably, long overdue, especially for a project that seeks to use innovative approaches and models the processes leading to recruitment into organised crime.

Because of this whole system collecting unreliable or partial data that would be fed into an AI system (similarly to the American COMPAS tool), the wrongdoing women may not be sentenced, and the culprits may walk free or get a lighter punishment. AI made results have the potential of being incorrect and unjust. Consequently, it is highly relevant that as many of these women's profiles and the many that have not made it into the spotlight, are carefully taken into consideration in order to break down the overall tendency to continuously reproduce biased images of mafia women throughout the various Italian organisations, and ideally beyond. As *Proton*'s sister project *Takedown* recommends in its policy, it is key to include gender-oriented approaches in de-radicalisation and prevention programmes. Gender plays an important role and understanding gender role models affects preventative measures' effectiveness ("TAKEDOWN Policy Recommendations," 2020:10), and ignoring them is no longer an option.[25]

[25] Organized Crime and Terrorist Networks are a major challenge for the European Union. However, more knowledge is needed to develop better strategies and instruments against these phenomena. TAKEDOWN aims at creating a better understanding of organized crime and terrorist networks and the consortium will develop digital and non-digital toolkits and solutions for more efficient and effective prevention, intervention and response strategies. See https://www.takedownproject.eu/ [accessed on 3 March 2021].

Such awareness is highly relevant when developing predictive systems where historical data may have marginalised female data. Despite the varied examples used to explore predictive systems in the sections above, the core issues dictated by inconsistent data with the possibility of furthering biases is the same. Adapting the criminal justice system to innovation is still a novel journey where different tools are being tried. As algorithms are being developed, the key is to allow the multidisciplinary contamination between fields to ensure better informatisation of such predictive models that can be adapted to then cater specific systems (i.e. law enforcement or the courts). Although AI plays an important role in the policing and judicial system through geographical mapping apps, criminal profiling or risk assessment tools, AI is in a subordinate position, only assisting the law enforcement or judiciary to handle the cases, whilst police officers and judges are the key and core of the processes. The extent to which policing and judicial decisions can be determined through statistical modelling, analysis and calculation, and through rules and standards, will be the extent to which AI can be applied. However, the criminal justice's judgment is not one-dimensional as it requires moral, ethical, and practical considerations. Before such complex law enforcement and judicial practices, the predictive systems still require the human-in-the-loop, but the transformative influence such systems bring to historical fields cannot be ignored (Xu, 2022). Arguably, the slow revolutionary introduction and increasing improvement of such tools may provoke long-standing structures to adapt to the changes brought by the Fourth Industrial Revolution, which may facilitate the better inclusion of what historically used to be marginalised groups of people, and in the longer run contribute to the better informatisation of (and not limited to) criminal historical data.

Having explored how AI has been catering to the needs of the legal sphere, the next section seeks to show the gap in the literature available on the specific criminal offence of mafia association and the reason why the thesis is an important contribution to the existing literature in the field.

2.5.1 AI and Mafia Women

Data means information, facts, statistics which are collated for reference or analysis. Perez suggests that human experience should also be part of data and that when a world is designed that is supposed to work for all humanity, women need to be in the room (Perez, 2019:XIV). If those that work on projects such as *Proton* in Italy or others are all white, able-bodied men then that constitutes a data gap in the

same way as not collecting stories of mafia women is also a data gap.[26] Consequently, failing to wholly include the perspective of female humans, especially focussing on the rarity of those that represent perpetrators of the law, is a huge vehicle that has the capability of producing unconscious bias. This is not necessarily done in bad faith, but as de Beauvoir stated, men do confuse their point of view as the standard to depart from, the absolute truth (Perez, 2019:XIV). In short, what may seem as objective can sometimes actually be highly male-biased.

The thesis tells a story about the untold narratives of women in the specific context of Italian mafia. Their continuous historical silencing makes the thesis a challenging one due to the data gap for women that is a result of not collecting that data in the first place, or when it is collected it is not necessarily separated from the dominant male data ("sex-disaggregated data" (Doss, 2014)). There is an overwhelming amount of mafia male bosses' data, but the research into the mafia women is not equally prioritised. Most published books on the women portray them as collaborating with the state going against the mafia organisations or those that are victims and only linked to the mafia via emotional ties (Requena, 2014). The crux of the thesis is not to show the reason as to why there is a continuous existence of the gender gap. Rather, it is to demonstrate that the silencing of the existing data complicates the exposure of the woman's role within the organised crime groups. The thesis consults the limited but increasing literature that has focussed on researching the female sphere. Once the possible weight of the invisible data is shown, there is a question to pose to the stakeholders driving AI change as to what to do and/whether to implement the uncovered data that seeks to fill the gap.

The thesis shows through the mafia women profiles that the gender data gap is both the root cause and effect of the type of thoughtlessness that sees humanity as nearly entirely male, presenting how extensively the bias occurs and falsifies the allegedly objective data that increasingly govern our lives. Ultimately, the thesis shows that even with this Industrial Revolution run by supposedly unbiased technology, women are still de Beauvoir's *Second Sex* and that the risks of being referred to, at best, a sub-type of men as it happens within the mafia societies, are as real as they have ever been (Perez, 2019:XV).

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[26] *Project Proton* was led by Professor Ernesto Savona (Criminologist at the *Università Cattolica del Sacro Cuore*), and other scientific coordinators included Mr Francesco Calderoni (Associate Professor of Criminology at the Università Cattolica del Sacro Cuore), David Weisburd (Professor of Law and Criminal Justice at the Institute of Criminology, Hebrew University of Jerusalem) and Badi Hasisi (Director at the Institute of Criminology, Hebrew University of Jerusalem). See: https://www.projectproton.eu/contact-us/ [accessed on 3 April 2021].

The presumption that mafia is universally a male organisation is a direct consequence of the gender data gap. What is male within the mafia is to be seen as universal because male data feeds the stereotypical image we have that fits the image of the criminal (Burbank, 2019a), and mafia women are not seen nor remembered in this scene. The accepted stereotype of the mafia leads to the positioning of the mafia woman in the shadow, which renders them forgettable and invisible within the organisation. Although there are mafia women that do "break the glass ceiling" (Burbank, 2019b), they are however deemed unconventional, bad for breaking feminine rules and standards. They are the exceptions from the norm.

The norm is women like Annina Lo Bianco from the *'Ndrangheta* organisation that start collaborating with the state to save her children from a violent upbringing in the mafia led by their father. She suffered domestic abuse from her partner, Gregorio Malvaso, who would put his hands around her neck, strangling her even in front of the children. He would get angry when she expressed her thoughts of not wanting to allow her children to be surrounded by the father's adult friends, for which she would get into trouble (Lauricella, 2019:20). Consequently, the norm does not capture personalities like Aurora Spanò who was a real mafia boss initially sentenced to 25 years in prison, which allowed the labelling of the *'Ndrangheta* group in the area of San Ferdinando completely female. Other dangerous female personalities include Matilde Ciarlante who was on the fugitive list of the hundred most dangerous criminals, Maria Filippa Messina was the first woman sentenced under the Italian hard prison regime from 4 November 1996 to 25 April 1999, Maria Licciardi arrested in 2001 and detained from 24 January 2004 to 21 December 2009 as a *Camorra* lead (Ministero Dell'Interno, 2021:40,42-43), which pose the question as to how many more women will have reached equality in the criminal sphere.

Most of the literature investigating how gender plays a role in crime is likely to look at the gender of the victim but less often at that of the perpetrator. However, more recently the number of women engaged in criminal activity has increased, which may be due to the technological progress and social norms which will have contributed to free women from the domestic sphere, and expanding their participation in the crime sphere. Europol suggests that modern research on crime and gender ought to investigate female criminal behaviour to determine whether the policy prescriptions to minimise crime should be different for women (Campaniello and Gavrilova, 2018; Campaniello, 2019). As Europol campaign states "Crime has no Gender" as evidenced on the Europe's Most Wanted website of female fugitives. The offenders of both genders in the EU law enforcement's campaign are all wanted for serious offences like murder, drug trafficking, fraud, theft and trafficking in human beings. A total of 21 EU Member States

had chosen one of their most wanted fugitives to be included feature in this campaign, which invited to focus on the story behind the crime, departing from a full mask covering the face of the criminal. As the story progresses, parts of the mask fade away leaving the viewer guessing the gender of the fugitive (Europol, 2019).[27] This masquerade of crime inspired the Phase 2 interviews of the research to understand how applicable "the mafia has no gender" concept would be.

Therefore, the thesis is first of its kind to use the mafia case-study in merging the criminology investigation together with the technological advancements to show that the two strands need to travel together. It focuses on what happens to women living in an organisation built on male power and brings mafia women out from the shadows, raising awareness. With their leading positions, steering criminal groups violently, perceptions and stereotypes society is accustomed to may start to shift and acknowledge that we no longer can be comfortable around the single-sided image that has been common for too long (Cayli, 2016). Only through this, will the data gap be narrowed because for a long time women that transgress the feminine canons have been defined deviant, breaching standard humanity and this is how they have become invisible (Schur, 1984). It is therefore time to adjust the perspective from which women are looked within the organisations, and ultimately the thesis' aim is to show that it is time for women in the mafia to be seen not only at this microscopic level, but encourage more research at a higher level too. The thesis seeks to distance itself from deepening institutionalised biases by finding justifications for women's violence within the mafia, and highlight that the reproduction of dichotomies may hinder the positive potential of predictive justice.

The hopeful news in the continuous integration of these technologies in our everyday lives, is that once the bias is acknowledged, and previously unavailable data is now made available, then it is up to the diverse workforce to use the information to fix their "sexist" algorithms (Hamilton, 2019). The hope is on them to use the information because these systems are not only reflecting human bias, but they are able to amplify them and become "Franken-algorithms". Coders themselves may no longer recognise them as with time they will have become erratic (Smith, 2018). Smith calls "dumb" those algorithms that

[27] The aim of the campaign was to attract as many visitors as possible to the website (https://eumostwanted.eu/) containing the most wanted fugitives in Europe. This was based on the fact that the more people look at the criminals, the higher the probability that someone can offer the missing piece of the story needed to find and arrest the wanted person. The platform allows for anonymous tips to be sent to the national investigators. This method has been successful in the past six years with a record of 69 criminals being arrested by 2019, after the website's launch in 2016 and at least 21 cases were thanks to the information the general public had submitted (Europol, 2019).

are doing what they are told according to parameters set by humans. The quality of results depends on the thought and skill applied on programming them, and on the opposite side of the spectrum there would be a human-like artificial general intelligence (AGI). The AGI would be able to question the quality of its own results and calculations derived on something akin to human intuition that could be compared to a corpus of knowledge and experience. Where the "dumb" fixed algorithms are complex, opaque and inured to real time monitoring as they can be, predictable and interrogable, the "frankenalgos" are different as they are continuously learning. Even their creators will no longer know for certain what their rules and parameters might be (Smith, 2018).

Despite the worries caused by the data gap, there is however research on other sectors showing that algorithms are unambiguously better than human judgment and are superior to tools that are currently being used (Chouldechova et al., 2018; Brown et al., 2019). At the same time, critiques of this research have also commented that ultimately what we are going towards is the creation of something equivalent of a nuclear weapon that can be used by different fields at large. *ProPublica*'s revelation called "Machine Bias" delivered vivid proof for regularly used algorithms that erroneously predicted black offenders being at higher risk of committing future crimes (Angwin et al., 2016). The risk scores for white perpetrators were automatically skewed to minor risk. There has been bias in algorithms police used against the underprivileged class for predicting the likelihood of crime occurring in certain locations (Cathy, 2016) and against gays in the infamous "gaydar" study of facial recognition for predicting sexual orientation (Wang and Kosinski, 2018).

There are unimagined yet significant ways to engender bias. *NamePrism*'s development, for instance, was meant to identify and prevent discrimination (Chen, 2017).[28] The application, developed by Stony Brook University in collaboration with various major Internet firms, was a machine learning algorithm that deduced ethnicity and nationality from a name, which was trained from millions of names, with an approximate accuracy rate of 80 percent. However, when the institutional review board and researchers proceeded with the project, they had not foreseen that the app would be used to disseminate discrimination (Snow, 2017). The lack of diversity within leading tech companies, and at senior management levels, does not benefit this situation. The dominance of white men in countless companies renders it much harder to identify gender bias against women and demands attention as it will not be something that an AI algorithm could fix. Although, these practical examples focus on

[28] See: www.name-prism.com [accessed on 20 March 2020].

ethnicity, nationality, the relevancy for the predictive justice and the use of mafia women is that there are a wide range application of similar principles witnessed so far that need to be implemented to ensure law-enhancing tools are given the best opportunity to produce positive outcomes. The mafia may be governed predominantly by men, and the law enforcement and judiciary tools may be implemented mainly by male leaders, however a more conscious effort needs to be made to explore the female mafia sphere, and include women within the workforce leading predictive justice changes.

In addressing bias, the AI Now Institute has suggested that "rigorous pre-release trials" are essential for AI systems "to ensure that they will not amplify biases and errors due to any issues with the training data, algorithms, or other elements of system design" (Campolo et al., 2017). Moreover, continued surveillance for any bias evidence is key for the safe use of these technological tools, which some groups using AI are hopeful to attain. The co-founder of the AI Now Institute, Kate Crawford stated: "As AI becomes the new infrastructure, flowing invisibly through our daily lives like the water in our faucets, we must understand its short and long-term effects and know that is safe for all of us" (Crawford, 2017). It is clear that engagement to monitor algorithms and to systematically audit algorithms is key in order to promote fairness (Vanian, 2018; Courtland, 2018) and transparency, strengthened more so to abide by the European Ethical Charter.

Indeed, as AI has been used to tackle *Wikipedia*'s and *Encyclopaedia Britannica*'s gender bias (Reagle and Rhue, 2011; Graells-Garrido et al., 2015; Wagner et al., 2015), there is even discussion as to whether AI brains are significantly less biased than human brains (Miller, 2018). As of now, they may not be able to predict which woman is going into becoming a mafia criminal, but it is hopeful that by fixing and cleaning data, the results through these innovative minds may be more accurate. Currently, there are differences in surveillance, law enforcement and bias in the Italian criminal justice system data because, as per December 2017, only more than 60 women were accused of mafia association and imprisoned according to the Italian Ministry of Justice (Tondo, 2017). Table A4 in the Appendix also contains the numbers of reported or arrested mafia criminals by gender between 2008 and 2018. In addition, the recent report of the Italian Ministry of Internal Affairs includes a useful table that shows that the number of women that have been reported or arrested for mafia association are 197 in 2019, and 151 in 2020 (Ministero Dell'Interno, 2021:25). Consequently, the thesis seeks to address the need of an algorithm that would be able to correct the flaws in the system and assist the human in different ways – an example would be by predicting future system involvement of these women and allowing the system to tackle the problem at its roots.

The international examples above will have shown how stakeholders are riding the Fourth Industrial revolution, each expert advancing its field. The sphere that is of focus for the current thesis is the Italian criminal justice system's long-standing fight against the mafia. An accepted image of the mafia is that of the mafia man being killed, in prison or on the run. But why is it not almost as automatic to draw the image of the mothers, sisters, wives and partners of these men that have always played a key role within the organisations as custodians of mafia culture (Kahn and Véron, 2017:2). When inserting to Google search engine, the words "*donne e mafia*" (women and mafia), 14,000,000 results are revealed in 0.41 seconds and it is increasingly possible to see different titles that cast a light over the ambiguous image of mafia women. My academic research on this topic began 9 years ago while writing my undergraduate dissertation, and when the same words were inserted, most of the first page's results consisted of information, literature, non-profit organisation of women that fought against the mafia, that tired of being victims of the patriarchy, they had become rebellious and started operating with the state against, what for as long as they knew was, their blood and family (Associazione antimafia Rita Atria, 1997; Aiello, 2012; Puglisi, 2012; Falcone and Padovani, 2012; Bartolotta Impastato, 2018).

Nearly a decade later, the focus on the female detainees in organised crime has increased and caught the attention of the very public bodies that were silencing them (see Ministero Dell'Interno, 2021). The recent report from the Italian Ministry of Affairs offers an insight into the mafia women with an acknowledgment that they have reached roles of leadership, confirming the research supposition that there is a strong female presence within the mafia, which unfortunately has not been methodically followed nor recorded as accurately as the male data. Considering the move towards predictive justice, and the envisaging of AI being implemented in various sphere of law enforcement and justice system, a mindful approach needs to be adopted to ensure that long-standing prejudices towards gender are not propagated into AI algorithms. The ultimate aim is to cast light on the female human dimension of the three main Italian mafia organisations.

CHAPTER 3 METHODOLOGY

The methodology focuses and requires the engagement of broad stakeholders including academics, technologists, data scientists and ethicists to openly share current awareness of AI problems and study what the future holds in order to make positive steps forward in the legal field. The research methodology is divided into two main phases, which together form mixed methods in order to investigate the research problem and showcase bias in the Italian criminal justice system, specifically in the cases of organised crime as well as in those contributors that should be assisting with the breaking of bias.

The study seeks to bring the woman into the spotlight and expose her for her criminal actions, and question if her invisibility should remain so when she is being translated into automated algorithms. It should be noted that other research methods were initially evaluated, such as philosophical (Giugni, 2019) or statistical perspectives (Moret and Shapiro, 2001). However, in pursuit of a multidisciplinary approach, it was decided to adopt a mixed method research especially because when working on predictive tools, the error committed is that of delegating the task of creating an instrument solely to one expertise (e.g. data scientists). However, the key to fighting biases is to have different players contributing towards an interdisciplinary input, and avoiding knowledge mismatches. For instance, if solely focused on a philosophical approach, a mathematician would suffer from a knowledge and communications gap, making the dynamics of the group too unbalanced (Piorkowski et al., 2021).

3.1 Mixed Method Research

Phase 1 and Phase 2 produce a mix of data which, arguably, provide a stronger understanding of the issue than by using either or the other method on its own. A relatively recent body of literature has named this new method “mixed method research” (MMR) (Creswell, 2003:713-714) as it involves the collection and analysis of both open-ended and closed-ended data as a response to the research hypotheses (Teddlie and Tashakkori, 2009). A comprehensive definition of the methodology as an entire approach has been offered by Johnson, Omwuegbuzie and Turner:

> *Mixed methods is the type of research in which a researcher or team or researchers combine elements of qualitative and quantitative research approaches (e.g. use of qualitative and quantitative viewpoints, data collection, analysis, inference techniques) for the purposes of breadth and depth of understanding and corroboration.* (Johnson et al., 2007:123)

Discrete examples of MMR are dated as far back as the late 1970s (Denzin, 2017), and it only gained credibility a decade later with writers later referring to it as the third methodological movement (Tashakkori and Teddlie, 2010:221), or the third research paradigm whose time has come (Johnson and Onwuegbuzie, 2004:14). It is of use for the current study as its aim is not to substitute either qualitative or quantitative methods, but it positions itself in between the two approaches to research, bridging the schisms (Johnson and Onwuegbuzie, 2004:15). It uses different ways to make sense of the social world, although it could be criticised as a grey area, as neither just qualitative nor just quantitative. In fact, scholars have carefully identified features of MMR so to be recognised more easily and to make it more appetising among researchers. Some of these key components are that the researcher:

- Collects and analyses persuasively and rigorously both qualitative and quantitative data based on research questions. This is to be seen practically through the Phases of the current study.
- Mixes/integrates/links the two forms of data concurrently by combining them or merging them, sequentially by having one build on the other (e.g. Phase 2 building on Phase 1), or embedding one within the other.
- Gives priority to one or both forms of data.
- Uses these procedures in a single study or in multiple phases of a program of study (Creswell and Clark, 2011:5).

Illustrating that MMR can be exploratory, explanatory, confirmatory, action, transformative, and critical, combined in unique ways, is crucial (Christ, 2009:293). A combination of these features can result in limitless numbers of research designs, but a core of six has been identified, including the convergent, explanatory, exploratory, nested, transformative and multiphase design (Creswell and Clark, 2011:68). It is possible to argue that the current study could fall into different designs, i.e. the convergent, the exploratory, and the multiphase design (Creswell and Clark, 2011:69-70). The convergent design is engaged in Phase 2, where both qualitative and quantitative strands are implemented on a parallel, and then the results are mixed at the stage of interpretation. The multiphase design could be argued to resemble the design adopted by the thesis as it involves access to multidisciplinary expertise, and multiphases with each stage of data collection informing the conceptualisation and application of the following stage. The ultimate objective is to answer a central research question (Davidov et al., 2020:553). This method is often used to support the development, adaptation, and evaluation of specific programs. For example, Phase 1 starts by conducting a qualitative needs assessment study to understand the accessible data on mafia women. Using these results, Phase 2 is developed which

functions as an instrument to assess unconscious bias across the interviewees (Creswell and Clark, 2011:70-72).

However, the current research's approach of starting with an explorative qualitative phase and then moving sequentially to a quantitative one is known as "exploratory sequential mixed methods" (Mihas, 2019:40), and is arguably the most appropriate research design. In fact, the exploratory design begins with and prioritises the collection and analysis of qualitative data in the first phase (see Phase 1). Building from the exploratory results (Phase 1), the researcher conducts a subsequent phase (Phase 2) to test or generalise the initial findings.

What follows in Chapter 5 is derived from the same interviews of Phase 2, following a shift in focus of the same experts to the problem of de-biasing AI tools, specifically predictive systems that marginalise female data. Such problem-centred expert interviews invited reflections and supported the exposition of individual expert's experiences and opinions (Döringer, 2021:266). Teddlie and Tashakkori (Tashakkori et al., 2020) highlight that MMR typologies are regularly combined using multiple forms of data blended and merged. Therefore, Chapter 5 is the result of an exploratory expert interview, which is usually used to gain knowledge and orientation in emerging fields, therefore ideal to collate multidisciplinary insights from the experts in predictive justice and gender bias, and generate hypotheses on ways forward (Döringer, 2021:266). Consequently, the self-reflective enquiry the researcher and experts undertook served as a source of knowledge, which allowed to understand and improve practices in which they participate when contributing to AI work. To conclude, the results from Chapter 5 inform future work, and prompt the researcher to investigate next steps, post-PhD, and the need to devise alternative approaches to implement predictive justice taking into consideration marginalised communities affecting data collection methods.

3.1.1 Why Mixed Method Research and Its Limits

The rationale for MMR is based on the exploration of a topic before deciding what variables need to be measured. The starting point is to question what is already known given the existing literature. In the current study where the literature review reveals few findings on mafia women to guide the research, the qualitative analysis might be beneficial to ascertain a larger range of topics and how individuals frame their understanding around a specific event or phenomenon. The qualitative phase is "exploratory" as it is data driven (Creswell and Clark, 2017) rather than led by a conceptual framework, which does not mean that information from a literature review cannot be used, but rather the qualitative data is of use to better comprehend the research problem. The reason to postpone

quantitative data collection after the qualitative step is because additional conceptual leverage is required prior to conducting a survey or questionnaire (Mihas, 2019:3).

The shift from qualitative analysis to developing a questionnaire sees the codes becoming variables, themes being translated to scales, and quotations to survey items. This is the point of interface in this MMR as there is a transition from a qualitative mode of exploration to one that is quantitative and focused on measuring variables. The quantitative data collection can consist of both open-ended as well as scale-based questions depending on the literature review and the knowledge acquired from the qualitative phase. In addition, the language from the qualitative data can assist to form questions and scales can assist in quantifying the answers. Scales are defined as follows:

> *Measurement instruments that are collections of items combined into a composite score, and intended to reveal levels of theoretical variables not readily observable by direct means, are often referred to as scales.* (DeVellis, 2017:11)

Therefore, a Likert item was used in the current study's questionnaire to measure variables. A Likert scale presents the item in a statement, followed by options indicating varying degrees of agreement from "strongly agree" to "strongly disagree" (DeVellis, 2017). Similar items would be developed to further assess this theme. The quantitative data would then be analysed to assess significance and generalisability (Mihas, 2019:4-5). The researcher proceeds to interpret how the quantitative results build on the earlier qualitative results (see Phase 2). Separately in Chapter 5, the researcher explores reflections based on the technical knowledge of the experts. Technical knowledge relates to highly specific knowledge of their field (see, for instance, Dr Ryan's reference to zero-knowledge proof), which Bogner and Menz (2009) contrast to everyday knowledge, describing it as educational and classifying as the specific knowledge advantage of experts (Döringer, 2021:266).

The challenges with this type of method are in the collection and analysis of extensive data, which has been time-intensive, and the requirement to present both phases in a clear and flowing manner. Other limitations of MMR are arguably its young age, which may require some time before it wins more researchers over. Moreover, purists may be against mixing philosophical writing with paradigms, and there is also the additional obstacle for the researcher that has to be competent to conduct both qualitative and quantitative research, and to know how to mix them (Creswell and Clark, 2011:80-99).

Overall, the mixed method was chosen because of its strengths, such as the ability to work with both qualitative and quantitative data and minimise each method's limitations. Additionally, the mixed method is a suitable approach to develop a more complete understanding of the research problem and

changes needed for the marginalised group of women in organised crime through the combination of quantitative and qualitative data. It further assists in answering questions that cannot be answered through a single method, especially in the present case where the topic is multidisciplinary including experts that bring in different approaches from their standpoints. The adopted MMR further supports the development of new research models (e.g. pragmatism), it is applicable to the real world, and lastly provides a greater evidence due to the mixing and verification of results (Johnson and Onwuegbuzie, 2004; Creswell and Clark, 2011).

3.2 Methods of data collection

Following the overall methodological approach explained above, this section looks at further details of methods that were used to conduct each phase of the research and outlines some of the tools, procedures and materials consulted to gather data, and the criteria used to select sources.

3.2.1 Phase 1 – Qualitative

The mafia women's case-study was collated through existing open-source data, and key publications that showcase the wide range of offending women. Various key databases were identified in conducting the research of these women in four different languages (i.e. Italian, English, French, Spanish). The sample of the chosen mafia women (Table 1) represents the initial data that could be suggested to be used to train an AI model as the 30 women on the table embody the main and most powerful three organised crime groups in Italy: *Cosa Nostra*, *Camorra*, *'Ndrangheta*. Ten women from each organisation were chosen that represent various criminal roles and characteristics and a wide range of judicial sentences. Following ethics approval, the case-study was further elaborated as a result of email communication exchanged with Italian experts in the field suggested by the supervisory team (Dina Lauricella, a journalist from Sicily; Gaia Trunfio, from an anti-mafia Association; Mario Marcuz, a lawyer; Sandra Berardi, an activist).

Multiple sources of data were used to verify the accuracy of the information on the offending women, such as interviews, documents, and audio-visual information rather than relying on a single data source. Once the information had been verified, it was made sense of and organised into Table 1's categories. In extracting the features, an inductive and deductive reasoning was also key in building patterns, themes from the bottom-up by organising the data into cells of information. The inductive process required to work back and forth between themes and databases until a comprehensive set of themes was established. Whereas the deductive process allowed the researcher to look back at the collected data from the themes to decide whether more evidence could support each theme or whether they needed

to include more data. Consequently, while the first step in the process is inductive analysis, deductive thinking was also key as it moved the research forward (Creswell, 2003:624-625).

The Table was divided according to feature variables, specifically: sex, age at the time of arrest or imprisonment, birthplace, residence, whether married or not, whether mafia affiliated or not; if yes, through which personal link is the affiliation made, which organisation they belong to, the crime committed, sentence and year of sentence. Most of the information was collected through a thorough research of newspapers, from the most local to the national and international databases available online. Some missing pieces of the puzzle for specific women was researched on various other databases, such as documentaries (Lauricella, 2019b), books, online journals, tribunal transcripts, and some converging women profiles have been checked through various sources in order to ensure that the profiles are as accurate as possible. However, it is undeniable the challenge in collecting the mafia women's comparative data (Paoli et al., 2009). In fact, when liaising with a renowned Italian journalist, Dina Lauricella confirmed information is very limited but, from her personal experience, she believed that based on the available information on mafia women, their positions within the different organisations are quite similar among each other. However, the only details that differ are the historical periods, the contexts, the specific conditions of a specific criminal group, except for those leading female figures.

Returning to Table 1 and the feature variables, a manual process was undertaken in order to identify related features on a first set of data that included over 30 mafia women. The selection of the features is a key concept in machine learning which affects the performance of the AI model. Consequently, age was chosen as one of the features to inform the model of the age range of offenders. Birthplace and residence should assist in training the model to accept that women do not necessarily stay in their birthplace, but due to either marriage, criminal business or other reasons, they move to other cities in Italy or even abroad. The "married" feature is needed to teach the model that women do not necessarily need to be affiliated to the organisation by their husbands. The "mafia affiliation" feature specifies through which connection they are affiliated to the organisation. The "organised crime" variable specifies which main organisation they belong to, and the crime feature allows the model to learn the varied range of offences mafia women are involved in. Lastly, the sentence and the year of sentence detail how varied, strict or lenient the courts have been in imposing a punishment on the women throughout the years.

Hobbs and Antonopoulos state that cross-border research may experience variable access to information (Hobbs and Antonopoulos, 2014). For instance, Dutch police are more welcoming to academic researchers than law enforcement bodies in other countries (Kleemans, 2007). In fact, materials used in the research to gather information on the hidden feminine mafia world vary from Italian case-law (very limited and challenging to access as not publicly accessible), international books, autobiographical accounts and media.[29] It should be noted that although an attempt was made to use Italian official archives, trial transcripts, reports from police enforcement (Hess, 1973), accessing these has been challenging. It is renowned that researchers of organised crime also seek to conduct interviews, and use parliamentary and trial sources (Gambetta, 1996:155). If the research's intention was to dig deeper, then statements from *pentiti* would ideally be pursued as Professor of Criminology, Letizia Paoli, did through her structural and cultural study of the *Cosa Nostra* and *'Ndrangheta* (Paoli, 2008). However, these avenues of research were obstacled by the limitation of the current study's ethical constraints that did not permit an interaction with dangerous mafia members. Network analyses (e.g. wiretap records) also were not possible (Natarajan, 2006), although they would have assisted in the attempt to reconstruct the female dimension of criminal networks. Moreover, another factor that added to the challenges of travelling to places of interest to conduct interviews of experts in the field has been the COVID-19 pandemic. Consequently, the interaction with experts has been conducted via electronic means.

Other types of network analyses have, however, been used. In fact, autobiographical accounts such as in the study of Howard Marks (an illegal businessman) by Professor Morselli (Morselli, 2001) is of

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[29] See examples:Freda Adler, *Sisters in Crime: The Rise of the New Female Criminal* (1975);Pat Carlen, *Criminal Women* (1985); Frances Heidensohn, *Women and Crime* (1985);Anne Worrall, *Offending Women: Female Lawbreakers and the Criminal Justice System* (1989);Clarice Feinman, *The Criminalization of a Woman's Body* (1992);Renate Siebert, *Secrets of Life and Death* (1996);Tamar Pitch, "Le differenze di genere" in *La Criminalita in italia* (2002);Kate Fitz-Gibbon and Sandra Walklate, *Gender, Crime and Criminal Justice* (2004);Giovanni Fiandaca, *Women and the Mafia: Female Roles in Organized Crime Structures* (2007);Umberto Santino, *Mafia and Anti-Mafia: A Brief History* (2014);Federico Varese, *Mafia Life* (2017); Dina Lauricella, *Il Codice del Disonore* (2019); Archives of *Rai*, which is Italy's public national broadcaster. *Rai Teche* is the repository of all media that has been produced and aired by the channel since 1995. The archive is second to the BBC for the volume of materials that it has catalogued and held for years. Videos and documentaries offer an additional dimension for the study to rely upon-See: Marc J Ventresca and John W. Mohr, "Archival research methods" (*The Blackwell companion to organizations* (2017)), 805-828; Barbara E L'Eplattenier, "Opinion: An Argument for Archival Research Methods: Thinking Beyond Methodology" (*College English* 72.1 (2009)), 67.

assistance because it connects processes of learning with ways of knowing while simultaneously referring to social and cultural influences (Polkinghorne, 1988; Neuman, 2006; Richardson, 2016). Unlike other models of research that, as Catherine Emihovich (Emihovich and Lima, 1995) highlighted, are often rhetorical and marginalising when exploring issues that challenge normative values and status quo of the dominant culture, critical autobiographical research is able to emancipate research from the strongholds of traditional forms of research. It focuses less on a state of being and more on the processes of learning and becoming. In fact, Clandinin and Connelly (Clandinin and Connelly, 2004:146) described the task for autobiographical researchers as:

> *Not so much to say that people, places, and things are this way or that way but they have a narrative history and are moving forward. The narrative research text is fundamentally a temporal text – about what has been, what is now, and what is becoming.*

Hence mafia women's autobiographical accounts are rooted in the thesis in a purpose to deconstruct life's experiences that, according to Donald Polkinghorne (Polkinghorne, 2010), empower researchers to analyse past events and actions as a means to examine previous outcomes as well as the planning for possible future outcomes (Walker, 2017). It is these future outcomes that the current thesis seeks to contribute to via the unveiling of a reality that for long has been downplayed or masked in an alpha male organisation.

However, when using autobiographical literature, it should be borne in mind that bias is an inherent attribute present in all thought and perceptions (Peshkin, 2001), therefore analyses of reflective memories and narrative are also biased. Consequently, in order to aid the thesis in gaining a more holistic view of the sample of women used in the research, other sources, such as those deriving from archival research, have been of use in order to counterbalance stories told from a personal point of view, enriched with other perspectives that may be derived by journalist's telling of the same stories, judges' analysis of facts, and more.

Although personal stories could be counterbalanced by other sources, it should also be noted that archival materials are never transparent nor innocent. In fact, they may offer partial or contradictory evidence for the interpretation of mafia women (Mohr and Ventresca, 2002:4). However, the archival research involves the discovery and use of primary sources held in archives, Special Collections library, or repository. The sources can include documents, records (both hard or soft), audio, video materials (The National Archives, 2016:4,19). Moreover, most of archival sources on mafia women as well as others that the thesis has relied upon were in the original language, and some limited in access. Italian

materials were accessed through external collaborations, specifically with academics based in Italian institutions. However, the research has been facilitated by my proficiency in the Italian language, which simplified the process of consultation of raw and original data. This spared time and resources and avoided the need to use third parties to act as intermediaries for translations.

It is worth thinking of Phase 1 as a study of collective behaviour as in George Rudé's work on the "crowd in history" used in European history and also on methodological issues to study popular movements (Holton, 1978). The historian Rudé's understanding of the crowd referred to a protesting crowd, however this may be applicable to the mafia organisation if looked at it as a crowd on its own. Crowd study may be seen as an investigation of why it is that particular communities (e.g. mafia ones) become involved in collective public behaviour to the extent that they do, and what function and meaning such behaviour in its different forms has for the community involved. This way of analysing the mafia is likely to cast a spotlight on the origins, meaning and function of territorial and community identity from the level of the organisation's street and neighbourhood, thereby contributing to an understanding of the intrinsic dynamics of mafia women's presence within the criminal group (Holton, 1978).

Methodologically, Rudé's analysis was based on the thinking that crowd activity could be used to involve social purpose instead of mindless pathological disorder. Consequently, crowd activity could be seen as a crucial part of the social process within which the popular politics' nature could be approached directly, rather than through general descriptions such as "the mob", "the offenders", etc. therefore, the task was to establish both the social composition of the crowd often through a list of the arrested people, killed or injured. This would be followed by an evaluation of the degree of the success achieved by the crowds, and an assessment in which the variables affecting the intervention or non-intervention of law-enforcement agencies is identified (Holton, 1978).

Although the current research is not a crowd history study, Rudé's method of reporting and analysing crowd behaviour in France and Great Britain during the French Revolution from a bottom-up perspective is of use. Rudé focused on the people and not the leaders; therefore, the methodology reinforces the reason why the current research uses the mafia woman as a case-study to learn more about them. Additionally, it shifts the focus from the manly mob bosses found at the top of the organisations' hierarchy to the overlooked female presence. The mafia case-study assists in looking at the organisations from a bottom-up view to anatomise its participants, and more specifically, female participants.

Finally, in the qualitative research step, the importance reflexivity (or "self-reflection" (Lather, 1993:674)) plays should also be highlighted. Reflexivity can take different forms. Some categorise them as personal, and functional (Wilkinson, 1988). My personal role as the inquirer brings me to reflect on how my background, culture and experiences have potential to shape my interpretations, such as the themes I put forward and the meaning I assign to the data. This is in line with what Wilkinson explains on how "personal" aspects of reflexivity refer to the researcher's own identity as an individual, woman. Consequently, for the individual, her research is usually an expression of her personal interests and values and the chosen research topics are likely to derive from personal concerns (Wilkinson, 1988:494). The functional reflexivity refers to reflection on the nature of the research, inclusive of the chosen methods and the construction of knowledge in order to reveal assumptions, values and biases (Wilkinson, 1988:495). In fact, this part of the methodology is more than simply advancing biases and values in the thesis, but more about how my own background has shaped the direction of the study. Additionally, the holistic account is not to be undermined in the research's development of the mafia woman's complex picture as an issue under the microscope, which involves reporting different perspectives with the aim of drawing a larger picture that surfaces (Creswell, 2003:626-627), that had been overlooked by many.

3.2.2 Phase 2 – Quantitative

Relevant to Italy and the case-study is the *Project Proton* co-sponsored by the EU that directly informs what the research seeks to accomplish in analysing the accuracy of the data that is being used in modelling the processes leading to organised crime.[30] The project ended in September 2019, and it is crucial that research as such that are led by experts in the technological field are questioned in relation to how much gender has been taken into consideration in the process of modelling, and how more or less biased the outcomes it produces are.

The thesis seeks to engage with AI experts (including computer scientists) to understand how their personal biases affect their way of modelling an AI system that predicts whether a person is an offender or not. It is key to interview the experts to understand, firstly, if they are biased when they think about the mafia. Secondly, if and when that is asserted, a more critically informative, holistic (Stockman, 2017:108) conversation would be needed to understand how the bias on the topic may affect the modelling of an AI system that should aid predicting the culpability of a mafia woman or making a risk

[30] See https://www.projectproton.eu/ [accessed on 1 April 2020].

assessment of their involvement in the organisation. The results of the impact of this type of research are explored in Chapter 5.

Phase 2 encapsulates the data from the qualitative analysis as well as the information collated through the variedly structured interview questionnaire. More specifically, the qualitative Table 1 formed the basis upon which quantitative Table 2 was created. Table 2 can be identified as the bridge between Phase 1 and Phase 2 according to the MMR. Based on the Phase 1 process, the key themes were identified, and summarised in Table 2 that offers a numerical quantification snapshot of women offenders divided by mafia organisation.

Table 2 offers an understanding of the proportion of women with criminal involvement that goes to show how imperative it is that this data is not missed when drawing a picture of Italy's underworld mafia. The data has been further enriched with official data (Hobbs and Antonopoulos, 2014:98) collected by liaising with Italy's Institute of National Statistics (ISTAT) and by studying if and how a public research body places care in the collection of gender data and what that information could reveal for the purposes of the current study (see Appendix Tables A1-A4). To simplify the reading of the spreadsheets shared by ISTAT, and to bring these to focus in line with the research's aims, the documents have been translated from Italian to English and only relevant crimes have been reported. Other data available on the documents included information on crimes such as stalking, abduction of people, sexual assaults, thefts, and more. Although these may as well have included mafia members, the statistics did not specify this. Hence why, Tables A1-A4 have been re-adapted to focus on selected data only.

Secondly, the AI and legal-tech experts were identified through academic and professional connections and they had agreed to participate in the interview. In order to test if the scientists were unconsciously biased on the chosen subject-matter, they were provided with a general introduction to the Italian mafia and factsheet in order to explain terminology that would be used during the interview. Consequently, following the introduction, they proceeded to answer general experimental questions based on profiles of mafia women (from *Cosa Nostra, 'Ndrangheta*, *Camorra*) found in Table 1.

The thesis is based on the basis that in order to get beyond biases, we must first take account of those biases. By taking account of the effects of biases, the developments in the field of AI can be conducted in a way that effectively balances the safety of citizens with fair justice under law (Clemons, 2014:713). In order to understand biases and their effects on predictive justice systems, one must first look into the

psychological foundation that nurtures discriminatory attitudes. Our minds draw subconscious relationships between nouns and adjectives, which form the basis of "implicit associations" (Carpenter, 2008:33). Through these implicit associations humans locate the people, places, and things in our lives to help our brains make sense of the world. As our experiences confirm those associations with time, these become built into our subconscious minds. For instance, we are able to associate sugar with sweetness, a crying person with sadness, and a fire with heat without having to make a conscious effort. Therefore, the exercising of implicit associations is a useful tool as it allows our conscious minds to conduct advanced functions while more basic tasks operate unconsciously (Carpenter, 2008:34).

Implicit associations are separate from explicit attitudes, which include thoughts on a specific topic that are consciously controlled (Wilson et al., 2000:101-102). Dovidio *et al.* explain that it is possible for a person to have different implicit associations and explicit attitudes about a given matter, especially on socially sensitive issues (Dovidio et al., 2002). For instance, Karpinski and Hilton explore that because a small number of modern Americans would confess to own negative explicit attitudes towards racial minorities, psychologists have invented the Implicit Association Test (IAT), which is a method of bypassing one's conscious attitudes to discover their implicit associations (Karpinski and Hilton, 2001:774-775). The University of Washington, University of Virginia, Harvard University, and Yale University are involved in the Project Implicit, in which they offer various IATs to collate data on the unconscious bias about discriminatory behaviour, stereotypes, prejudices in races and ethnicity, religion, gender, sexual orientation, etc (Ocejo, 2020).

Judges, for instance, have been empirically shown to have implicit racial biases (Rachlinski et al., 2008). The cumulative effect of implicit racial bias on the decisions made by criminal justice actors result in a wave of racial imbalance which starts from the police officer who decides to stop an individual to the final judge's sentencing hearing. At each decision stage along the process, the disparity expands. For instance, citizens from a black minority are more likely to be stopped and searched, arrested, and charged with more severe charges and sentences. They are also less likely to receive an exhaustive defence (Clemons, 2014:699). This is applicable to any other type of bias, specifically the gender bias in the context of organised crime. Although inspired by the IAT, the survey design encouraged a more holistic reflection, while providing a rather rapid quantitative description of opinions of experts by studying a sample of the population (Creswell, 2003:537) or rather a marginalised community, that for the purpose of this specific research, concentrates on mafia women. Data collection happened at one point in time or over time, depending on the stakeholders' availability, over Zoom, Microsoft Teams, or

telephone (Fink, 2015; Fowler Jr, 2013; Krueger, 2014). The solely virtual nature of the interviews is due to the global pandemic that acted as an obstacle to travel and meet people face-to- face. However, the electronic means of communications also supported the opportunity to collect data internationally, from experts in Australia, Asia, Africa and America.

Questions were worded in a user-friendly manner so to engage the stakeholder in a flowing conversation. Once the information was collected, a data extraction process was undertaken to quantify the answers and draw inferences on female criminality perceptions. The questionnaire was created with an initial set of general questions focussed on the mafia to slowly settle the researcher and participant into the interview context. The conversation then proceeded to different mafia women scenarios presented to the interviewee, providing their characteristics (e.g. age, whether single or married, with children or not, etc.) and an extract of their stories available from the consulted materials within the literature review. The participants were then invited to answer questions, such as whether they believed for that mafia woman to be guilty, not guilty of mafia association or cannot say, whether they believed the criminal justice system convicted them or not, and invited them to specify on a scale from 0 to 10, where 0 is Not Guilty and 10 represents Guilty, on how guilty they believed that mafia woman is. The interview schedule template can be read in the Appendix. Part 1 and 2 of the schedule has contributed to Phase 2.

There are substantial benefits to a scenario-based approach. This interview method was adopted because it facilitates the uncovering of patterns that erode impartiality or enhance biases in the context of depicting the mafia, and more specifically the role of the woman within the organised crime group. Scenarios provide an accessible entry point to engagement with stakeholders that would facilitate meaningful discussions to elucidate how to combat biases once these are identified. McWhirter *et al.* holds that, more importantly, scenarios allow to evaluate ethical, legal, and social theories in the context of actual and predicted practice, rather than the more restricted value of investigation and discussion at the broad level, which may hide a multitude of presumptions and misconceptions (McWhirter et al., 2020). This scenario-based method should provide the opportunity to reflect on the changing nature of predictive justice research and practice more generally. Tools are needed to assist in articulating the challenges of identifying historicised prejudices to then proceed to cleaning dirty data, and the scenario-based method provides one such tool.

Features of these women were extrapolated to engage in a conversation with the interviewees as to how the data could be inputted to create an AI model that does not render the women's presence

invisible. Features the document presented included information needed for an AI system to produce an outcome that predicts whether a woman is likely to be engaged in mafia association or not. If and once it was ascertained whether the participant, as would any other person that has some general knowledge of the mafia, had some bias on the image of the woman tested through the questionnaire, the interview focused on how that specific bias may affect the formulation and training of the AI model in identifying criminal mafia women. However, even if the expert did not reveal a substantial bias in its categorisation of women, it was still fruitful to have a conversation on how a data cleansing process may be of help in these circumstances.

As Stockman states: "A more holistic, critical, human research takes the bigger picture into account" (Stockman, 2017:111). From the interview schedule enclosed in the Appendix it should be clear that part of the questioning sought to comprehensively understand whether, if and when the technical expert is made aware of a reality that he/she was not aware of, the bias could be corrected in the AI model. The improved system then should work in a way that the outcome does not necessarily picture the *mafioso* as the sinner and the *mafiosa* (mafia woman) as the victim, as a result of exposing the bigger picture. Additionally, close monitoring of technological developments in the legal field as well as publications on AI, gender and the criminal justice system are a recurrent theme and will continue to be so, especially with a rather worldwide consensus that data-driven technologies such as AI will underpin countries' future prosperity (InterAction Council, 2017).

Italy is not at the same pace as the UK in following these developments, although there is a real interest in joining the latest industrial revolution. Therefore, research and development that have already advanced in the UK and other countries (e.g. USA) could inform countries that have recently embarked on the same journey. Reports are being published from many different bodies, whether professional ones, academic, or governmental, which expose how legal AI could be affected by biased data that would produce biased outcomes (see: Centre for Data Ethics and Innovation, 2020; Dillon and Collett, 2019; The Law Society, 2019; West et al., 2019).

3.3 Phase 1 + Phase 2= Mixed Methods

Current research strands focus on the Fourth Industrial Revolution and associated developments. It is, therefore, crucial to slow down these technological advances to allow for legal frameworks to catch up and consider potential issues that might arise from them. For instance, in the implementation of AI solutions that run risk assessments or provide recommendations as to the probability of criminality of a given person, the data used to train the tool should include a fair and diverse representation of women

and men. The aim of seeking a completely impartial judgment via the help of AI is yet a troublesome outcome given "dirty data" at an input stage. For instance, in France, *Predictice* was tested which was a software that examines precedents and suggests an outcome that is pertinent to the case that is being decided. The software supported both judges and lawyers to make justice more linear.[31] However, if this is what we are moving towards, it is crucial that the data that is being fed to these AI-based systems undergoes a cleansing process that is reflective of reality and that produces formulas that do not fall foul of the current criminal justice system and mafia structures, which are already biased and reluctant to openly hold mafia women accountable as much as men (Siebert, 2007:19-20,33).

The overall approach to this thesis is to use a mix of data and methods which allow for a combination of numeral measurement and in-depth exploration.[32] This is because literature on organised crime has only recently embraced quantitative-oriented approaches. In fact, projects like *Proton* have noticed studies adopting a mixed methods approach by using judicial and law enforcement data together with interviews to analyse the recruitment processes into mafia and other criminal groups. These quantitative studies have mainly focused on drug smugglers, gangs and other criminal groups. Consequently, the fact that recent studies have moved towards a more quantitative method may have resulted by a systematic collection of data on organised crime, stored in structured databases, academic access to confidential information on offenders, and a growing interest to understand the phenomenon by government institutions (UCSC-Transcrime et al., 2017:47).

Consequently, in order to add to the body of emerging literature, the thesis seeks to use two mixed methodological phases: Phase 1 (qualitative), and Phase 2 (quantitative), which form the mixed methods, following the exploratory sequential design. **Phase 1** seeks to predominantly use qualitative methods using mafia women as a case-study focusing to understand how the judicial system has identified them, categorised them and whether they have been held accountable for the offences committed (Table 1 found in Chapter 4 provides a sample table based on the open-access information with several mafia women profiles, containing data such as crimes committed and their sentences). The case-study is useful to depict a pattern of how judges justify women when linked with criminal offences

[31] See https://predictice.com/a-propos [accessed on 22 June 2019].
[32] John W Creswell, "Research Design: Qualitative, Quantitative, and mixed methods" (2003); Geoffrey Marczyk, David DeMatteo, and David Festinger. *Essentials of research design and methodology* (John Wiley & Sons Inc, 2005); Sharan B Merriam, and Elizabeth J. Tisdell. *Qualitative research: A guide to design and implementation* (John Wiley & Sons, 2015); Mark Balnaves, and Peter Caputi. *Introduction to quantitative research methods: An investigative approach* (Sage, 2001).

and how they are made to match the notion of femininity and rendered invisible within the criminal organisation, and consequently made lacking agency within the judicial process.

The case-study is mostly valuable as it offers a way to describe, compare, evaluate and understand different aspects of the mafia, the role of the woman within it and when placed in front of a judge. The case-study allows for an appropriate design seeking to gain concrete, contextual, in-depth knowledge about the real-world of how mafia women are depicted in judicial reasoning, and understanding characteristics, and implications of the court cases in producing data that may result in biased AI-systems.

The case-study on mafia women has been considered to draw a pattern of these feminine and masculine mafia women, and assists in depicting the different types of mafia women from the faithful religious partners to those that undertake a more active role, up to those that are real bosses. These profiles could not form a uniform standard easily translatable to a compound of data that can be led through an AI system to predict and detect mafia women based on scattered precedents. Moreover, the case-study should support the thesis to focus on mafia women and make space in the field to a neglected aspect of criminal organisations, which is the feminine world that for long has been secluded within a masculine dominated one. Highlighting the presence of mafia women, and their various active roles within the organisations may shed new light on the research problem, by giving as complete a picture as possible of the subjects that would consequently feed into modern courts data that is less biased.

Phase 2 of the methodology seeks to provide a quantification of Phase 1. Having in Phase 1 drawn a qualitative pattern of how mafia women tend to be translated into judicial terms in a biased way (i.e. rendered wholly or partially invisible within the criminal justice system), Phase 2 proceeds to provide a quantification of the bias. At this stage, the research seeks to collect as much data as possible to generate statistics that can be subsequently presented to computer scientists who will thus have the possibility to design their AI algorithms with less biased data, i.e. a more inclusive representation of men and women in mafia crime, given that even recent studies on the matter, focus on mafia members being 98% men out of 13,229 criminal convictions (UCSC-Transcrime et al., 2017:199-200). This research focuses on the invisible number of women within that.

AI algorithms are data models, i.e. they generate an output based upon on what they have learnt on previous data. Most of the AI-algorithms are trained like one trains a baby brain (also known as

"supervised learning" (Nasteski, 2017)). If the baby has been taught something inaccurate or biased, the reaction the baby will have when presented with the same situation is going to be logically inaccurate or biased. Data quality to train AI-based algorithms is key to generate as much of an unbiased outcome as possible. If the collection of data contains a heavy presence of men being associated with mafia without a truthful proportion of women, the input of the data would create an AI model that is more prone to hold mafia men more accountable for the criminal offences overlooking guilty women, in a situation of adopting predictive judicial outcomes. Therefore, a statistic representing mafia women should be recognised and subsequently fed into the AI system in order to produce less biased judicial outcomes (see the Scheme in the Appendix). It is highly relevant to raise this point when following technological developments in the legal AI framework.

Phase 1 and **Phase 2** align with what Philip Runkel (Runkel, 1990) (a research methodologist), described as "casting nets and testing specimens" (Stake, 1995). In order to find common relationships among mafia women cases, the thesis casts nets to catch as many cases as possible that deal with women involved in crime in Italy, as shown in Table 1. For finding how the individual case of mafia women works, the thesis examines single specimens. Runkel called casting nets (i.e. aggregating measures across cases), the method of relative frequencies. Both qualitative and quantitative phases within the thesis cast nets (1) when they look at frequencies within the cases (i.e. how many women were married and associated to the mafia) and (2) when they do cross-case analyses (Stake, 1995:36) between mafia men and women to show bias. Runkel labelled it the method of specimens when the intent is to learn about the species (i.e. mafia women, for the purpose of the current thesis) by examining a big sample or a sample of one.

The method of specimens is useful in order to come to know extensively and intensively about the single case. For instance, it is expected that if a mob crime is committed, the judicial system would look for a *mafioso* rather than the feminine counterpart. See, in fact, Anna Mazza who represents a historical image of a woman as a leader that after her husband's death in the 1970s, takes control of the clan for over 20 years. She was able to create a vast and powerful network, leading a matriarchy (Agence France-Presse, 2016). Her success is dependent on the culture's delay in depicting who she really was and what she really did, which allowed her to take advantage of women's impunity that was reserved to them due to the dominant patriarchal judicial stereotypes.

As a result, Phases 1 and 2 are both needed in order to cast the nets over the mafia women and test them in order to examine how the judicial reasoning has produced inconsistent results when identifying

them, interpreting their actions, sentencing them, which will consequently affect the data that is collected and fed into modernised courts founded upon numbers, coding, statistics, variables.

3.4 Interview Process Overview

The questionnaire results fed into Phase 2 of the mixed methodology and the holistic reflections of Chapter 5. The interview schedule was divided into three parts: the first part included predominantly open questions on the general depiction of the mafia and the roles played by the man, woman and other members; the second part included scenario-based questions derived from three renowned mafia personalities and events; the final part fed into the reflection piece of the thesis encapsulated within Chapter 5.

3.4.1 Participant Recruitment

Following ethical approval (Ref: RKEEC200201), experts in the field were contacted either via email or LinkedIn. These included data scientists from renowned corporations, to experienced legal-tech lawyers, IT consultants, and more. With the initial communication, the Participant Information Sheet and Consent Form (see Annex) were included, which were signed, dated and sent back before the interview took place. My professional position within a law firm facilitated recruiting participants who were keen to contribute towards current debates on AI in the legal field. As the interview was divided into three sections, some of the participants were accommodated throughout shorter sessions, but multiple times due to different time zones and their agendas. The data collection and analytical process for Phase 2 and Chapter 5 took 8 months, as due to the fast-paced nature of the topic, it was held best to keep the interviews concentrated, and studied as swiftly, efficiently and thoroughly as possible.

Fox explains that recruiting participants in research tends to use either existing networks or ones known to the researcher or to key informants in the context. In fact, lawyers that have been recruited result from the contacts at disposal at the legal firm where I am employed. Other contacts derived from direct approaches. In fact, Fox identifies different methods which can be used for recruitment: approaching senior members of an organisation, using informal networks, direct communications or the internet. Fox also explores “snowballing”, which entails the asking of respondents to provide names of possible other interviewees that can be contacted (Fox, 2009:12-13). This method was adopted within the questionnaire which during the conclusive remarks would pose the question of other experts from the participant’s own network that may be relevant for the study (Parker et al., 2019; Vedapradha et al., 2019). The snowball sampling to attract more participants to the research is strictly in line with the interpretative phenomenological analysis (Alase, 2017:13) explored below .

When choosing respondents to maximise diversity, the intention of the interviewing is to get a range of perspectives, even if these may be extreme and may or may not represent the "average" view (Fox, 2009:12). However, Fox argues that this theoretical or purposive (Emmel, 2013) sampling enables the data to count much more than if analysis is based on a broadly representative sample. This kind of approach is different from a quantitative sampling strategy. The number of people interviewed is not relevant, but what matters is that each respondent is able to add something to the researcher's understanding of the setting with the aim of uncovering the widest range of meanings held by the participants in the given context. A purposive sample has the objective to produce a selection of informants representative of their ability to clarify a specific theme, concept or phenomenon ("Purposive Sample," 2008; Robinson, 2014). The selection process involves identifying themes, concepts, and indicators through observation and reflection (Schutt, 2018:348). The purposive sampling technique is the deliberate choice of a participant based on the qualities the participant possesses. It is a non-random technique which does not require underlying theories or a set number of informants, but it is the researcher who decides what needs to be known with regards to the phenomenon of interest, and finds people who can and are willing to provide the information as a result of their knowledge or experience (Bernard, 2017; Etikan et al., 2016:2). Among the various purposive sampling methods, expert sampling has been of assistance (see below). Expert sampling calls for experts in a particular field to be the subjects of the purposive sampling. Such sampling is a useful tool where there is a lack of observational evidence and new areas are being investigated to assess whether or not further study would be worth pursuing (Etikan et al., 2016).

For the purpose of the current research, ten interviews were conducted and no more participants were pursued because a trend of answers were identified in the field of law, data, and ethics and Taylor and Bogdan advise that when it is not possible to uncover new meanings in an interview, it means that enough participants have been interviewed (Taylor and Bogdan, 1984:83). Fox explains that this is known as "theoretical saturation", which entails a concurrent process of data collection and analysis to monitor when no new meanings are surfacing from the interviews, and it is held to be suitable for exploratory research (Fox, 2009:12).

3.4.2 Participants

A sample of elite experts were identified to ensure that the analysis of perspectives reflected the broad view of participants. The logic and power of purposive sampling of experts lie in selecting interviewees who are knowledgeable about a subject matter and willing to share their knowledge. Expert sampling

involves identifying key informants who can inform a study through their knowledge, experience, and expertise. Experts can offer valuable insights into the causes of problems, what has been done and failed, what has been done and worked, and future trends to monitor ("Expert Sampling," 2018). In fact, the selection of interviewees was made on the basis of including key figures that would ideally be needed to be involved in the process of creating an AI-Assistive Tool. The expert sampling strategy has been adopted to select the respondents to represent different categories, for instance, elite members within scientists, lawyers, and ethicists. The participants have also been chosen to maximise diversity. A justification for the choice of experts has been provided below through a description of participants' characteristics. This is in line with Matlis and Lawrence who explore that, for 35.2% of studies, such descriptions outline the population from which interviewees were chosen together with further contextual details. They add that these usually included an anonymised description of the organisation, sector, or range of sectors respondents belong to (Maitlis and Lawrence, 2003:113; Saunders and Townsend, 2016:20).

In the last three decades, there has been a small but growing literature on elite interviews, partly resulting from the resurgence of ethnographic research (e.g. interviews, focus groups, case-studies and participant observation), but also because scholars have become increasingly interested in understanding the perspectives and behaviours of leaders in business, politics and society as a whole (Harvey, 2011:432). Because the body of literature is emerging, there is no clear definition of the term "elite". Zuckerman (1972) uses the term "ultra-elites" to describe individuals who hold a significant amount of power within a group that is already considered elite (Zuckerman, 1972:160). McDowell (1998) analyses a broader group of "professional elites", because they are "highly skilled, professionally competent, and class-specific" (McDowell, 1998:2135). Parry uses the term "hybrid elites" because she argues that critical knowledge does not necessarily exist in traditional institutions, "but rather as increasingly informal, hybridised, spatially fragmented, and hence largely "invisible", networks of elite actors" (Parry, 1998:2148). Given the undefined nature of the term "elite", Smith recognises why academics have shaped their definitions to match their respondents (Smith, 2006). When referring to the current study, I define elites as those who occupy senior positions within tech corporations, organisations, law firms, and academic institutions with data and AI expertise.

Literature on interviews and participant selection/sampling guidance rarely indicate a precise number of "expert voices" needed (Baker and Edwards, 2012:6). It is common practice not to have a too small of a number that would obstacle obtaining data saturation, and not too many participants either that would

make the analysis challenging (Onwuegbuzie and Leech, 2005). Therefore, ten experts were interviewed for Phase 2 and Chapter 5. They were all anonymised for the purposes of the bias discussion in Phase 2, and some kept their anonymity for Chapter 5 too. Others expressed that they were happy to be quoted and contribute to this active area of research. The anonymised participants in Phase 2 have been assigned an ID consisting of "I" (for Interviewee) and a number (e.g. I2, I3, I4 etc.). Chapter 5 offers titles of the participants and a brief description of their expertise. To summarise, the chosen participants had a range of experience that ideally would form part of a multidisciplinary team working towards one objective of creating an efficient predictive justice tool, limiting gender biases. Their fields of expertise are illustrated below:

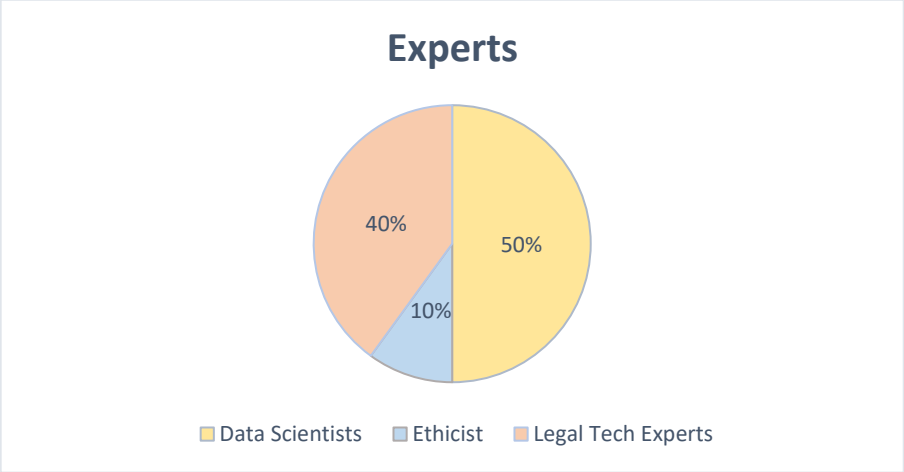

Figure 1

The 50% of "Data Scientists" work for multinational companies such as Microsoft, Pfizer, Shell, and Space Agencies. They consist of senior applied scientists, mathematicians, researchers and IT consultants. The 40% of "Legal Tech Experts" are experienced international lawyers, and senior lecturers from institutions like the Australian National University and transatlantic law firm, Womble Bond Dickinson. The 10% consists of a non-practising barrister that is leading legal-tech innovation in Africa whose concerns revolve around the ethics of implementing AI. In short, the reason for the type and number of participants is based on transparency, the possibility to show that the collated data are of sufficient depth to equip the study with salient information in relation to the research aims and of satisfactory breadth to allow coverage within the responses.

3.4.3 Development of the Participant Information Sheet, Consent Form, and Interview Schedule

The Participant Information Sheet (PIS) and Consent Form (see Appendix) were sent to the experts at the initial time of contact. These were drafted and thoroughly reviewed by the Ethics Committee before being approved to be shared with the participants. The Ethics Board's review took seven months, as the reference of the mafia case-study required a higher level of scrutiny. The lengthy process ensured that the interview pack was well reviewed before the engagements of the external participants.

The PIS included an overview of the research, and information that would assist interviewees in deciding whether they would have liked to contribute to the study or not. Once they had read the PIS, they were invited to read, complete, sign and send back the Consent Form. The Interview Schedule was not shared with the participants until the moment the interview took place as a preview to the questions would have solicited prior research being done, which would have affected the results of the bias expert discussion.

The Interview Schedule was divided into three parts: the first and second as seen above at Phase 2, which included open questions and Likert scales; the third part's results consisted of the expert's reflections presented in Chapter 5. In short, the interview structure had three components: (1) a discussion on AI and potential bias; (2) a concrete bias process discussion based on the case-study; (3) a reflection on the way forward.

Literature on how to draft surveys and how to word questions were consulted to assist in the drafting of the questionnaire (Alvesson and Ashcraft, 2012; Baker and Edwards, 2012; Dolnicar, 2013; Fowler Jr, 2013; Fox, 2009; Krosnick, 1999; McCracken, 1988; Schaeffer and Presser, 2003; Survey, 2017). More specifically, the function of leading questions was explored and some literature explains that the use of this style of questioning is usually avoided as it may cause interviewees to respond to in a biased way (Survey, 2017). However, other perspectives analyse the different types of leading questions available that have their advantages depending on their intent, objective and framing. It could be argued that the scenario-based questions may seem leading, but are based on assumptions. Assumption-based leading questions are usually used in surveys where the intention is to evaluate the respondent's perception of something, and to test those assumptions (Formplus Blog, 2021). Therefore, these types of questions assisted with the bias expert discussion (see below), and to understand the likelihood of the participants becoming aware of their assumptions and pushing back prejudices that may have surfaced. Implicit techniques seek to gather information without asking directly, but by measuring participant reactions related to inherent and subconscious attitudes (Ocejo, 2020). The asking of the scenario-based

questions was inspired by the IAT that psychology researchers have used for the past forty years, and the first tool was created in 1998 to investigate and discuss unconscious attitudes, stereotypes, and prejudices towards racial, gender, religion or sexual orientation differences (Greenwald et al., 1998).

The final version of the questionnaire was developed after a pilot study to ensure that the objectives of the interview were going to be achieved. The argument to have mock interviews derives from the assumption that once a pilot study has been conducted, researchers and particularly novice researchers, will be more knowledgeable, and prepared to face the challenges that may arise in the substantive study and become more confident in the use of the tools for data collection, (Malmqvist et al., 2019). In fact, three respondents were interviewed that had a similar background to those in the sampling frame (one data scientist, one engineer, and one lawyer) to ensure that the "right" questions were being asked and that questions were not forgotten or omitted. The pilot interviews were conducted during the weeks leading to the first interview so to remember what worked well in the trial. This process allowed to avoid poor questioning, and to practice the flow of the interview, and adjust questions that may have been leading, ambiguous, and simplify the overall structure of the questions (Fox, 2009:32-33). In addition, the proper analysis of the procedures and results from the pilot study supported not only the identification of weaknesses that were addressed before the first official interview, but also offered a small peak into the pattern of results different experts were giving. A carefully organised and managed pilot study has the prospect to increase the quality of the research as the results from this stage can inform parts of the research process to come (Malmqvist et al., 2019).

3.4.4 Bias: A holistic expert discussion

The IAT seeks to measure implicit associations by comparing the differences in response times as individuals classify various terms related to a given topic into categories. Quicker reactions show that individuals' brains are conducting the classification more speedily unconsciously, which means that the individuals have a rather solid implicit association between the term and the category (Karpinski and Hilton, 2001:774-775). Because the difference between conscious and subconscious reaction times may consist of mere milliseconds, there is a limited possibility for individuals to control the results of the IAT, even if what is being assessed is known and individuals are motivated to do so (Do-Yeong, 2003). Although the IAT is subject to criticism, it has been almost unanimously accepted by the psychological community and substantiated in many studies since its creation in 1998 (Greenwald et al., 2006). The purpose of the questionnaire is to test the brain's ability to make implicit associations more rapidly than one forms conscious views and intentions. It is possible to understand implicit association and conscious behaviour

as if they were racing with one another: when implicit association "wins" by happening first, conscious attitudes are skewed through its lens (Correll et al., 2002; Clemons, 2014). However, the IAT does not allow to explore the process of thinking and reasonings behind the associations, which this thesis proposes.

Consequently, the exploratory nature of the research to investigate how experts would react to questions that have not previously been studied (Döringer, 2021) in the mafia sphere before, sees ten AI and legal-tech leads being interviewed. The process offered a range of different results based on a set of open and closed questions to explore, expose and reflect on possible biases of the experts in the field of mafia. Chapter 4 seeks to report the answers given by the experts in two parts. The first part predominantly groups the answers from the open questions, and the second part encapsulates the scenario-based questions. At every question asked, the answer given by the ten experts will be summarised, highlighting the most likely given answer, and those that differed from the common responses. Chapter 5 captures the dialogue had with the expert interviewees in which general and specific explorations were pursued centred on the problem of bias and making considerations on ways forward. The general explorations were pursued to enquire after aspects and details that were of potential research interest, but had not yet been mentioned by the interviewees, and specific explorations referred directly to the interviewees' account in order to gain deeper insights into their opinions and reflections (Döringer, 2021).

Recent studies have observed that, when it comes to AI, spotting biases require a holistic evaluation as AI bias is multifaceted and requires a multi-disciplinary approach to practically address it (DeCamp and Lindvall, 2020). It is suggested that the first step to address bias in AI is to identify the bias in a way that can be traced back to its root (Jercich, 2022). For instance, if looked into society's continued exposure to cultural stereotypes and historicised notions of blackness, a great number of Americans own negative implicit associations about black Americans. Empirical research has shown implicit associations between blackness and different negative adjectives, such as links between blackness and criminality, danger, violence, and aggression (Eberhardt et al., 2004). The implicit association between blackness and criminality is well-founded that it is reciprocal. In other words, not only does blackness evoke images of criminality, but criminality also brings to mind images of blackness (Eberhardt et al., 2004). Furthermore, studies have consistently demonstrated that these implicit racial biases live within individuals despite the explicit racial attitudes they allege to hold. It is shown that implicit racial bias affects research participants' conscious behaviour even when they are instructed to be free of bias (Devine, 1989). Therefore, the psychological literature strongly suggests that implicit biases contaminate the

decisionmaking of criminal justice actors even when those subjects possess a general duty to act impartially (Clemons, 2014).

Association tests work by assessing the strength of association between two concepts presented via a series of words and images that have already been established, similarly to the scenarios offered to the participants before proceeding to answer questions on them. Data from Project Implicit show that 75% of people who have taken the test have associated men more strongly with work roles and women with domestic positions. A recent study revealed that employers whose results on the IAT indicated gender bias were likely to favour men over women in their recruitment decisions (Sleek, 2018). Similarly, the questionnaire was to have a similar role in explicitly assessing how the participants locate the woman within the mafia, based on the theory that depending on their prejudices, they would subconsciously make links between "male" and "criminal", and "female" and "victim".

As researchers continue to explore how to use and interpret association tests outcomes, it is unquestionable that the test has affected public discussions about biases. For instance, the US Department of Justice (DOJ) has included findings about implicit bias into the training of more than 28,000 DOJ employees as a method to fight implicit bias in law enforcement agents and prosecutors. Another example is a historic fair housing decision in 2015, in which the US Supreme Court referred to implicit bias allowing federal action against housing policies that have a disparate impact and are discriminating (Sleek, 2018).

The empirical approach of using a set of scenarios that capture the diversity of roles played by mafia women enables to show the "behind-the-scenes" of how experts process information, with the holistic interplay of implicit assumptions and explicit attitudes. McWhirter *et al.* believe that scenario-based methodologies provide a strong foundation for developing useful and relevant recommendations in future work that would consider ethical, legal and social issues when advancing predictive justice practically and in research contexts (McWhirter et al., 2020).

3.4.5 Process of Data Collection and Analysis

Creswell states that qualitative research has the exploratory ability to investigate, interpret, and understand the issues in a study. He believes that "we conduct qualitative research because a problem or issue needs to be explored" and the phenomenological method is the most suitable tradition to use to get to the root-cause of the phenomenon (Creswell and Clark, 2017:47). Phenomenology was first developed by Husserl (1931) to understand the "lived experiences" of the interviewees and their

meanings. However, other theorists have shaped the theory to align it with the modern qualitative research methods (Moustakas, 1994; Van Manen, 2016), and Smith et al. have renamed it the interpretative phenomenological analysis (IPA) (Smith et al., 2012).

Smith et al. argue that IPA represents a dual position because the interviewer is making sense of the interviewee, "who is making sense of X":

> *Dual role of the researcher as both like and unlike the participant. In one sense, the researcher is like the participant, is a human being drawing on everyday human resources in order to make sense of the world. On the other hand, the researcher is not the participant, she/he only has access to the participant's experience through what the participant reports about it, and is also seeing this through the researcher's own, experientially lens.* (Smith et al., 2012:35-36)

Phenomenological analysis of interview data (Hycner, 1985) was of great assistance during the process of data collection and analysis as the aim was to reach the root cause of bias in predictive tools and explore venues to de-bias these.

The key steps of the phenomenological analysis included the identification of general and unique themes for all interviews, the contextualisation of themes, and the writing of a composite summary. The identification can be vividly noticed in the concluding remarks in Chapter 5 where the main themes of models suggested by the experts are listed. These are then inserted into the context of the current study, and related to the research question in a summarised format (Hycner, 1985:291-294).

The open-ended questions from the first and third sections of the interview were intended to get respondents to enter into a "stream of consciousness", limiting interventions from the interviewer. McCracken's guidance of practising with a mirror, nodding occasionally or even using an "eyebrow flash" was also followed (McCracken, 1988:35) to support the participant to keep talking. On occasions, respondents diverged magnificently from the questions, and they were brought back to the main line of questioning. Silences were welcomed which allowed the respondents the opportunity and the time to reflect and to add additional information (Fox, 2009:26-27).

As Keen states, phenomenology is an approach, an investigative posture with a set of goals (Keen, 1975:41), which well-aligned with the aims of the study. The transcription process is one of those goals. In fact, all interviews were transcribed following consents sought from the participants that agreed for the interviews to be recorded. Four of the interviews were transcribed through the engagement of an external company thanks to the annual funds the University of Winchester offers postgraduate researchers. However, the other six interviews were transcribed manually, leaving a margin on the right

to be able to note down discussion points in line with the phenomenology research approach (Hycner, 1985:280).

It is important that the "lived experiences" of the interviewees be allowed to steer the narrative of the study. Creswell states that in a phenomenological research the data collection process entails primary in-depth interviews with as many as ten individuals (Creswell and Poth, 2016:161). Moreover, Walcott argued that it would not be possible to initiate a research without an idea of what one is after and one would be "foolish not to make that quest explicit" (Wolcott, 1983:57). In fact, in a phenomenological method, the only time that a researcher must keep his/her ideas out of the process is during the interviews and the collection of the data.

For instance, the stage of the bias discussion in Phase 2, and the reflections in Chapter 5 were affected by the "bracketing" and the phenomenological reduction (Keen, 1975:38). This consists of suspending or "bracketing" the study's meanings and interpretation, while allowing it to welcome and enter the world and perspective of those being interviewed. In other words, it required the research in Chapter 5 to put aside its initial hypothesis pursuing an understanding of how a female data algorithm would assist overcoming gender biases, and really open the listening to other solutions, and AI models that could assist in overcoming discrimination. The step requires the researcher to fully be absorbed by what the interviewee is sharing and listening to him/her, rather than imposing on the interviewee what the researcher expected that participant to say. Smith et al. stated that:

> *The IPA approach to data collection is committed to a degree of open-mindedness, so you will have to try to suspend (or bracket off) your preconceptions when it comes to designing and conducting interviews or other data collection events.* (Smith et al., 2012:42)

Therefore, the current study listened to the interviews for a sense of the whole (Giorgi, 2007:166), and that is listening to the participants' voice, intonations, emphases, pauses, hesitations, exclamations, etc. This step led to listening to the recordings many times over, together with the reading of the transcript that allowed to outline the emergence of different strands, meanings for discussion points later. The following stage is that of delineating units of general meaning, which entails the process of going through the literal data to detail and extrapolating units of meanings, or concepts that are unique and coherent (Hycner, 1985:282).

The overall data coding process is key because it allows the researcher to read through the responses to identify common themes, searching for words or phrases that are repetitive which helped with the narrowing down of the answers. What follows is the re-read of each transcript for clarity and then a

third read that would be followed by the delineation of units of meaning that are relevant for the research question, which is a key phase in explaining the data (Alase, 2017:15-16). A “meaning unit” is a group of words or statements that relate to the same central meaning of the “lived experiences” that the interviewees are seeking to convey through their answers (Graneheim and Lundman, 2004).

Alase’s suggested three generic cycles of data coding was followed. The first cycle involved the process of gradually coding the lengthy and convoluted answers into selected blocks of sentences, which helped with the breaking down of responses into a format that could be condensed and managed. This step also allowed to be mentally aware of key words of phrases that are common to all or some of the interviewees. The second cycle entails an additional condensation step that further assisted the research to minimise the first generic bulk of sentences into fewer words, which was an opportunity to extrapolate the “gist” of the answers. Alase emphasises the point that although the first two cycles of coding will have broken down the responses into manageable formats, the condensed coding would still accurately represent the thoughts and “lived experiences” of the participants’ (Alase, 2017:16). The final generic cycle stage is what Alase named as “the category phase”, which allowed the answers to be further shortened without reducing or misrepresenting the meaning unit of the responses (Alase, 2017:16).

The study proceeds to evaluate the notions shared by the participants and how they relate to the research question. This can be noticed both in Phase 2 and Chapter 5, when contributions made by singular participants are then linked back to the issues sought to be covered by the project. The results presented in Phase 2 and Chapter 5 are the ones that were collated following a process of eliminating redundancies, according to the phenomenological method. At this stage, what is searched for is how many times a given meaning was repeated during the interview, weighing the importance it may have. Once a list is made of the notions that are not redundant, then the study proceeds to gather similar meanings together, and determines themes from clusters of meaning as shown, for instance, in Phase 2, when answers to open questions were grouped together as per central themes (Hycner, 1985:287-291). This consists of a thematic analysis, which is a systematic way of identifying all the main concepts which arise in the interviews, and then trying to categorise and develop these into common themes (Clarke et al., 2015).

Following the grouping of the main statements to form a large unit of information, the last step Creswell suggested was the description of “what” the respondents experienced with the phenomenon. This is known as the “textural description” of the interviewees’ experiences, which include *verbatim* examples.

It is generally recognised that the more an interviewer has to write down, the more likely he/she is to make a mistake in the recording of that data (Fox, 2009:32). Consequently, to ensure that the core meanings were the least altered, the study sought to keep as far as possible, unedited examples of answers given where they were needed to highlight a point. Creswell also suggested to write a description of "how" the experience took place which is referred to as the "structural description", which allowed the study to reflect on the setting and context in which the phenomenon was experienced (Creswell and Poth, 2016:193-194). This final step is explored within Chapter 5, and Smith et al. as well as Alase emphasise the need for research to increasingly include reflective sections (Alase, 2017; Smith et al., 2012).

Overall, Chapter 5 contributes to a research area recently gaining particular importance, which is knowledge exchange. It is broadly defined as:

> *a process of generating, sharing, and/or using knowledge through various methods appropriate to the context, purpose, and participants involved*. (Fazey et al., 2013)

Knowledge exchange and research impact are increasingly being recognised as research fields in their own right (Straus et al., 2011). The outcomes of the chapter will be of relevance to researchers and practitioners from diverse backgrounds interested in learning from existing AI implementation projects and programmes and to improve the design of knowledge exchange processes.

3.5 Conclusion

The overview of the methodology delineated above has outlined two main phases to be followed in pursuit of the objectives of the research: to depart from an unusual image of the woman to portray how bias instilled in society and the criminal justice system affects the modelling of AI algorithms. Biases in AI are a major concern limiting AI adoption in the legal field. Mafia women have been used as a thought-provoking case-study as they epitomise the stereotypical notion of femininity, but also one that transgresses it. The departing point is that mafia women get to be treated differently to mafia men, and the explanation is not solely attributable to the fact that women might get involved in the mafia less or in different and/or lighter roles than men, but it is because of the historical data and long-standing power structures that have created a hole in the process of collecting data. The examples explored within the literature review of recruitment tools, creditworthiness assessing models and healthcare systems silencing women is also replicated in the scenario of organised crime.

The current research aims to find patterns of biases to raise attention to possible problems affecting the informatisation of the mafia trials, and contributes towards a less biased judicial system by exposing

how the male-dominated structure has shadowed the presence of the woman in the criminal society. This fact needs to be brought to the forefront of the attention of those leading technological structural changes (e.g. the European Charter, the UK's National Strategy, etc.) within established systems, such as the legal one, in order to reduce the bias fed into AI systems. The thesis seeks to support these technological advancements by bringing in a socio-legal critical eye which is to shadow and accompany scientific developments. Both are placing the foundations towards the next wave of changes in the operation of the law and the process of translation of the criminal women offenders' stories into realistic data.

Following the discussion on AI and potential biases, with concrete bias process considerations based on the case-study, Chapter 5 captures the results of the final part of the interviews held with the experts. Experts made holistic reflections on ways forward in the betterment of predictive systems, which use historical data that may not be as accurate as it could be due to unchallenged biases. Chapter 5 was conducted to answer key points on gender data bias, that further reflect data protection laws and regulations that uphold principles of fairness, accountability and transparency. These problem-centred (Döringer, 2021), multi-disciplinary evaluations require continuous reviews, specifically on the long-term impact of using these potential algorithms in the criminal profiling, law enforcement and sentencing contexts, and even more regular communication between the socio-legal and technical field. One needs to complement the other.

CHAPTER 4 MIXED METHODS – RESULTS & DISCUSSION

This Chapter presents the results from Phase 1 explored in the methodology Chapter. Phase 1's qualitative results have identified and categorised women in the mafia in order to understand what role they may have played or still play within the organisation. These first results also show how the criminal justice system has defined them, highlighting if/how they have been held accountable for any offences. These results are listed in Table 1.

4.1 Phase 1 Results

Phase 1's results assisted the research in its quest in testing the initial assumption of the difficulty in collecting gender data in the field of mafia convictions, and the later step of collecting mafia women profiles. This was done in order to highlight the presence of an uncommon image to the mafia woman. This more invisible aspect of the woman should be taken into consideration during the operation of the criminal justice system, and the possible implementation of AI-Assistive Tools that would have to be trained on comprehensive data, enriched with female data. Dino also addresses the challenge in collecting information on the life of mafia women, and she explains how her research has had to undergo a systematic examination of newspapers as a starting point, including the reading of articles that directly or indirectly concerned mafia women. She then moved to investigate the women's opinions, habits, reactions to their situations (Dino et al., 2007:108). However, only Dino's first step was replicated for the purposes of the current research, as liaising with mafia women fell beyond the scope of the study.

Table 1 is the result of the methodology adopted in seeking to highlight missing pieces of the organised crime group. The Table shows 30 mafia women profiles, highlighting 10 variables for each woman. Despite the efforts in seeking to collate as much information as possible, some of the columns have been extremely difficult to research because of the data either missing, or being contradictory depending on the different sources consulted. Thus, some columns have been left blank. An additional tool that could assist in compiling the missing data would be the access to the judiciary's records, which unfortunately are not publicly available.

The Table includes 10 women for each mafia group to show their presence throughout the different geographical locations in Italy. Moreover, the age goes to show the varied age range of these women, with the youngest being a 20-year-old woman, and the oldest being a 93-year-old widow. The data on age assists in understanding if/how the role of female figures changes within the criminal setting (Dino et al., 2007:111). The birthplace and residence columns show either mafia women have the freedom of moving from their birthplace and reside elsewhere, or they are able to travel far from their family's roots. For instance, the example of Angela Strangio shows that despite the woman being born in San Luca in the region of Calabria, she was able not only to leave her hometown, but her country and operate the illegal activities from abroad in Amsterdam.

The mafia affiliation columns is useful in understanding the women's network, and how they have come to be entangled in the criminal organisations. This information is significant since it assists in mapping out a network that could offer more information as to any other woman that could be linked to the mafia woman (e.g. sisters, mothers, mothers-in-law, daughters) (Dino et al., 2007). The column on crime shows the vast number of criminal offences committed by these women, from money-laundering, homicides, drug trafficking, extortion, leading a criminal organisation and more. The sentences equally show a wide range of sentencing years and where possible noting when some of these sentences were reduced or quashed completely by the criminal justice system for lack of data that would hold that specific person guilty. In the future, Table 1 should be further enhanced with more mafia women details that have different roles within the criminal organisation. For instance, Dino classifies them as: "no role", "rate witnesses", "hard-liners", "militants", "chooses the family, following the organisation", "chooses the family, disassociating themselves from the organisation". The first group refers to those women that have no particular role, the second include those that decide to speak to public prosecutors about what they know of the mafia. The "hard-liners" are those that position themselves with decisions in favour of the mafia going against their family and friends; the "militants" are women that are suspected or under investigation (Dino et al., 2007:111). Consequently, the awareness of such varied roles, could assist in the process of collating better data that would be capable of improving the AI model.

Finally, the sentence year dates back to 1971, however the study has not been limited to a time-bar beyond which cases have not been researched. The women profile reported are any that the research has been able to collate as much information as possible on. The Table does not include those mafia women profiles, which had more than two pieces of information missing required on the Table. It is

highly relevant to re-iterate that it shows a sample of mafia women culprits as a case-study, and it is not an exhaustive lists of women associated with the mafia. Table 1 was used ultimately in the research's Phase 2 in the quantification of the data, and Chapter 5 in the reflections with the AI and legal-tech experts on the ways forward.

Table 1. Profiles of Mafia Women

ID	Name	Sex	Age*	Birthplace	Residence	Married (Yes/No)	Mafia Affiliation	Organised Crime	Crime	Sentence	Year of Sentence
01	Angelina Corsanto	F	77	-	Cetraro, Cosenza (RC)	Y	Husband	*'Ndrangheta*	Mafia association;	9 years imprisonment	2020
02	Mara Muto	F	47	-	Cetraro (RC)	N	Father	*'Ndrangheta*	Mafia association	7 years imprisonment	2020
03	Sandra Muto	F	52	-	Belvedere Marittimo, (RC)	N	Father	*'Ndrangheta*	Mafia association	1 year and 4 months	2020
04	Anna Rosalba Lazzaro	F	52	-	Rosarno (RC)	Y	Husband	*'Ndrangheta*	Abuse of her daughter	3 years and 8 days	2016
05	Aurora Spanò	F	58	-	San Ferdinando (RC)	Y	Husband/ Lover	*'Ndrangheta*	Mafia association	23 years and 6 months	2013
06	Lucia Giuseppa Morgante	F	93	-	Gioia Tauro (RC)	Y	Widow, current boss	*'Ndrangheta*	Homicide and mafia association	Life sentence	2016
07	Angela Strangio	F	30	San Luca	Amsterdam, Netherlands	N	Brother affiliated	*'Ndrangheta*	Conspiracy of Mafia association	8 years	2010
08	Concetta Romeo	F	55	-	Seminara (RC)	Y	Husband affiliated, widow	*'Ndrangheta*	Attempted murder, mafia association	-	2009
09	Giuseppina Iacopetta	F	63	-	Stefanaconi (VV)	Y	Husband affiliated, widow	*'Ndrangheta*	Murder, mafia association	Life sentence	2017

10	Donatella Garzo	F	38	-	Seminara (RC)	Y	Husband affiliated	*'Ndrangheta*	Mafia association	7 years	2009
11	Anna Castaldo	F	50	-	Tribunali, (NA)	Y	Lover affiliated (Leader)	*Camorra*	Drug trafficking	-	2007
12	Giovanna Cacace	F	44	-	Naples (NA)	-	Mother affiliated, Leader	*Camorra*	Drug trafficking	House arrest, years unclear	2007
13	Teresa de Luca Bossa	F	56 65	-	Ponticelli (NA)	Y	Husband affiliated, Leader	*Camorra*	Drug trafficking, Mafia association	8 years 41-bis	2000 2009
14	Anna De Luca Bossa	F	39	-	Ponticelli (NA)	Y	Father and Mother affiliated	*Camorra*	Two homicides	Life sentence	2016
15	Anna Terracciano	F	54 67	-	Quartieri Spagnoli (NA)	N	Brother affiliated, who died	*Camorra*	Extortion, Mafia association	11 years	2006 2017
16	Maria Licciardi	F	50	Secondigliano	Secondigliano (NA)	Y	Family affiliated; Husband affiliated	*Camorra*	Murder, Drug trafficking, extortion	8 years	2001
17	Anna Casella	F	57	-	Quartieri Spagnoli (NA)	Y	Husband affiliated	*Camorra*	Usury and aggravated extortion	Years unclear	2009
18	Assunta Maresca	F	20	Castellammare di Stabia (NA)	-	Y	Own family affiliated; Husband affiliated	*Camorra*	Revenge killer	18 years; Pardoned in 1965	1955

19	Rosetta Cutolo	F	53	-	Castello Mediceo (NA)	N	Brother affiliated	*Camorra*	Criminal association	Sentenced in absentia to 9 years	1990
20	Anna Mazza	F	41	-	Afragola (NA)	Y	Husband affiliated	*Camorra*	Mafia association; Possible murder	Years unclear; Released for the murder for lack of evidence	1978 Died in 2017
21	Maria Catena Cammarata	F	45 65	-	Caltanisetta (CL)	Y	Brothers affiliated	*Cosa Nostra*	Mafia leader	6 years and 6 months; -	1998 2018
22	Ninetta Bagarella	F	27	-	-	Y	Husband affiliated	*Cosa Nostra*	Accomplice of Salvatore Riina	4 years on "*soggiorno obbligato*"	1971
23	Nunzia Graviano	F	31	-	Nice, France	N	Brothers affiliated	*Cosa Nostra*	Money laundering; Mafia association	3 years at first level; Sentence quashed at appeal	1999
24	Maria Filippa Messina	F	28	-	Catania (CT)	Y	Husband affiliated	*Cosa Nostra*	Mafia association	Hard prison regime (41-bis); Duration not available	1995
25	Anna Patrizia Messina Denaro	F	46	-	Castelvetrano (TP)	Y	Brother affiliated	*Cosa Nostra*	Mafia association; attempted extortion	14 years and 6 months	2013
26	Giusy Vitale	F	26 31	Palermo (PA)	-	Y	Brothers affiliated	*Cosa Nostra*	Leader, Mafia association Ordering a murder	6 years	1998 2003 and became a *pentita*

27	Angela Russo	F	74	-	Palermo (PA)	Y	Husband affiliated	*Cosa Nostra*	Drug trafficking	5 years	1982
28	Mariangela di Trapani	F	40 49 in 2017	-	Palermo (PA)	Y	Husband affiliated	*Cosa Nostra*	Mafia association Extortion	8 years -	2008 2017
29	Carmela Iuculano	F	31	-	Palermo (PA)	Y	Husband affiliated	*Cosa Nostra*	Extortions Guns trafficking	-	2004
30	Maria Rosa Campagna	F	49	-	Napoli (NA)	Y	Husband affiliated	*Cosa Nostra*	Drug trafficking	-	2017

*Age at the time of arrest or sentence.

"-" data not available or disclosed

(RC) means Reggio Calabria (a province in the Italian region Calabria)

(VV) means Vibo Valentia (a province in the Italian region Calabria)

(NA) means Naples (regional capital of Campania)

(CL), (CT), (TP), (PA) mean Caltanissetta , Catania, Trapani, Palermo in Sicily.

Beyond the information contained within Table 1, it was found that Angelina Corsanto was running an apparent fishery which profit was suspiciously of nearly 130M Lire on a specific year back in the 80s (equivalent to £65,000) (Giangrande, 2014:385; Molinaro, 2020). Aurora Spanò is a rare example of a wife that receives a harsher sentence than her husband, and detained under the Italian hard prison regime via Art 41 bis. Some say she was sentenced for 25 years in prison (Musolino, 2015), and other sources say 23.5 years (La C News 24, 2018). Her husband was sentenced to 18 years. She was a real boss for years, and on the run for 7 months. Additionally, Concetta Romeo's sentence is not accessible, but sources confirm she died in prison. She was remembered as the 'woman of honour' on her funeral flyers (Ingrascì, 2010:53). She was responsible in organising reprisal operations against a rival gang (Kahn and Véron, 2017:89).

Historically, *Camorra* women have been most active in practising extortion, usury, gambling, drugs and firearms trafficking. However, this did not exclude them from using violence which is required to conduct these practices. In fact, these women have directly contributed towards bloody feuds and revenge killings. Allum and Marchi argue that they act and behave "just like men, intimidating enemies and dominating their clans by using aggressive words and violent threats, without hesitating to resort to the use of weapons or murder" (Allum and Marchi, 2018:369). Therefore, the clear separation of roles or gender segregation suggested by the "gendered market" approach does not apply to the *Camorra*. Anna Terracciano, known as *"o Masculone"* (big macho), is an example of *Camorra* women that have engaged in revenge killings against rival gangs (Gribaudi and Marmo, 2010). Anna uses her masculine and aggressive temperament, and not only was she involved in her clan's business, but she was also a member of a hit squad that surveilled the city while armed (Zaccaria, 2010; Allum and Marchi, 2018). Maria Catena Cammarata was a widow, which may explain the reason why she was affiliated to the mafia via her brothers. She was sentenced for homicide, extortions, production and smuggling of drugs. In 1998, she had taken the responsibilities of her brothers who were on the run. She hid her criminal life behind that she was conducting during daytime while being employed at the local post office. However, the duration of her second sentence is inaccessible (La Repubblica, 1998; Santangelo et al., 2018; TFN TeleFuturaNissa Caltanissetta, 2018).

Antonietta (Ninetta) Bagarella was proposed to be sent to *soggiorno obbligato* (forced to reside in a different area under the surveillance of the police). During her trial she denied all of her charges (as seen

above in Chapter 2) challenging the facts contained in the police's reports. She justified herself as being a woman in love, who had chosen to love Totò Riina. However, her story did not move the judges. In fact, the prosecutor asked for Ninetta to be sentenced for four years in a small town in the North of Italy in the hope that the distance will have ended her relationship with the mafia. However, she successfully appealed against the sentence as she convinced the judges she was a mere woman in love with her own man (Giornale di Sicilia, 1971). Carmela Iuculano was arrested on 3 May 2004, and a week later she is placed on house arrest because she has a 17-month-old baby. Once home, she listens to her daughters and decides to collaborate with the state against her husband. She admits he is a killer (Penner, 2005; Luca, 2010).

Table 1 goes to show a reality of the female sphere that contradicts (or offers an alternative image of) the one presented in the opening pages of Lauricella's publication *The Dishonour Code* (Lauricella, 2019: VIII). She refers to those women that initiate to collaborate with the state against the mafia, and the fact that this begins in pursuit of freedom and to save their lives. She specifically draws her comments in the *'Ndrangheta* context, referring to the "*femminitudine*" (or womanhood) being something that is complicated in general, but more so within the criminal organisation. Lauricella states that these women have a hard job, full of responsibilities, of deprivations, of silences and deaths. They not only need to deal with the deaths of their husbands, but also of their fathers, sons, who are always at the forefront of the criminal group, running from their enemies, the state, and their death themselves. She continues and states that "if you are a daughter of an *'Ndrangheta* family, you cannot make mistakes, but you have to live up to the rules dictated by the organisation in order to protect the family name. Alternatively, the organisation does not think twice before killing you and making your body disappear" (Lauricella, 2019: VIII).

Giuseppina Pesce entered witness protection and offered missing pieces of the mafia organisation puzzle. Her stories allowed magistrates to put together information of missing women, of girls that were killed by their fathers, with their mothers' consents and with the support of their own children. They are simply killed and forgotten because the *'Ndrangheta* comes before the family, before any blood relations. The stories of the women as victims is what is brought to light through Lauricella's work, but it is also true that her recent publication on these women is slowly helping to break down the wall of silence, "*omertà*", and allows outsiders to understand a little more about the domestic culture in the mafia (Lauricella, 2019: XIV).

Clare Longrigg is one of the first journalists that investigated the gender data gap researched in the current project. She wrote about Pupetta Maresca and Anna Mazza. The first lady gave birth to her first child while in prison for having committed a murder. Her son's death remains a mystery, but he was abducted and murdered possibly by Pupetta's lover. Anna is known as the "black widow" who trusted her 13-year-old son with a gun and sent him to seek revenge and kill the man who had killed his father (Longrigg, 1998). Longrigg, differently to Lauricella, tracked those women who are at the opposite side of the spectrum. She found those that seek revenge, buy guns, recycle drug money – clearly a first in the depiction of women as leaders and Table 1 could arguably be a continuation of her work that should be intensified, and enriched as years pass.

At times, Table 1 shows those images of dark female figures (e.g. Giusy Vitale), which are substituted with the images of woman as an accomplice and secret keeper (e.g. Ninetta Bagarella). However, trials have revealed how these women, even as accomplices, have been judged capable of understanding. Despite the serious crimes committed, many of them are acquitted of the charges, or even worse, receive lighter sentences. The reason is due to the importance of the role of the woman in her various facets, i.e. mother, wife, companion, sister, daughter. These are the accepted roles within the organisation itself (Di Maria and Lo Verso, 2007:97). As Longrigg stated, "the mafia is a great creator of myths" (Longrigg, 1998: X), and despite work has been done to break away from the myths, and reveal a reality that is more comprehensive of the women, data is not collected as methodically and fully as per men.

Dino, in fact, states that already collating male mafia data is complicated because of the secret nature of the association, so it is even more difficult to determine the role of women, who would be expected to be excluded *a priori* from any type of participation due to the organisations' male-dominated character (Dino et al., 2007:107). Table 1 shows the difficulty in collating information for a restricted number of women - the missing data is not easily accessible, and it is hoped that a better record keeping job has been done by the relevant departments. If a move is made towards the integration of innovative tools against organised crime such as *Project Proton*, then data collated should be consistent, and made available. Unfortunately, projects such as *Proton* sought to do something extraordinary with the creation of a tool using computer and social sciences with the aim of improving existing knowledge on the processes of recruitment to organised crime, but with data that is flawed. Another fault of the project was the fact that focus on gender was not one of the objectives listed (Proton, 2020), which in the long run will be likely to affect results produced by these tools making them biased.

Table 2 is a quantification of Table 1 that summarises the key themes and trends identified in Table 1. Table 2 offers a numerical snapshot of mafia women offenders that together with Table 1 is relevant information shared with AI and legal-tech experts in Chapter 5. However, the limitations of these data should be noted. Given the small sample size of mafia women that have been identified, the statistics might not be representative of the wider organisations.

Table 2. Quantification of Mafia Women Profiles from Table 1

	Cosa Nostra	***'Ndrangheta***	***Camorra***
Number evaluated	10	10	10
Average age convicted*	40 years old [range: 26-74]	57 years old [range: 30-93]	47 years old [range: 20-57]
% convicted twice	30%	0	10%
Affiliated through husband	60%	70%	40%**
Affiliated through blood	40%	30%	60%
Affiliated through career	0	0	0
Operating on-site	90%	90%	100%
Operating off-site	10%	10%	0
Number with sentence length <1 yr	1	N/A***	N/A
Number with sentence length 1-5 yrs	3	2	N/A
Sentence length >5 yrs	4	7	6

*For those convicted twice we take first conviction.

** One out of ten women was in an extra conjugal affair.

*** N/A has been used to highlight the fact that some of the women's sentence lengths are not available.

The Table is divided into 3 columns representing the different mafia groups. The average age of the convicted women in the *Cosa Nostra* based on Table 1 is 40, in the *'Ndrangheta* is higher with 57, and 47 in the *Camorra*. Based on the available data, it seems that women in the *Cosa Nostra* are 30% likely to be convicted twice, and 10% likely to be convicted twice in the *Camorra*. With regards to the '*Ndrangheta*, it seems the likelihood of multiple convictions is not present on the sample of women chosen for the purposes of the research. This percentage seems to align with Kahn and Véron's view that there are fewer women in the *'Ndrangheta* that reach the higher rankings of "women of honour" (Kahn and Véron, 2017:90), but then questions arise as to where one would fit data of women such as

Rosa Zagari? Rosa was arrested with his partner Ernesto Fazzalari, an *'Ndrangheta* boss, in June 2016 for mafia association. She was covering for his fugitive man and meeting with Ernesto's right hand to deliver him the *pizzini* (refers to pieces of paper used in the criminal organisation for high-level communications) (Marconi and Tizian, 2020).

There is 60-70% of probability that women are affiliated to *Cosa Nostra* and *'Ndrangheta* via their husbands, and 40% probability in the *Camorra* as the organisation in Naples is renowned for being more of a matriarchy (Kahn and Véron, 2017:139), and consequently the lower percentage of affiliation through husband is expected. It is to be noted that 1 out of the 10 *Camorra* women was in an extra conjugal affair so she was affiliated to the mafia via her lover, rather than her husband. Affiliation through blood represents those women that belong to a mafia family at birth, and it seems *Camorra* has the highest percentage with 60%, followed by *Cosa Nostra*'s 40% and finally *'Ndrangheta*'s 30%. Affiliation through career was to represent those women that willingly become mafia women, having had no prior linkage to the criminal organisation. However, none of the women identified for the case-study have undertaken a criminal career on their own.

Operating on-site and off-site represent the women that operate in areas near their birthplace and outside of their birthplace. The Table shows that all the *Camorra* women operate *in loco*, whereas 10% of the *Cosa Nostra* and *'Ndrangheta* women operate beyond their birthplace showing a wider ramification of the organisations' links. In terms of the sentences, based on the available data, 1 *Cosa Nostra* woman was sentenced the shortest length, less than a year. 3 *Cosa Nostra* and 2 *'Ndrangheta* women received a sentence between 1-5 years, and 4 and 7 women respectively received a sentence over 5 years. As the data available on the *Camorra* women is incomplete, the numbers reported have only been calculated based on 6 women that were sentenced for over 6 years in prison, and with unknown sentences for the remaining 4 women.

The broken-down data shown in Table 2 is useful at the stage of moving towards communicating with computer scientists and legal-tech experts that would have to collaborate to create a model in assisting the criminal justice system. The information collated through the Tables is the type of data scientists need to do their part of the job. Table 1 and 2 have been drawn on 30 women, and in order to ensure that as many venues as possible have been exhausted in investigating mafia women, the Italian Institute of National Statistics was contacted to collate gender data in relation to the crime of mafia association.

The data provided by the Institute are included below and within the Appendix. These have been translated from Italian to English to simplify their reading, and only relevant data associated with the mafia has been extrapolated.

- **Table A1 in the Appendix:** contains data on numbers of reported/arrested criminals by the police divided into gender and age range in 2018. This is the latest data available at the time of writing, which records mafia related crime numbers. On the second half of the columns, numbers related to mafia women are offered. More specifically, there are 0 women involved in the mafia up to the age of 13, then 1 woman between 14-17 years, 22 women between the age of 18-24, 64 women between the age of 25-34, 63 women between the age of 35-44, 49 women between the age 45-54, 27 women between the age 55-64, and 12 women that are 65 years and over.

  More recent data was requested via the online platform, but an ISTAT representative answered that numbers for 2019 and 2020 are not yet available. Moreover, broken-down data is also not available. Moving forward it would be highly relevant to include a categorisation by organisation type, so to closely monitor the variation of women inclusion, or exclusion, depending on whether *Cosa Nostra*, *'Ndrangheta* or *Camorra* is under analysis. This would also closely assist in enriching the information available on the evolution of mafia women within the organisations (Bodrero, 2019). Bodrero uses data from Transcrime that stated that a third of confiscated mafia company shares belonged to women.[33] It seems that in leisure and hospitality businesses, 52% of share owners are women, followed by 38% in retail, 37% in the transport sector and 28.5% in construction. Michele Riccardi, from Transcrime, states that women represent the perfect name to be used in such fields because they generally have a cleaner criminal record, and therefore there is a smaller chance of them raising conflicts in due diligence processes carried out by banks. These women are needed to keep the control of these illegal businesses in-house (Bodrero, 2019).

- **Table A2 in the Appendix:** contains data on different crimes divided by areas/counties and gender from 2018. Only relevant sections of the vast spreadsheet have been reported - of importance are the columns on Table A2 that includes data on numbers of voluntary murders

[33] Transcrime is a Research Centre on Transnational Crime of the Università Cattolica del Sacro Cuore of Milan. For further info see: https://www.transcrime.it/en/ [accessed on 04 May 2021].

associated with the mafia, and mafia association crimes. Other crimes have also been reported among the many, as it is unclear if any of the numbers reported are related to any *mafiosi* (mafia men and women). The data sees 139 men having committed mafia related murders, compared to 27 women within the country. The breakdown of data demonstrates that the majority of these murders were committed in the South of Italy, split between the counties of Campania, Apulia, Calabria and Sicily.

The fourth column on Table A2 collates the data on the crime of mafia-type association, which includes a total of 3730 men and 476 female in the country. These numbers have been calculated manually without taking into consideration the numbers for "Italy". It is unclear what 1865 and 238 refer to, but a plausible assumption to make would be that they include those offenders that could not be linked to a specific territorial area. The numbers below are rooted in many different parts of Italy, unlike the earlier sole Southern concentration. Nonetheless, the highest intensity of crimes is still in the South.

Unfortunately, Tables as such do not include mafia operations in Europe or worldwide. For instance, it may miss data of women such as Nunzia Graviano. She is Giuseppe and Filippo's sister, both spending their life sentences for having killed Father Pino Puglisi and responsible for the massacres in 1993 in Florence, Rome and Milan. Due to their absence, Nunzia manages the family affairs from Nice, in France. She is renowned to be qualified, she speaks different languages and knows how to operate a computer (Bodrero, 2020). Consequently, from the data available of the men, it should be instilled in the data collection process a method that allows to draw a genealogy of the family to see what other links there could be in the business. This method potentially assists in widening horizons and looking beyond the stereotypical images of the "Godfather".

- **Table A3 in the Appendix:** contains data on different crimes divided by territorial areas/counties, whether male-female Italians OR male-female foreigners. The columns of interest have been reported in Table A3, and these are the same as the ones in Table A2. The first one contains data on voluntary homicides related to mafia and the fourth related to the crime of mafia association. It is clear from the data that the mafia association is predominantly composed of Italian members rather than foreigners, and more specific data as to the gender split is unavailable. Despite the smaller number represented by foreign *mafiosi*, data suggests that organised criminal groups have developed a network hierarchy within which "shared

ethnicity has become less of a barrier in creating alliances" (Leiva and Bright, 2015:2) (Sergi, 2017:325).

Sergi offers a specific example of foreign groups normally being subordinate to mafia clans, but often in "equal partnership" with them in the North/Centre of the country. In fact, through the Operation Aemilia, the investigation offered an insight into the dynamic of the illicit business. The *'Ndrangheta* group based in the region of Emilia-Romagna, was supported by a Tunisian man and woman that were in charge of money-laundering activities. In addition, two Chinese individuals worked as front men for the mafia group in the management of a nightclub while extortion tasks were carried out by an Albanian man (Sergi, 2017b:74). Consequently, data collated on foreign *mafiosi* should be investigated further to understand how these links have resulted, and the women's sphere among these foreign relationships. This arguably could reveal a more enriched image of the mafia woman that research and studies so far have yet to be acquainted with.

Same as Table A2, the crimes of extortions, laundering, usury and other crimes have also been reported. Although the National Statistics Office does not specify whether these crimes, or a portion of them were committed by *mafiosi*, it is highly important that a more detailed data collection is implemented. Breaking down data from the crime type, and clarifying if/and how many of the reported numbers belong to mafia groups is relevant to minimise the data gap in the field. If, in turn, the crimes are broken down to show how many of the crime authors are male or female, this would consequently assist bridging the gender data gap. If the data on the foreigners is further broken down to understand what nationalities have been held accountable for the crimes, then that data could also be used to draw a more realistic picture of the mafia, that has clearly evolved to be more inclusive towards outsiders.

From the data available, especially on the two columns that are specific to the mafia (and the overall "Other Crimes" column), it is possible to discern that the majority of the crime is concentrated in the Centre and South of the country, although ramification of the organisations can also be noticed in the North. It is unclear what the data reported for "Italy" accounts for, but it can be safe to assume that it may be data that could not have been identified with a territorial area or county. If that is the case, then can a better job be done in the collection and upkeeping of records? The spreadsheets made available are a positive start but, if moving towards a world of AI and human combination, processes of data collection need to be strengthened.

- **Table A4 in Appendix:** contains data collated over 10 years (2008-2018) on different crimes, divided by gender. Of focus is the highlighted crime of mafia association which delineates a constant gap between crimes committed by mafia men and women, with a noticeable increase of women numbers in 2018. Until the early 1990s, the crimes committed by women were seen differently by the judiciary in comparison to the same crimes committed by men. For instance, if looked at the crime of illegal possession of guns, according to certain case transcripts, says Alessandra Dino from the University of Palermo, it is now seen to fall the crime of mafia cooperation. Earlier, the woman found in the same circumstances would have been justified because obliged to commit those crimes by her family or because she would have wanted to protect her family. Dino confirms that the first sentence in the Supreme Court in Italy that explicitly declared the women's imputability even without a formal mafia affiliation under the mafia association crime dates back to the 1999, and in just over 20 years, it seems women have been held more and more liable (Dino et al., 2007:74).

  It is noticeable how widely the data has been stored by the Institute and more broken-down information in relation to the data on the women, as per Table 2, would be of great assistance in projects such as this in pursuing the objective of bridging the gender data gap in the field of mafia and its convictions. Table 1 from Phase 1 was an introductory snapshot of women in the mafia, but the data highlighted through the data above show how functional women are in conducting mafia activities. This is reinforced by another piece of data that proves that among those sentenced for mafia association, on average *only* 2.5% consists of women while more than 30% of them are shareholders of mafia firms (Savona and Riccardi, 2018:46).

4.1.1 Conclusion

Data on recent research confirm that the ratio of women business owners is above the national average as there is evidence that wives, mothers, sisters, fiancées, partners are used as figureheads in organised crime. The gender of convicts and business owners was made available in a project led by Transcrime, and evidenced that while 90% of the convicts were male, only 65% of the owners were men and 33% were women (Savona and Riccardi, 2018:90, 94). It is remarkable that despite the key role played by women as owners of mafia-controlled firms, on average only 2.4% of the imprisoned criminals for mafia-type association were women during a 16-year period from 2000. The statistics are derived from data collated by the Italian National Statistics (ISTAT) (Savona and Riccardi, 2018:94). The share of female presence is extremely relevant. Criminals have to strike a balance between maintaining their control and

their need to hide the beneficial owners of their illicit activities. Hence why, tracking and researching data gaps need to be done side by side to the work bringing innovative advancements, breaking through stereotypical barriers that promote antiquated operations of organised crime groups.

Phase 1 findings confirmed the research's initial assumption of the difficulty of collating data of mafia women profiles. In fact, the mere collection of 30 mafia women required the consultation of a varied number of sources, predominantly different newspapers, and heavily relied on the few publications available on the hidden lives of the female sphere in the organisations. Despite the reliance on different sources, in some instances, the broken data available was inconsistent, especially with regards to sentence years, release date, whether married or if the woman was having an affair. Consequently, it is to be confirmed whether the data collated in the first place in Table 1 is reliable or affected by biases of those sources that reported on the women. Identifying those gaps will then assist to ensure that relevant bodies (e.g. ISTAT) do not underestimate female participation in mafia crime, when collating data nationally (Dino et al., 2007:119), and a more conscious effort is required to look at the women's places in organised crime

If predictive justice is to be pursued in any context where the lives of women have been silenced such as the mafia's, a further step is required to move beyond the prevailing approach of collating the data based on biographies, resulting from judicial sources and qualitative interviews. Journals like *Meridiana* focussed on revealing and investigating the multiple roles and functions played by women. Siebert questions whether these changes relate to a mafia women's emancipation process. Ingrascì's analysis confirms that there is women involvement in the *'ndrine* but may not be as present within the decisional meetings which require further reflections on the ambiguities behind the image of female power in the *'Ndrangheta*. Dino focuses on *Cosa Nostra* through the use of interviews, letters and judicial sources to reconstruct the story of the mafia as told by the women which discovers new perspectives that reveal facets of a changing underworld. Gribaudi uses extended judicial documentation and reports of the local news to analyse groups of women in Naples as she is concerned with the gender patterns that emerge and their changes and similarities with the past patterns within the *Camorra.* Zaccaria goes further to offer an estimate of the feminisation of the *Camorra* using data collected and arranged into a relational database. She uses profiles of women bosses to outline the mode of access and rise of women within the organised crime network (Meridiana, 2010:234-238).

Table 1 and 2 outline the challenges in collating the data of a reality that has marginalised women. However, there has been acknowledgement that women have always been present in the criminal

organisation and that they have started to come to light in the last thirty years or so (Zaccaria, 2010:155). Zaccaria explains that beyond the traditional role, these women have become active members of the criminal networks, steering new allyships, challenging enemies and competing bosses, leading groups. She explores that parallel feminine hierarchies are emerging through a database based on relationships, which she clarifies to purely be experimental (Zaccaria, 2010:157). The tables follow the same exploratory basis, with information collated based on secondary sources to suggest various interpretations to address a phenomenon that has recently welcomed the attention of researchers and to suggest avenues to be undertaken to ensure a more constant and detailed effort is invested in the collection of any data aimed at bridging data gaps wherever possible.

The tables' focus of mafia women that play an active role were derived from secondary sources with the goal of addressing their routes to and progression within the criminal networks, which constitute a map for qualitative considerations that should form the first step to acknowledge the presence of a data gap. Recent AI studies have focussed on methodologies to detect and fill gaps in datasets through a multi-stage approach that includes (1) identification of the gap, (2) investigation of patterns of occurrences of gaps, and finally, (3) use of various methods for data generation without gaps (Bidyuk et al., 2022). Therefore, the thesis brings forward the Italian justice system's identification of the feminine mafia sphere as anything but innocent, and has recently distorted the accepted image of criminality introducing new practices and standards to define hierarchies and resources of power (Zaccaria, 2010:173). What the thesis proceeds to explore is to understand why the gaps have occurred and ensure improved mechanisms are put in place to generate a more accurate picture of, but not limited to the Italian organised crime.

4.2 Phase 2 Results

Phase 2 of the mixed methodology consists in the investigation of the occurrence of patterns of gaps, testing and building on the exploratory results from Phase 1. Phase 2 allowed to explore the effects of having multidisciplinary expertise that would ideally be engaged in steering through the integration of innovative tools in the justice system and law enforcement.

The questionnaire adopted within Phase 2 was inspired by the IAT methodology. In fact, ten experts were interviewed from different backgrounds, including senior data scientists, applied mathematicians, tech lawyers and academics, ethics scholars and IT consultants. Phase 2's exploratory bias discussion was adopted to understand how individual experts, that would in practice form part of a team steering innovation, would answer open and closed questions on specific stereotypical images and roles. This more critical and holistic approach offers results which encourage reflections (Stockman, 2017:104), and eventually show how biases could easily be fed into algorithm-led systems. Particularly, this comprehensive research perspective acquires an importance of acknowledging those biases to do a better, fairer, equal and more efficient job when it comes to using data for the improvement of key services. For the avoidance of doubt, the interviews have been conducted individually to highlight how each expert's background and professional stance affects their way of thinking, that ultimately influences how the approach adopted to identify and fill data gaps in machine learning procedures changes from person to person. Consequently, in order to have a better opportunity of limiting built-in biases, it is highly relevant that gaps are investigated by a diverse group of people.

4.2.1 Bias Expert Discussion – Part 1 Results

- *Question 1 required experts to describe a mafia boss in their own words.*

Half of the respondents described the mafia boss as a man. The other half either used gender-neutral language, or hinted at the woman having a less powerful position in society and therefore, unlikely to hold a position of power embodied in the mafia man or boss.

Looking more into detailed answers that pictured the mafia boss as a man we have a few of the experts describing the criminal, as one resembling renowned movies such as *The Godfather* (1972) by Francis Ford Coppola or *Goodfellas* (1990) by Martin Scorsese. The main actors in those movies were powerful men that shared and handed down their power with and to other men. These images seem to have become more or less standard cultural reference points when thinking about the mafia.

Moreover, associated to the description of a mafia boss, was not only the adjective "powerful" (I5 and I9), but also: "loyal" (I5), a "family man" (I5) "ruthless", "dangerous" (I9). "I4" described a mafia boss as "having a covert or secret criminal activity, which is masked by something that looks a little bit more legitimate". "I4" continued the description stating that:

> *I always imagine the mafia to be running two lives: one where they have the business that looks honest, through which they launder money, and that money has to be cleaned because it's the ill-gotten gains of criminal activity. That opinion is informed by what we see in Australia, because on a smaller scale we have inherited organised crime from the mafia. It's part of the Riverina and we've got a strong history of it here. It's a dark underbelly. The Riverina is an area of New South Wales that is rich in market gardens, olives, fruit, wine - beautiful, stunning, and pretty much run by the mafia. We have had only two assassinations in Australian history, and one of them was by the mafia of somebody trying to shut down illegal and illicit crime in that part of New South Wales.*

The mafia mentioned by "I4" is echoed by Anna Sergi's article on Australian *'Ndrangheta* where she stated that academic research and media have recently started to be concerned about a growth of mafia groups of Italian origins in certain areas in the island (Sergi, 2017:321). Despite the thorough description of the inherited mafia in Australia, "I4" started the description of mafia boss by stating that she sees it as a male or female. In fact, it was only two out of the ten experts that clearly stated that the mafia boss could either be a man or a woman. "I6"'s answers were equally influenced by international criminal organisations. The answer referred to criminal groups similar to the mafia having operations in Hong Kong or Malaysia. Hong Kong triads, or Chinese mafia, are high on the public agenda and locals perceive them as a menace especially because of their infiltration of schools and influences they have on youngsters (Chu, 2005:8,12). "I6" made a distinctive point that the Hong Kong mafia boss would not stand out in the society with illegal activities that are advanced and well-hidden. Whereas the mafia boss within the underworld would be one that could be pointed out when passing by in the streets. "I6" stated you could "point out that she is the mafia boss, or he is the mafia boss". Once again, an unconscious acknowledgment that to the understanding of "I6" men and women could equally be seen under the same light.

Those that used gender-neutral language in their answers, described a mafia boss as:

> *an individual who has a leadership role within tightly knit organised, community-based group. Has particular expertise on criminality, but often related to highly sophisticated business operations but of the illegal kind.* (I3)

> *somebody who wants to be as wealthy as possible, but using illegal ways of achieving that wealth.* (I10)

And other respondents, started with a gender-neutral language, but when continuing with their answers they effortlessly shifted to refer to the mafia boss as a "he". For instance, one answer stated that:

> *A mafia boss is basically someone who leads an organisation. It can be small or large. It's basically an organised, structured organisation with its own purposes. It works pretty much like a manager, you know, he has his context, his ideas and just needs to make sure that everything works and the goal is achieved. Just like any other organisation.* (I8)

Finally, another interesting gender-neutral answer described the mafia by linking it to that of a family, and reinforcing a stereotypical image of the feminine sphere. More, specifically:

> *When I see them, the mafia, I see them as having big families, like a lot of kids, a lot of relatives, they also stick together. The family is the most important thing. But also the family members hurt each other the most.* […] *at least that is what I see based on movies, they may or may not be reflecting the reality.* […] *women are seen not very powerful in those movies.* (I11)

Despite research having started on the women's sphere of the mafia over 40 years ago, the reluctance of society's unconscious mind to depict a mafia person as female, or to speak of the person without referring to gender is challenging. Clare Longrigg's motivation to pursue her research into women's active participation in the mafia was moved "by irritation", she stated (Longrigg, 1998:XV). She had said that even back then, there was evidence of what the women's role was in the criminal organisations, and "yet the idea was usually dismissed and laughable" (Longrigg, 1998:XV). We have come some way from the image of the mafia woman being laughed at, but there is still a journey ahead to fully explore and recognise her agency.

- *Question 2 asked the experts to picture a family of four in Southern Italy and imagine who would likely be associated with the mafia.*

Answers were more easily given by interviewees. The immediate responses given by eight respondents was that they envisioned the male to be associated with the mafia, and seven specified, it would be the father.

Additionally, two answers gave a further context:

> *It would be father led. In fact, because I do have experience of this because I spent 25 years in Turkey, so they're not dissimilar to the Italians in that group, so it would be a family. It would be a family that's been involved in it for generations. You don't tend to get - from my experience, you don't see leaders or local mafia just popping up and suddenly occurring. It's something that's been in the family for a long time. They go down that course. It's just a natural evolution for them.* (I2)

> *If you go to an Italian situation, I would imagine this is very patriarchal, and I would be thinking of a classic sort of Godfather Part II Don: somebody who has an established, legitimate-looking*

> *business but is running something on the side or whose business is supported by corruption. I would imagine male, middle-aged to older, maybe even with grandchildren, and very well connected, including not just the people they do business with but the infrastructure or institutions of politicians and law enforcement, who are paid off or in some way involved to protect you. Protection is very important.* (I4)

However, there were two responses that took a more neutral or balanced position stating that the person likely to be associated with the mafia would depend on both the time and locations. Although the answer concluded similarly to the eight other respondents that the mafia boss would likely be male dominated, it also stated that a different role would consequently be placed on the rest of the members of the family, whether that was the wife, children, siblings, etc. A different conclusion was reached by two interviewees:

> *I think because pretty much any depiction of mafia I've seen has been the dad. I say that, but I also know that like, so I grew up in the Middle East, so not quite far from Italy, but some of the cultures are quite similar and especially I think with Southern villages. I think that they're quite matriarchal as well. The grandmother is the most important person in the family and I think it's quite similar here. So it could be that the dad's at the front, or his mum is controlling it* [the mafia organisation] *from the back. And I don't know if that's possible, but those are the two I'd think of.* (I9)

Another response stated that the father would be likely to be associated with the mafia, but added:

> *Women are so dominant because the men tend to die early. Someone needs to take care of the business so, I think usually the mother is the one. If they're still alive, they keep the family stick together. Also she probably knows a lot about the connections and what's going to happen next in all this business gatherings and things like that. She may seem like a second plan, but probably not as much. As men tend to die early, that's why they [the women] are there.* (I11)

Therefore, despite the different shades of answers given, the most common perception is that the man, in whatever role (e.g. father, husbands etc.) would take the criminal function. However, fewer questions offered a more impartial role, with the last one justifying the possibility of the woman undertaking a criminal responsibility fuelled by her nurturing sense towards the business. This is at least a few steps beyond the original perception held by the courts in 1983 when a judge in Palermo declared that women could not be guilty of money-laundering because they are not self-sufficient, and are “too stupid to take part in the difficult world of business” (Longrigg, 1998:XV). Longrigg stated that some magistrates still maintain that a woman managing the husband’s businesses would not be committing a crime because mafia women simply do not have a choice but obey higher orders. However, in 1995 Giuseppe Narducci, a magistrate from Naples, had said that:

> *Women's role is in no way subordinate: they make decisions, they plan strategies and commit crimes. Some magistrates have a problem believing that women are equal, but they'll get over it.* (Longrigg, 1998: XV)

The only question that follows is whether Narducci' statement in 1995 has changed or whether it is still applicable today, nearly 30 years later.

- *Question 3 asked what sort of criminal activities they thought the mafia criminals might engage in.*

Answers were quite unanimous. Most of them included a knowledge of different types of criminal activities that mafia would be engaged in. The most exhaustive answers encompassing a summary of illicit businesses mentioned are:

> *I imagine a lot of cash handling that avoids having to declare income or provide invoices, so that you can avoid paying tax. Then the next part I guess to that whole piece* […] *would be something like extortion. You set up a structure where people are worried about the security of their business, and maybe that insecurity is created by you, the mafia boss, but then you also provide protection by demanding money from them in order to protect themselves. Extortion and tax evasion with money-laundering so that you are making money that is actually from the ill-gotten gains of illicit activity and you need to clean it by, I don't know, gambling it through a system or putting it into a tax haven.* (I4)

> *The spectrum of crime I think you're looking at is everything from economic crime, which is arguably simply being on the wrong side of what is considered as lawful business, through to an element of social control, and imposition and maintenance of social norms, that have criminal expression when it comes to imposing sanctions, or pursuing vendettas, for example.* (I7)

Question 3 was a preparatory question to set the context upon which the next question was asked. It served to set their thinking into how they would then position the woman in relation to the mentioned crimes.

- *In fact, Question 4 asked if they thought the woman of the mafioso engaged in the criminal activities explored in Question 3 would be aware of these.*

All respondents replied that they thought/believed the women would be aware of these criminal activities, except for one respondent that went a step further and said:

> *I suspect that there would be awareness of the activities. What I think is worth questioning is whether they would be perceived as criminal activities, and I think that's much more rooted in the concept of what is the base value, what is the root values of a particular society, or what is a cultural approach.* […] *Just to close that answer, I think that I would be very surprised if women were not aware of the activity, but I would be unsurprised if they were to characterise or portray those activities as just, rather than criminal.* (I7)

Another respondent stated:

> *This is the thing, because this is, you're talking about the wives of the mafia men. I think they do. They certainly did in Turkey. They were very much part of the organisation and they were a very strong part of it. I think in the films when you see it, they are kept completely separate and never told anything, but from my experience, that's not the case. They are fully aware of what's going on and they are very loyal to their husbands and they reap the benefits for it as well.* (I2)

Otherwise, the more recurrent answers were similar to the ones below:

> *I would say to some extent they are aware of what their husband or their partner is doing. It's very hard to totally alienate yourself from your spouse or your partner* […] *They are probably aware but then they probably choose not to make a fuss or say anything out of it. Or, on the other hand, they could be part of it as well.* (I6)

> *Yes, absolutely.* […] *it's funny about power-dynamics and this is not to denigrate women's positions. In our general life, we know how powerful some of the female figures have been in our lives and the idea that this image is not being translated into the mafia life is fanciful. Any man has very strong very strong women to advise and to be partners with, so absolutely.* (I3)

> *Yes, and I can't help but being a lawyer about this. I know there are five types of knowledge and I would put her into the category of Nelsonian blindness. Nelsonian blindness is that type of knowledge where it's actual knowledge, but you turn a blind eye to what you see because it's in your interest to turn a blind eye. Not having an active role but being a knowing recipient of the ill-gotten gains.* (I4)

- *Questions 5 to 10 sought to ask what the expert thought the role of the woman, the wife, the mother, the sister, the brother and the children of a mafioso might be to see if different perspectives would have changed the answers given.*

The woman – there is a split image of the woman, seen either mainly as one that is aware of the men's business but passive, or as one that supports the men actively, with a minority of experts drawing examples on other types of mafias where they have knowledge of women taking a leading role. For instance, one expert draws on his expertise of Turkey and stated that in small family mafia organisations, "she could be the boss quite frequently". "In the fishing industry mafias, the woman was completely in control of the entire fleet of fishermen. Very, very publicly open and feared by them". The expert also stated that even in prostitution in Turkey, women tend to run the houses, "the madams of the brothels". However, the expert specified that when it comes to protection money, then those types of organisations are likely to be run by men.

A couple of the experts mentioned the matriarchal role played by women – more specifically stating that the matriarchal figure is very important within these organisations which is however counterbalanced by the imposition of a degree of "subservience and discipline particularly on daughters" (I7). Moreover, an

expert stated that because of the matriarchy, it would be likely that decisions and judgments are deferred to mothers, and 'anyone that's not the mother, would probably be objectified' (I9).

Another expert followed the more readily accepted stereotype that women are "there to give men children so their family can expand more" (I11). Men "prefer boys, so they can grow up and become part of, or head of the mafia they are leading". Additionally, the expert stated that "the profile like the violent criminal profile is not very well matching with the caring or warm heart person of a woman". (I11)

The wife – The most recurrent description used adjectives such as carer, adapting, subservient, disciplined, supporter. One expert stated that:

> *I know first-hand that wives can be kept completely in the dark. They know what's going on, but they just bury their heads in the sand and choose not to be, because they have very cushy lives.* (I2)

Another expert stated that women have a role of "holding things together". Family women with huge resources and network have a "pivotal role in keeping that together and obviously being the right hand person to the boss. That aspect of loyalty and the underbelly, the thing that holds things together matches her image". (I3)

Two experts also referred to a religious aspect associated with the role of the wife:

> *I think about the modern Italian woman, I think of her and her mum, who are really quite - not devout Catholics but actually respectful Catholics, like they take quite seriously the family relationships. The family relationships are as complicated as anyone else, but if I'm thinking about my perceptions unhampered by that, I would say* […] *at least on the surface, dutiful but having a fair bit of control over actually what goes on, over the whole structure, but she does it in a way in which her husband continues to think he's in control! That's genuinely me giving you my perception.* (I4)

> *I suppose they would include things like the tensions within, if you like, Catholic views of the family, which has a slightly weird dualism within it. Which is firstly the not quite veneration, but emphasis on the maternal and matriarchal role, whilst, at the same time, imposing a degree of subservience and discipline, particularly on daughters. Again, I think that possibly has a Catholic aspect to it, possibly has a general rural community aspect to it. That, I suppose, leads on to the question of how essentially rural structures and family relationships translate into other settings.* (I7)

Some experts stated that women would be aware of their husbands' activities, but because they would be silent about these, it would equal to them supporting illicit work (I10). It was said that wives would follow orders, the rules of the organisation, but like any other person working in a company would have

to – “we get policies to follow” (I8). At the same time, some experts stated that the figure of the mother or wife would the more powerful within the mafia, and that they would carry an extra value (I9).

The mother – The image of the mother is mostly linked to one of protection, loyalty, advice and a voice of reason. One of keeping the family going. It is likely for her to be easily in the dark of the son’s illicit activities, according to one expert (I6). Another expert stated that the “mother to child relationship, has a much stronger residual protective aspect to it […] A greater ferocity in defence, in relation to children” (I7).

A mother’s image was also linked of one that prepares the children for a criminal life ahead – “either you need to adapt or leave, but leaving is not usually possible […] so you adopt a survival mode” (I11). Equally, some other experts stated that the mother holds a strong position, wanting to develop some autonomy in their kids and further elucidating that there is no doubt “this Nelsonian blindness, this turning a blind eye in the same way that all mothers do” (I3). Another expert drew on the example of the Kurdish mafia which are “close-knit families. They will never talk about the family outside of the family. They are extremely secretive. Their role is really keeping everybody tight, everybody well fed, dressed and clean, and they are extremely secretive” (I2).

The sister – similar to the images of the wife and mother, the sister would hold a good façade, she would be loyal to the family and be the subject of family trades to bridge mafia families and create stronger organisations. She is also seen as one fulfilling the role of the mother when the mother is absent, so she is considered a step in. Again, a Kurdish mafia example was mentioned and it was stated that if the sister is an “*abla*” (eldest sister), and she is older than an “*ağabey*” (older brother), the eldest sister would have the power. The younger sister would have to do what she says and she would be playing the role of the mother and ensuring that everyone is fed, clean – “it’s a management role” (I2).

Another expert drew the difference between those siblings that detach themselves from the organisation and those that remain within it:

> *If the brother or sister has extracted themselves and removed themselves from that world, I'd think judgemental and perhaps a little bit worried for them, but if they haven't, they're part of that world, very loyal and quite deferential to whoever is more in control. Whoever is the most in control I think people would defer to.* (I4)

The brother – linked with loyalty or rivalry. One expert specified that if the brother is older, he will be the decision-maker more than the middle brother or the younger brother. The older brother would take the father’s role, and that’s the case with the Kurdish mafia which the expert suspects has the same

application in the Italian mafia (I2). If there are more brothers, then there was an assumption that the brothers would have a brotherly bond or become rivals depending on their allegiances.

The children – One expert believed that when a mafia group would become hugely successful and wealthy, it is often the case that the mafia children would attend the best colleges (e.g. Harvard) and get MBAs to professionalise operations. They would learn the trade, but bring a more sophisticated façade to the operations (I3).

Another interviewee states that the role of the children is dependent upon the father's role within the organisation. If placed at top levels, then the son would be following his footsteps, but if the father is in the lower rankings, then the children would have more freedom in their choices.

Differentiation of the children's role was also made based on their age. If they are younger (up to the age of 10-12), children may not be aware of the father's business, but when they reach the age of 17-18, they would be much more likely to have a voice in the father's matters. A similar example was drawn upon Turkey when 10-12-year-olds start getting increasingly more involved in the family businesses. The starting role would be that of a tea boy which would require the boy to prepare tea for everyone until older. When older, the children would become runners and be sent to do jobs. Then as children continue to grow up, they will be assigned different roles, e.g. a driver and they grow through the system. The interviewee further stated:

> *If it's a local family who are quite powerful and have a lot of money, then they end up getting quite a lot of guys in because they employ them, they take in the tea boys from a young age. It won't be quite the same in Sicily because you won't be able to recruit at such a young age as you can in Turkey, because they don't have the employment issues. They should have, but they don't recognise it. So you just have the young kids come and work for you pretty much for nothing or they come out of tourism schools and they come in for work experience, and you join the family. If you've got people coming in from the outside, then the family members clearly have control over them. If they don't and they're only recruiting, then they are doing the running around and all the jobs that nobody else wants to do, and they have to do them. They have to do them whether ağabey, the big brother, says or if the sister says or whoever is older than them says they have to do it. It is again, it keeps going back to this, but you have to do as you're told by whoever's older than you, but all reporting to the eldest brother.* (I2)

Overall, the perception of associating women in whichever role that may have to the mafia is not an automatic connection that can be made. Women and mafia are accepted to be contradictory words, and it is due to the well-founded stereotypes that see the women in mafia as underestimated or ignored in legal investigations and research focused on organised crime. The readily accepted image is that of the woman that is submissive, no moral responsibility, and dependent upon her husband. Yet, as seen

throughout the study, women have played essential roles not only in protecting the mafia rules by handing them down to children, but also by taking decisive roles when substituting their men or deciding to turn against the mafia and collaborating with the state (Kahn and Véron, 2017:179).

- *Question 11 asked the experts what they thought might happen to the mother/wife/sister/brother/children of a mafioso when he would be imprisoned.*

The answers were unanimous. The readily available image would be that of the mafia women being supported by the rest of the organisation when one of the men would be imprisoned. If it is a husband that goes to jail, it would be unthinkable for the woman to even consider initiating a new relationship (I2 said). The women's destiny would also depend on how the imprisoned man managed the wealth. It would be tactical for the authorities to monitor the women to trace any illicit monies.

Another interviewee drew a distinction between those men being incarcerated first and then doing a deal and those persons whom are incarcerated and have informed upon others:

> *If they're incarcerated and did a deal, they're going to be very, very well-protected by anyone who was protected by the deal-making process. If the person who's incarcerated has informed upon others, I think that their relationship would become quite fragile, because it's a way to get at the person who has ratted on those around them. I really think that would be not just a mafia thing; I think that would actually be quite important for any organised criminals. If you give away, if you do a deal with the prosecution in the States I think it's probably the District Attorney that you would do that deal with, by giving up those around you, I think you make your family quite vulnerable and fragile, their position.* (I4)

Another interviewee responded as follows:

> *If it's a family business I'm sure it will be carried on by the family regardless of the gender, but if it's not a family business, and if it's something that the family has always been against it, while they will not be happy that the mafia boss has landed himself in jail. In a way, they will be glad because he's no longer putting himself in danger, or doing dangerous things, or hurting other people. In a way, I assume they will feel some kind of relief that he's not out there endangering himself and others.* (I6)

A more exhaustive answers stated:

> *That's, location-specific, and community-specific. In that, I think I'm potentially blurring the lines here between communities, because one of the critical impacts of male imprisonment is often undermining, undercutting the economic security of the family. Now, that depends on quite how far you have any concept of, if you like, a male breadwinner. Also, how far you have the ability to soften the impact of a key member of a family being imprisoned, by having other sources of income. For example, from children or from available family. The economic context, I think, will drive what happens next. You could find almost the classic urban decline from a family-based household to a lodging house, for example. You could find rather more stark impacts, like a move*

> *into borderline or unlawful activities. I guess things like prostitution would come into that context, in some locations. Involvement in crimes, for example, small-scale money-laundering activities. There I'm thinking of money-laundering techniques like smurfing, which is where small amounts of money that requires laundering are allocated to quite a wide range of individuals. I would suspect, and it would certainly, I think, be worth investigating whether male imprisonment intensified any of those types of activity, or lines, directions of travel.* (I6)

A prison would be at the source of women's involvement in the mafia, and it is renowned that the men's incarceration would spark the passage of women from a phase of acquiescence to one where they would be aiding and abetting to arrive to an active role with a certain visibility (Massari and Motta, 2007:57). Fiandaca explores the domino effects of when a family member is imprisoned and refers to it as the emancipation of women as they assume roles that are less subordinate to men. The increasing number of women that undertake roles beyond those of the mere assistant or supporter (as female providers or messengers), see them undertake more sophisticated activities as "money collectors", business or shops managers, money-launderers etc. Fiandaca explains this may be explained on the basis of cultural evolution and the personal emancipation of women with recognised roles of active collaboration, co-leadership and parity with men (Fiandaca, 2007:4-5). Ingrascì calls this "pseudo-emancipation" (Ingrascì, 2007b:84-91), while Siebert defines it as "ambiguous emancipation" (Siebert, 2007:37-43) to refer to a partial, apparent mafia women's equality. The changing environment of illegal markets, connected partly to socio-economic evolution and globalisation, offers more opportunities to women. Their increasing involvement in the criminal world constitutes a reaction against discrimination, and arguably a tool of gender emancipation (Principato, 2007:294). But is this parity real?

Another interviewee stated that the mafia is a group of people which will take care of the mother, the wife, the sister who may not become criminals because they did not believe the women have a direct connection to the organisation (I9). Another interviewee stated that because they are not very well educated, it is hard for the women to run away and make their own money (I11).

Consequently, would it be possible to argue whether women of honour are emancipated? Freda Adler argues that there is a connection between emancipation and female criminality. Adler argues that if crime has always been a right of men it is because of the sexual inequality that reigns in society and preserves male dominance. The increasing number of women accused of illegal mafia association, supported by data, therefore seems to point to a movement of female liberation. Yet for the Palermo prosecuting magistrate, Teresa Principato, it is difficult to view this phenomenon as anything more than "pseudo-emancipation" and certainly not as liberation (Kahn and Véron, 2017:180). As Principato says, it

may not be possible to refer to mafia women's status as fully emancipated, but this train of thought should not heavily affect the collection of data on both genders, with a particular focus on female data.

- *Question 12 asked what happens to the son when the mafioso father is imprisoned?*

The most straightforward answers did not hesitate to picture the son as stepping up to the father's throne. It was mentioned that in situations where there would be more sons, then the son who has displayed the criminal acumen would become number one.

One interviewee made a distinction:

> *That depends on the relationship that was extant before conviction and imprisonment. You may well have, in some cases, an imperative to step in and carry-on activities. In other circumstances, you may have a real drive to move away from something that is perceived as transgressive and shameful. Now, that second one I think depends on how far the activities that are the subject of conviction and imprisonment are actually perceived, from a community basis, as really criminal. What prevails? Is it cultural values, community values, or is it the external imposition of law? I think reactions would depend on the views in that area.* (I7)

- *Question 13 asked whether the experts thought the mafioso's women could be coerced to do his dirty work when he would be imprisoned.*

One interviewee answered a straight no. When questioned why, the answer was that the sons would be expected to do the dirty work. When challenged further and asked what the father would do if he only had daughters, the interviewee answered:

> *I think it would be very, very unlikely. There's a trust issue there, because you're now talking about outside the family and they have the trust issue. Yes, certainly, you would never see it - I would never see it, certainly not in Turkey. Again, that's only from my experience. Unless, it depends if her brothers were also in the mafia, that might be a different issue, but it depends if she has family connections directly in or if she is absolutely outside. Very typically, she would have family members in the same organisation, because the businesses marry. When you marry you're actually entering into a contract there, so they marry families into families to get more power. So if that's the case, then she would just continue her role as was and be protected by the other side, by the in-laws.* (I2)

Considering the non-existence of women as persons as the image sold by the mafia (Principato, 2007:298), it seemed almost unthinkable to the interviewee that they would be entrusted with roles of responsibilities and power. On the contrary, another interviewee straightforwardly answered:

> *Yes, yes, very easily, very easily* […] *I've often said to my students, everybody thinks that women who lie about signing a guarantee for their husband's debts, but signing the guarantee with the house as security, people think those women who lie are terrible. I think women, put in a position where you could lose your house where your children live, because you've got to give evidence in*

some way or manage a business in a certain way. I don't think it's a big leap to lying and entering into a dark or black economy in order to protect the family home and keep a roof over your kids' heads. I don't think it's a big leap. (I4)

Another interviewee stated that:

I would say most of the time the women always ended up doing things what the husband has asked them to do, or even others. It's quite rare for a woman to stand up for herself because if the woman is able to do that in the first place, she won't be getting married to the guy. (I6)

Another interview drew on an analogy with an image of Irish women similar to that of Italian mafia women:

I think coercion is an easy assumption to make, and it's certainly an easy defence to run, in the context of trial and conviction, but I think it's worth investigating further. I think, again, I'm going to reach for what might seem like quite a distant analogy here, but one period and one location in which there was a high incidence of imprisonment for unlawful activities, in the context of the War of Independence in Ireland, in the early 20th century. There's very strong evidence there of, if you like, the female wing of the pro-independence movement being both voluntarily and very actively involved. The particular organisation involved in Ireland, the Cumann na mBan, had a very active role in terms of things like gun running, in terms of things like carrying messages, in terms of things like smuggling stuff into prisons. In fact, within my wife's family, there's a very strong tradition that one of her maternal ancestors did just that during the period of the War of Independence.

The reason I mention it is that in that particular context, there was clearly a lot of active and ideologically committed involvement on the part of women who were both wives, and mothers, and obviously daughters, in the moment. In other words, in the context when there was what was perceived to be a war to be fought, a struggle to be pursued. What subsequently became apparent, and this was during really the 1930s through to, actually, the 1980s, was that individual women who had been actively and committedly involved at that point in the 1920s, in their later lives clammed up about it, would refuse to talk about it. One of the things that was very consistently said in that period, the 50s, 60s, and 70s, was no more than, 'Those were terrible times.' Now, I don't think that means that the individuals would necessarily have acted differently, had some other circumstances arisen later in their lives. I think that it's something that, psychologically, was put into the context of a struggle. (I7)

Returning to Italy, and more specifically to places like Sicily, there is confusion as to women's criminal capacity. Mothers are venerated to the point that it almost makes it impossible for Italians to imagine them as being dangerous. It is this perception that has led to a number of questionable acquittals, says Longrigg (Longrigg, 1998:XV). For instance, in 1971 Ninetta Bagarella who was mafia boss Totò Riina's widow persuaded the courts not to punish her for her illegal mafia association with the clan from Corleone by declaring to the court "I am a woman in love. Is that a crime?" (Longrigg, 1998:XV). Clearly, images like hers do not show women that were coerced to do the dirty work, but rather the opposite.

These are women that come from criminal families that seem to be loyal to their roots and their husbands.

- *Question 14 asked whether the experts thought the mafioso's women would be able to detach themselves from the organisation after the man's imprisonment.*

All interviewees shared the same view, that it would be very difficult, and almost impossible for a woman to leave the organisation, even after the *mafioso*'s imprisonment. In fact, testimonies such as those of Lynda Milito tell a story that could arguably be applicable to women married to the mob. Lynda wrote her story of love, murder and madness, she tells her suspicion about her husband, Louie having probably stepped outside of the house to kill somebody, but that she would not be aware of anything specifically. She says that if she had been able to read between the lines before she married him, things could have been different but now it is too late for the "should've, would've, could've" (Milito and Potterton, 2003).

Another interviewee referred to the role of the mafia women as custodians of the mafia culture:

> *They are not property as such but it is close to that. On the one hand they are property, but they are recognised as custodians of the culture so you can't let go, you won't allow for that to happen and destabilise the organisation. Men know the importance of women in culture. If you want to destroy that, destroy the women. It follows in my view, that the mafia boss would not want his wife or daughters to transgress from what they want because they know they are custodians and want this to continue.* (I3)

In fact, Teresa Principato writes that women are confirmed to be one of the most important protectors of mafia "disvalues and always useful in furthering the organization's interests" (Fiandaca, 2007:287). She further emphasises that due to the late arrival of research on the women's role, the attitude nurtured towards the organisation was that of accepting its stereotypically patriarchal image and allowing facets of women's role to fall in between the cracks of the system.

A hopeful answer for the women and the possibility of leaving the organisation was given by one of the interviewees:

> *I think there's a very small window, and that window closes very, very fast. I think that window is somewhere around having the opportunity to go to university or to be well educated or to leave physically the place.* (I4)

Unfortunately, insights into *Cosa Nostra*, for instance, have taught that those women that are born into the mafia are controlled from an early age, and they are modelled, educated in view of a future when they will be marrying a *mafioso* (Di Maria and Lo Verso, 2007:96). At the same time, there is also a trend

that does show that women's advancement in school is correlated to their further establishment in crime while undertaking more sophisticated roles in white collar crimes (Simon, 1993). For instance, Nunzia Graviano is an example of a woman that was active in the financial field and was responsible in re-investing illegal money earned by his imprisoned brothers, income from slot machines and the coffee industry in the USA. She was leading all these operations based in Nice, France. Despite having the freedom to undertake such a managerial role, Nunzia had to end her relationship with a Syrian doctor and choose her family over her personal love life to abide by her brothers' rules (Ingrascì, 2007b:72).

Another participant indicated various factors upon which the freedom of the woman would depend stated:

> *I would probably go back to some of the earlier points about cultural expectations and the aspect of social disciplining. I think it's legitimate, possibly, to look at phenomena in other cultural settings, things like honour killings, and to investigate whether that is to any extent a feature of the cultural expectation. Whether there's any degree of social disciplining that would take that direct, violent form, or whether there was any more indirect, but still psychologically powerful mechanism, like exclusion or disowning. It seems to me that if either of those are, to any extent, present, then you have an incredibly powerful disincentive to disengagement. That's why I think my answer would be it's going to depend on the strength of those types of factor.* (I7)

In fact, this is echoed by Giacoma Filipello's story. She was one of the first women to turn against the mafia and start collaborating with the state, a first *pentita*. She was Natale L'Ala's partner, and a woman that shared the lives of many other women, one of complicity with the *mafioso* as well as that of a victim. Giacoma stated that she loved him, but she is now aware that she lived 25 years of hell. She became tired of it, of being locked-up at home and she admits she could not cope with seeing any more murdered bodies, and the cruelty. She witnessed wives losing husbands, mothers waiting for their children to become older just so they could seek *vendetta* (revenge killings) and she admits she was scared for him as well as for herself. She said that she would have liked to put an end to that circle of violence, but if she had done anything while he was alive, he would not have understood her and would have thrown her out of the house and she could not have coped with that. So only after his death, she felt freer (Siebert, 1996:111).

- *Question 15 and 16 asked whether the experts thought the women could take the role of a leading mafioso either if coerced or willingly.*

The idea that the woman would be able to take the role of a leader whether under coercion or willingly was easily accepted by the interviewees. Extracts of some of the answers are found below:

She'd have to be tough, but yes, I do. I've met some women who could definitely do it! Especially the Kurdish. The Kurdish girls, can be ferocious, so yes, they certainly have the capacity to do it. How well they'd be accepted at the board meetings is one thing, but it just depends how much power she commands, but I would say yes is the answer to that. (I2)

It is about how you command respect, how are you able to network? If the mafia boss is, for example, in prison, that might give you status, which could be elevated as the wife and be able to assume the role and have people around you who will support your actions. I am sure there is some level of communication with the boss himself. It would be possible to that extent, yes. (I3)

Yes, women have strong characters, usually whatever job they put themselves in, they're able to execute it, so I presume if she has the intention of leading a gang, she would be able to do it. (I6)

An international perspective was also offered:

In Australia yes, absolutely. I don't know modern Italy well-enough to know whether that's something that we could import into that geographical scenario, but in Australia, absolutely, not a problem. There's been some pretty amazing underworld figures who are frequently born in Australia, particularly in Melbourne, which has an interesting underbelly. (I4)

The international references to the Kurdish women, or the underworld in Australia have been of great interest to emphasise the weight played by gender roles. Symbolically speaking, crime is associated with aggression, courage, action, destruction, which are all terms easily linkable to the masculine in many cultures. At the same time, words like peace, non-violence, softness, commitment, lack of agency are unconsciously associated with the feminine (Fernàndez Aragonès, 2020:1). However, among these symbolically accepted gender roles, there are also exceptions to the rules that are acknowledged. For instance, the Kurdish example bring forward images of Kurdish female combatants as in the documentaries of *Commander Arian* (2018) and *Girls' War* (2016). The former portrays Kurdish guerrillas in their battle to end the patriarchy, seen through the eyes of the women. The latter shows the process of women empowerment in Qandil (Iraqi Kurdistan) entirely enabled for militia women of the PKK (the Kurdistan Workers' Party), where they received political and military training (Fernàndez Aragonès, 2020:10).

With regards to "I4"'s comment, the Australian underworld is echoed in Anna Sergi's research focussed on the migration from the South of Italy to Australia, which allowed the establishment of criminal groups in the country (Sergi, 2015:156). She further explores the phenomenon to also confirm the presence of the mafia in the USA and Canada, as early as the 1900s (Sergi, 2015:158). Despite the more general stance that associates deviance with masculinity, while considering it more anomalous if it is female (Dino et al., 2007), the interviewees were more prone to accept the idea of women being bad. Corso argues that it is as if women are not allowed to be bad. When women commit deviant acts, then

they are twice guilty, once for committing the crime, and again for breaching feminine canons (Dino et al., 2007). Faccioli states that women are not recognised even in crime as subjects endowed with the same rights enjoyed by men (Faccioli, 1990). However, the interviewees within the study were able to take a more modern stance on this occasion.

A more neutral answer was also given:

> *Quite probably, but I'm not sure how overtly. I would be, actually, possibly very interested to learn more about the extent to which something like an overt matriarchy would fit within the cultural expectations, and the community structures, and self-perception. Even in societies where there is no overt matriarchy, you still have a very high degree of influence and involvement across all members of the social group, of the community. The short answer to that is, yes, but I wonder how openly.* (I7)

In fact, Di Maria et al. argue how the Southern Italian society's ambivalent fantasy of a matriarchy masks the nature of male protection over the female world (Di Maria and Lo Verso, 2007:95). Therefore, the question as the interviewee poses, is not only how openly a mafia matriarchy would exist, but also how realistic that matriarchy is.

Another interviewee made a distinction depending on the role of the woman, specifically between the mother and wife:

> *I think it depends on the woman in the family. If it is like the mother yes, because she's able to, gain the respect of the men. But I think if it was just the wife of one of the bad* [men]*, probably not. Because it would be much more difficult for her to get the respect because it's a fairly patriarchal system.* (I9)

Then a reference to violence was made:

> *It depends on the type of mafia we are talking about. So if you're talking about, Godfather type drug-related type of mafia where there's a little violence, you know, etc, then I would find it difficult, you know, to foresee a woman.* (I10)

In fact, Ernesto Savona and Giacomo Natoli wrote that data on female crime confirm that women are less likely to contribute to the overall number of crimes than men. More precisely, data confirm that women's involvement in crimes is likely to diminish if violence required in the commitment of the crime increases (Reiss Jr and Roth, 1994) (Fiandaca, 2007:104). They further stated that they based this conclusion also through collation of data from prisoners that were highly male rather than female, and added that the disproportionality is also applicable in all countries with greater or lesser variations (Fiandaca, 2007:104).

References to women's personalities were also made in defining her possible role within the mafia:

> *I think it depends on … also personality, like if she's ambitious, and very supportive role to her husband. I think she would love to take the role because she's a leader. But if they still have some kind of caring and not very violent kind of portion in their personality, maybe they don't want to, but maybe if they have to, they would, it really depends on the circumstances.* (I11)

> *I think it depends on the personality, doesn't it? Yes, those who are ambitious would set out to do that I think and I don't see any reason. I mean, it may even be that there are mafiettes [sic], if you like, which are completely female-run mafias. That, I don't know, but I suspect it's highly possible.* (I2)

The thin literature available on mafia women tends to draw a picture of women's personalities as being more prone to participate in property, and economic crimes such as fraud, confidence schemes, and counterfeiting. There is said to be data available confirming the presence of women in authoritarian positions managing youth gangs (Fiandaca, 2007:106). However, there is no questioning that this data may be of existence, but the more pressing issue is to investigate this data further, and the possibility of it revealing one side to the story, or skewing a reality. In fact, Savona and Natoli both state that whether these managerial roles are evidence of direct participation in violent crimes "remains uncertain" (Fiandaca, 2007:106), which is exactly the reason why the gap in the data that either confirms or denies the different aspects of women's roles is required to be filled in.

Finally, a couple of answers also were doubtful as to whether she would willingly take the role of a leader and took more traditional positions:

> *No, I have to say no, I've got to speak for my gender. I've got to say no. No, other forces would have to actually play a part. I think she'd rather escape some other way.* (I4)

> *I guess part of the problem is whether the organisation would be accepting of it.* (I5)

Moreover, the question is also whether modern society would be accepting of publications that sell the same mafia story. For instance, recent literature continues to enforce the stereotypical images of mafia as brotherhoods (Paoli, 2008), and of historical perspectives made up of male figures of 99% of the time (Balsamo and Carpozi, 2019). Arguably, the continuance of portraying mafia organisations as masculinist tends to hide the smaller evidence that is available that points towards the female sphere. It would be of interest to see if the dialogue on women is brought forward, whether society's response to the questions above be different? If society was made aware of criminal profiles such as those of Anna

Colizzi, Antonietta Giustolisi, Anna Ianni or Carmela Migliara, would the interviewees' unconscious bias be less so? (Siebert, 1996:113-114).[34]

4.2.2 Bias Expert Discussion – Part 2 Results

Three different mafia women scenarios were presented to the ten interviewees, providing their characteristics (e.g., age, whether single or married, with children or not, etc.) and an extract of their stories to gauge the experts' reasoning as to why they come to the conclusions that they do, therefore offering an insight into their process of thinking, which could be key for a well-functioning AI tool, or expose the bias. The participants were then invited to answer questions on a linear scale from 0 to 10. For an easier representation of the results, the ranges of scores on the scale have been translated to a Likert scale:

- 0-2: Very Unlikely
- 3-4: Unlikely
- 5-6: Cannot Say/Neutral
- 7-8: Likely
- 9-10: Very Likely

The three blind cases have been reported below with pie charts offering a visual representation of the results. Once all of the questions were answered, the anonymised profiles of the women were revealed, offering a further layer of information highlighting their criminal contributions.

Scenario A [Annina Lo Bianco, *'Ndrangheta*]

Age: 39 [in 2020]

Married: Yes

Mafia Affiliation: via husband

Children: 3

Location: Reggio Calabria

[34] Anna Colizzi lived in the North of Italy, but originally from Apulia. She was engaged to a drug trafficker and was accused of having made her villa in Sicily available to be used as a heroin refinery. Antonietta Giustolisi is from Sicily and was accused of using her apartment in Rome as a hiding place for mafia fugitives. She also managed drug payments and deliveries. Anna Ianni was accused of making available her living room in Rome as a clearing house for international drug smuggling. She was also a member of a Rome mob that imported large quantities of drugs from Thailand in 1980. Carmela Migliara was accused of hiding in her home a mafia boss and fugitive.

Facts: A wife of a mafia boss [Gregorio Malvaso]. She was taking care of their 3 children. The mafia boss was arrested in 2014 and when searching the family home, guns and drugs were found.

- *Question 1: On a scale from 0 to 10, how much was the woman carrying out the tasks of a mother in upbringing the 3 children?*

As depicted in Figure 2 below, the majority of participants responded that Subject A was very likely or likely to have carried out the motherly tasks towards the 3 children. Followed by 2 respondents that remained neutral.

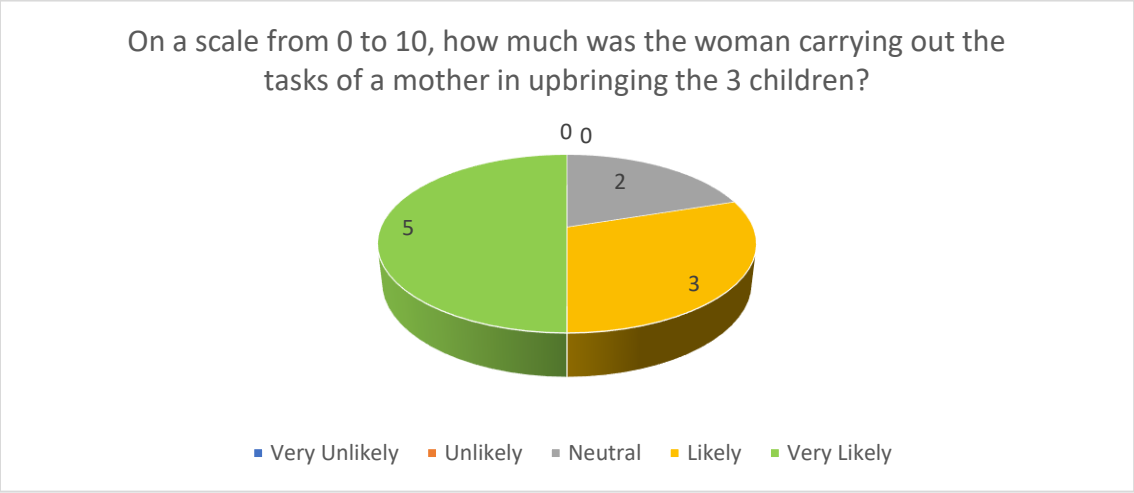

Figure 2

- *Question 2: On a scale from 0 to 10, how much do you think Subject A was involved in the children's life with a father that was absent due to running an illegal business?*

As depicted in Figure 3, participants fully believed in Subject A's involvement in the children's lives with a husband absent due to his mafia activities. One participant also stated that the mother-in-law could be of help too in the circumstances of the *mafioso*'s absence. More detailed answers stated that there may be help coming from Subject A's mother or mother-in-law (I2) and that the answer on the degree of involvement would also depend on the age of the children and educational circumstance (I7).

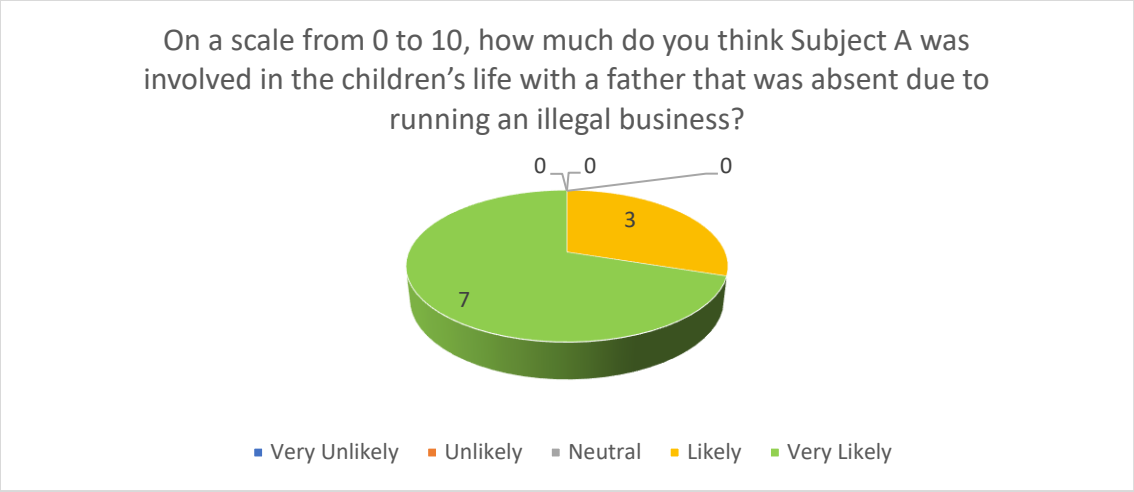

Figure 3

- *Question 3: On a scale from 0 to 10, how much do you think Subject A was involved in her husband's private life?*

As depicted in Figure 4, answers among participants varied between 2 "Unlikely", 4 "Neutral" and 4 "Likely". The two participants that chose "Unlikely" believed that the woman would have low awareness of her husband's private life, and among the "Neutral" respondents, one participant stated that:

> *I can't tell because all you have mentioned is just the husband is the mafia boss, just he has got a wife with three children. He has been arrested and police raided the home and found guns, but nothing within that context tells me how close the relationship between the husband and wife, how involved she is in the husband's life because all I could gather is that the wife is still one taking care of the children. So I don't see how much she is involved in those activities.* (I6)

Also, among the higher scores, a respondent stated:

> *I suppose what you're saying, given that what is clearly a key aspect of that private/criminal life has been physically brought into the home, that would suggest a higher likelihood of awareness. Awareness would, in those circumstances, if you're looking at guns and drugs, constitute involvement, because there isn't really an innocent explanation of having an AK-47 and a stash of coke. On the facts you've given, I would say six/seven would be a starting point for assumptions to be made.* (I7)

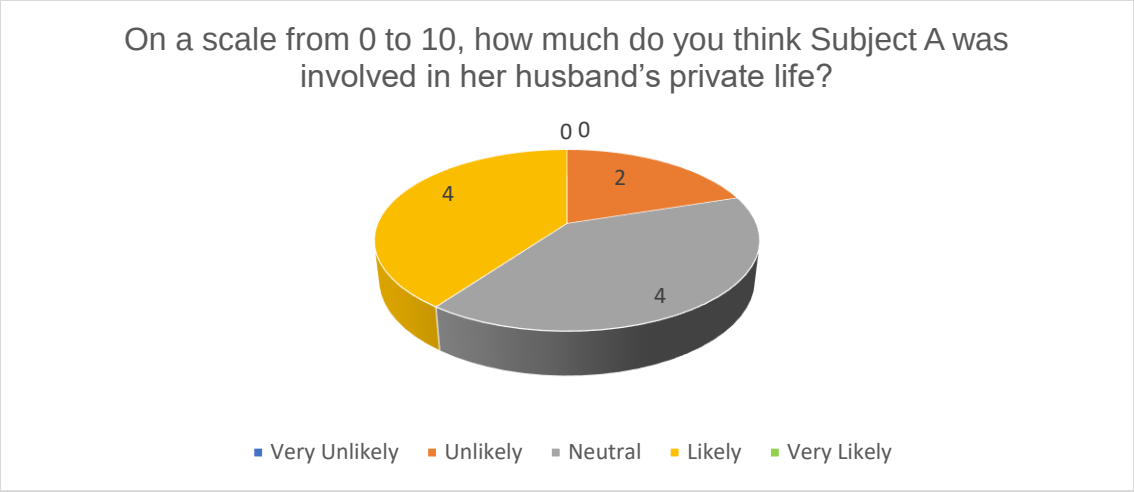

Figure 4

- *Question 4: On a scale from 0 to 10, how much do you think Subject A thought that her husband was doing an ordinary job?*

As depicted in Figure 5, more mixed answers were given with the higher proportion stating that it was "Very Unlikely" that Subject A thought her husband was doing an ordinary job. Some answers included the following reasonings:

> *I think it's highly unlikely! It does happen rarely. I mean, people have got twin families, haven't they, that they never know anything about. So I would probably say that I'd hover around about the middle again on that, because I think she would know what was going on but she may probably be too scared to ask actually.* (I2)

> *You're not looking at innocent items, if it's guns and drugs. Unless, I suppose, arguably, if you were looking at something like a sporting rifle or a shotgun that could have an innocent explanation, then that might soften the perception. If it is something that is quite clearly, yes, something like, say, an assault rifle, then it's incredibly difficult to build an argument that knowledge doesn't equate to involvement, or collusion, or acquiescence. The fact that those items were within the home environment, I think would make it less likely that there was no knowledge of the nature of the external activities.* (I7)

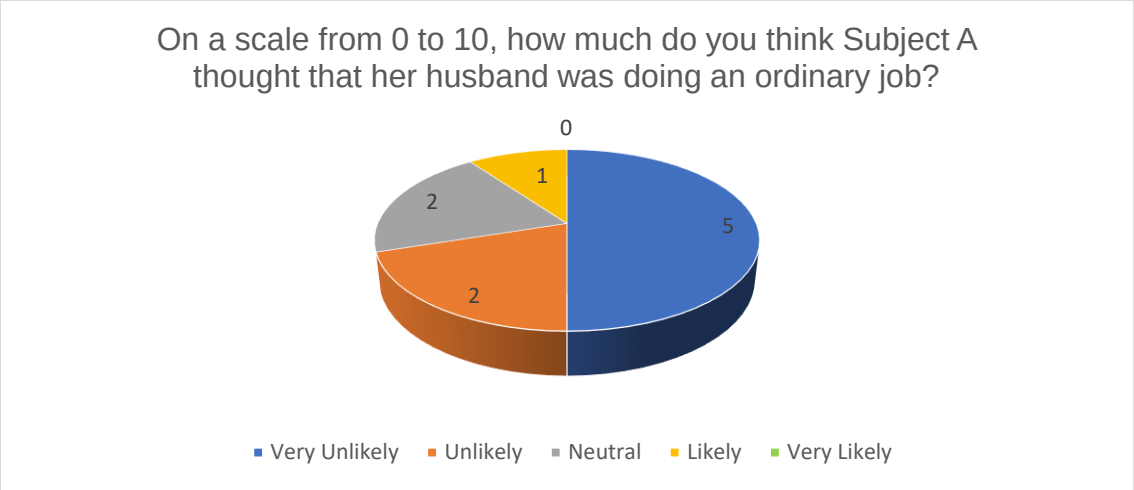

Figure 5

- *Question 5: On a scale from 0 to 10, how much do you think Subject A was aware of her husband's illegal business?*

As depicted in Figure 6, there was a similar split between the respondents as to the question above, with the majority opting for low scores placing them in the "Very Unlikely" bracket, then two answers each for the "Unlikely" and "Neutral" bracket, with one responding "Likely".

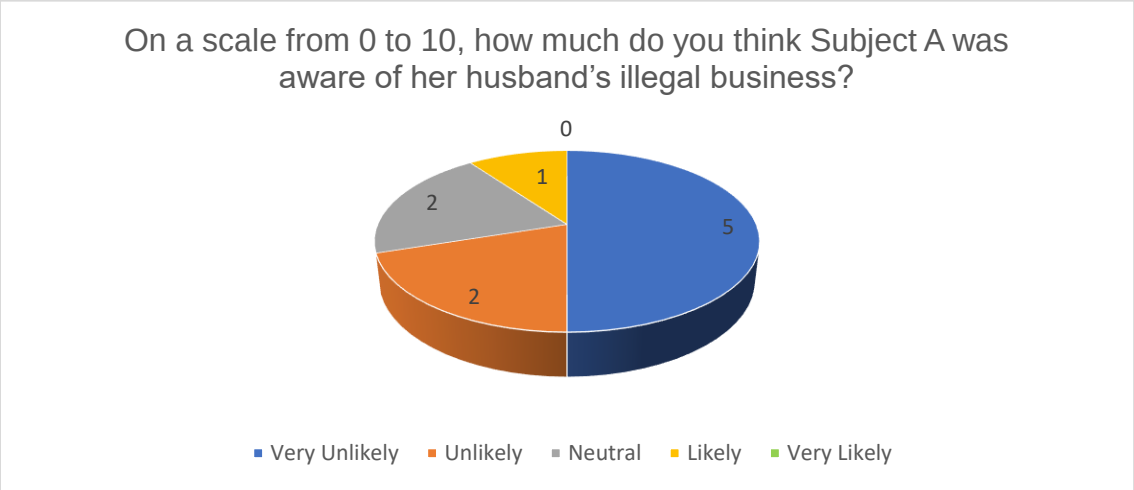

Figure 6

- *Question 6: On a scale from 0 to 10, how much do you think Subject A contributed to her husband's illegal activities?*

As depicted in Figure 7, the majority of participants believed that it was “Likely” that Subject A contributed to her husband’s illegal activities, followed by four split answers between “Unlikely” and “Neutral”.

Some of the processes of reasonings are reported below, and through I4, for instance, it is possible to see a conscious effort in fighting the assumption of depicting the woman engaged on a “secondary” level. Such practices are arguably what would bring AI models to be scrutinised and possibly de-biased.

> *Given that she's got guns and drugs in the house that she would know about, I'm guessing she would know about, it depends where they were found, but contributing to it, not a lot I don't think. I would put that at about a four.* (I2)

> *You know that's amazing, because you think actively or on a secondary level. I'll give her a seven. She's an enabler.* (I4)

> *I think that's going to turn on the precise location in which those items are discovered. If you like, the more central to the common domestic space those items are found, the higher the likelihood of contribution and involvement.* (I7)

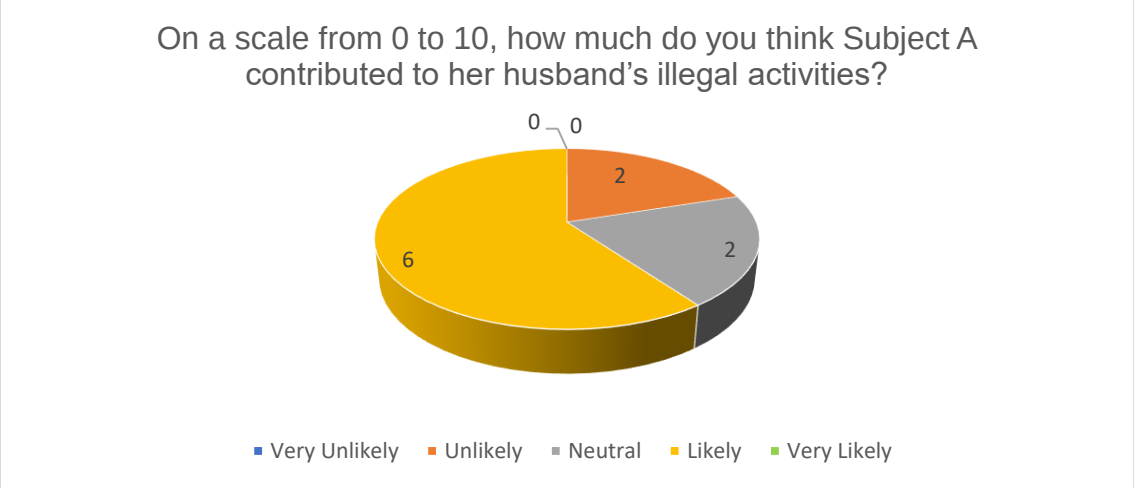

Figure 7

- *Question 7: On a scale from 0 to 10, how much do you think Subject A contributed in raising the 3 children according to mafia culture?*

As depicted in Figure 8, three participants believed in the very likelihood, and five in the likelihood of the mother raising the children according to mafia values, followed by two neutral positions. Participants stated:

> *I think it's compulsory, isn't it? So ten.* (I2)

I guess that's going to be age-specific, but assuming that you have a high degree of contact between mother and children at crucially formative periods, so essentially anything up to early to mid-teenage, then the contribution is likely to be fairly high, I would have thought. Certainly, a seven-ish. Seven to eight-ish. (I7)

I wouldn't be able to answer the question. I know she's the one taking care of the children, but whether she is supportive of what her husband has been doing, it was not clear in the context because all we heard of is, she's taking care of the children, full stop. (I6)

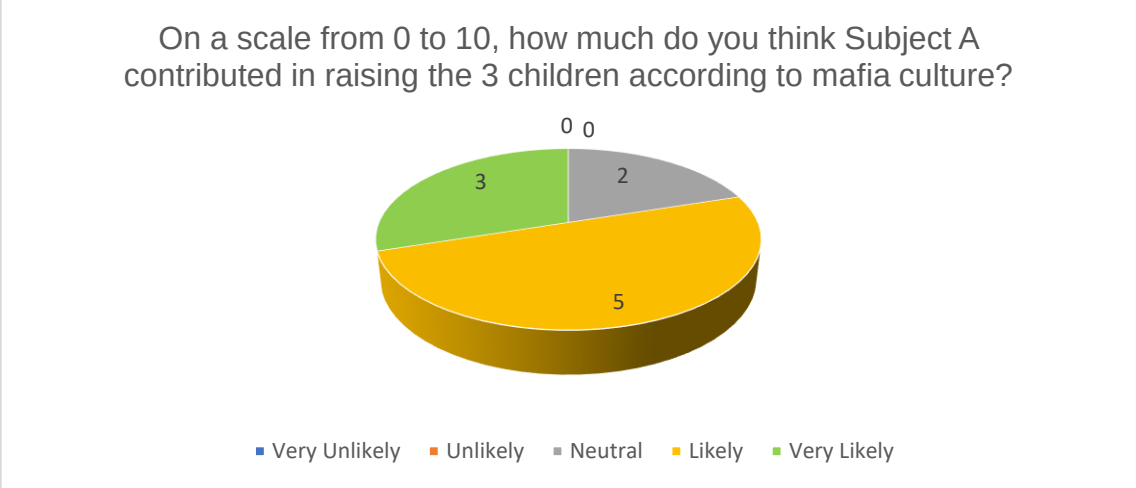

Figure 8

- *Question 8: On a scale from 0 to 10, had Subject A been aware of her husband's criminal profile, how likely would it be that she would have left the family for the sake of her children and herself?*

As depicted in Figure 9, five respondents believed that it is "Very Unlikely" and one "Unlikely" for the woman to run away from the situation, followed by four "Neutral" positions. Reasonings focused on the difference between wanting to leave and being able to leave:

Wanting to I suspect or actually being able to do it are very different things, aren't they? So actually I think probably six. (I2)

There's a lot in this question. First of all, whether she wants to leave the husband, that's one question. Whether she's able to leave her husband is another question because wanting and being able to, I'd see entirely two different issues. She wants, but she may not be able to, but if she wants and if she's able to, then that's good, but if she wants and she's unable to, which means she is stuck where she is! […] *It's hard to gauge what is the scale because how much she wants to leave the husband, and whether she's able to leave her husband, I don't know, so I wouldn't be able to tell* […]. (I6)

Again, if you have criminal activities that involve items of the type that you've described have been discovered, any degree of awareness would logically, I guess, carry with it an awareness of the potential for violence and, therefore, violent retribution. That would, I guess, weigh pretty heavily,

in terms of disincentivising any escape, any move away. I would probably put that around about five-ish. Now, the reason I put that at five is that the other factors, I think, push slightly higher towards the level of involvement and awareness, but that's contingent on exactly what was found and where. (I7)

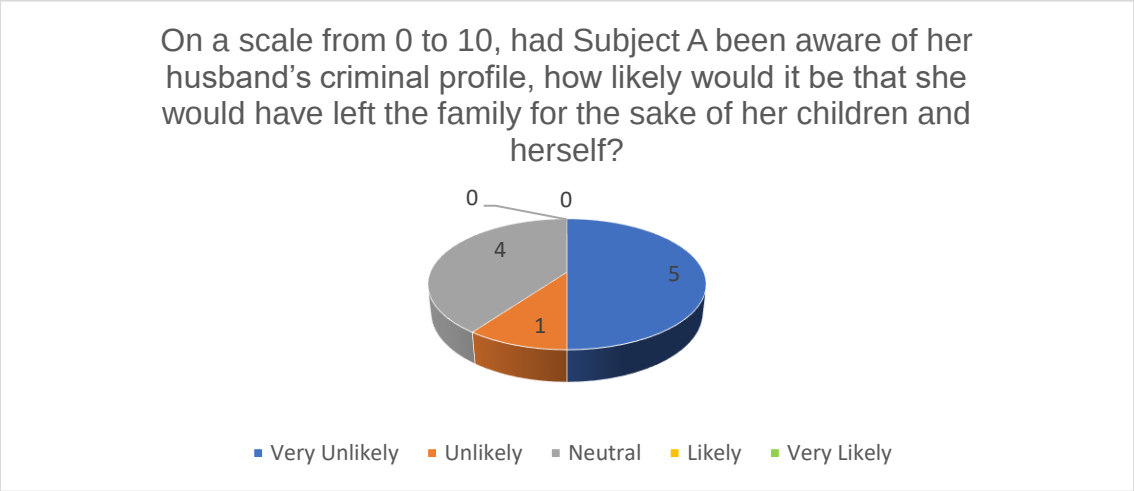

Figure 9

- *Question 9: On a scale from 0 to 10, where 0 is Not Guilty and 10 represents Guilty, how guilty is Subject A of mafia association based on the facts?*

As depicted in Figure 10, mixed positions were taken in answering, with six interviewees taking the higher brackets of "Likely" and "Very Likely", followed by two "Neutral" responses, and one each for "Unlikely" and "Unlikely". Reasonings given are found below:

It's difficult to say because we don't have enough facts. All we know is that there were guns and drugs in the house, but were they in an area where she would have known? Without knowing that, it'd be difficult to say I think. For instance, if it was drugs like cocaine and there were kilos of it and guns, how many of them, because guns in a house, that's not even illegal I don't think. It depends if they're automatic. It depends what type of guns they are because I think Sicilians, like Turks, are allowed to keep guns in the house, so that's not an issue. If drugs were found in there, it depends again if they were prescription drugs or was it kilos of cocaine or something else. If it was over a certain amount and it was found somewhere that you know she would be regularly going to, so it could be in the bathroom cabinet or very obvious places. If obvious places, then it's completely guilty, but if not and they would be in places that were obscure, I think it's less likely but I still think she'd be around about, it'd range between three and ten I think depending on the circumstances. I don't think there would be any complete innocence there. (I2)

If I am the prosecutor, it's going to be quite hard to prove that she has any links to the gang just because the arms were found in the house where she was staying. So if I'm the prosecutor, I would need more proof to prove that she is involved somehow, in any of the illegal activities, not just by her staying in the house. I would say she's not guilty. Probably about two, three. (I6)

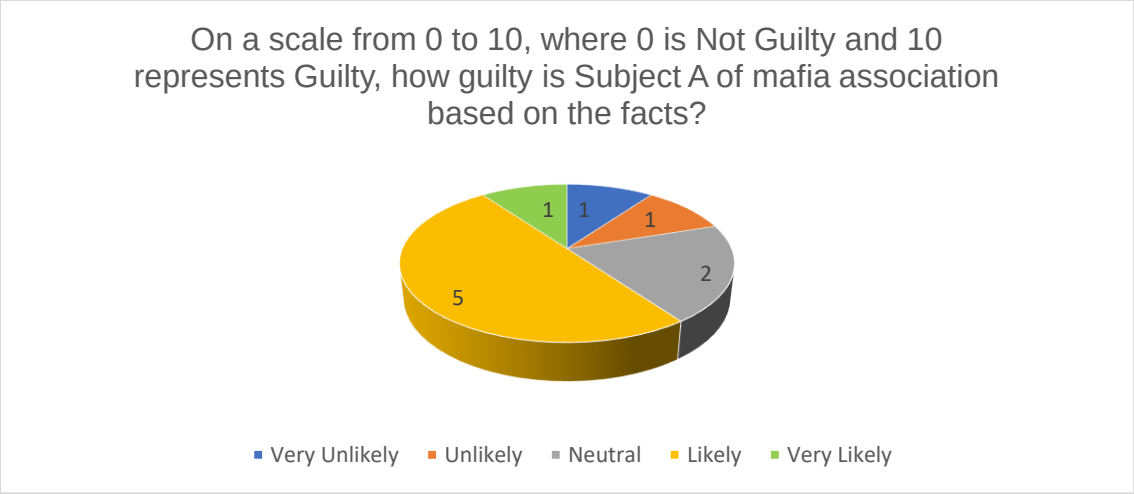

Figure 10

- *Question 10: Do you think that the criminal justice system may have convicted Subject A?*

As depicted in Figure 11, the same split of the answers above were given for this question with six responses between "Very Likely" and "Likely", followed by two "Neutral" responses and one answer each for "Unlikely" and "Very Unlikely". Some of the insights into the reasoning processes given are reported below:

> *No, I think if she helps them out with some information, which I don't think she will - okay, so let's assume that. Let's assume she won't help them out with anything, will they convict her? No, no they won't. No, they'll leave her with the three kids and without him and make her just suffer in another way. I don't think the system will go for her, no.* (I4)

> *That really goes to the cultural expectations and really dealing with the judiciary, because I think there are a number of players here. First of all, you have the subject herself, and her family, and cultural setting. Then, if there is a trial, that's going to be determined by some form of investigative and law enforcement activity. In those circumstances that, I presume, would involve police. One of the actualities there is that those involved in prosecutions, seek prosecution, so then I guess it comes to the cultural views of the final arbiter, of the judge. On the facts you've described, I would probably put it around about six.* (I7)

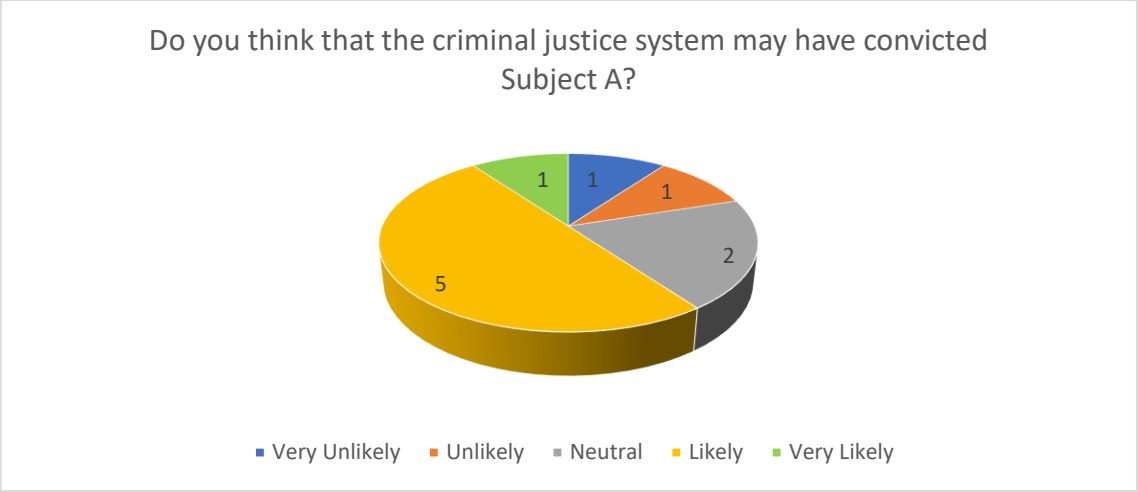

Figure 11

- *Question 11: Based on the initials facts I gave you, describe what role she must have had in the family setting (A victim, an innocent housewife, a criminal…)*

As depicted in Figure 12, the conclusions participants reached have been categorised into 4 distinct roles. The "Victim/Supporter" summarises those answers where the woman has no choice but to support the husband in his illicit activities either actively or passively with keeping the code of silence. The "Innocent Housewife" group those answers that depicted the woman as being unaware of the husband's criminality. "Criminal" groups those answers that portrayed the woman as an active criminal, fully conscious of her actions. Finally, the "Cannot Say" option summarises those that were not able to define her role for various reasons.

For the current scenario, there are split images of the woman with three holding she is a "Victim/Supporter", one holding she is an "Innocent Housewife", three believing she is a "Criminal", and three unable to respond. Some of the processes of thinking are reported below:

> *I doubt she was a victim, but without the context around it, it's almost we're creating stories ourselves… if you had more accurate data, it would help. I don't know. It's really difficult, that one.* (I2)

> *She's supporting it and has reached a point in her life where any alternative is untenable, and their debts and obligations have got them deeply buried in it.* (I4)

> *Her role is more of a mother tasked to bring up the children. I've not heard you mention anything, and I can't say that she's involved in any way, of any of the husband's activities. So I see her more like a mother, or even probably a housewife.* (I6)

> *I would imagine, assuming this produced a trial, it would be extremely interesting to see what lines of defence were run, and to what extent there is a line of defence that seeks to portray the subject*

as victim. What I think I would be interested to do there is then to look at a number of trials in a similar area, to see how commonly that portrayal is run as a line of defence. In other words, whether that's your go-to defence and, from there, how often it's successful. I think, looking at the dynamics of prosecution, and the dynamics of trial, and patterns of outcome, would tell you a lot about the cultural views of law enforcement, of the judges. (I7)

I think it depends on the history. As I said, if she knew before that the husband was part of the organisation and she decided to get married, and she didn't do anything to stop then I think she is part of the business and that she is supportive. (I8)

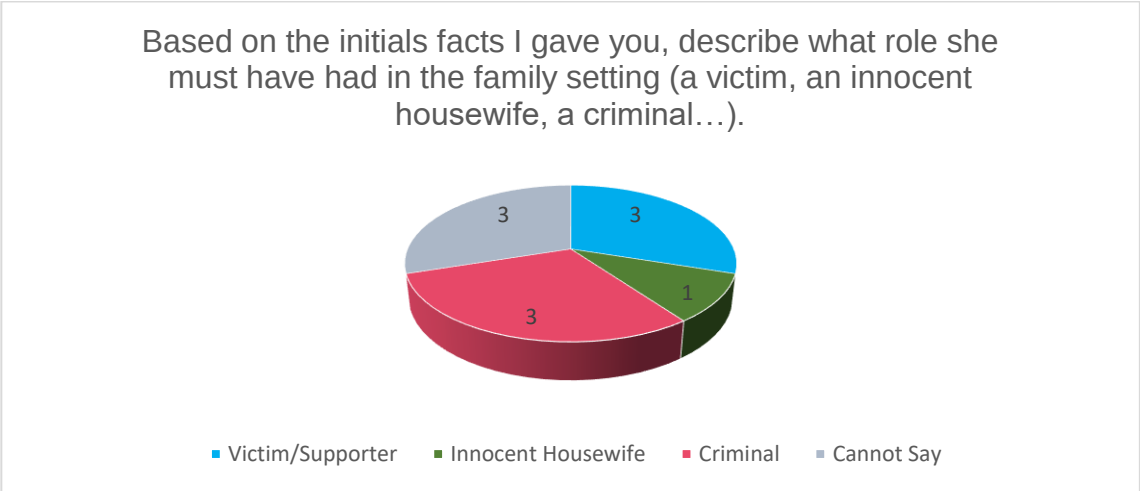

Figure 12

Annina Lo Bianco's real story is that she is today renowned as a courageous woman that turned herself against the *'Ndrangheta* to save herself and her children. She entered the witness protection scheme by herself because she did not want her children to be raised with wrong values fed by the father. She had admitted that the 11-year-old son would play with guns with his father and she was not able to stop it because she would not know what would happen to her if she spoke up against him. Annina's story embodies the more traditional story that is told and renowned when learning of the mafia women. The suggestion made by "I7" would actually help to see how other roles similar to hers, or different to hers were judicially dealt with. She is the woman that, for the love of the kids, wanted to save them but, for the love for her husband and her safety, she could not leave him. In 2004 she also took the responsibility when law enforcement entered their home and found illegal guns and drugs which she had tried to hide inside her lingerie to protect him. She was placed under house arrest as she was pregnant (Il Dispaccio, 2015).

Scenario B [Mariangela di Trapani, *Cosa Nostra*]

Age: 52 [in 2020]

Married: Yes

Mafia Affiliation: family and husband affiliated

Children: Yes (one son)

Location: Resuttana, Sicily

Facts: A daughter of a mafia clan and wife of a mafia boss [Salvino Madonia] who has been in prison since 1992 under the Italian hard prison regime, allowing very little to no contact with the outside world. He had killed a renowned entrepreneur who had refused to pay the mafia protection money he had been asked for and condemned the organised crime through an open letter published in a Sicilian newspaper. Subject B married him while he was in prison in 1992.

- *Question 1: On a scale from 0 to 10, how much was the woman carrying out the tasks of a mother in upbringing the only son?*

As depicted in Figure 13, the answers were split between six "Very Likely" and four "Likely", which was mainly due to the fact that the father was in prison, and consequently it was logical for the respondents to assume that the primary carer would be the mother. However, one also responded that she may have had help from her mother or mother-in-law in the upbringing of the son (I2).

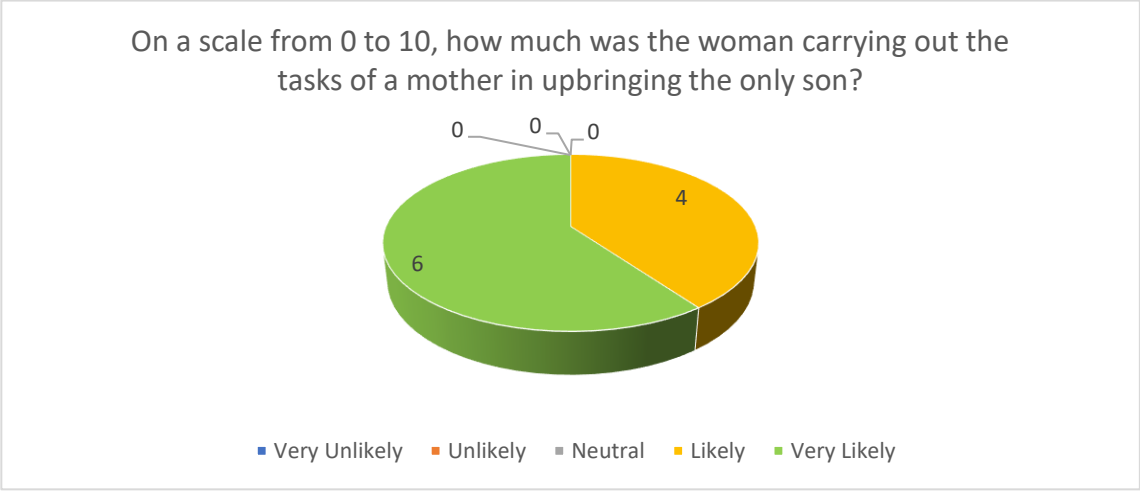

Figure 13

- *Question 2: On a scale from 0 to 10, how much do you think Subject B was involved in the child's life with a father that was absent due to running an illegal business?*

As depicted in Figure 14, there is again a similar response as to the question above with seven “Very Likely” and three “Likely” answers with regards to Subject B’s involvement in the son’s life with an absent father. Although these two questions are very similar, they were aimed at understanding how assumptions would be made when the same questions were asked in different scenarios where there would be a more traditional family with both mother and father present, and a less ordinary family where the father would be in prison. It was also further hoped to see if assumptions were made with regards to the possibility of the father’s presence in the son’s life despite his imprisonment as it would be logical in the mafia culture to prepare the next-of-kin to take the father’s throne.

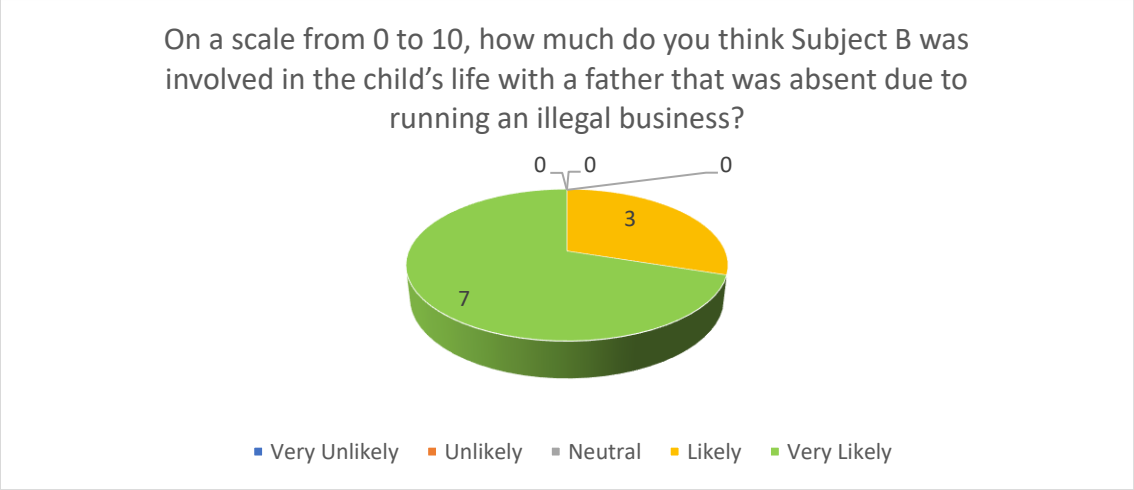

Figure 14

- *Question 3: On a scale from 0 to 10, how much do you think Subject B was involved in her husband’s private life?*

As depicted in Figure 15, answers were split with three “Very Likely” and four “Likely” responses, two “Neutral” and one “Very Unlikely”.

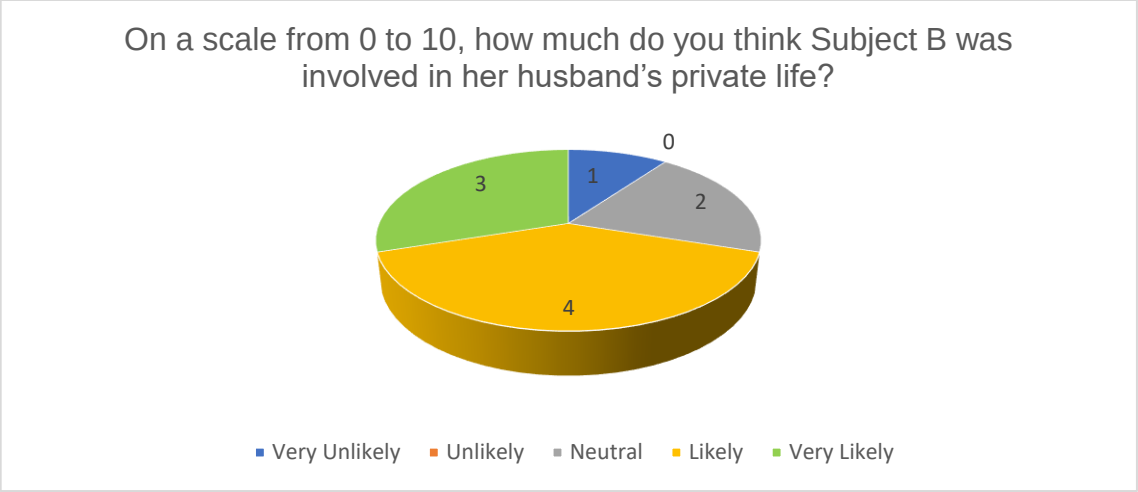

Figure 15

- *Question 4: On a scale from 0 to 10, how much do you think Subject B thought that her husband was doing an ordinary job?*

As depicted in Figure 16, six responded "Very Likely", two "Likely" and two took a "Neutral" position. An interesting perspective was offered by a respondent:

> *Yes, you've set the context there quite carefully, that she's from a mafia family. That creates an interesting issue, which is from that context, what would a person perceive as being an ordinary job. I think it goes back to the point I was making earlier, that what is lawful and unlawful might really be perceived as external, and so what is an ordinary job and ordinary way of life might be defined by that context. Was she conscious that his activities weren't lawful? I would have thought quite probably. Eight-ish. Would she have perceived those activities as troubling or unlawful? Much more difficult to say, maybe five.* (I7)

This more nuanced answer is vital for data collection processes that eventually feed into AI models, and make or break such systems. This very detailed questioning exposes the lines of enquiry to undertake in the integration of data in an AI tool.

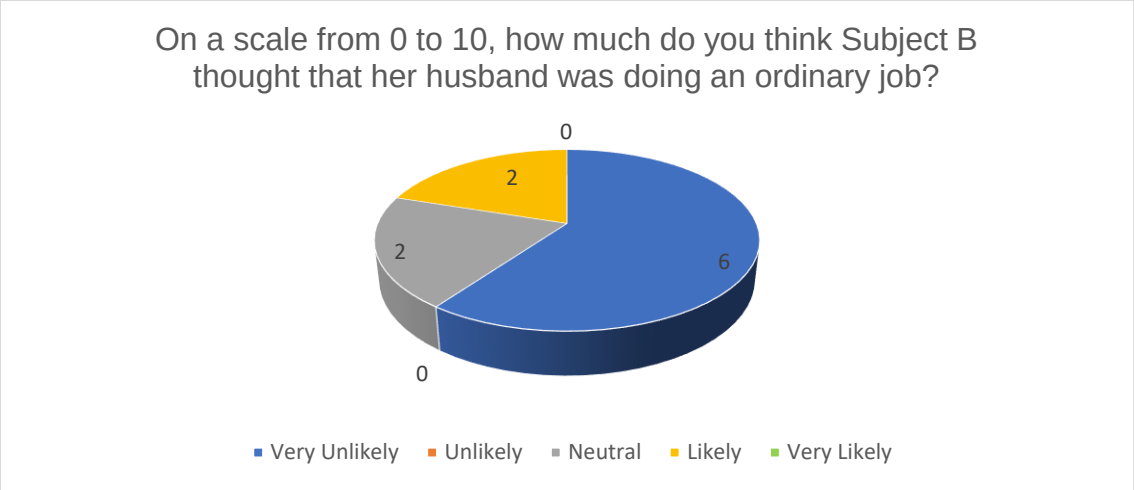

Figure 16

- *Question 5: On a scale from 0 to 10, how much do you think Subject B was aware of her husband's illegal business?*

As depicted in Figure 17, nine respondents believed that it is "Very Likely" and "Likely" that Subject B was aware of her husband's illegal activities, with only one respondent believing it was "Very Unlikely".

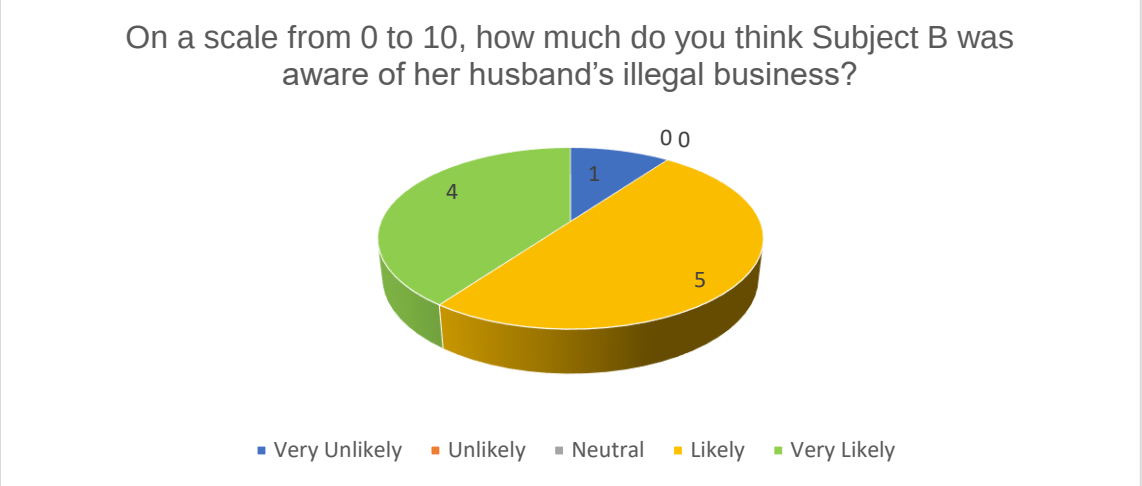

Figure 17

- *Question 6: On a scale from 0 to 10, how much do you think Subject B contributed to her husband's illegal activities?*

As depicted in Figure 18, answers varied between one "Very Likely", five "Likely", three "Neutral" and one "Very Unlikely". Some of the thinking processes are reported below:

If she married him whilst he's in prison, that can only be for a contractual reason, but there could be fear involved. I would say probably about seven, seven or eight. (I2)

The question there is how far she individually contributed. In other words, it's a question of agency. We would need to know a lot more about the individual. For example, you've indicated that the marriage might well have been, if you like, a business deal to strengthen family relations. It would be interesting to know how far the individual woman bought into that, or had that imposed upon her. I think that question of agency is key. Given that marriage takes place after conviction, again, that, I think, pushes up to maybe six, seven as a working assumption. (I7)

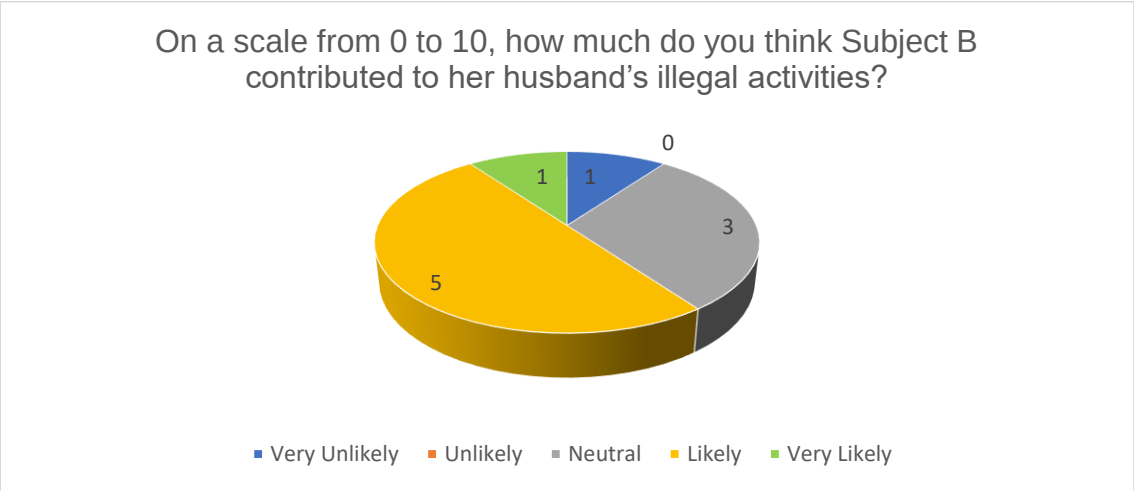

Figure 18

- *Question 7: On a scale from 0 to 10, how much do you think Subject B contributed in raising the only son according to mafia culture?*

As depicted in Figure 19, half of the participants gave "Neutral" responses and the other half was split between "Very Likely" and "Likely". Main reasonings given are found below:

I would not be able to tell that as well because there is nothing in the whole context to say how the child was being brought up. All we heard is that the mother brought up the child. I guess somehow, whether it's directly or indirectly, it must have influenced her as well because she was brought up from a mafia family. She ended up marrying a mafia boss, so somehow, I would say it runs in the blood, so I would assume that whether it is consciously or unconsciously she may have passed down some of the values on to her son. It's just that I'm not sure how much […] *I mean, one could come from a mafia family, but detest being associated with mafia gangs. This way, I would say, the value about six to seven, so she may have passed down some of the values on to her son.* (I6)

Again, put that fairly high, given the context. If the marriage occurs after conviction, and imprisonment, then you can, I think, fairly strongly infer a degree of knowledge, and a degree of approval, a degree of involvement in whatever are the cultural norms, whatever are the assumptions. As the mother of an only child, there's a pretty strong inference there that that's a dominant influence. That's a very strong channel of value transmission. (I7)

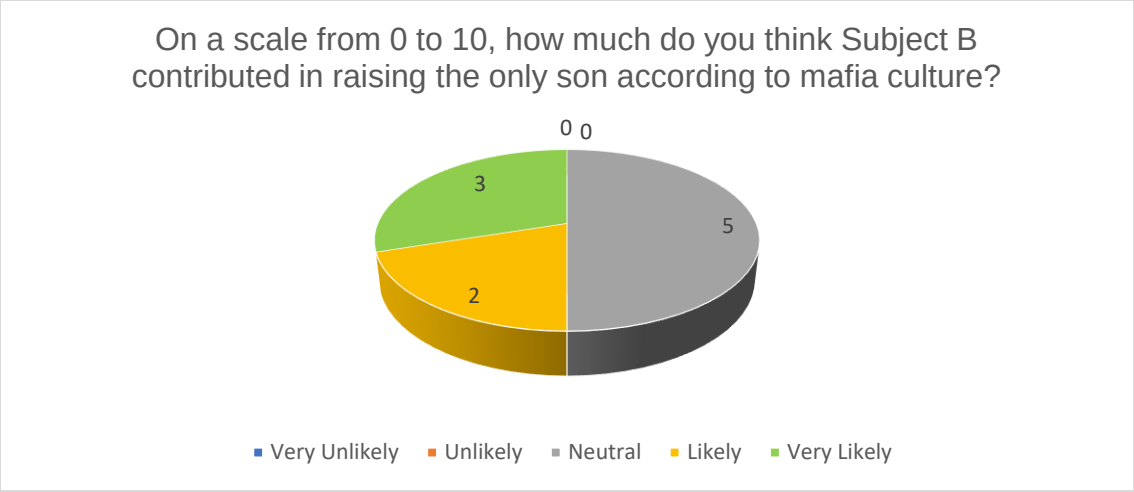

Figure 19

- *Question 8: On a scale from 0 to 10, had Subject B been aware of her husband's criminal profile, how likely would it be that she would have left the family for the sake of her son and herself?*

As depicted in Figure 20, seven responses indicated the very unlikelihood of Subject B running away from the situation, with one stating that it was "Unlikely" and two taking a "Neutral" position. Some of the answers stated:

> *I don't think she would have done because if she married him whilst he was in prison, she's bought into the principles, so I think that's total commitment.* (I2)

> *I guess that's a broader family question, isn't it? That would require more information about the dynamics within her family and the extent to which you can identify agency in terms of her involvement with the marriage or how far it was something that was imposed by her family. If you contemplate a situation where if she was to refuse to enter into the marriage or to run away, presumably - at that point she would have been childless, early 20s, childless, from maybe a small-town community in Sicily I would imagine that's a very difficult situation to contemplate escaping from. A difficult place to contemplate leaving. What that might depend on is the availability of other potential family connections; community connections; or friendships elsewhere. Assuming they're very limited, I think, you are down to the point escape would be really difficult.* (I7)

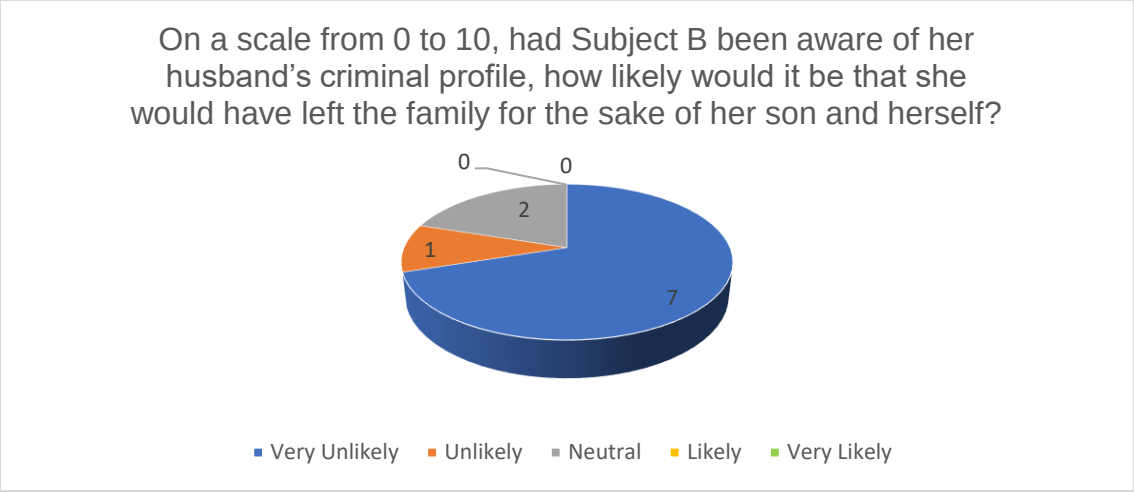

Figure 20

- *Question 9: On a scale from 0 to 10, where 0 is Not Guilty and 10 represents Guilty, how guilty is Subject B of mafia association based on the facts?*

As depicted in Figure 21, seven responses believed Subject B to "Likely" or "Very Likely" be held guilty of mafia association, with two taking a "Neutral" position and one "Unlikely". Some reasonings are reported below:

> *In this case, she may not have been involved in any of it but just was in the families, so I think possibly less so. There was nothing found, there was no evidence found. Well, there wasn't because he was in prison, so she's not done anything wrong. She's actually carrying on as we understand it and running a family, so I would say three.* (I3)

> *After the imprisonment, then I'd think there is a high likelihood of criminality, that would not be by association, but more direct, a higher degree. If they could pin stuff on her, I would say 8.* (I3)

> *This is quite tricky. I would say it's half. It's about five because knowing that she comes from a mafia family. She got herself married into another mafia family, so if I'm a police officer, I would have suspected her* […] *just because of the connection.* (I6)

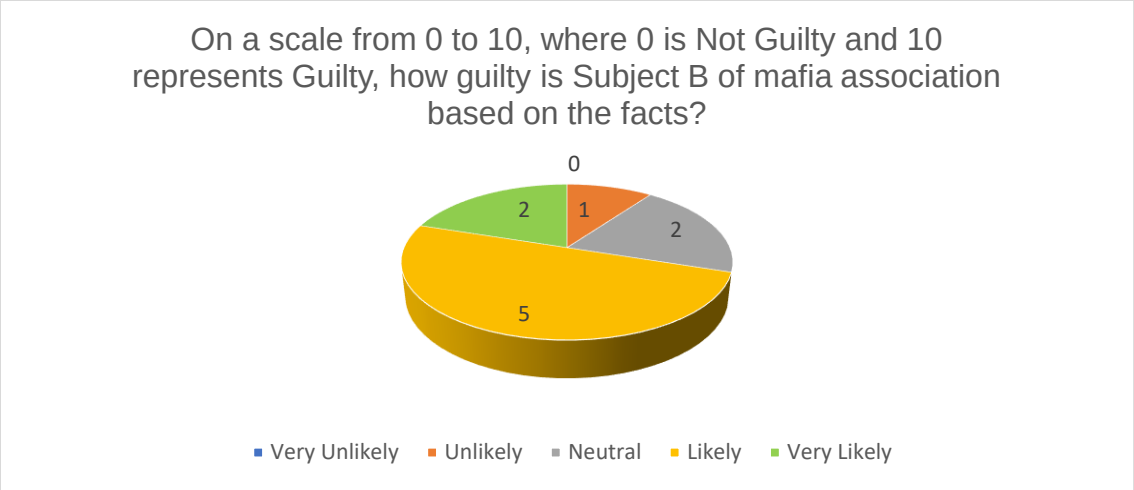

Figure 21

- *Question 10: Do you think that the criminal justice system may have convicted Subject B?*

As depicted in Figure 22, five responses stated that it was "Likely" and "Very Likely" that the criminal justice system convicted Subject B, with four taking a "Neutral" position and one stating that it was "Very Unlikely". However, some answers elucidated on the need of having more information to understand the culpability, for instance:

> *I think that would depend on exactly when the proceedings occur. It would seem to me more likely that you would have conviction as the subject gets older. As someone in their early 20s I would suspect it would be a lot easier to run a defence along the lines of coercion. Also, I guess it would be worth knowing a lot more about the age of the only child and whether the only child subsequently demonstrates any strong signs of continued mafia involvement. In particular, if the child eventually is convicted it would seem to me that that would weigh very strongly as a factor against the mother.* (I7)

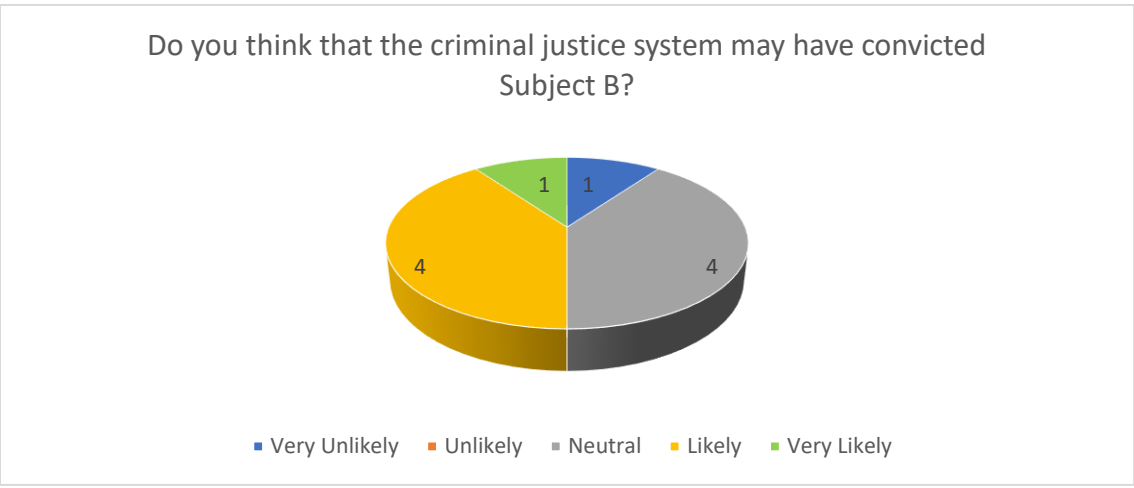

Figure 22

- *Question 11: Based on the initials facts I gave you, describe what role she must have had in the family setting (A victim, an innocent housewife, a criminal…)*

As depicted in Figure 23, four respondents believed that Subject B could be a "Criminal", with one stating she could be an "Innocent Housewife", three tending towards the category of "Victim/Supporter" and finally with two not being able to associate her with a role. Some of the varied and more holistic responses have been reported below:

> *I'm trying to create a picture of what she might look like. I don't think she'd be a victim and I don't think she's innocent!* […] *I think she's probably innocent actually based on my previous question, because there's been nothing to point out she's been involved in the very limited facts. There's nothing there to say that she's actually been involved in criminal activity.* (I2)

> *I am not sure I agree with any of those. I could argue criminality would probably be closer to her. She is continuing her husband's activities, but it may be that I am looking at it romantically. Is she just doing by proxy? But that would still amount to criminality.* (I3)

> *That's a good question, because I think the 'victim' imports the fact that she sort of knows more, whereas 'innocent' suggests she really doesn't know. I would say victim, and I would say I would characterise her as a victim of her circumstances, in a vulnerable position, which is what keeps her from being able to make some decisions for herself. The reason why I don't completely exonerate her is because she may actually be a little bit trapped - and I think this is important - by her own expectations for what she thought her life would look like. Maybe what keeps people in that place, in that position, is they just can't imagine being divorced and having no associations, no money, and having to take a step down even further from being the knowing victim. I think she's trapped. I think she's trapped by the prospect of what the alternative, the better, more legitimate life, would look like for her, because her options are so few as a woman who's 52 and is where she is. I just think she's trapped.* (I4)

> *I would say she's more like a partner to it because she's highly aware of what her husband had been doing. She has the background knowledge. She has the connection.* (I6)

> *When you say the victim or not, it's black and white. It's not that clear, but I would lean more towards not the weak victim because she's also part of it but she can still be the victim of their own family. She can't really say no so I don't know.* (I11)

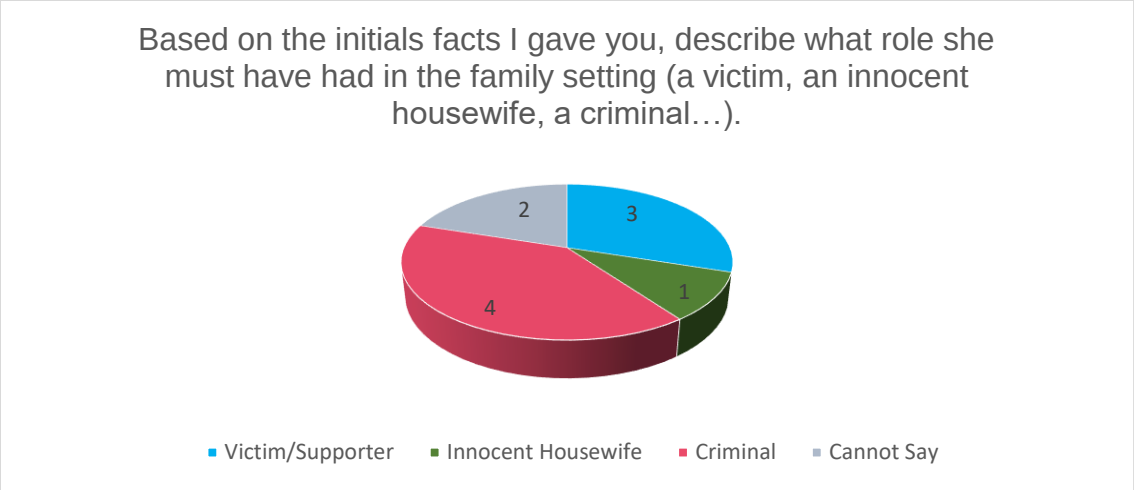

Figure 23

Mariangela's profile and criminal CV differentiated how the biases towards women and crime were perceived by the interviewees. It was slightly easier to fight those conceptions that would justify the woman and would disassociate her from anything to do with violence. Since the idea of strategic marriages to strengthen clans is more accepted, it was easier to accept that Mariangela came from a criminal family, which would normalise her marriage to the mafia. She served prison time between 2008 and 2015 for delivering her jailed husbands' orders to the rest of the organisation. One of the orders she had delivered included the killing of another boss who had spread the word that Mariangela's son could not be her husband's because he was in jail. When she was released, she did become a real woman of honour. In December 2017 she was arrested again, after running the clan, involving herself in extortion and other crimes (Allum, 2018; Hughes, 2017; Ferrara, 2017).

Scenario C [Rosetta Cutolo, *Camorra*]

Age: 83 [in 2020]

Married: No

Mafia Affiliation: Brother affiliated

Children: No

Location: Naples, Camorra.

Facts: A sister of a mafia boss [Raffaele Cutolo]. A pious-looking woman, lived alone with her mother near Naples for years tending her roses. She has a love-hate relationship with her brother who was imprisoned for mafia association.

- *Question 1: On a scale from 0 to 10, how much do you think Subject C was involved in her brother's life?*

As depicted in Figure 24, six participants believed that it was "Likely" and "Very Likely" that Subject C was involved in her brother's life, with four taking a "Neutral" position.

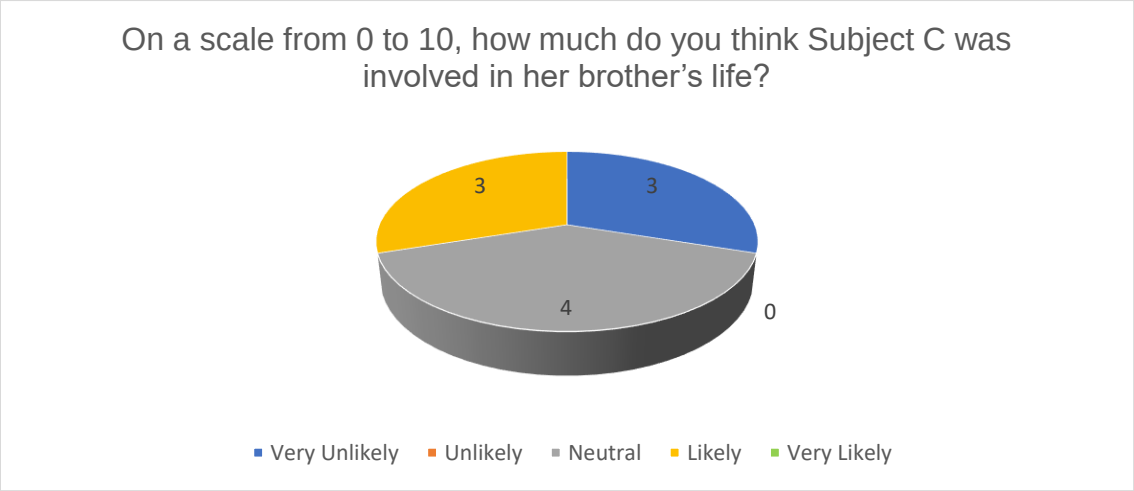

Figure 24

- *Question 2: On a scale from 0 to 10, how much do you think Subject C thought that her brother was doing an ordinary job?*

As depicted in Figure 25, seven responded that it was "Very Unlikely" that Subject C thought that Raffaele Cutolo had a normal job, with one taking a "Neutral" position and two responding that it was "Likely". An interesting insight into a process of thinking that highlighted the importance of diverse knowledge is included below:

> *Thinking about the context of Naples in the 40s and 50s, I suspect there might be quite a high degree of awareness of criminal activity as criminal activity. I'm basing that on this particular book by a guy called Norman Lewis; it's called Naples '44. Forty-four in question is 1944. Lewis was there essentially as a war correspondence. It's a fairly harrowing account of the city in that period. He subsequently became a travel writer and was active from the '50s through to the 1990s and revisited Naples numerous times and traced essentially a post-war experience of the city.* (I7)

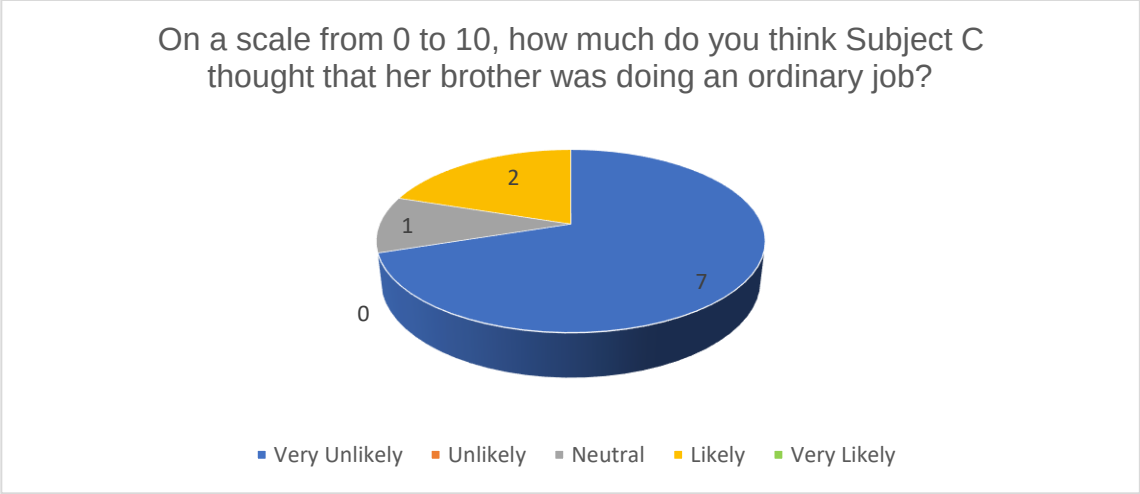

Figure 25

- *Question 3: On a scale from 0 to 10, how much do you think Subject C was aware of her brother's illegal business?*

As depicted in Figure 26, six believed that it was "Likely" and "Very Likely" that Subject C was aware of her brother's illegal business, with three taking a "Neutral" stand, and one thinking it being "Very Unlikely". A couple of the reasonings that mirror the majority's views are reported below:

> *She's very aware. She has a love-hate relationship, so nine. Eight, nine.* (I6)
>
> *That would depend on any particular role that she played. Whether, for example, she has any function in terms of looking after stuff, in terms of any kind of money-laundering activities. Without further information you'd have to place that sort of five-ish.* (I7)
>
> *This is a grey area, can't really say.* (I11)

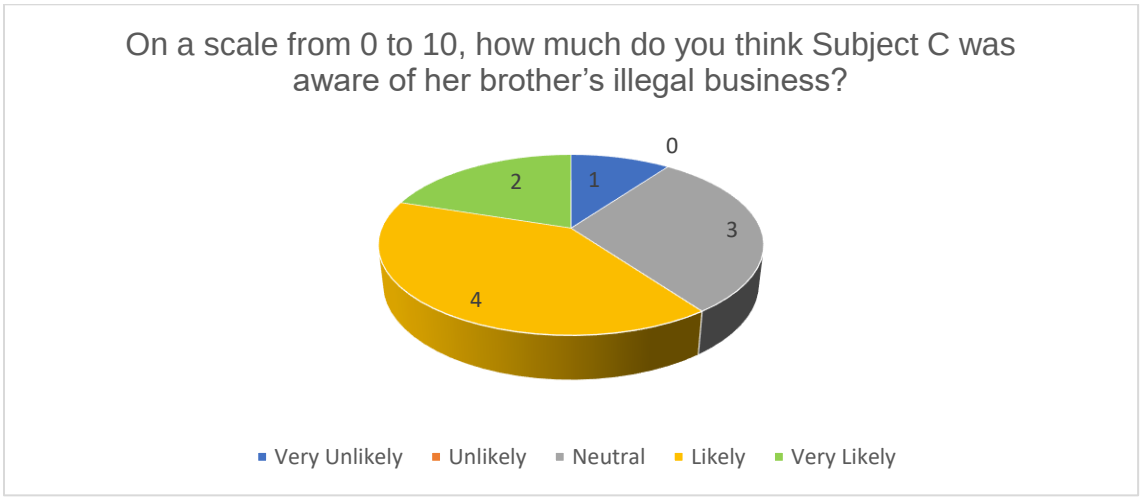

Figure 26

- *Question 4: On a scale from 0 to 10, how much do you think Subject C contributed to her brother's illegal activities?*

As depicted in Figure 27, four believed it was "Very Unlikely" that she contributed to the mafia, with two stating "Unlikely", three taking a "Neutral position" and one saying that it was "Likely. The scores were given straightforwardly by the respondents with very limited comments.

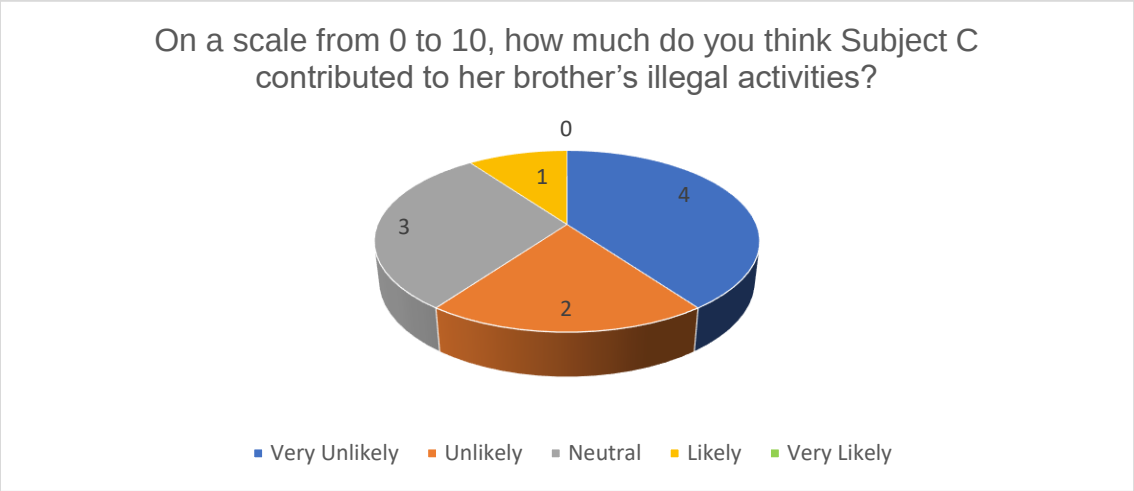

Figure 27

- *Question 5: On a scale from 0 to 10, how much do you think the mafia brother contributed in influencing Subject C according to mafia culture?*

As depicted in Figure 28, five believed that it was "Very Unlikely" and "Unlikely" that she was influenced by the mafia culture, with the rest of the respondents taking a "Neutral" position. Those in the middle had a reasoning that was summarised exhaustively by one particular answer, which is informative also for the enrichment of the data collection process:

> *I think we'd need to know more about the mother. I think you could almost put the question the other way around which would be: how far would the mother and sister contribute to legitimising the mafia brother's sense of what he's doing? Then, I think, we'd also need to know more about specifically what the mafia brother was doing. What types of criminal activity was the brother involved with and how far that provides, for example, the source of support. How far is the brother economically supporting the mother and sister? What levels of economic support have been offered? Is it some subsistence or is it affluence? The further you go from subsistence to affluence, I think, the more difficult it is to conceal the source of wealth.* (I7)

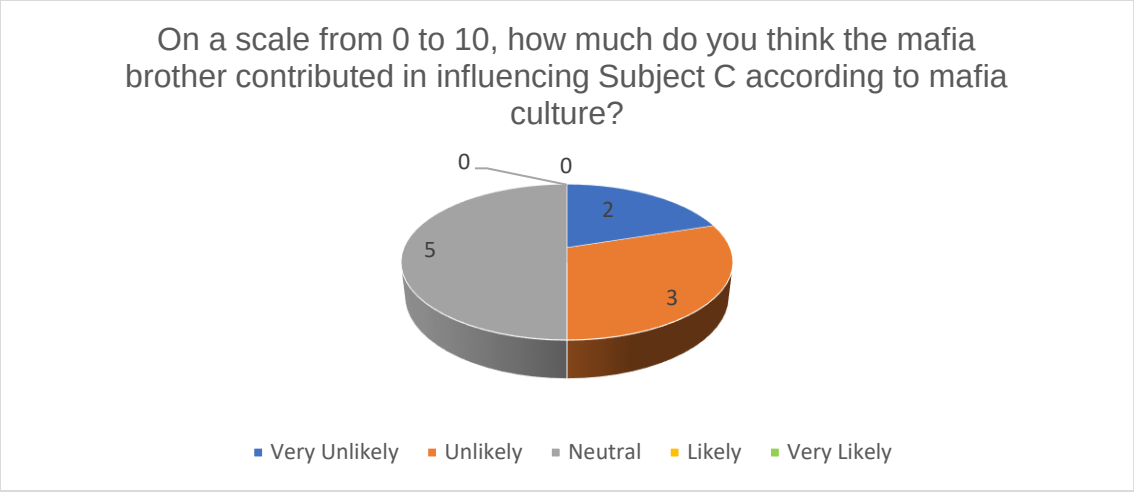

Figure 28

- *Question 6: On a scale from 0 to 10, had Subject C been aware of her brother's criminal profile, how likely would it be that she would have left the family for the sake of herself?*

As depicted in Figure 29, the majority believed that it was "Very Likely", with one taking a "Neutral" position, and four split between "Unlikely" and "Very Unlikely".

> *I think it sounds like she did. Seven. She's not involved, she's never been involved and she's just the sister.* (I2)

> *I think it depends on what alternative locations might have been available, what alternative means of support might have been available. Again, drawing on things like Lewis, Naples '44 and his subsequent writings, at the fairly critical stages of the age of a person who's now 83, unless you have a very clear path out of Naples it might be extremely difficult to escape; to move on; or to find another way of being. I suppose you mentioned in your introduction that she was a religious seeming woman. Again, I think that loops us back to the question of cultural and religious perception of the brother's activities and whether it is something from which escape might be thought to be even necessarily desirable but pretty low.* (I7)

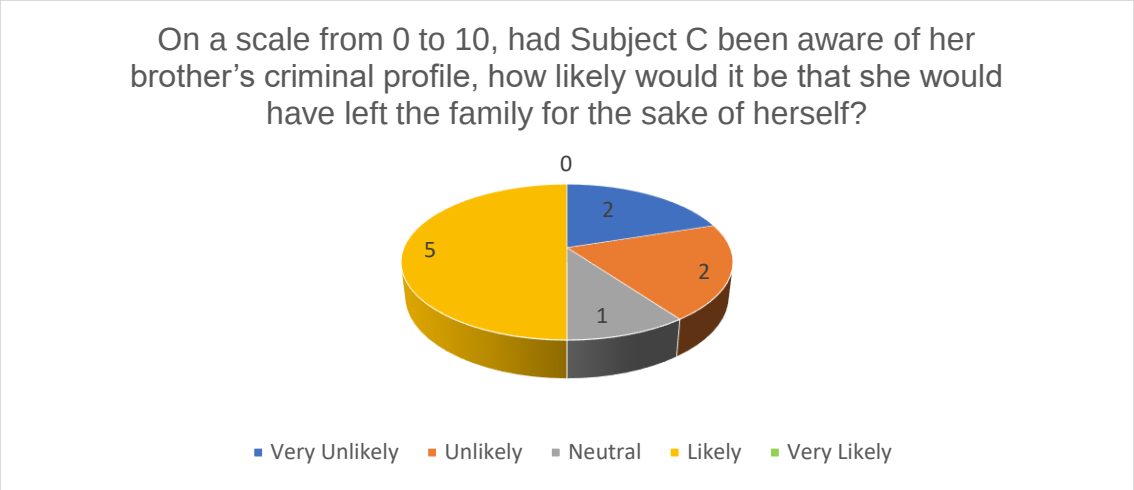

Figure 29

- *Question 7: On a scale from 0 to 10, where 0 is Not Guilty and 10 represents Guilty, how guilty is Subject C of mafia association?*

As depicted in Figure 30, six responded that it is "Very Unlikely" and "Unlikely" that she is to be found guilty, with one taking a "Neutral" position, and three stating that it is "Likely". Some of the answers touched on the fact that she may be guilty because if she knew even a little bit about the business she should have reported it, and if she had not, then she is to be held guilty (I8). Whereas another respondent stated it is a grey area because there is not enough evidence, and this is an evidence-based discipline. Moreover, the fact that mafia people are religious does not necessarily mean that they are warm-hearted and caring people (I11).

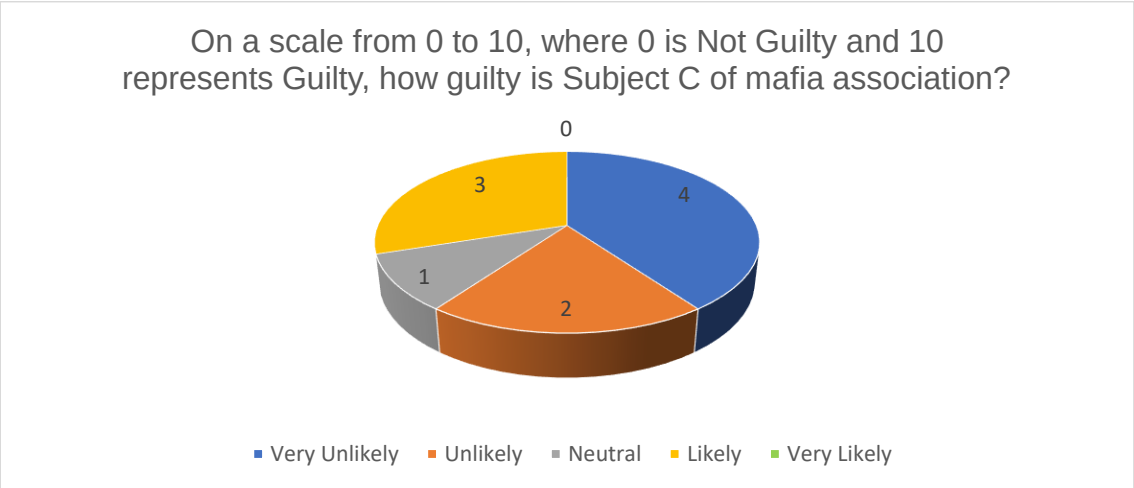

Figure 30

- *Question 8: Do you think that the criminal justice system may have convicted Subject C?*

As depicted in Figure 31, five believed that it was “Very Unlikely” and “Unlikely” that she would be convicted, with four taking a “Neutral” stance, and one stating that it is “Very Likely” that she is convicted.

> *If he was married and not in the house, he could easily have left and just gone into the mafia route himself and really moved out of the house early on, in which case, she would have no association with them at all. I don't think she's guilty at all.* (I2)

> *No. I can say this: I think in Australia she would only be in trouble if they found the proceeds of crime on the premises, and as you didn't include that, I'm going to give it no, zero. No, they're not going to convict her.* (I4)

> *No, it's going to be quite hard to link her to any other mafia activities just because, for one, she's not staying with the brother. She doesn't seem to like the brother very much, so the police usually will ask subject C to be a witness.* (I6)

> *I think there'd be quite a high chance of that approach being taken by the judiciary. It would depend very largely on, I think, personal presentation as much as anything. Your description referred to a religious seeming woman. The question there is how does that translate into appearance and presentation. If you're looking at someone who is demure; devout looking; non-threatening looking then you may well have almost the perfect subject for the defence of either unaware, coerced, or nowhere else to go, nothing else to do. I would have thought there the likelihood of conviction would have been commensurately lower. But you'd need to know more about any pattern of activity, any specific evidence that might be available in relation to her.* (I7)

Such different processes of reasoning by the experts, the challenging of the facts, of the data is what would contribute towards the better informatisation of AI models, and eventually narrowing the gender data gap. Fighting historically established societal norms, requires conscious efforts to raise awareness of such discriminations, whether they happen implicitly or explicitly. Holistic reflection and discussion nurture more considered thinking processes based on a bigger picture, context or circumstance.

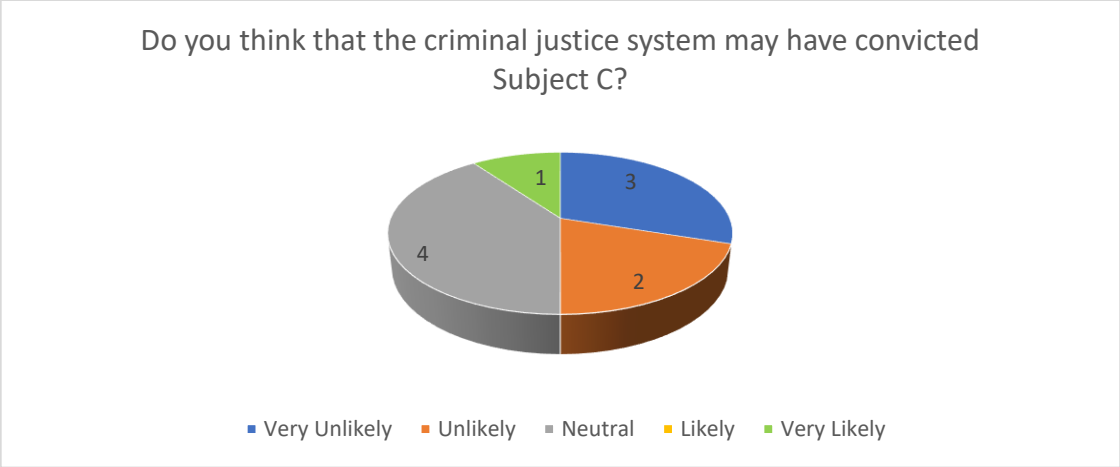

Figure 31

- *Question 9: Based on the initials facts I gave you, describe what role she must have had in the family setting (A victim, a criminal…)*

As depicted in Figure 32, four believed her to be an "Innocent Sibling" with three tending towards "Victim/Supporter" and three unable to respond. It can be noticed in some of the answers, the assumption made of the woman, the sister, seeking to save the brother from becoming a criminal, her nurturing and protecting side is sought to be highlighted.

> *Interesting … this is a bit atypical, you have the love-hate relationship which suggests that it is family, you love your family but hate what he is doing. There is another aspect, which is stereotypical which is the fact that she has not had children. When that happens in community, it is the norm to have kids, then there is something going on and question why that is the case assuming there is not something physiological going. Maybe she thought I do not want to bring in children to this scenario so to me this indicates that while she does not want to leave her family, she does not approve of what they do. And she pursued religion. You see that often in communities the kind of religious type, almost praying on the behalf of mercy and forgiveness.* (I3)

> *I think she brings legitimacy, an air of dignified legitimacy to the entire family. They need the odd elderly matriarch who can be sweet and innocent, because it's good for the look, that's all. She can turn up to church, people will respect her. Yes, I think she brings - and I'm not suggesting she's playing that role intentionally, but they're exploiting it tacitly.* (I4)

> *I would say she's one who has tried very hard to convince the brother to step away from the mafia. So someone who is against what the brother is doing and trying hard to stop the brother until the moment of the fall-out, which is when she decided to leave.* (I6)

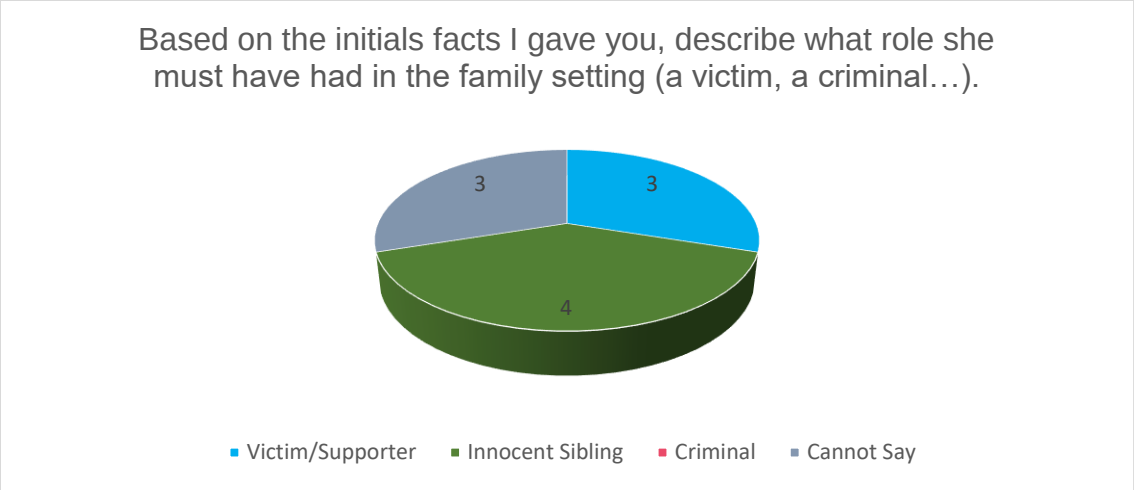

Figure 32

Once Raffaele Cutolo was imprisoned, he put together a trusted committee led by his sister, Rosetta. Rosetta was 5 years older than him, and renowned as “eyes of ice”. Rosetta, as the manager of the organisation, led it on behalf of her brother for over 15 years. She became a fugitive since September 1981 until February 1993 when she became tired of running and gave herself up to the law enforcement. She was sentenced to 9 years and 7 months for mafia association (Longrigg, 1998:12). However, after only 6 years in prison, she returned to Ottaviano (Naples) where, at 84 years (in 2021) she still lives today (Redazione Internapoli, 2020). When she was arrested, the papers described her as looking like a dowdy housewife. The Italian way of drawing the attention on women wearing skirts was to describe them as being beautiful so to capture the reader’s attention, says Longrigg. However, it was not Rosetta’s situation as at 55, her grey hair was neatly cut and curled, and the police chief who went to arrest her said later that as he opened the door, she burst into tears. But a contrasting image of the woman was given by her lawyer that depicted her as perfectly calm and resigned (Longrigg, 1998:15).

4.2.3 Conclusion

The current Chapter’s objective was to highlight two main themes: the focus on discovering female data in the sphere of mafia women, highlighting why data should be captured more neatly and consistently, and the method of discussing how bias may affect the collection of certain data.

Phase 2 quantified the results of Table 1, highlighting a level of detail that may be of use when it comes to the collection of data on women and the mafia. Its finding revealed the type of data that may be of use to tech experts in creating and fuelling algorithms that would potentially assist the justice system and law enforcement. The numerical data in Table 2 would consist of a starting point in the collection of

the level of detailed data needed to ensure that women datasets are collated consistently and are informative.

Furthermore, results of Table 1 and 2 led to the question of whether the lack of female data was due to the fact that women are inactive in the criminal organisations, or whether there is a bigger problem of inconsistent reporting and collection of the data. To investigate this further, the Italian National Statistics Office (ISTAT) was contacted to enquire if they had any detailed figures as to women's association with mafia related crimes. The outcome of the investigation was positive in the sense that it revealed Tables A1 to A4 (in the Appendix) that showed a heavier involvement of women in the mafia that reinforced the initial presumption that women are existent in the criminal field. Unfortunately, the reporting of their stories are likely to be skewed by biases, and lack of interest/focus in bringing to light their criminal attitudes.

Moreover, the fact that ISTAT has been collecting data based on areas, crime types, and gender brings hope for those pursuing legal-tech research similar to the current project. If further research is to be sought in the field, and the next step of creating and trialling for machine-learning led models in the legal field is undertaken, then some data is available to fuel and train the systems upon. However, the results also warn researchers and tech experts to question the data collated and analyse those available from ISTAT even further. Results reveal the need to drill down even more the data collated and be specific as to, for instance, sentence years, numbers of arrests before sentencing the men and women that appear on Tables A1 to A4. It should also be questioned whether these women are married, have children, if they are affiliated to the mafia via marriage or family or by their own choice, and much more. Phase 1 and Phase 2 results revealed the need for continuous data collection, monitoring, and storage to be done more accurately, consistently and methodically. This could facilitate access to those seeking to use the data for the better, fair and inclusive functioning of the criminal justice system, law enforcement, and overall the good of the public, and safety.

Phase 2 asked open questions and collated answers from experts in the legal and tech field to understand the biases that may be instilled in humans, depending on their accepted images of gendered roles in given circumstances. This particular results section offered a wide range of views offered by the interviewees to show a shared common theme among them although interviewed individually. For instance, to the questioning of describing a mafia person which was asked in a gender-neutral way, most of the responses described this person as a male, and only a couple of responses remained in neutral territory using terms such as an "individual" or "somebody" to describe a mafia boss.

Phase 2 was an additional step in the interview process that shared three different scenarios of mafia women, with limited facts that would be readily available to anyone with a quick research of the women and questions were asked based on the information. Interviewees were asked to answer on a scale from 0 to 10, representing answers from Very Unlikely, to Unlikely, Cannot Say/Neutral, Likely, and Very Likely.

Scenario A used the story of Annina Lo Bianco who embodied the most traditional mafia woman's role of the mother raising children, married to a mafia man. That led to many answers describing her as a victim of the situation, or innocent, unaware of the businesses carried out by her husband, dedicated to look after the home and upbringing the children. Others took a more neutral stand, stating that more information was needed before understanding what sort of role she might have played in the family setting and the organisation, if any. Then others were very sure that she was a criminal. Despite the initial story shared that depicted her as a caring mother, when the facts were shared of her aiding her husband to hide illegal weapons when law enforcement entered the property, most interviewees were surprised to know her level of awareness of the illicit activities as well as her contribution to protecting her husband and consequently to the mafia.

Scenario B used the story of a more unusual woman, Mariangela di Trapani who came from a mafia family and married a mafia man who was in prison. The different scenario clearly changed the assumptions made by the interviewees who became harsher in describing her. She was held to "Likely" and "Very Likely" be aware of and contributing to her husband's illegal business as well as guilty of mafia association. Although when it came to describing the role she must have had within the family setting, four held her to be a "Criminal", three a "Victim/Supporter", one "Innocent Housewife", and two responded "Cannot Say".

Finally Scenario C told the story of Rosetta Cutolo, the unmarried mafia woman that led her imprisoned brother's businesses, while also being a fugitive for a long time. Despite most interviewees thinking that she would have been aware of her brother's criminality even before facing prison, the majority responded that it was "Very Unlikely" and "Unlikely" that she contributed to her brother's illegal activities, or one took a "Neutral" position. It was also the only woman to have had five responses that thought that she was "Likely" to be able to leave the situation for the sake of herself. Whereas for Scenario A and B assumptions were made that those women, as mothers and married to the mafia, were less likely to have the freedom to run away.

Phase 2 was of use to understand people's interpretation of the woman's criminal role in an organised crime, and how their assumptions would differ depending on the family context, relationships and gender. Ultimately, the expert discussion led by the interviews encouraged more holistic reflection that enabled the focus to shift from whether experts have gender biases to what would the experts consider is needed to integrate the gender data in an AI tool. The expert discussion allowed to gain insights into the experts' thought processes as to why women may be present or not in the mafia. It is this type of comprehensive discussion, which could make the difference in the more inclusive and less discriminatory AI tools. This was further done to understand if/how the raising of awareness of the bias would allow a more mindful collection and use of data when moving to the following step of considering how to best utilise the information to create better functioning AI models.

Clearly, there is still a "perpetuation of the mafia myth", as Sergi states. The interviews with the experts brought to the fore the idea that Italian mafias are still seen as a foreign phenomenon, one that is ethnic-centred, among the stereotypical images of the Godfather and of Italian migrants (Sergi, 2017:325). It also seems man-centred, despite efforts in highlighting a different context to the data collated. The majority of the answers above show a tendency whereby if an image of a woman is shown, and the question of whether she is a *mafiosa* is asked, the instinct would be to deny and explain that she is just a wife, a mother, a daughter, a woman. This perception is backed up by the judiciary too. In fact, in absolving Anna Maria Di Bartolo in 1983, the courts maintained that women's emancipation had not reached the criminal organisation and the only way a female would be part of the mafia would be if she married into it, and became a wife. Therefore, if in situations where the wife would have been an accessory in committing crimes (e.g. Antonietta Bagarella Riina), she could not be prosecuted. Piera Fallucca wrote that these failures by the judiciary have clearly contributed to consolidate culturally and symbolically alternative laws, those in the codes of "men of honour" (Siebert, 1996:118-121), which are arguably valid in other fields where the contrasting personalities of women are disputed.

What follows is the collation of results from the third component of the interviews held with the experts, which offered an opportunity for AI and legal-tech experts to reflect on how it would be possible to move forward in integrating advanced tools using the data that is available. It will explore what is currently lacking, the issues, and overall what could be done to ensure AI could be of assistance in minimising women's oppression and invisibility, and specifically support their emancipation beyond the mafia sphere.

CHAPTER 5 EXPERT INTERVIEW & REFLECTION

Knowledge production is an open-ended process, moving towards unknown futures, taking into consideration unforeseen options and developments (Meuser and Nagel, 2009:29). Knowledge about recent technologies and societal challenges has significantly improved understanding of the need to instigate change towards more sustainable developments paired with human activity. However, simply providing more and better information and predictions of technological change is not enough as more expert effort is needed to understand how to create change, implement research, and facilitate new ways of thinking (Fazey et al., 2014:264) about predictive justice more holistically. How knowledge is integrated and perceived is crucial in this context. Incorporation and perceptions of knowledge affect how problems are identified and framed, the possibility of supporting innovative and practical solutions, the relevance of outcomes to policy and the extent of participation in learning (Bracken and Oughton, 2013; Juntti et al., 2009; Raymond et al., 2010; Reed, 2008).

Despite the need for further work to bridge the gap between research and practice, there are indications that the process by which research is being led, facilitated, and supported, and the relationship between science and society is changing (e.g. Biermann et al., 2011; Funtowicz and Ravetz, 1993; Nowotny et al., 2001). Traditional notions of researchers as the only contributors of knowledge are growingly being replaced by practices that include interactions and production of knowledge among researchers, decision-makers and other stakeholders (Fazey et al., 2014:204-205). This development mirrors the increased appreciation towards the value of different types of knowledge (e.g. technical, ethical, scientific, etc.) and inclusion of different voices to discover more *avant-garde* solutions and ensure research is pertinent, justifiable and empirical (Connick and Innes, 2003; Raymond et al., 2010). Hitzler et al. argue that a person is considered an expert if she or he embodies an 'institutionalised authority to construct reality" (Hitzler et al., 1994 in Meuser and Nagel, 2009:19) These changes are particularly relevant for technological integration research into long-standing systems such as the law enforcement and justice bodies where there is a need for a mix of perspectives to deal with challenging and multi-faceted issues (Kates et al., 2001; Norgaard, 2004).

As a result of the purposive sampling of experts, it was possible to reflect with the participants the way forward in the field of predictive justice and gender bias. Such sampling was the tool of assistance to investigate emerging areas of technologies and assess whether or not further study would be worth

pursuing (Etikan et al., 2016). It is through the third and final part of the coherent interview process that it was possible to reflect on each bias expert discussion had with each respective expert in Phase 2, and explore venues to correct the gender data gap and bias in the field, which would consequently have a knock-on effect on the AI systems that could be implemented in the justice system. Results of the third part of the interview are presented in Chapter 5, which embraced the collaborative and reflective relationship with each expert (Christ, 2010). The final section of the interview facilitated the collection of technical insights from the same AI and legal-tech experts as to how they see the market respond to legal technological advancements that require data to fuel AI-Assistive Tools in the predictive justice sphere, but which are likely to be biased (as explored in Phase 2) as in the chosen mafia case-study. When interviewing the experts, Table 1 and Table 2 results were shared to ensure that answers could be as focused as possible to the research questions. The main line of questioning was sought to enquire and reflect on how to solve a situation where there is a lack of data, and the data available is arguably biased in order to improve practices moving forward.

The chosen participants have been employed as "reliable gateways" (Alvesson and Ashcraft, 2012:240) into understanding different perspectives that address the same issue of data gaps and their effect on AI-Assistive Tools. They have been identified to provide breadth, depth and saliency of information for an authentic analysis (Curtis et al., 2000; Lincoln and Guba, 1985) enabling new insights and understandings (Patton, 2015) of the phenomenon of AI within the case-study of mafia which has received less scrutiny than its centrality warrants, but nonetheless presents issues that are far reaching, and relevant to many fields. Expert knowledge is characterised by the chance "to become hegemonial in a certain organisational and functional context within a field of practice" and, thus, "to be influential in structuring the conditions of action for other actors [....] in a relevant way" (Meuser and Nagel, 2009:19).

Some of the experts agreed to be expressly cited and some wished for their name and title to be anonymised. Therefore, explicit and implicit references to the interviewees will be made respecting their privacy wishes. Summaries of experts' recommendations are reported below. Their responses have been intentionally grouped in an unedited format in order to show how each expert contributes to the field, their line of thought, and to show how their background affects the plan of action suggested. As Hamilton states, data scientists may not be fully cognisant of civil rights issues, while legal practitioners often lack statistical skills (Hamilton, 2019:148). As the experts are seen as "crystallisation points" for practical insider knowledge, and were interviewed as surrogates for a wider circle of players (Bogner et

al., 2009:2), the aim is to show how different experts face and deal with issues differently, and how (if brought together) members of a multidisciplinary team counterbalance each other so to ensure the specific gender data bias issue is tackled from many perspectives.

5.1 Jonathan Bowker, CEO of Innovative Integrations and Director of Data Law Services

Innovative Integrations is a technology and consultancy company based in the UK. It supports open collaboration with clients to combine service models, data engineering, data science, emerging technologies, as well as legal expertise to provide digital solutions, e.g. the lawyer-in-the-loop computing system and legal operations cloud. The lawyer-in-the-loop process automation framework is a suite of interdependent technology assets that facilitate the delivery of high-quality and cost-effective solutions for scaling legal operations.[35]

When Table 1 was shown to Bowker, he thoroughly went through the collated datasets and suggested that more information would be needed for a better functioning algorithm that would predict women's criminality. Among the missing variable, he suggested to add behavioural data. However, as a response to the question of whether the available data would be enough to create a model, his response was that it would be enough to design a model, but "you would need to enrich it with other datasets to get any real value out of it". Bowker further added that historical data would be needed. Table 1 would currently constitute a watch list for technology companies like Innovative Integrations, which would require them to run real-time data past the Table to pick out activities in these people. He also suggested that in order to create a model, some life-cycle data on the women from as young as possible is also needed. It would be ideal to have a timeline upon which predictions can be made. The timelines of different women would allow to see patterns, which would enable predictive modelling.

When questioned on his experience about how to get richer datasets that would constitute time-series data, Bowker suggested to get "pseudonymised or anonymised data from the police or from the state" in Italy. In fact, getting data on mafia is fairly straightforward through the ISTAT (Italian National Statistics Office), but sadly recent data may not be readily available. When researched how latest projects have gathered data on the mafia, it resulted that it was collated directly from the Ministry of Justice, which leaves a hopeful path that could be undertaken to move conversations forward in the field. The *Project Proton* was a novel research which held to have revealed a modern mafia profile and

[35] See https://dataprotectioncentre.com/about/about-data-protection-centre.html; https://innovativeintegrations.co.uk/; http://lawyer-in-the-loop.com/ [accessed on 02/03/2020].

allowed a platform to scientifically test policies to fight it. The Project was motivated by a wake-up call Europe had when *'Ndrangheta* members were killed in the German city of Duisburg which made the EU understand that the mafia was not just an Italian problem. The data upon which the simulation of the criminal networks were created was provided by the Italian Ministry of Justice, and the researchers focused on the profile of 11,000 convicted mafia members and 200,000 crimes to reveal an image of the modern mafia (Sforza, 2018). However, it is uncertain how much weight was placed on the inclusion of women through the data used that seems to have been of "mafia members". Unfortunately, it is renowned that women can never be members of the organisations if not unofficially.

However, the amount of data used by the *Project Proton* seems to align with what Bowker suggested. He stated that when it comes to building models to try and train a category on Natural Language Programming (NLP), between 300 and 1000 records are needed to even train a neural network on just one category.[36] Based on the criminal profiles collated in Table 1, they could be used to create a model, but with the result of convicting people. He further added to look further into the types of businesses so to start drawing patterns on investment trends, locations, demographics, the family origins, "how heavy a mafia family was it, was [the woman] from an impoverished background" which justifies her recruitment?

A suggestion the CEO made to find patterns in these mafia women was to collate information from the life and criminal journeys of these women, from the youngest to the oldest, in order to go across a time series. This is how, he suggested, it would be possible to identify patterns and he also referred to the Harm Assessment Risk Tool (HART) adopted by the Durham Police, which uses the "random forests" technique that is one of various forms of machine learning. The technique offers interesting features such as a facility to identify fairly unusual but dangerous results, to model relationships in non-linear ways, and to balance the differential costs of different kinds of errors (Oswald et al., 2018:227). The HART model is built based on around 104,000 custody events over a 5-year period and it used 34 predictors to reach a forecast, and most of it focuses on the prior offender's history of criminal behaviour. Advanced algorithms such as random forests are based upon millions of nested and conditionally-dependant decision points, which are spread across many hundreds of unique trees. Differently to earlier predicting methods, it is not the case that a certain input on a single predictor has a

[36]Natural Language Processing has been used for automating the process for recognition of human behavioural patterns and modification of the behaviour; it is an intelligent process developed for increased accuracy and reliability (Amirhosseini and Kazemian, 2019:175).

fixed and unavoidable impact on the anticipated outcome. For instance, solely residing in a given postcode, has no direct bearing on the forecasted result, but must instead be combined with all of the other predictors in thousands of different ways before a definitive estimated conclusion is reached. It is therefore the combination of variables, and not them in isolation, that produces the outputted risk level (Oswald et al., 2018:228-229).

Consequently, the random forests model is arguably of use for the present case of mafia women, as different variables have already been outlined on Table 1, with location being one of those. However, it is clear that many more variables would be needed to ensure a better functioning of the model, and this is key information that bodies such as ISTAT and the Italian Ministry of Justice need to be aware of to ensure a better, methodical data collection process. At the offer of trying to think what other data could be added on the mafia women to enrich the information available, it was clarified to Bowker the difficulty in researching the topic due to the lack of consistency in collating data. When asked if he had any experience in searching for rare data, or data that is difficult to access, his response referred to a project that sought to identify human trafficking on the dark web. He suggested using web crawlers to find specific information and use "big sources" like "WebHomes":

> *…WebHomes is an Israeli company and they've been crawling the media for a long time now and they sell raw data. Basically, they crawl it and they structure it and they have the data in. What we could do then is go back. I mean, there is a cost associated with this, but what you could do is you could get an historic dump of their news on a specific section, and then we could run it through our algorithms to build a mafia model to identify, to see if we could identify other people and start to help to fill this list out.*

Bowker explained that he is currently doing a similar search for data and suggested that the first step would be to create a bag of words around the "mafia type". This would "find out which words are indicated to the signals" and clear patterns would be drawn, such as common mafia family names, proximity to a crime, etc. The next step would then be that of populating the patterns. To the question of whether the web crawling could be done in Italian, Bowker responded that it is possible based on deep learning models or relying on somebody that will have created a library of Italian names identifying whether they are male or female:

> *I believe some of the data science teams in Italy are really slick. I know a couple of really good companies there. If you could hook out hundreds of records like this, you could make a knowledge graph out of them. Basically, what you do is through a graph, you could connect all of the data points. That way, you're starting to build a model that you can query…Graph technology* […] *takes each of these notes, so ID one* [referred to Table 1]*, and then it joins, everything is just joined*

independently as a node against ID, but they can be cross-referenced from node to node. That way, you would start to get an intelligent model from this, so that you could ask questions.

However, an issue that would still remain with crawling the newspaper webs would be the fact that the most common images and information associated with the mafia are male. A 2010 article studied the representation of mafia women on Italian newspapers between the 1960s and 1970s. The article begins with a thought-provoking image of *L'Europeo*'s cover, which was a renowned Italian weekly news magazine, that exposed a collage of mafia bosses with predominantly male figures. De Toni questions how many of those bosses are women, and what the relationship is between the representation of these women in the media, and their real contribution to the criminal organisation (De Toni, 2010:179-180). Although women's representation in newspapers may not match realistically their active participation in the criminal underworld, it is also true that by starting from the many male images that are more easily available, more links could be made, and family trees delineated through which women's roles could be questioned. Bowker added that relationships could be defined between people by looking at, for instance, who the male is married to or who the father is and he compared it to how Facebook or LinkedIn work as graphs.

Bowker suggested to gather family data on mafia members, link all of those so that a graph could be created and "see if you can then start to find wives". The known nodes to start with the web crawling would be to find who the mafia bosses are. Because those names will be known, they will be in the media, and from there he suggested to create a family tree just based on relationships:

You'll end up with a much better system. The Neo4j is one technology that you would be able to do that on or Azure's Cosmos DB is a big graph database. Creating a knowledge graph of the mafia would be a fascinating project actually, and that would give you your answers, because they're used as to make recommendations, which is what you're talking about really, it's a recommendations engine.[37]

Bowker further explained that a recommendations engine is based on "what everybody else has done in the past or that group has done." Then if a given person follows that group, then the likelihood is that he/she is closely associated to that group.

LinkedIn do it when they serve adverts to you, Facebook are doing it to you based on your behaviour, but it is based on a knowledge graph because they can group you. What you don't have

[37] Neo4j is a graph database management system. For further info see: https://neo4j.com/ [accessed on 04 May 2021]. Azure Cosmos DB is Microsoft's proprietary globally-distributed, multi-model database service 'for managing data at planet-scale'. For further info see: https://azure.microsoft.com/en-gb/services/cosmos-db/ [accessed on 04 May 2021].

at the moment, but you could do is you could then be monitoring the media going forward to start profiling people against this as your base knowledge graph and then add to it. When I was talking about adding other data in, the only other data you can really bring in is media mentions going forward. You could play a timeline of the media that WebHomes give you, you might speak to some of the Italian papers to say you're doing your PhD and ask them if they would give you some historic news that you could process and go through those.[38]

When questioned if these solutions could still be sought in Italian, Bowker responded:

Yes, we could do Italian. […] *We use a library, in some of our processing, called spaCy which is open source and very good, but that's got a neural network in Italian which has been trained on a massive amount of news.*[39]

Bowker suggested to use that library as it has been trained on Italian news. It would then be able to be used to identify people, organisations, locations, percentiles, ages, and more:

There are a number of different records. It's called entity extraction in Natural Language Processing (NLP), and these are trained to recognise people's names in text, organisations names in text, locations, geo coordinates. You can put in bags of words like crime or guns or drugs, mafia and so on, and if you ran then through our engine, we ran that news, that Italian news through it, we would be able to hook that out, and that would help you then to build your profiles.

To summarise, from Bowker's technical point of view, the data collection process should start broader, looking at the crime in general, and then refine the mafia-related crimes. Arguably, this deductive process will give better scoring (i.e. results) through the predictive/recommendation models.

Bowker suggests venues and tools that could be used to simplify data gathering processes that are readily available (some are free to access, some are provided by third parties). Following Bowker's advice, contact was made with *Diffbot*, a computer software company that automates web data extraction from websites through the use of AI, computer vision and machine learning. One of the services offered that could have been of use was one where a number of articles would be fed into their system, information would be extrapolated to then build family trees. However, when going into the detail of the project, and the need for the system to extract information in relation to terms such as "prosecuted", "convicted of", etc., it was shared that those were not a category of predicates that the company were currently prioritising in training the model on. Nonetheless, projects such as the mafia

[38] WebHomes provides outsourced IT management solutions. For further info see: http://webhomes.com/#0 [accessed on 04 May 2021].

[39] spaCy is a free open-source library for Natural Language Processing (NLP) and helps in building applications that process and understand large volumes of text. It can be used to build information extraction or natural language understanding systems, or to process text for deep learning. For further info see: https://spacy.io/ [accessed on 04 May 2021].

one, entail customised services that companies like *Diffbot* could offer if funds were available. Consequently, if the current project was to move forward with the actual creation of a model, which would be of relevance beyond the current thesis, then conversation with software companies offering such services would be a priority. The project as it stands had the aim of surveying the availability of such services and their efficiency.

Moving forward with the interview, when asked if it would be more appropriate to feed a model with not just the criminal profiles gathered in Table 1, but also other profiles of mafia women that are victims, or innocent housewives, Bowker replied positively as any life cycle, time series or any information that can be "thrown in there" are all important for the formation of the knowledge graph, and consequently of a decision tree resulting in "innocent" or "not innocent" predictions or recommendations.

To the question of whether a possibility would be to create a model that is fuelled by female data only, Bowker responded that he would start with the bulk of data that is going to be on males, and bring in the female via a data discovery process:

> *I always take a big-data approach, which is take absolutely everything around mafia and then start working and honing that data to get to a model that you want, because those connections, the men will lead you to the women, because that's the bulk of the data. There's more intelligence around the men, but then you will be able to create a knowledge graph, you'll be able to then start to pull all of the women in as being associated in any way with those if you do a knowledge graph properly. You need the information from the men and the crimes that the men have been involved with to then see if any of those are associated at the same time with the women. If that happens, you could then go off and collect more data about the women and their families, if you can. Go off and do crawls or do Google Dorks to go and find out other members of the family and start linking it together. So you need it all in one, because all that would happen in the decision tree is you'll be able to press M* [male] *or F* [female] *to separate the graph in two, straightaway.*

According to the CEO, what could be done to ensure that a model can be created and trained on good data is to firstly put together an inner database, and use graph databases that would allow to ask questions of data like a human being. For instance, one would be able to ask the model to show a mafia woman who was married to a mafia boss or is over 76 and lives in a particular area who has other connections to the mafia, and the graph will highlight the results. Bowker clarified that it is a very different way of querying, but that is how social networks work. He referred to the creation of a "social network of mafia" and said "if you could create a mafia LinkedIn on a graph, then the judicial system would then be able to answer those questions".

When questioned about the possibility of these AI-Assistive Tools being affected by gender data gaps and unconscious bias in the judicial system, Bowker suggested that a solution might be:

> *Pseudonymisation of the data. If you could get the judiciary's data and build a knowledge graph, that's your starting point, and then you go out from the graph to go and collect more data. The other thing is, assuming that data could be made available, the police will have phone records, so that's another way of enriching it. Who was calling who? In the UK you can get them, but you have to go to the Home Office to get permission, but it's fast now and it'll be the same across all of Europe. That's how you would do it, because when they confiscate their phones, they will then go and look in the phone logs.* […] *They create burners, which are mobile phones that you chuck away. But those records do exist, so your starting point to understand the network and communications is to look at the phone records, and that will be to other phone numbers. You're dealing with very sensitive data at this level, but that's the way.*
>
> *If the judiciary gave you access to their data, I would be sure we would be able to do something that they can't do very quickly and give them information back on a knowledge graph. Absolutely definitely, because I know our judiciary is archaic but Sicily will be a million miles behind that. So if their data is sitting, a lot of it will be PDFs or Word documents or some of it is probably still printed. If it's printed, we can do text extraction from print, so you can actually do OCR extraction on that, which means extracting the text from that and making sense of it and then get it to raw data, which is then run through the algorithm.*

Bowker emphasised that if a collaboration could be established with the judiciary to get pseudonymised data, technology companies such as his would be able to compile a database that would be informative on mafia women. This would assist in making decisions based on patterns, because the knowledge graph will be able to give those answers. However, the worry in relying on judicial data is that it is predominantly male. Therefore, how would it be possible to ensure that women are not yet again rendered invisible in the system?

> *You would use AI to extract the information, but you'd use a graph database to then make it accessible and join it together, so it's extracting it and throwing it into a graph database to build the knowledge graph. Then you can answer the questions. That will give you more visibility because you've got more data in there.*

Bowker drew upon the example of the *Ancestry*, which is the largest family history site that operates a network of genealogical, and historical records.[40] Bowker explained that the more data one has, or the more data points one can throw into the graph, that means there are different ways of joining those together. The data would be based on birth records, family records, etc. If one went to the registry of births or family records and a graph was made based on those, that would give the government or the

[40] For further info see: http://ancestry.co.uk/ [accessed on 04 May 2021].

local authority a huge amount of intelligence. The birth dates would be the starting point, and then through the research of the news the data would be expanded, so that those profiles can be further delineated.

When questioned on how difficult it would be to create an AI Assistive model that would predict mafia women's culpability, Bowker responded that the hardest part is getting the data:

> *We can do anything with data if we're given it really, and building those models. Honestly what you've done there* [referring to Table 1] *is a model, and all we would do is we would just AI and machine learning to populate that table at a much bigger scale, save it to a CSV file. You just import the CSV file straight into the database and that's it, it's ready. Then you start writing the queries. This is something that could be done.*

In summary, Bowker's suggested methodology is predominantly a plausible solution from a technical point of view. The main issue, with solely technical answers is that they can undermine the need to understand, and acknowledge the possibility that enriching a model with news data may not necessarily assist in mitigating the injection of biases in the digital solution suggested by him. The key is to understand that the judiciary, media, society are the biggest perpetuators of biases. Consequently, emerging technologies, if relied upon, need to assist the human, or the "lawyer-in-the-loop" to do a better job and not fall foul of established stereotypes. A better job needs to be done in digging deeper, and finding the hidden female sphere of the mafia women. However, his expertise in the field of data engineering, and emerging technologies is key to bring in the technical perspective in, which needs to be counterbalanced and complemented by other multidisciplinary perspectives.

5.2 Anonymous, Non-practising Barrister

The interviewee working field is in professional studies and although not an AI expert *per se*, the respondent is one of the leading spokespersons in the legal-tech field in Africa. The research contributes to the current project by bringing in an international perspective as well as focus on the ethical side of implementing emerging technologies in law. A few quotes from the interview are reported below accompanied by reflections.

When Table 1 was shared, the interviewee questioned the purpose of this research, and whether it was ultimately going to solely focus on the Italian jurisdiction, or aimed at creating a global overview of "how things should be" in AI and law. The Barrister acknowledged that the issue of mafia women has potential application more widely to understand how women are held accountable and culpable. Referring to Table 1, the interviewee scrutinised the varying sentence lengths, and noticed:

> *I am seeing 9 years, 23 years, it is quite varied. If we are able to demonstrate that there's a lighter touch* [on mafia women] *if you compare to men's sentences then I think it is more of a chance to understand the interplay between how the judges see, so you'd have to see like for like and see trends and then compare to other crimes.*

The Barrister suggested that it would be interesting to look, for example, at cases of women that murder children, and their sentences:

> *If I am correct, they are often sentenced quite harshly because the woman is going against what society perceives as how she ought to behave as a mother, so she is being criminalised not only for a crime but also for transgressing from being a woman.*

The interviewee drew a distinction from infanticide crimes and mafia women who suggest the opposite. Mafia women seem to be sentenced for a crime, but then:

> *You're given credit because you're a woman and this is not how women ordinarily behave. There must be something binding that makes you behave like this, unconscious bias. It would be interesting to line up a number of criminal references to see the trends of how people are sentenced to make some sense of where the judge's mind is. That is more important in lots of ways which is better reflective of how society looks at these issues. Because if you went to speak to individuals and ask them if a woman was to take over the mafia business, how culpable would she be in the circumstances of being a woman in a patriarchal society, I think you would get some interesting answers.*

The Barrister then drew upon an example that explained the concept of women being keepers of cultures, and how they play significant and powerful roles in passing on obsolete norms and practices. For instance,

> *If you take Female Genital Mutilation (FGM), it is carried out by women rather than men. How is it that women continue that act and oftentimes the women are those propagating the continuance. This does not mean that this is the women's view only because she is bought into a system that is patriarchal and about control and is therefore custodian of that culture. I think that is important to distinguish and it is really hard. If that's the case, then there might be this leniency on criminalising them. For instance, you have this 82 years old grandma* [referring to Rosetta Cutolo].

The barrister's point of departure, although different from that of the data scientist, is of equal importance. Although there is agreement among criminal justice professionals that few women pose a risk to public safety, current sentencing laws are based on male characteristics and male crime and therefore fail to take into consideration women's lives, characteristics, responsibilities, and roles in crime. Until recently, criminological theory and research focused on explaining male criminality, with males considered as the normal criminology subjects. Arguably, two approaches may be observed in the literature: firstly, theorists have attempted to explain female criminality individually, without references to theories of male criminality. Unfortunately, many such theorists make assumptions about the female

psyche that are sexist and without empirical support, argued Covington (Covington and Bloom, 2003:2). The second method applies traditional theories developed to explain male criminality, to women, which creates the "generalizability problem" (see Daly and Chesney-Lind, 1988). In addressing the issue, criminologists have tried theories derived from all-male samples to see whether these would also apply to girls and women (Cernkovich and Giordano, 1979; Datesman and Scarpitti, 1980; Zietz, 1981). Others have borrowed from existing theories (e.g. Moyer, 1985, on conflict theory) or have re-formed the logic of a theory completely (e.g. Schur, 1984 on labelling; Covington and Bloom, 2003:2).

Many feminists have explained the degree to which science has been spoiled by characteristically male approaches to social reality. As Cain explains, "[W]omen and girls exist as other: that is to say, they exist only in their difference from the male, the normal" (Cain, 1990). Such analyses have brought increased attention to women and girls in criminological theory and research, and a re-analysis of basic assumptions, research interests, and theoretical frameworks. This re-analysis goes beyond the mere "adding women and stirring" in the empirical study of law and legal institutions. The re-analysis raises questions about gender and about the fields of criminology, socio-legal studies (Covington and Bloom, 2003:1-2), and artificial intelligence. It also raises questions about how those deep thoughts and stereotypical images enshrined in us (i.e. unconscious bias) could affect the creation and training of an AI Assistive model for the judiciary. In fact, the interviewee answered that despite the excitement of the possibilities these emerging technologies bring, the unconscious and contextual biases are a real danger in the success of these tools:

> *Even if the dataset has a particular trend, there is an underbelly as to why that data has been developed in that way, so you could be channelling out an algorithmic formula that cannot take into account a much broader nuanced reality. The human-in-the-loop, the multidisciplinary look at these things is critical. I would not be comfortable with a data scientist putting out an algorithm, that should be done over time with subject-matter experts. You could have one who is an Anglo-sax expert, an American, and female expert from Cuba – all experts in their respective rights. Subject-matter experts themselves must be of a cross section so you start to see a complexity of how we are able to get that nuance of info to ensure that what we are developing is representative of a reality beyond just what the raw data say. What the raw data doesn't say, it just doesn't. When you speak to people you can understand how things work. This is just raw, and the undertone is missing.*

What the barrister suggests clearly complements the digital solution offered by the data expert, Jonathan Bowker. This is exactly what the earlier concluding remarks from Bowker's interview referred to: a multidisciplinary approach is the way forward to mitigating biases. The anonymous interviewee further added:

Whatever algorithm is being developed, what I would want to know is how is it going to be used ultimately, to what extent are we ensuring that there is going to be a very nuanced interpretation of whatever output the machine gives. It is not like oh the algorithm has said X ok fine so I just tick the box. There has to be a continuous interrogation of the outputs and not just pure reliance on it. We know the pressures the judges are under so we have to ensure there should be mechanisms clearly in place. An interesting example I've come across recently, the scoring for an algorithmic program to basically pass it off as a known fact is something between 95% certainty and above. There are already thresholds that we know and understand are deployed when a machine confirms something is uncertain. Perhaps the next move is to raise those thresholds so that where there is uncertainty in the data, the machine itself can recognise its limitation, the machine can send it back for assessment and I understand from reliable sources that it is now very possible to do. Another thing about this is that it keeps the human-in-the-loop and the human must be centrally in the loop.

Points raised by the interviewee, clearly as a result of interdisciplinary discussions, are extremely relevant as AI systems are tasked with arguably making life/death decisions, whether that is in combat settings, healthcare or simply on public roads. Society is faced with the unpleasant possibility of splitting human lives into more and less valuable groups. Consequently, it would be fair to fear a "death algorithm", which has the final say independently (Mazzolin, 2020:52). Questions then arise as to upon what basis an AI system should control which COVID-19 patient gets care when the healthcare system has reached its limits? What level of confidence must an AI weapon system have that a target is an enemy rather than a civilian before firing?

Returning to the project's focus, a question was asked with regards to where the male criminal model is that which is likely to be accepted, would an alternative way towards narrowing down the gender data gap be that of creating a "female algorithm" fuelled by female data only? The interviewee responded agreeing with the suggestion and emphasised the need to ask a question of "what are you trying to demonstrate from the data?". The interviewee further shared a controversial thought, i.e. the need to get algorithms to try to ask humans better questions, which must be answered by humans. A suggestion was made that guidance is needed on how humans can get algorithms to ask better questions:

For instance, if the data is showing a profile of a woman with children, who's been dealing with activities in the mafia, but later on she goes into this protection scheme, what does that say? What does that tell us and what do we need to start asking questions in terms of culpability and understanding this society better, where sociological intervention may be made. We are saying that the reason why we are all doing this, is that this mafia narrative is something we want to intervene in and make better so that people can make better choices so we can use those entrepreneurial skills these guys have for legal means. What do we need to be doing as society?

The legal thinker's approach was more in line with drawing attention to the socio-legal and ethical aspects of integrating such technological tools. The emphasis was placed in understanding what is

wanted to be achieved through the data. By forming pictures of what it is wanted to achieve, it would be possible to understand better what problems are sought to be solved:

> *The starting point is critical and it is a massive breakdown and task. We conducted 5-part multidisciplinary series on the pandemic, with lawyers, technologists, environmental leaders etc., crunched everybody together and what was amazing was the rich much interaction with one another. At the end of it, we ended up having 25M more questions to ask and answer, beyond what we had already prepared. It's the refinement of questions and sources that help us to ask the right questions and having the answers is critical in how we use digital transformation TOOLS, TOOLS!*

It is highly relevant that questions are being asked about these technological advancements, or "tools". For instance, how much autonomy do societal consumers and decision-makers wish for AI technologies to have? What goals and purposeful manner will guide the establishment of ethical limits for AI's ability to make decisions that may affect humans' fundamental rights and, ultimately, eliminate that target's life? More importantly, what moral agenda does the decision-maker use to make decisions? An agreed moral framework is not yet available — divine command theory, utilitarianism and deontology represent various approaches, says Mazzolin (Mazzolin, 2020:52). There is an element of subjectivity to these judgments, which is challenging, if not impossible, for current AI systems to fulfil. Therefore, international governance bodies should think about this issue seriously when developing regulatory frameworks, which is exactly what the interviewee is doing supporting multidisciplinary discussions in the field for African governance.

When asked: Is it possible to correct the gender data gap and unconscious bias by creating an AI model fuelled by female data only? Or would that nurture discrimination and not uphold transparency?, The Interviewee responded that it is key to gather together an understanding of individualised and collectivised information:

> *It's the weakness you've identified on women dataset, we booster that up and we bring this together. We par that data. We would still want to aggregate things in a way that we have sufficient data for the women and to be able to sufficiently bring things together and understand better.*

The interviewee stated that it would be interesting to see how compartmentalised data could be then brought together all at one. Additionally, it is by trying to ask different questions, that more information would be collated and would consequently influence a range of outcomes. The barrister returned to the point of nuances and how numbers are not capable of explaining those:

> *If we take the assumption* […] *that women within the mafia scenario are still operating within the patriarchal paradigm, notwithstanding how powerful they are in their own right, they are propagating that narrative. If we assume that, and say let's get a dataset that focuses on the*

women only, then combine it with the male scenario, are we not just forming the patriarchal thing anyway? I don't know is the answer, it's about how do we, having looked at the dataset by itself, and tried to make sense of it […] *trying to make sense of the other perspective, are you going to make sympathies? It's about what questions are we asking, why are we asking these and what are these leading us to? If we constantly have these in mind, and combine the data, and it still shows up a particular bias, trend and so on, that still leads us to refine. What it still enables us to do, is still go back to that data. It's de-coupling but still have that data available. Content computing could help us one day to do things simultaneously and separately. I suspect that may be where the answer lies.*[41]

When asked: How easy or difficult it is to create such an AI model?, the interviewee responded:

There are some imminent people I have spoken to recently […] *this particular academic lets the data tell what the story is. He is relying on it in that way. I was intrigued by this. Who am I to question someone so imminent? He was challenged on that on the basis of hold on, the data itself has so many inherent biases, that purely just listening to the data is not enough. His point was that the fact that it is showing the bias also says something. But it's about the awareness of it. That's why I am saying the human has to be in the loop because you have to be aware and be able to interpret what is being churn out as opposed to simply relying on it.*

The interviewee was sceptical to fully rely on just data, and suggested that the safer option is to allow the data to speak to humans who have the ability to interpret and implement feedback:

That's the principle of ML [Machine Learning] *and AI to continuously take in, but at what point are we able to influence where things go to because we are better able to detect the bias because the machine is using what we put in it even if it has the ability to finesse the algorithm engine.*

The legal thinker from his standpoint sees humans as being able to dig deep, but narrowly, and the machines as operating huge breadth of information, but quite shallowly. As the human brain can make sense, this skill should never be lost, according to the interviewee. However, it was also shared that the cooperation between humans and machines is only going to improve, but:

[41] The fast growth of the Internet has already made it the key infrastructure for information dissemination, education, business and entertainment. While the client-server model has been the most widely adopted paradigm for the WWW, the desire to provide more value-added services in the delivery layer has led to the concept of an active network, where content-driven, intelligent computation will be performed to provide quality-of-service for content presentation and best-fit client demand. These value-added services typically aim to enhance information security, provide pervasive Internet access, and improve application robustness, system/network performance, knowledge extraction, etc. They are realised by incorporating sophisticated mechanisms at the delivery layer, which is transparent to the content providers and Web surfers. Consequently, the notion of "Content Computing" has emerged. Content computing is a new paradigm for coordinating distributed systems and intelligent networks, based on a peer-to-peer model and with value-added processing of the application-specific contents at the delivery layer. This paradigm is especially useful to pervasive lightweight client devices such as mobile and portable end-user terminals with a wide variation of hardware/software configurations (Chi and Lam, 2004).

> *To what extent do we want to be in control or not? Being in control is not the question of playing God, but it's being assured that the bundle of intelligences that we wish to deploy in our world remains intact and in focus. Becomes more ethical. We have to be key determinants as to how these things operate within the science and technology we are creating and that's not going to come from the machine but comes from us.*

This is in line with what Mazzolin writes on the "meaningful human control" concept. He argues that it provides a useful method to discuss the employment of increasingly autonomous AI technologies. The conceptual framework shifts the attention from speculation related to technological advancement and future skills toward the development and use of emerging technologies that respect founded societal norms related to responsibility, accountability, legality and humanitarian principles (Mazzolin, 2020:53).

When asked: Does an AI model trained on sex-disaggregated data have also an ability to nurture the gender data gap?, the interviewee offered an interestingly and rather philosophical perspective:

> *In every meeting/conference involved in terms of methodology and basis, it's all about getting more and more and more. The mantra across the board is we need more data. The disaggregation of data from my understanding does not solve the problems you identified from the outset, but clearly will assist because the more you have the more you are able to form pictures and ask questions of the veracious system that is required for this type of endeavour, the more you have the more you are able to use. It's an ongoing game, so the disaggregation is important because it is giving you a line of enquiry on the specific item. As a woman or man, is that an absolute? Even we determine as an absolute but is it in terms of how we behave? I don't think we are. In this day and age that is not an absolute anymore, but I am saying even in terms of dataset, this is all men and women ,but what is the spectrum in between? What influences how we behave just because we have put a label on it? I don't know how we would go about even trying to delineate the variety of who we are alongside the commonality of who we are and that is with the conundrum that we are infinitely different but so similar. How do we get to that nuance?*

Although philosophical questions are equally as relevant, they do not form the basis of the current project. It is nonetheless important to refer to studies that delineate three notable AI systems which repetitively fall foul of reproducing controlling and restrictive notions of not only gender, but also race. These are (1) humanoid robotics, (2) virtual personal assistants (VPAs), and (3) gendered epistemology (Dillon and Collett, 2019:9). With regards to the first, and to answer the question posed by the interviewee above as to what influences our gendered behaviour, Judith Butler states that certain appearances and body language are normalised to be consistent with the meaning of male and female (Butler, 2011:185-186). Humanoid robotics abide by these gendered structures and tend "to produce and reinforce gendered bodies and behaviors" (Hicks, 2015:5). See for instance, Cortana, a character in the Halo video game series, who has no physical form but is extremely sexualised when projected as an embodied representation. Or Sophia, the humanoid robot developed by Hanson Robotics, which also

has a lifelike resemblance to a stereotypical woman. Consequently, these humanoid representations reproduce stereotypes and through this, they eliminate bodies which defy gendered order (Dillon and Collett, 2019:9).

VPAs reproduce stereotypical female images of the faithful and supportive woman. Think of Siri, and Alexa, their voices being feminine arguably has damaging implications for reinforcing images of domesticated feminine persona through the promotion of "digital domesticity" (Dillon and Collett, 2019:9). Finally, "intelligence" and the epistemology operationalised by AI research focuses only on a certain form of knowing which excludes other epistemologies traditionally gendered as female or feminine. However, AI may provide an opportunity to shift assumptions about male and female epistemology. For instance, the narrative of "hard" and "soft" intelligence is often gendered as masculine and feminine respectively. Adrian Weller notes how this "hard" intelligence, often thought to encompass logic and rationality, is much easier to reproduce in technological form. Subsequently, it is reinforced as encompassing all "intelligence" by the fact it is adopted in these machines, but what has hitherto been thought of as "soft" intelligence may become more privileged in being harder to encode (Adel et al., 2019). As Sarah O'Connor's notes:

> *As machines become better at many cognitive tasks, it is likely that the skills they are relatively bad at will become more valuable. This list includes creative problem-solving, empathy, negotiation and persuasion.* (O'Connor, 2019)

She further adds that these qualities have historically "been more identified with – and encouraged in – women". Whether AI is thought to depend upon and embody a masculinist epistemology, or whether AI hopes to give a feminine epistemology the advantageous position, for instance, in the recruiting job market, AI is perpetuating and reinforcing binary, gendered stereotypes of epistemology (Dillon and Collett, 2019:10).

5.3 Dr Philippa Ryan, Barrister and Associate Professor at The Australian National University

Dr Ryan is on the editorial board of Stanford's Journal of Blockchain Law and Policy and her current research explores the automation of trust, and the accountability of algorithms, thanks to which an original line of comments and suggestions were made on the project.

When questioned about the gender data gap in AI, Dr Ryan's response relied upon her area of expertise to offer an alternative perspective to close the gap. Dr Ryan departed from the Zero Knowledge Proof (ZKP) method that is used in blockchain:

Logic systems and computers operate in a binary world, it's either on or it's off. What happens with human knowledge? Humans tend to work with information. They have three domains in which humans operate knowledge. We have the things we know, the things we don't know, and then there's all the stuff we don't know that we don't know now, and identifying those is incredibly important when you're talking about bias.

Dr Ryan draws on an example to explain the concept further. For instance, there are two photos of different people which are shown to a lawyer. These are racially profiled, and therefore very distinct. A question is asked about which of the two profiles is more likely to have been the person who stole the bicycle. What happens with a human brain at that point is that it initially starts working with what the brain knows, i.e. information available from the two images of the humans in the photos. Then, the sophisticated brain of a lawyer with enough sense would be able to say that there is not enough data to answer the question. The further information required would not readily include, for instance, who was physically present at the time of the theft, who has a criminal record of stealing bicycles. But before that data is collated, other subjective information would be needed, such as socioeconomic conditions, level of education or information that is specific to the people so that the process of aggregating all of the data can be intensified to finally form an overall view:

What we're doing is we're working with propensity information. That's what we're trying to do, and our bias becomes a problem. If you think about it, that's what they're doing with these systems for bail applications in the States and the propensity, or the probability of recidivism. We're talking there about an application that's been made without any further information about your antecedents.

In breaking down her answer, Dr Ryan (Pip) went back and used other examples to explain ZKP. Her answer has been heavily quoted as her explanation, step-by-step, is key to understand her line of thought:

First of all, let's go back. We have, what does Pip know? She doesn't know. And what I'm saying to you is when I think about what, I don't know, what I'm saying is what is it that I know that I don't know, that would be relevant and useful. I can identify that. The third domain: what don't I know that, I don't know. This is where ignorance, lack of experience, expertise kicks in. And if you said to me, which of these two, let's say there were types of amino acid, is going to be the better amino acid for digesting a lemon. I would say to you, I have no idea. And what I can tell you is I have zero expertise. So I am now going to be able to tell you what I don't know is unidentifiable. I can't even identify for you what, I don't know, because I am so ignorant. And so that's the third domain. What now?

Blockchain world becomes incredibly helpful. We take the ZKP as a way of identifying the vacuum of information. Whether it's the, what I don't know or what I do know I don't know, and we create a statistical probability that what you are going to conclude is trustworthy information. And the way it's done in blockchain world is very complex, but let me give you an example and I think this is

really helpful for what you're trying to achieve and may set you on the path of saying, yeah I need to look more closely at ZKP.

If I said to you, I'm going to show you a photograph of two humans, both male. And I'm going to ask you to identify which one is the president of Uruguay. And I'm going to say to you, one of them is the president of and you might say to me, Pip, this is hopeless, cause I don't know what the president of Uruguay looks like. If I then show you a photograph, and one of those people in the photograph is clearly of Asian descent and the other one looks Latin American, you could use all the information about what it requires in the world and form a view that it's very likely that the person who's not Asian is the president, but you would only be, I would assume about maybe you'd say, I'll give you 60% certainty, Pip, and you would do that because there was nothing to say that an Asian person might not have been born in Uruguay, very well-educated and have gained the trust of the people who are required to rise to presidency.

And you might think, Ooh, that's sending me off in an interesting direction. I don't have enough information to be certain. And it's not trustworthy. If I said to you, is that trustworthy? You would just say, statistically, the probability is probably more than 50% that it's the person who is not, say, Japanese looking now. What if I show you those two photos again? And I say to you, one of those people is the president of Uruguay and the two photos I show you are a person you have never seen before in your life, who's male, and it looks like they're born in Latin America. And the other one is [former] *President Trump. You're going to go, Pip, this is easy because I can go through a process of elimination and I can tell you who the president of Uruguay is with a hundred percent certainty, and the reason why is because you know who the other person is. Now this is how zero-knowledge proofs work. Zero-knowledge proofs, or about being able to use statistics to reach a conclusion that is absolutely certain and trustworthy because of what you've disproved.*

The following question asked was the scenario of how ZKP would work when unreliable statistics are being used, as in the case of the mafia. Dr Ryan's answer was that more data would be needed, and that the ZKP technology would have to test the information. She further relied on tools like COMPAS in America to say that the way the correction of biases has happened in such tools is to use all the information available on all African-American males between the age of 18 and 28 (as an example), who have been guilty oftentimes and who statistically have a propensity to be recidivous. What they have not done is to look at what alternative data could prove that, statistically, they are not as recidivous as initially assumed. The other sphere would not have come to light, if alternative data was taken into consideration, which is the exact reason why the current study suggests the need for richer data on the mafia women.

You could say for example,[…] *the risk isn't that you're African-American the risk is that you're poor. If that's the only basis for the risk that you're poor, then you ask yourself, what's the statistical probability that you're going to be poor if you're also African-American. And then you've got a very, very high probability there. If you then said, well, how many African-American people are actually poor? And you found that was very low because the number of poor people is also very low, suddenly you don't have the same statistical probability that an African person is also going to be recidivist. So you look for the data that actually gives you the causal connection and*

you run the statistics counterintuitively. […] *This is actually something really complex. So what I'm suggesting to you is that if you ask me what could be done to mitigate biases, then that would be to create datasets, to build into the analysis, into the number crunching, information that give you more profound insight or more accurate data with which to work, to undo the bias.*

Returning to the mafia case-study, the hypothesis of the research is that women are present in such patriarchal organisations. Although invisibly, these women are part of the problem. A possible answer to draw the attention on to the hidden world of mafia women would be to create a tool that is going to start detecting or seeing these women. In order to do this, Dr Ryan suggested to look back at Table 1 perhaps stopping to worry about the gender, and focussing "on all the other data, to ask general questions such as":

- What is it that makes an organised crime, syndicate or family operate successfully?
- What are its features?
- What are the networks that matter and how important are they?
- What are the relationships women have, and how are these and their power measured/controlled?

As the anonymous barrister above, Dr Ryan suggested to ask questions, and build into the data that information about what makes an organised crime system work, and understanding much better what it is about the women that makes it work. The following step would be to enrich the data with more information that is specific to the mafia, "family or syndicate that has no contribution, zero contribution to ensuring that it's successful".

You need to make sure that that data exists as a zero output while all the other stuff is an equals one, or an equals true. And all the stuff that has no role, because I think the danger with the bias, the bias arises in favour of finding men guilty of running mafia, syndicates, and women getting off scot-free would be because the maleness is too readily an equals true factor in the data. You've got to strip it out.

In short, Dr Ryan suggests removing the variable on gender so that that "maleness" is no longer a quality that is regarded as creating propensity. The emphasis is in finding behavioural data, as also suggested by Jonathan Bowker earlier. Dr Ryan further stated that it may be possible to find that acts committed by women end up not being built into the data because women have not fully been "busted", and therefore the causal links are not being gathered.

You need to work out what do they do? What is their role? And build it into the data as something that is an equals true. And if you get rid of all the gender, you will start capturing the women as a greater probability that they're partly responsible for the success of the syndicate and therefore liable for the accessorial role, knowing assistance. And I think you would need to go back to basics

on that. Look at when we talk about knowledge, and liability for assisting in a dishonest and fraudulent design. And that's an aphorism that we use in the law all the time. Accessorial liability, liability for assisting in a dishonest, fraudulent design or something that you know is a wrongdoing. So there's a judge in Australia who uses the expression: "General naughtiness", or wrongdoing that amounts to a dishonest and fraudulent design. And what you're talking about is a dishonest, or some fraudulent design that supports the ongoing, shenanigans of the mafia. However you want to describe it.

Following Dr Ryan's suggested method and researching ZKP further, the technology seems to be at an early adoption stage, especially in the justice system. One of the obstacles faced by ZKP is the lack of standards, systems and consistent languages, which would allow different actors to interact with services based on the technology. It also seems that the focus of implementation of ZKP is in settings where it can be applied to allow users to interact with digital services in a trustworthy manner. For instance, in real estate, agencies could ask their future tenants to share their latest pay cheques, bank statements or other personal documentation to show they have the requisites to bear the cost of the tenancy without sharing any specific private data. The benefit of ZKP is that it can demonstrate that certain information is true without sharing them with external parties (BBVA, 2020). To summarise, ZKP solves a trust issue: a prover wants to prove that she has a secret without telling a verifier what the secret is. ZKP is fascinating for its seemingly opposing definition in that it is "both convincing and yielding nothing except that the assertion is indeed valid" (Cui, 2018:643). ZKP, being an active research area, will need to be closely monitored to investigate how the technology will be developed and made applicable in different fields.

When Dr Ryan was offered the perspectives given from other experts suggesting to gather as much data as possible, albeit male data, Dr Ryan replied that in her opinion, data scraping would "reinforce the biases". She further added that the data needs to be made "gender-neutral, gender-blind". Additional unedited quotes from her interview have been reported to gather an insight as to how a legal professional with a technical understanding reasons, which makes the multidisciplinary approach key in tackling data gaps:

Let's say you have a male, he's 38 years old. And he was associated with a whole bunch of people who have been found liable for some mafia activity, money-laundering, tax evasion, extortion. Let's go with those three. If you have that information associated with that male, there is going to be a bias towards saying, well, he must be guilty. And yet what you really need to do is say, what did he do? You need to enter that into the system and find out whether it returns a true or a false on all of the data that you've entered, where the true attaches to the stuff that you know is definitely mafia activity. Because then what happens is you could run the data across any human male or female, because the data now is, is gender-neutral, it's gender-blind. And all it cares about is what did they do? And then the data will crunch through and come up with what you've entered

and may tend towards a propensity that this actually has nothing to do with supporting this sort of activity. In merely driving a car, merely being in a certain geographic location, merely depositing certain amounts of money. You need more. What you need is structured deposits of cash amounting to more than 10,000 Euros over a certain period of time. Tick, tick, tick, tick, tick, who did that? And then boom, you will get the woman. She's the one who's doing those transactions. She is the problem because you didn't enter any gender.

You've got a major problem that you're trying to solve, which is how do we work out which women should be held liable for assisting in a dishonest, fraudulent design? And in order to do that, what is it that they do that you will know some of that data. So you've got the behaviours that you can program in that create "this behaviour equals true" result on the data and "certain behaviour equals false" on the data. You need to make that clean and pure in order to get a very accurate view once you start testing it against the humans. And I think you would find that there are certain mainly female behaviours or activities that equal true, and then others will cluster around the males. But what I think you'll also find is that there are surprises and I think that's the importance of your work because the surprises are where you're going to capture a gender, doing a certain activity where you were expecting it to be something that is attached to the other gender. Because it's so easy to say, well, we're going to be right 70 or 80% of the time, so let's do it the easy way. That's why bias exists! It's pure laziness!

Finally, when asked how to best get rid of gender bias and unconscious bias, and how to control it, Dr Ryan responded that there are three steps to it:

Number one, you get rid of the gender data. The second one is make sure you've got all of the data in there […] *don't just have the mafia related behaviour because there is already too much bias baked in. You've got to work out if you ask yourself, what is the behaviour of a mafia, of a person in Italy who belongs to a family within the mafia that's not mafia behaviour. If you don't have that baked in there, then every single person who has anything in that data that looks like they might be related is just going to be a hit that they must have a propensity. The third thing* […] *There's a co-authored article by two guys, and their article has an argument which is that the only way that you can actually test for bias is to test the outputs. We've got to test before you implement. It's a really compelling case that thinking you can feed in to a system an algorithm in the information in a way that you can be confident is going to behave in an unbiased way without testing it, they say it is ridiculous. So you've got to then build into your argument, in your thesis, that testing is a very important thing. And then you would, then I would suggest have a half chapter or so on how you model that testing.*

Despite the interesting suggestions made by Dr Ryan on women's recidivism and making the systems gender-blind, existing literature suggest that algorithms that are designed and trained to be neutral about protected groups, whether that's focused on ethnicity or gender, may still produce disparate impact. The key point is that if an algorithm's training data imbedded discriminatory practices, such as inequitable police decisions to arrest, then its outcomes may replicate those same biases (Hamilton, 2019:147). Some scholars cheer for incorporating gender-based risk assessment tools in criminal justice specifically because gender is shown to be a statistically significant predictor of recidivism. In fact, the Model Penal Code of the American Law Institute advocates for the use of gender to inform sentencing

decisions because of its importance for the wider public safety. Northpointe goes further and offers as an option COMPAS risk scales with separate male and female norming, which could however fall foul of what Dr Ryan suggested of reinforcing bias this way.[42] Arguably, making AI models blind to gender as suggested by Dr Ryan may be unjustified from a practical standpoint, as it would critically undermine basic requirements of the evidence-based empirical movement in AI.

5.4 Anonymous, Senior Research Officer at the Malaysia Space Agency

The expert has a PhD in computer science completed in the UK and is currently working for a Malaysian government agency. When Table 1 was shared with the expert, the question was asked of how much data is enough data to create an AI-Assistive Tool, and the response was:

> *It's always hard to say how much data is enough because you will then have to ask yourself, based on the amount of data, how much do you think you have collected enough of samples for you to be able to come out with a modelling. What usually people do is, you can try with… For example, you have the 30 data. Can you then build a model based on these 30 data, and then take a new sample and see if that sample can fit in your model? If it cannot, then that could be an indication that your model is still not strongly developed, and you need more data to prove it further. But with the 30 data you have gathered, and you put in a new sample, and you could clearly distinguish this sample from the rest of it, or you can classify it* […] *anyhow the 30 data is good enough.*
>
> *A new sample that they put in is a known sample, so you know what the result is supposed to be. You put it in your model, and if your model is able to provide the same result as what you expected, then you know your model is good enough, but then again, one sample may not be enough, so you got to do a bit more random samples. So in statistics, they do have this distribution of 70/30. Something along that line. So 70 samples is what you use to develop your model - 70 per cent samples - then the balance - 30 per cent sample - is what you use it to test your model with.*

When dealing with limited or incomplete data, the minimal size of the dataset is dependent upon many factors, including the complexity of the model sought to be built, the performance aimed for, or also the timeframe at disposal. It is usual for computer scientists to achieve the best results with the minimum of resources (i.e. data or computation) while building the AI predictive model. This means that the machine learning practitioners will seek to create simple models with few data points before trying more advanced methods that would require larger datasets (Biering, 2020).

[42] Northpointe's COMPAS is a popular risk tool used in pre-trial bail decisions. Investigative news journalists and ProPublica researched and found a series of statistical analyses involving based on real-world data and concluded that COMPAS was racist as the algorithm overpredicted high risk for blacks (Hamilton, 2019:146).

In the current scenario, where collecting more data is challenging, then data augmentation or synthesis may be options. Via the augmentation process, new data could be generated based on the dataset that is already available. It allows to enrich the diversity of data without the effort of collecting any more real data, while helping to improve the model's accuracy (Biering, 2020; Tran, 2021). Data synthesis is sometimes used where one class is imbalanced (Biering, 2020), which could be looked into as female and male data is imbalanced in the mafia. Companies are increasingly looking into data synthesis methods to build AI systems because synthetic data is easier to create (Jefferson, 2020). Through this method, it would be possible to quickly build datasets of varied mafia situations without having the real data.

When asked how unconscious bias would affect the creation of models, the expert stated:

> *I think in that case you would have to look in terms of the bias value of it. My husband did something similar about training. It comes from an organisation who train seafarers so they have certain bias value of whether the trainer will be accepted to work on board of a ship. What he did was, in his study, he made a relationship in terms of bias and trust. I think you can apply that as well. How much trust the judiciary system in Italy, and the bias value. From that, you can have some sort of, not a conclusion, but some way forward to probably improve the trust or reduce the bias level* […] *Obviously, it's a different scenario, but the underlying approach, the way I looked at it, it's the same. Both of you need to have some sort of a relationship. That could be part of your finding. What is the relationship between the trust, between the bias?*

Trust, bias, are all legitimate concepts to keep at the forefront when thinking about AI and the decisions it makes. The question, as rightly put forward by the Senior Research Officer, is whether these decisions can be trusted. To elaborate, does AI-aided recruitment facilitate or reject the right candidate selection? Is the Tinder match made in heaven or by the algorithm? Who is being sent to jail — criminals or innocents predicted by AI bias (Ghosh, 2021)? There has been enough debate around COMPAS (Correctional Offender Management Profiling for Alternative Sanctions), as an algorithm that courts in the US devised to anticipate the likelihood of repeat offenders. The algorithm indicated twice as many false positives for black offenders (45%) as white offenders (23%) (Shin, 2020).

"Machines get biased because the training data they're fed may not be fully representative of what you're trying to teach them," says IBM Chief Science Officer for Cognitive Computing Guru Banavar. "And it could be not only unintentional bias due to a lack of care in picking the right training dataset, …" (IBM, 2015). IBM spoke to 30 AI scientists and leading thinkers about the possibility of building trust in AI and they had stated that a significant effort will be needed to instil it morally, and transparently. An example that gets referred to frequently to show how tough this can be is the moral decision an

autonomous car might have to make to avoid an accident. Imagine if there is a bus coming toward a driver who must swerve to avoid being hit and seriously injured; however, the car will hit a baby if it swerves left and an elderly person if it swerves right—what should the autonomous car do? "Without proper care in programming AI systems, you could potentially have the bias of the programmer play a part in determining outcomes. We have to develop frameworks for thinking about these types of issues" says Arvind Krishna, Senior Vice President of Hybrid Cloud (IBM, 2015).

When questioned about what types of models could be created to ensure that women are not yet again made invisible in the system, the expert responded that there are two types of models that could be of use based on the aims of the project. One is a "classification model" (classifying whether the woman is or is not involved in the mafia), and secondly a "likelihood model" (asking how likely is it that this woman is involved):

> *The first classification model could probably be easier for you to create, but you will have a lot more false positives in that, meaning to say you could classify the person a lot wrongly. Likelihood is probably a little bit safer because you're not* […] *Unless the case really presents to you in a way that the model completely eliminates all possibility of this woman being involved in the mafia business, you will have some sort of like a percentage, how likely is this woman involved? From what I can see there is two models you can create.*

Classification models were covered with Jonathan Bowker's interview above. These are models that attempt to draw some conclusion from observed values. Based on one or more inputs a classification model will seek to predict the value of one or more outcomes. There is a wide range of classification models, including logistic regression, decision tree, random forest (explored above), gradient-boosted tree, multilayer perceptron, one-vs-rest, and Naïve Bayes (Fuchs, 2017). Maximum likelihood models are one of the most encountered ways of thinking in machine learning, one that looks at the maximum likelihood point of view. This relates to the fact that when working with a probabilistic model with unknown parameters, the parameters which make the data have the highest probability are the most likely ones (Zhang et al., 2021: 887).

When asked whether she would suggest the use of sex-disaggregated data for these two models, the expert responded that it does make sense to use female data separated from male data because "after all, your subject is a female so you will want to gather data that's related only to females":

> *you're trying to take away the gender bias and to evaluate people on the same scale.*

As Caroline Criado Perez writes, closing the gender data gap is both an easy and difficult job. It is easy because the solution to it would be collecting sex-disaggregated data. However, it is hard because the

gap is the result of a routinely occurring bias that affects "pretty much all of us: when we say *human*, 9 times out of 10, we mean men" (Perez, 2020).

5.5 Malcolm Dowden, Legal Director at Womble Bond Dickinson (UK) LLP

Malcolm Dowden is a data protection, privacy and technology lawyer as well as an internationally accredited legal training provider focusing on technology, with expertise in blockchain, distributed ledger and the "Internet of Things". Malcolm Dowden co-wrote a chapter for the American Bar Association book on *The Law of Artificial Intelligence and Smart Machines*, and he is also an Honorary Professor of Law at the Indore Institute of Law, in Madhya Pradesh (India).

When Table 1 was shared with Malcolm, and the question was posed as to the possibility of creating an AI-Assistive Tool for law enforcement and the judiciary that would predict women's culpability, Malcolm stated that:

> *I'm absolutely sure that a data scientist would be confident that they could put together predictive analytics. The more data you have the more confident they would be that they could do it.*

Dowden then questioned how many data points had been collated so far, which are eleven (referring to the columns of information at the top of the table). Dowden stated that a data scientist would ask for more data points to put together a predictive algorithm and suggested to collate more information for instance focusing on number of children, whether marriage happened before or after conviction. He further added:

> *The sort of analytics that have been put together have tended to rely on upwards of about 40 data points to come up with anything like a robust profile. I think it's simply that question. The data science approach would be, yes, of course we can generate a profile, but we need more data points to create a more secure profile. That would be the starting point. The other thing is that the conceptual approach that your table is taking is inevitably to look at historical data.* […] *Does your table include only those who have been convicted or are there any case-studies where you have an acquittal?*

It was explained that the focus of the project was to resurface the mafia women profile that transgress the traditionally accepted role of the women, which would be likely to be those that were either tried and acquitted or those that did not fall under the law enforcement's radar. However, the suggestion from a data science perspective was clear – that there would be a call to have data about those who were tried, but were acquitted as well as those who were tried and convicted. Also, data would be needed for those who maybe were investigated but not charged. Following the gathering of more

profiles through that line of thought, the range of data points (across Table 1) can consequently be expanded. Dowden further reiterated:

> *What you'd be looking to do is essentially use historical data to predict future potential outcome and so the more data points you have the stronger the modelling can become. If you look, for example, at the HART system, the Durham Constabulary system, my recollection is that it's about 47 data points. From all of the discussions I've had with data scientists, including people like Jonathan Bowker* [whom has also been interviewed – answers found above]*, Jonathan's starting point and consistent message is more data points you have, in other words the more nodes in the knowledge graph you have the more secure the profiling becomes. The push against that is the more data points you have the greater the risk of building-in inherent bias. For example, it's very easy for location to become a point of bias.*

When further researching the question of how many data points would be enough for predictive analytics, an interesting read revealed various myths on this point. To the issue of using datasets, there is also an argument that interesting insights could equally be gained through small datasets. It is useful to do basic analytics on the available data while it is fairly contained, size-wise. It is also often argued that models should not be built on a sample of data (arguably Table 1), as it would reduce the model's power. However, there may be situations in which there is no other option but to use the sample data, instead of enriching it with other data that may not be as relevant. Therefore it may make sense to limit the analysis on a sample, as the cost of collecting more data would outweigh any possible benefit that might give the model (Simmons, 2014).

When questioned about the possibility of creating an AI-Assistive Tool for law enforcement or the judiciary fuelled by female data only so to avoid the woman getting lost in the rich male data that is available in the field, the Legal Director responded:

> *The starting points for any development of algorithms, any AI based system, are you must first have a recognition of the risk of the potential for bias. The strength of an algorithm depends on the strength and the validity of the data that's put in. Inevitably when algorithms are formulated you're applying a weighting between different types of data. There's also a sequencing question as to almost the order in which data is processed in order to arrive at a profile, to arrive at your output. Those factors, I think, have to be demonstrably present in any tool that's used for investigation for judicial analysis. Certainly, for any form of judicial decision making. The ethical credentials of the system would have to be very strong. There's a practical reason for that which is that if you pursue prosecution or if you secure conviction based on evidence that is inherently subject to challenge then arguably you're introducing inefficiency into the trial system. You're introducing cost inefficiency and appeal potential. Those factors would have to be addressed.*
>
> *An algorithm that looks at only female data would probably be too narrow. Given that a lot of things* […] *which depend on broader cultural, community, and social context, I think, you would have to bring in more data points to place the female data into its setting.* […] *You need to ask*

different questions or interrogate the data from different angles in order to arrive at a more robust outcome, in order to stress-test the biases within your initial questions. I think a layered approach is the way to progress.

TechTarget defines the concept of "garbage in, garbage out" this way: “The quality of the input determines the quality of output”. Humans aside, bias can also infiltrate a machine's intelligence. After all, as B Nalini noted, it is humans who frame the problem, train the model and deploy the system. Even with unbiased data, there is no guarantee of accuracy, as the very process by which machine learning models achieve this can yield biased outcomes (Ghosh, 2021). When asked how to minimise the effects of unconscious bias in the present context, Dowden reinforced that a layered approach would be a solution to ensure that discrimination is minimised:

In all honesty I think it's the only way to break it precisely because unconscious bias is unconscious. The problem is that unconscious bias is baked into the selection of data and then the questions that are applied to that data; the search techniques; the interrogation of that data can only reflect what the investigator is looking to find. Having as many crosscurrents as possible allows you to stress test and allows you to challenge the formulation of the questions.

When asked how to work around the fact that there are data gaps in the context and how to ensure that the next steps taken in modelling recruitments into organised crimes is done in a way that is better informed including female data as well as male data, Dowden answered:

I think because you're looking at this in a judicial context it really begins a question of evidential weight, of probative weight. In that context, I would tend to reach again for 19th century, early 20th century debates of evidence. For example, fingerprints have become in many jurisdictions widely used because they're regarded as highly probative. They're regarded as highly probative because there is a large body of evidence that fingerprints are more or less identifying marks of an individual. If you've got fingerprints that match the person in the dock located at the scene of a crime those fingerprints carry a lot of weight. By contrast you've got other 19th-century quasi-scientific approaches like phrenology and telling someone's character from the bumps on their head which was essentially run as a serious criminal evidence investigation as a line of argument and then was essentially debunked. I think that algorithms and big data analytics really need to go through a similar trajectory of being tested as a type of evidence.

Just to bring the story more up to date, DNA evidence, for example, has led to a number of historic crimes investigations being reopened and has secured convictions long after case files went cold as it were because the science and the evidential quality of DNA has been accepted by courts.

Dowden stated that algorithms are themselves on trial. The more cases of algorithms being demonstrably unreliable, the greater the challenge is going to be to their acceptance. Conversely, the more robust, the more tested; and stress tested algorithms can be, the higher their probative value becomes over time.

Going back on suggestions made by Jonathan Bowker as to the use of data scraping services to find more data, a question was posed to Dowden as to the usefulness and efficiency of these tools from a legal perspective. Dowden explained that data scraping is challenging in a GDPR context because:

> *Let's say that the objective of data scraping is to find information about living individuals. Unless you can rely on one of the specific enabling provisions for law enforcement, say, for example in Part 3 of the UK Data Protection Act, going and finding data on individuals essentially requires you to tell them what you're doing. There are difficult elements there with the law. In the US, I'm sure you've heard of the Schrems II Judgement in July. One of the reasons that the European Court found that the EU to US data transfer protocol Privacy Shield had to be struck down was that the US Federal Government has very strong powers for digital surveillance which essentially includes bulk interception, bulk scraping of data from emails and any other data sources or databases. Now, the US position there is that, actually, [?Visa 1:42:05:3], the executive order that are at the root of that have congressional safeguards, have checks and balances built in. The investigation; law enforcement; and intelligence purposes that are being applied to are legitimate and are worth pursuing.*
>
> *You need to be in that environment with a government that is essentially enabling that sort of data scraping for it to be particularly viable without running into data protection and privacy problems. You also have human rights issues. Article 8 of the European Convention on Human Rights, the right to privacy of correspondence, for example. Not quite privacy but the right to protection for personal correspondence militates against much of data scraping. Where you're looking, for example court transcripts, that is inherently under control of government and the judiciary. That's something that if government were minded, if judiciary and law enforcement, were minded would be a fruitful area to look.*

The European Union's General Data Protection Regulation (GDPR) has had a significant impact on emerging technologies. For instance, Article 13 and 22 of GDPR require that certain algorithmic decisions need to be checked and explained by humans, and such limitations will significantly increase labour costs and break the integral balance between accuracy and transparency; Article 17 provides users with the right to erase personal data without undue delay, which might affect key rules underpinning the AI system, which may lower the efficiency and accuracy of algorithms, or even breaking them completely. As to blockchains (earlier suggested by Dr Ryan), it is difficult to identify the data controller and hard to require each node to perform strict obligations (Wallace and Castro, 2018). Furthermore, as the data of each node of the blockchain affects succeeding records, if blockchain users have the right to erase and correct data (as per articles 16 and 17 of GDPR), then the efficiency and effectiveness of blockchain will no longer exist. China and the United States are seeking to seize advantages with emerging technologies to study safer and more efficient data processing methods to augment their potentials to preserve personal data. For instance, a focus is on optimising anonymisation methods and data mining algorithms to resolve the ambiguity between transparency and efficiency (Li

et al., 2019:4), but in the EU and UK, the same focus would be challenged by legislation aimed at protecting personal data. At this moment, due to “re-identification techniques” and development of advanced technologies, it is challenging to believe that there would be "complete, infallible, and perfect anonymisation” of personal data as a result of traditional anonymisation techniques (Pearce and Stalla-Bourdillon, 2019).

When asked about the use of sex-disaggregated data for the purpose of ensuring that female data is brought to attention, the answer was:

> *I think that having segregated-data sets is valuable but as part of a multi-layered approach. As far as I mentioned, I think that if you have the largest universe of data - for example all criminal, investigation, and conviction data, that's your big catchment, within that you might have mafia related conviction data. Within that you may have male, female, mother, son - however you slice and dice and segment the data are simply different ways and different entry points for running your analysis. One of the major advantages of big data analytics is that it allows you to take huge amounts of data points and to analyse them quickly depending on the amount of computing power you throw at them. Then to re-analyse and re-interrogate that data in different forms so that you can in a layered sequential fashion test your assumptions. That goes back to my point that taking a linear or simplistic approach, I think, maximises the risk of challenge. Taking a layered multi-factorial approach increases the probative value.*

Following Dowden’s suggestion of the multi-layered system, the question of how the feeding of unconscious bias of the data scientists creating the predictive algorithm could be minimised was posed. His answer was that a “very high degree” of bias could be fed into the system:

> *I don't mention that as a reason not to pursue development of those tools. I think that rather like the concept of privacy by design and privacy by default in data protection law you need some principle of alertness to bias when you're operating algorithms. At the start of our call I mentioned the exam algorithms that were run in the UK over the summer that eventually had to be abandoned. A major part of the reason for that was that the existence of particular biases became apparent through the process. There was insufficient attention paid upfront to how those inbuilt biases might play out at the point when decisions were made, and results were allocated. I think that what we can learn from that sector and from things like the HART project in Durham is that awareness of the potential for bias when you are building an algorithm is critical. The way you address one person's bias is by coming in with interrogations from other angles and stress test it. It's no different really from the process of peer review in scientific analysis or any form of academic discussion.*

Drawing on his expertise, the question was posed as to whether the interviewee could see any other way of ensuring data gaps such as the one in the context of the mafia could be better tackled in the development of technologies. His answer focused on the need of having and continuing multidisciplinary work:

I think one of the things that struck me about data scientists is they are broadly interested in what is possible not in what is ethical. They're also very confident about the ability of anything that is data driven and, if you like, numerically analysed to be objectively true. I think that in itself requires cross-disciplinary collaboration. Not to take the point too cynically but people who believe in numbers tend to believe only in numbers. You need the nuance. You need the ability to build-in provisional judgement and you need the ability to recognise that evidence doesn't lead to one truth. What evidence does is provides you with the basis against which to tell the story that is being told. The better story is the one that best fits the available evidence. I think it's that, again, layering of analysis and layering approach that's critical. The numbers don't tell the story. The numbers give you the basis against which to test a range of stories. Data scientists, I think, need to understand that humanities-oriented approach.

To conclude the interview, Malcolm Dowden commented on the mixed methodology adopted in the current study and appreciated its applicability more widely:

I think there's a very strong drive at the moment, for example, in the courts of parts of Africa to test the usability of technology to get a long way towards resolving what are perceived as what are seen as relatively simple disputes or carrying out relatively simple investigatory processes. Again, my fear there is that if you're looking at purely historic data and looking to extrapolate from that that you have the risk of inherent bias informing and ultimately sapping the credibility of those tech-based approaches. I think that looking in particular at a particularly difficult area like identifying mafia women provides simply a point of entry into that broader debate which is any criminal or civil legal context where are the assumptions; where are the issues that are biases risk generating outputs; and how could those be, first identified; then tested; and then addressed. I think the methodology is much more broadly applicable than the particular case-studies that you're looking at.

In fact, Dowden's view on the multidisciplinary nature of work required in the advancement of AI is also echoed in many other scholars and thought leaders' views. It is held that such an approach "creates an inherent unevenness in the logical flow but captures the distinctive orientations of the experts and their recommendations at this critical juncture in the evolution of AI" (Dwivedi et al., 2021).

5.6 Dr Matteo Venanzi, Senior Applied Scientist at Microsoft

Dr Venanzi suggested an alternative solution to address the unconscious bias of data scientists that would be engaged in the creation of a predictive algorithm. He acknowledged that humans are biased in nature, so it would consequently be hard to build unbiased technology by biased creators. Therefore, "the most powerful approach would be to correct the biases in the creator, train humans, train technologists as much as possible to mitigate their biases which is what is going to deliver in the long-term". Dr Venanzi's view is that having the human-in-the-loop is key from building the technology, to its evaluation, which could be done by a pool of judges to test the system's efficiency.

When focussing on the gender data gap in the mafia, the Senior Scientist stated that if the data held in the context is biased, and there is a lack of female gender representation, then a way forward would be that of building a model that does not make assumptions about gender:

> *Because the tool is just interpreting data and recognising patters in the data, hiding a feature, e.g. gender, will probably lead to some suboptimal results.* […] *It will potentially be more politically correct and the model will be perceived as fairer technology by the consumer.*

However, there are equally arguments that hold that even if obvious gender indicators are removed from the dataset, there could still be patterns that highly correlate with gender. For instance, in the financial sphere, it was not too long ago that women had legal obstacles to obtain services. Therefore, what historical data would be available when women had problems opening bank accounts in their maiden name, without their husband? Or information on gender could be indirectly assumed if there is a gap in someone's income history at the time of the woman's childbearing years. Women have lower approval rates for credit products to date, and lower access to investment opportunities in the small business space. Consequently, if the objective is that of increasing women's contribution in financial services and investments, then removing gender indicators may not be the solution (Gürdeniz et al., 2020). For the purposes of the mafia case-study, removing gender and using predominantly data of men that may have committed violent crimes such as murders to train a predictive model, would not be likely to hold a mafia women responsible for racketeering and guilty of mafia association.

Consequently, a question was asked focused on the possibility of using sex-disaggregated data to enrich the female data gap to train models. Dr Venanzi responded:

> *Yeah, you can definitely do that to increase the gathering of female data. Or the other way, you can down-sample data as long as you are aware of the fact that biases might be introduced, especially when down-sampling data from one category might slightly increase biases. I think it's probably best to look at the data gathering process and try to identify blind spots and see where we need more data which would be more preferable, but probably more expensive because you need to go back to the gathering process, but I think that's less risky. Whenever there's touching of the data there's the danger, the risk of introducing biases. But I have to say like re-thinking the gathering process and really increasing coverage on some areas/categories that would help.*

When asked how much data would be enough, Dr Venanzi responded that it depends on the model sought to be created, but that big data offers more opportunities and a wider range of technologies. It is usual for powerful models to be trained on big data. However, if certain data is challenging to be collated as per the mafia case, there are other techniques that can work:

There is no exact answer for how much data you would need. It's like you train a model, you try something, look for its performance, and then if data is the issue, you invest on getting more data. It is an interactive process. If what you are trying to do is predicting the culpability of mafia women, then you're basically looking at classification techniques. In computer science, you have a range of these techniques and you are looking at discriminative versus generative models.

The first type of model looks at the causality between some signals that you're given, and some F variable like the weather, for example, even temperature or the geography, you know, just look for patterns and correlations between the variables. Another model thinks about how data is generated and look for causalities between all factors like, for example, say, Oh, you have three variables that describe the problem, for example the weather, temperature and time of the day. So look for all possible correlations between these variables and then when we want to predict one, then just isolate one button. Well, it's a more complex category of model because it's more generic, but anyway, it's a domain, but think more of a black box approach, definitely look into classification techniques, and neural networks.

As mentioned by Jonathan Bowker, the Senior Research Officer and Dr Venanzi, it seems that the classification model would be the preferred one among the tech experts. To train a generative model, data is collected in a specific domain and then a model is trained to generate data similar to that (Karpathy et al., 2016). Discriminative models, also referred to as conditional models, are a class of models used in statistical classification, especially in supervised machine learning. Unlike the generative approach, which studies from the joint probability, the discriminative modelling predicts probability of y(target) when given x(training samples) (Anand, 2019). It is not the intention of the thesis to recommend the model approach to be undertaken in predictive analysis, but the technical overview presented is of assistance to understand a basic concept which is that models and systems are created and trained by humans. Consequently, any AI biases reflect humans' inherent preconceptions.

When sharing Table 1 and asking for Dr Venanzi's technical view on how many more data points would be needed before a model could be created, he stated that in order to find other data points, we would have to think like a human judge and understand their mental process when deciding outcomes of cases. Following that, the technology would just be able to mimic that process with larger sets of data. The answer of what other data points should be included depends on what the assumptions are that a judge makes, and principles they follow to come to a decision:

You would usually start with the data you have, or you can increase data if you think that there might be cases where the model gets it wrong. For instance, if a judge says this case should have had a better decision. Like some judge will look at the results and say, Oh, this is wrong. And then you understand why it's wrong and what signals could help to change that decision, and that becomes a data point, a new data point. So now that you know these things, you can implement changes at the bootstrap phase, you can do it immediately. You don't need to train any model. But

you probably reached a point where the next round of signals will be guided by the performance of the model and the opinion of the judge, who judges the quality of the market.

When questioned about the danger of bias in including in the data the assumptions a judge would make to come to a decision, Dr Venanzi clarified that when he said that assumptions should be used in the modelling, he does not suggest modelling biases of a judge:

I'm thinking like modelling the minimum set of knowledge, the technical knowledge of a judge. So, if a person kills, or is carrying a knife, he is more likely to kill someone or something like that. I think in that sense, the interpretation of the data should be based on a large sample. You should get the historical data of many judges and then the training of the model of this sample should give a biased estimate of how an average judge in the foul system would interpret this case. But then it's again going back to the question of, if the sample is biased, then the model is just going to reflect that. But it usually should be more accurate than a single opinion.

The issue is that women have been depicted in different ways in the judiciary. Women have been shown to be associated with derogatory, negative descriptions on one hand, and on the other as being beautiful, and lacking of agency. These links are arguably encoding gender biases that if fed into a model, could be reproduced and magnified. The overall suggestion of enriching the dataset, as well as removing gender indicators, although promising, may not work as gender is one of the most important determiners of order in the criminal organisation, which reveals a concept of apparent social order assigning more power to men (Leavy et al., 2020:3).

5.7 Yusra Hussain, IT Business Consultant at Shell

Yusra Hussain is a technology consultant with a Master in Electronic Engineering and a passion for diversity focusing on women and ethnic minorities. Her technical expertise assisted the research in its questioning of how to tackle the gender data gap while ensuring predictive analysis could be sought inclusively with male and female profiles.

When Table 1 was shown, she said that the dataset is not large enough as did many other interviewees. However, she also stated that thirty data points could work, although with a high risk of false accusations. Hussain suggested alternatively to weigh “mafia affiliation” data higher than, for instance, the women’s “age” or where they live as it seemed to her to be a key piece of information. Similarly to Jonathan Bowker, she also suggested to use the data on men to map out all the women that are connected to those men.

If you know that, Angelina Corsanto, the first lady [on Table 1]*, her husband is a criminal, but like his sister or his mother or the other women that are associated with that man are or are not criminals or whether or not, there are even thoughts of any suspicious, you could probably put*

weighting around that and that may help. But I think based on this alone, it'd be really hard because what you basically end up doing is saying that every single woman that has any association with the mafia is a criminal, which may not actually be wrong.

Essentially, you have a small sample size, which is already skewing towards guilty and you're just going to get more guilty than non-guilty. Which may not be a bad thing, because then you could have this group [referring to Table 1]*, we assume that the algorithm tells us guilty and then you can have a human go through it and actually check it. But if you were to reduce human involvement because of the already existing bias, then you're going to want even more data to back you up. And, I think it's difficult to, because also the data being gathered with the newspaper articles, maybe they were always sort of biased towards innocent. Because a lot of your data is human gathering data, it's not like factual data. I mean, it's factual, but the humans are still gathering it. So there may be bias that you may be wanting to be wary of, like it would be biased towards innocence versus guilty. So you may want to weigh towards guilty than normal. The way AI algorithms work is that you have your model that you've built based on assumptions, and then you keep feeding it with more and more data as time goes by.*

When the issue of the challenging nature of the data was shared with Hussain, she suggested that it would be possible to start with the current data in Table 1, but changing the weightage. Her response has been quoted in unedited format as it is key to follow the logical analysis to understand her technical standpoint:

Because your data is skewed guilty and you know that your data is not meant to be representative, you can add in your own assumptions to the models to say that, for example, husband affiliation is higher than brother affiliation and affiliation in general, higher than location of more men, and age higher than something else. And you can bleed as much information as you can from this data, from your knowledge. And so this is basing back on your assumptions or the assumptions that people have on what mafia women look like.

If you can get more detail on these women that you have, so anything else to identify them even down to like a certain personality type, that's another indication because you may find out that all of these women are a certain type of personality. There's always a psychological basis, right? So that means that they're more likely to be mafia involved or they have children, and so they're more likely to be mafia involved. So you can also add age of the children during their criminal activities, because maybe that's an indicator because if the kids are older, maybe they're more likely to step back.

Where you are currently, there's nothing stopping you from getting as much data as you can, and just around the women that you have. So instead of looking to get more women, because that's going to be hard, focus on the women you have, how much more can you find out about them? And from there can you then build a profile based on what you've learned of these 30 women. I'm hoping you will see a pattern emerge. And then you can use that pattern to build your model, and then you can coach your model based on new information as it comes in. And that, because essentially you're building the profile and maybe coach it to get closer and closer to that profile.

A suggestion made by Hussain was to start small, and keep running the model as a prototype for years, and continue to feed it new data. As a result, the system will improve but a constant engagement from a human will be required to check its performance:

> *You don't want the algorithm to just convict people.* […] *Humans are unpredictable and they may not react the way their profile says they should.* […] *Where you are is a step in the right direction.*

Increasing human involvement in the design and monitoring of algorithms is a growing sentiment in the field. The risk that algorithms would make biased decisions is always present. Humans will continue to play a key role in recognising and fixing biased outcomes even after an algorithm is developed, tested, and launched. While more data can inform automated decision-making, this practice should complement rather than fully substitute human judgement. Alex Peysakhovich from Facebook shared, "[W]e don't need to eliminate human moderators. We need to hire more and get them to focus on edge cases" as the use of both improves the outcomes for users (Turner Lee et al., 2019).

Returning to the mafia women case-study, it was then explained to Hussain that Table 1 represents an effort in finding female profiles in order to bridge the gender data gap in the field, and that it had not endeavoured to collate information of other categories of mafia women. A question was posed as to whether a collection of other types of women would help to make a difference when it came to train a model (by including innocent mafia women, those women that knew, but kept the code of silence, those women that were investigated but were released for lack of evidence, and those women that were charged but not sentenced). Hussain's responded that would be helpful,

> *because you can make the assumption that if they were arrested and released for lack of evidence, you could probably then weight them differently. Like, you know, we did the 0 to 10 guilty scale* [referring to Phase 2 Results in Chapter 4]*. You could do something similar where 10 is these women that have been arrested and definitely have been criminals and then 5 is the women that were arrested and let go, because probably they are criminals but we just couldn't find the evidence for it and the 0s are women that aren't proven guilty. Then that could give you an idea, better idea, but I think you still need a differentiating factor because each of these crimes is unique and then trying to think what it would be* […] *Like obviously the mafia affiliation is important, and being able to prove the crime is important, but if you're able to prove the crime, you don't need AI to do it for you.*
>
> *It also seems like most of them are husband affiliated* [referring to Table 1] *which you could use to get in another factor as well as where they live. So what type of house they live in. So if you're going to be with your husband and you have a massive, nice house, you probably know that he's a criminal. Then the question is, how involved are you in that criminality? But if you are, if you're like the sister and you live in a not so nice place, or something like that, then you may not be as involved.*

A key tip the Consultant shared was that anything that suggests wealth would be a good indicator, as well as someone's quality of life although hard to measure. She held that if most members of a family are in prison, but the women continue to live a comfortable life, it could be assumed there is some mafia involvement, "whether she is the link or the conduit or whether she's being propped up by the rest of the family."

> *…money trails is probably the best way to go about it because I mean, most of this is like they have fisheries, and you'd probably have to look at the different other things that you can measure. I think the difficulty is because you could just be that innocent wife that keeps getting money and you don't know, but you're actually not involved.*

When querying what other type of data (e.g. medical records) could be used to bridge the gender data gap, Hussain suggested that actually medical data could be of assistance. For instance, if these women had active involvement in crime, the records could assist in checking whether any of them may show historical record of violence, abuse, that may show shot wounds, etc. However, getting this type of sensitive day is challenging.

When asked about her expertise in data scraping services and their efficiency for the type of research undertaken by the project, Hussain's positioned differed from that taken by Jonathan Bowker. She argued that web scraping would be limited to newspaper results, and suggested pursuing other venues, such as "sentiment analysis".

> *…if we look at crimes across the world they're becoming more and more technologically advanced. Especially when they're recruiting, or just like talking to each other, obviously you can't get access to like encrypted messaging services, but on Twitter you could look at sentiment analysis. There are quite a few companies that do sentiment analysis. That's essentially, you're looking at the tweet, and you're trying to work out the general sentiment of the tweets, is it a happy tweet, a sad tweet. If you could find, and this is difficult, but if you could find the Twitter of a known mafia person, you could probably scrape that Twitter, and look at their tweets. They may just be very innocuous tweets, but probably they may be coded in some way or form and probably could speak to a cryptologist that specialises in it… I've been watching a TV show "The Bletchley Circle'. I'm thinking like an organised crime room, they probably have a coded way in which they talk to each other. If they're putting like tweets out there, maybe it's like a warning to the rival gang or something but that could help you.*

There is evidence of a shift of *mafiosi* relying on social media platforms to spread their message of power. "Honour and Dignity" was a social media brand owned by an Italian mafia boss, Vincenzo Torcasio, of the *'Ndrangheta*. He invested on the profile and built up 18,000 followers, but after his incarceration in 2017, his frequent posts came to an abrupt end (Johnson, 2021). It is a new and upcoming field where research should be focused to see how mafia men and women have advanced

their strategies with emerging technologies and platforms. It is clearly a digital strategy to grow their criminal brands that may reveal more on the various roles played behind the screen. Despite the novel means, it is not new that crime bosses relied on the media to build their personal profiles, which happened also in the pre-digital age. John Gotti, was a mobster in New York that sought publicity in the 1980s. However, building a high-profile reputation may be good for business, but it comes at a price as one draws the law enforcement's attention on one's self. In fact, Gott made himself a target (Johnson, 2021).

Anna Sergi, a criminologist at the University of Essex (UK), stated that crime bosses and their family members use social media to promote and defend what they believe are admirable cultural values. "The mafia identity is not always the same as the activities of the organisation", she said. "Those who belong to the clans often see it as a lifestyle and way of being, with lots of good in it. For these people it is natural from a criminological perspective to defend your identity and values at a time when they are attacked by the state" (Johnson, 2021). Consequently, sentiment analysis may be another tool of research to be implemented when collecting data on the mafia with the potential to reveal perspectives that transgress what is known already.

When asked about how the unconscious bias of the humans creating a predictive model would affect it, Hussain believed that there was no doubt that bias would be fed into the system. She suggested that one way of minimising biases being fed in is by having more than one person involved and where possible, being aware of your own biases. She suggested for technologists to perhaps do an unconscious bias test "like the Harvard Implicit Test similar to what you made me do at the beginning with the scenarios" (referring to Phase 2 results above and the questioning inspired by the IAT).

When reflecting about available alternatives to ensure that the woman does not fall through the cracks of a patriarchal system when collecting the data, Hussain suggested to look at the mafia man's profile, and use the same indicators to build a profile for a mafia woman. As suggested earlier, Hussain also stated that stripping gender out of the context could be an option:

> *Something you could probably do is compare your female dataset to your male dataset to show which ones are more likely to meet the mafia profile, and then when you get to present that you strip the gender out of it and you put it in front of the judge and the judge will say, for instance both of them are mafia. And then you put the gender back in and then the judge has to go, okay, because at the end of the day, the judge is making that decision. And if you presented to him, this is a female mafia person, he may still go five years in jail, but if you put a man's name on that, he would've gone like 50 years of jail.*

And the more I think of the comparison between the woman, the man, it makes sense because you have the sister [referring to Rosetta Cutolo at Phase 2 in Chapter 4] *who basically was the mafia boss and if you were to profile her she would have been the same as a male mafia boss. The only difference was that she was an old lady. So let's say if you could compare your female profiles against your male profile, you should be able to come up with something that does come out each time, as a similarity, and then each time you get a new piece of data, a new person that you want to check if it is a mafia person, you go check it against the females data, and the female data suggests yes, then you check against the male data, and the male data also suggests yes, then you can assume she's mafia.*

It seems that what Hussain suggests, overall, is a tiered system where there would be separate female and male algorithms. The promotion of a female algorithm is arguably in line with the thesis' initial hypothesis. It is also important to highlight that removing gender, although a logical approach, may not offer the optimal results sought as the default human at the centre of most data is a Caucasian man, around the age of 25-30, weighing 70kg. He has been the "human of reference" in research studies across fields, and when data is not collected and separated by gender, it is not possible to learn what works and what does not work for different groups. A solution to this gap is to collect gender-disaggregated data, which is key if AI is to meet its aim of improving its results (MyITU, 2020).

A parallel example to draw upon is one that Caroline Criado Perez made on health workers that have spoken during the COVID-19 pandemic to share how they felt exposed to the virus due to "unisex" personal protective equipment (PPE). Research has shown that a woman wearing a seat belt in a car accident is 47% more likely to be seriously hurt and 17% more likely to die than a man in the same crash because the dummies used in test runs were based on the 50th-percentile man. Equally, any algorithm trained on male-dominated datasets is unlikely to foresee accurate risks and offer reliable results. Criado Perez also mentions an example of a gender-neutral algorithm that was apparently designed to predict heart attacks, but her studies found issues in the data. She said that the paper hardly gave any disaggregated data and the studies on which the AI was tried were mainly male-dominated, with a lack of focus on data that would be higher risk factors for women (e.g. diabetes, smoking) (MyITU, 2020).

To conclude, the question of how easy or difficult it would be to put such an AI model into practice was asked and the answer was that technically it is not difficult because the tools are available and there are different statistical models that could be used to do the predictive analyses. However, the model is only "as good as the data you're inputting", therefore:

At work when we're building models because we do renewable energies to predicting the generation of a wind farm, we need the engineer that's built the turbine or knows everything, the ins and outs of the turbine, and you need a data scientist that knows the ins and outs of our stats

sat together and learning from each other to build that up. So I think in your case, we need criminologist or, a lawyer or maybe you need a group of experts because I think there's so much more to it – there are the psychological and sociological aspects as well, and then a data scientist because the data scientist knows their stats that are models, their algorithms, but they don't know the ins and outs of the mafia system or the criminal system or things like that. So I think you can't just give them a piece of data or a dataset and tell them to do it. So it's not impossible, it can be done using the right group.

5.8 Anonymous, Senior Lecturer in Computational Methods and Mathematical Modelling

The interview with the Senior Lecturer was useful in understanding the technicalities behind the creation of an AI model. It was reinforced the need to identify parameters that would describe a mafia woman:

It could be a list of 10 parameters for which you have data and what you would essentially try to do is try to understand, first of all, the variability, and the uncertainty in the data you have collected. There are many techniques available in the literature that one could use to actually understand the variance in the data. Also understand the correlation between those parameters. Once you have done that, then you could create a model by essentially using the most important information in the data you have collected, and that would get rid of the information that is not important. Once you have done that, then you could be using the model to predict instances for which you didn't have any data previously. […] *then you validate the model and make sure it is accurate enough.* […] *You test your model at those points for which you know what the exact output is. Once you've done that, and you have confidence in how the model is making prediction, then you use it to now predict the output at data points for which you didn't have any group for the input parameters.*

The model referred to by the current interviewee seems similar to what was earlier suggested by Dr Venanzi, regarding generative vs discriminative approaches. The interviewee then referred to a recent cybercrime research, which collated data from six different countries and for each country, data was researched under fifteen parameters (e.g. lack of education, crime, lack of infrastructure etc.) to understand cybercrime. The result was a table of "six times fifteen" (ninety) entries. The task was to understand to what extent high cybercrime countries share common characteristics, which "is a typical artificial intelligence problem". The expert further added:

You build a model based on what you have found in between those countries and between those characteristics. And then you can select those characteristic that are strongly dependent on each other, and then you refine your model. And what you can actually do with this type of model is you can generate more data for virtual countries. For countries for which you don't have any data, for example, or you have less data than required for this type of analysis, when you build a model, you build a model for process, it's an output versus inputs. What you'd like to do is use the model to predict more outputs in terms of inputs, you would like to minimise the outputs or you would like to know what would be the minimum or the maximum value of those outputs, etc. So that could well be applied to the type of problem you are looking at, but this requires to have a good understanding of, what are those characteristics? What are those parameters? You need to do a

> *good survey of the literature if you want to simply look at Sicily, so that would be a local study where you actually extract data or find data for all these criteria, same parameters, and then try to understand what the correlation is between all the different things.* […] *It's only when you look at a specific data that you can look at numerical modelling, and that could really help.*

Following a similar logic, a model on mafia women could be based on characteristics found among the various mafia organisations, then select those that are dependent upon each other (e.g. location, mafia affiliation, etc. from Table 1), and then refine the model. Consequently, synthetic data could be generated for virtual mafia profiles to match sample data (in Table 1). To clarify, synthetic data is artificially created rather than being generated by actual events. The data is created through algorithms for different reasons, which could be test data for new products and tools, for model testing, and in AI model training. Studies that compared the performance efficiency of models that used synthetic vs real data revealed that between 70-99% of the time results produced by the synthetic data was on par with the model using real data (Dilmegani, 2021). Consequently, synthetic data may be an interesting venue to pursue as further technical research in the circumstances of organised crime where privacy laws limit data that is accessible for researchers, or because the data has not been consistently collated or in detail as per mafia women profiles.

When asked about unconscious bias that could be fed into the system, the expert responded that a "sensitivity analysis" could be carried out, which consists of

> *coming up with individual effects of each parameter. So you would end up, for instance, with a graph that would reveal that being a brother of a mafia man is actually not important compared to being a wife.* […] *The bias can be removed or added, you can update the model* […] *and that is a continuous exercise.*

When questioned what solution there might be when data is difficult to collect like the present case of mafia women, or data that is available is biased, the export highlighted the possibility of creating a model based on virtual data, and to test to check if it makes sense. The academic warned that there is no guarantee that the model would make sense, but there are ways of doing that if one wants, by starting with minimal data, and then updating that model as the process moves forward.

To the question of how much data is enough data for such a project, the expert responded that there is no set answer to this, but what is important is the number of points/data, as well as the location of data:

> *Think about a 2D graph…It all depends on where your data is, how your data is prepped, and we call, in modeling terms, space fillingness. If your data fills the space well, then you have more confidence in the model accuracy than if your data is not filling the space. You want to have a sufficient amount of data that is well spread across to be confident enough that you have*

simulated or tested your model or trained your model, and you don't want to miss out those points that are important.

As an example, the expert took the student population and stated that if we were to look at the average student across the UK to try to understand the effect of height on performance, you could get data on heights and the studies should reveal that if a student is tall enough, then we expect that student to have a 2:1 degree. Now, to be able to do that, we would need to look at as much data as possible and consider those students that are more representative. But if we are going to look at one institution alone, and its population of students that are of average height alone, that is not going to assist in creating a good model.

The good news is that when you develop an artificial intelligence-based model, by using set of data available to you, you can build one model, which can be updated as you collect more data.

5.9 Dr Seda Arat, Computational Toxicologist at Pfizer

Dr Arat is an applied mathematician with a background in computer science and mathematics. She is a Computational Toxicologist in drug safety at one of the world's largest pharmaceutical companies, Pfizer. Dr Arat's main advice was to, first, have a clear understanding of what one would want to predict with a model. For instance, in the present case, what is it that the project is wanting to predict – is that the probability of a woman being involved in the mafia, or predicting the length of sentences, etc.?

If it's the latter, how many years they're going to get, the data should be consisting of all the criminal records for instance. On Table 1, they're all female, but age, married or not, year, these are the regular metadata, like age and sex and birthplace, nothing to do with being involved in the crime. We need more info about maybe families involved in a mafia or not prior they are married to the mafia men or not. So that could be other categories that we can use if we really want to predict their involvement.

Similarly, we should include some other people that are not involved in mafia and they are profiled, so the model can learn what kind of profiles in, or what kind of columns in the data can explain the relationship to the mafia or not, or how long they have been involved in the mafia. Maybe they're involved since they get married and we can call it as like, since they get married or if they're involved since their birth, maybe they are born in a mafia family. This kind of numbers will help. We can get more information about their case than just age and sex and birth place or residencies.

The expert continued to explain, as opposed to other interviewees above, that using information like location to do predictive analyses may not be the best way because we cannot assume that people based in a certain area are going to be part of the mafia and that they are going to get sentenced, for instance to five years in jail. It would be better to focus on marriage, whether born in a mafia family, or whether fathers and brothers are in the mafia, or information like if the brothers are in the mafia, it is

harder for the women to escape. She also suggested to include data of those women that are investigated, but not sentenced. Or sentenced, but released before the end of their imprisonment years so that the model can learn:

> *If they have this kind of profile, they're not guilty, but if they have this kind of profile, there is a high probability they are guilty.*

Most importantly:

> *what do you want to predict from the model? Do you want to predict If they are guilty or not, or they're involved in mafia and not guilty or guilty or not involved in mafia at all. Depending on what you want to predict, we can collect the data accordingly.*

When examples of the *Project Proton* or other predictive models like COMPAS are used in the USA to recommend sentences, or bail hearings were shared with the expert, the problem with regards to the lack of data leading to discriminative results was shared with Dr Arat. A solution was suggested by her in situations where access to data may be problematic:

> *We can do sub-sampling. If you have 30 women data, you can add 30 men data. You just keep it equal instead of men's data being over 100. One way is to balancing data. If you want to build the mixed men and female model, let's say 30 men, 30 female* […] *it doesn't have to be 30 exact, it could be 32 or 25 or something, as long as they are relatively close to each other. But if you want to build a female model and see what kind of profile of women you have, predict whether that person can have high probability or higher chance to be convicted or not. So adding another 30 women that were captured or interrogated, but not sentenced, not guilty would be good, so the model can predict based on their guilty and not guilty, using columns which have most predictive value in terms of guilty and not guilty. Is it the age or not, or if it's they're interrogated before or not, or they have a longer history in a mafia or not.*

> *Another thing is just extracting those information, which ones are really important. So from building a machine learning model, let's say if we have 60 in total data points, data rows, probably you don't want to have more than 60 columns. But also you don't want to have just five columns,* […] *in that case, the model needs to be balanced. Again, the data needs to be balanced in terms of rows and in terms of columns* […] *I'm just making it up, but the 100 columns, that means there's so many parameters that the model needs to learn just to decide the distinction between guilty and not guilty based on five data points… it can't do that. But if you have 60 data points, 60 people guilty, not guilty, but also you have roughly any columns of information like sex as one of them, ages is another, also birthplace instead of having like little towns or something, maybe you can think as a region, that would be of help.*

When asked how to address unconscious bias affecting the collection and use of data in training a model, the expert responded that knowing the data inside out is key and one way to reduce the effects of bias is to have a multidisciplinary team. She drew upon her personal experience and shared that when she works on building a ML model, she works with lab scientists who generate the data, and she is

responsible for inputting the data into the model. The lab scientists would be the team that knows the data well, so if there was to arise an issue with the model, they would be the first port of call to understand the data further. She emphasised the importance of interdisciplinary teams, and counter-balancing expertise for better informed outcomes:

> *Because I'm working with the biology teams or biomedical research, they know the biology better. The samples, let's say some mice and I question whether it is liver or not, they know the tissue so I can work with them to understand the data better. So when we draw conclusions from the data, it should make sense. At some point, when we have built the model, half of it is the making sense part and half is extrapolation. What I mean by that is, I generate the model, and mafia affiliation column makes sense. It's high predictive value so that's good. Maybe a couple of the other columns would be fine* [referring to Table 1]*, and the model predicts those to be high predictive values, which is good because we should make sense of the data as well after the modelling. And then maybe there are other columns that the model suggests that maybe may have higher predictive value, for example, having a brother in mafia or having a son in mafia or, we can have different columns or having, a mother who is born in a mafia, something like that. Then we come to think - okay, actually, we never thought about it, but it's quite interesting that we can pursue these venues after. There is one validation part, the makings sense part, and another part is kind of extrapolation, which means generating new hypothesis.*

The expert suggested that this information is crucial when we look at people's profiles, suggesting that maybe certain suspects should not be released right away, or maybe they are to be interrogated further. Again, the idea of the model is not to replace the human, but it is just an aid, helping the human:

> *And based on a potential new woman being interrogated, having a case, we can look at those 10 columns in their information and based on that, they can have a probability. Let's say if she points to probability that is closer to zero, she may not be guilty. I'm not saying that we should let them go. We should still interrogate her, but it's good to know when we started, whether we should interrogate further or not. But if you have the 90% probability based on their profile, maybe we should not let them go. Again there's still 10% chance that that person may not be guilty, but again, we can take actions accordingly. That's so helping, aiding people just thinking about the case.*

As the expert is in the medical field, the question was posed as to her view of using sex-disaggregated data to fuel a model in order to see whether that would be a possibility to ensure the female data does not get lost among the vast male criminal data. The expert suggested that if, for instance, the model to be created is one that predicts what kind of women profiles are highly likely to be involved in the crime and plead guilty, then she believes this could be done in an unbiased way because the data points that would be fed into the system are of women's profiles that are some guilty and some not guilty:

> *I think maybe one of the outcome of the model you're interested in is "What kind of women profiles are highly likely to be involved in the crime and pledge guilty?", then I think we can do that unbiasedly because these are all women, some of them are pledged guilty, some of them are not.*

So all you need to include is the other woman data, those that are not guilty although suspected of mafia association.

Other columns to be added to Table 1, as suggested by Dr Arat are:

how many times they were interrogated before pledged guilty and sentenced, maybe they're caught and then maybe they are not guilty five times, six times before they are actually found guilty. I'm sure they have some sort of history to go back and forth between a police station and maybe courts of law. But again, the main question is what do you want to get out of the predictive model? What's your question of interest? Based on that we collect the data. We can predict almost anything.

The expert referred to another way of creating models that sometimes may not be ideal:

That's one of the big things in our field. People have data and say, okay, let's build a model with them. No, it's not that way. I mean, you can do that way too, but it's usually a two-way communication. You want to know what do you want to predict, then collect the data accordingly so it can be less biased and more relevant data […] *People go more like, okay, we have the data, let's build a model. I think people should think more about, okay, that's what we want to predict, how can we collect the data for that for it?* […] *Let's say there's some limitations, you can't find certain data or something. Then we can adjust our scientific question accordingly. I mean, they go both ways, but usually you should start with, what do you want to predict?*

Dr Arat's position strongly validates the need for people that set out the issue sought to be answered in the relevant field, whether that is healthcare, financial services, robotics, automotive. It would help to think of the process leading to the creation of a model as a supply chain, where each expert contributes partly, to produce an overall product that is multi-disciplinarily researched. It would start off perhaps from the academics, as per the thesis, questioning an issue and bringing to light some relevant sample data. At the same time it is highlighted the need for more information, that would encourage law enforcement and the judiciary to keep a better and more thorough track of datasets. The first stage involves already scholars from different fields (e.g. criminologists, lawyers, data scientists, etc.). Once a specific question is set out, then technical expertise would be consulted to understand what data would be needed to answer that specific question. Following the collection and preparation of data, a prototype of the model is created and selected data used to train it. The model would be evaluated by end-users to test its performance. Depending on the feedback given by the multidisciplinary team observing the model, the machine would be adjusted accordingly and the rest of the available data would be used to see the predictions the model would bring to real life scenarios (Smith, 2020).

Returning to the specific question posed by the research, the expert stated that if Table 1 was to be expanded with thirty other data points of women that were not sentenced, and have twenty columns (add to the horizontal line) of parameters, then that would be

A good step to build a model. And then once you collect more data, perhaps from the UK, maybe from USA, you can always build the model and then expand the data when you have more data. You can build the data on the new data as well. It's easier. So it's more like an iterative process if it makes sense.

Once this data is collected, then creating the model is fairly easy:

We are looking for associations. There are many different algorithms, some of them are easy to build and a little bit easy to interpret. Some of them are really complex to build, and hard to interpret. So really depends on again, finding the optimal model and that's where a competent computer scientists and mathematicians come in and statisticians for sure.

5.10 Christina Blacklaws, Former President of the Law Society of England and Wales

Christina Blacklaws was the 174th president of the Law Society and only the 5th woman to hold the office. During her presidential year in 2018-19, her agenda mainly focused on promoting diversity and inclusion with a particular eye on unconscious bias, focusing on the future of law and harnessing the power of legal technology, and ensuring the justice system is accessible to all.

The opportunity to exchange the aims and objectives of the current project with an elite interviewee that is driving change in the field of legal technology was a great honour and the insights and recommendations offered by the former President are reported below.

Blacklaws mentioned the Law Society's report on the use of algorithms and the impact of human rights in the criminal justice system, which the current project has referred to on many occasions (The Law Society, 2019). She further added that it was:

A really interesting project to steer ahead because there isn't a great deal of academic research and research can be quite siloed rather than looking at the big picture. Of course there is a good number of use cases in the criminal justice system where algorithms are predicting future outcomes. And if you look in the reports, we evidence on the interactive map … significant numbers of police constabularies utilising algorithmic technology for a huge range of applications. It's quite awesome, and I don't mean that in a complimentary sense… So that's police forces, crime labs, courts, lawyers, parole officers, and a whole different variety of applications themselves.

The expert then shared her position with regards to some of the technological advancements stating that:

Some of them are indeed concerning because the technology is not actually very good at the moment, AKA facial recognition technology. But I think more concerning because of the problems inherent with the data, as you say, the use of the training data almost inevitably, I'd say certainly actually going to be biased.

You know, if we're looking at criminal conduct there's no way really to measure the number of crimes that are committed in society. We only have … more problematically individuals arrested or

charged, and then there is an inevitable issue that if we accepted that we had to use the criminal justice system under certain populations, with the police and others, with biases reflected in the data, then you have got the second problem in the way that the algorithms are programmed themselves.

The former president then proceeded to talk about a concern The Law Society Commission on the Use of Algorithms in the Justice System had when writing the report which was that they

Were worried about the impact on privacy in particular and on the categorisation that would be involved in certain algorithm programmed machine learning, perhaps even some other unsupervised machined learning. One of the major worries that we just didn't know that was going on with these algorithms was that there is no transparency, no capability within the police constabularies to actually assess the working of the algorithm itself. They don't have the technical expertise and then you add to that the worry that was actually expressed by the Constable of Durham, which a few said to stop using the algorithm, which was predictive of what crimes were going to occur. I think there's a pullback from some of these, but very much around the use of facial recognition technology, I think there's very much pushing forward, for instance the South Wales court case there.

Blacklaws continued to then express that the main issue is the inability of the offices, the unwillingness as well to question why we have arrived to any of these algorithmic decisions

It does lead to very challenging environments with no transparency. No internal ability to analyse processes, the natural biases that are inherent in anybody, who's actually building algorithms and amend the fact that nobody was willing to say that algorithms got it wrong. Real worries.

She further added that it is not all bad, but there are good things too that are happening that should be acknowledged:

There are lots of things police officers hate and do badly, sort of routine administration. There's lots of insights, the proper analysis of the datasets that the police have, so big data analysis, which would actually really, really support better policing. Through their work we could probably get much more granular and much more accuracy in terms of the supporting offenders. If we can use algorithms appropriately, but there's concerns about the use cases and the individual constabulary use of the algorithms. So we are not there yet, and I think it's worth proceeding with caution to nurture these things until we can get them right.

The expert's tone and position begged the question of whether experts in the field were then hitting a moment of stall, and reflection before proceeding with further discussions as to how to bring in more technological advancements within the criminal justice system. The answer was that:

We must recognise that these are public bodies and therefore public bodies whatever they are undertaking need to be held to higher standards and particularly in the criminal justice system where the consequence of getting it wrong is very, very severe. Our report made a number of recommendations about what needed to be put in place to provide a more robust framework, which would enable the support for appropriate usage of algorithms. In large measure, it is no

different in the criminal justice system than it is in any other system … there must be mechanisms to ensure transparency and understandability of the data which does not fuel algorithms to discriminate inappropriately.

We have suggested to have data protection impact assessments added to a quality impact assessment so that every usage of an algorithm in the justice system should be registered. Then those are the sort of levels of accountability and reporting, and analysis to a risk matrix embedded into the process. Obviously that hasn't happened so there has not been any statutory change in this. I think there has been a growing awareness, public awareness, but also in the decision-making, in the police constabulary that there are significant issues in this. It isn't just a matter of a piece of kit you plug and play it. […]

And that's in the pre-court stage. I think in court process, things have changed. After all the recognition during the Covid-19 periods where we now have the most appalling backlog, that puts us into a very, very worried position with time limits that have to be extended. We've got Crown Court cases that have been listed in 2022 with some of the accused being detained throughout that period, for a period much longer than the sentence that they received. That's not justice at all. And we've got that within the context of what was happening pre-COVID with significant cuts in judicial sitting days. And now I think we've certainly got over a half a million outstanding cases and that's just in the magistrates' court and in the Crown Court I think we've got maybe 50,000 outstanding cases. That's going to take years to resolve.

In relation to criminal court proceedings, the whole burden is on us to look to ways of reducing the time and changing process, which still enables due process, but which supports speeding up because the balance here is completely out of kilter.

Another recent paper that explores a new policy framework for data analytics and algorithms in policing in England and Wales is by the Royal United Services Institute which was commissioned by the Centre for Data Ethics and Innovation (CDEI). The paper suggested that any future policy or guidance should be "tech-agnostic" and based on principles. The framework should establish standard processes to ensure that algorithm projects follow recommended procedures for empirical evaluation within their operational field. It would also have to evaluate the project against legal and ethical standards (Babuta and Oswald, 2020: 43).

To the question of how to then balance the integration of such technologies in a justifiable, controlled manner, the former President responded that:

I think it's a matter of utilising the technologies that are currently available to us. The process in criminal court proceedings is antiquated and certainly not an efficiency model, quite the reverse. I think there are things that can be done to speed process at this point without utilising novel, and potentially untested and therefore risky algorithmic programs to start to determine justice.

Even I, and I am a great proponent of e-courts and really of radical change in terms of the way that we deliver justice, there is something in relation to criminal justice where certainly for the most serious of cases, it's really important that the justice is seen to be done as well as being done.

And it may well be that the best is still necessary to be a sort of in person, old style criminal justice system. But I would imagine that for many cases, for the less serious, for individuals who are facing either a very lengthy wait, a determination by algorithm entirely understood, would be safe to do so. People may choose to have a quick and early determination of their issues as opposed to waiting, having it hanging over them for possibly 18 months to two years. So I think, many might rather put their faith in the hands of an algorithm, i.e. a robot judge for less serious criminal offenses. I could see that being fair and appropriate provided that we can address the bias issues.

Babuta and Oswold refer in their paper to a process for police data analytics projects, which is the cross-industry standard process for data mining (CRISP-DM), which could also be a good starting point for Italy's journey in establishing tech punitive systems. The process highlights the importance and need to start with a clear "Business Understanding" before moving into "Data Analytics", "Modelling", "Evaluation", and "Deployment". In law enforcement or the judiciary, that means starting with a clear case documenting the problem the public bodies seek to address, the reasons for selecting that problem, and clarifying why it is believed the problem may lend itself to a technological solution. This is opposed to the "exploratory" model, which involves starting with the data analysis, and not establishing a clear purpose for analysis until after the insights have been generated (Babuta and Oswald, 2020:44) (as was also mentioned by Dr Arat above).

The last comment given by Blacklaws was when questioned about cleaning data that may not be accurate and unconsciously biased. When presenting to her some of the suggestions received so far about how to best do it by AI experts and legal-tech lawyers, she responded:

I am not entirely sure that lawyers are involved in the solution. The solutions are laid out there, there's some really interesting work around reverse engineering data to test, to see if it is biased. In the example of gender, if you reversed/changed gender of all the people in dataset, would you have the same outcomes? There are ways that you can test that out. And if you don't, then you have to go back to your datasets and tweak until such time as there is a gender-neutral outcome, for example. So there are techniques that can be used. That is something that I think we really do need to start to socialise, and to put pressure on to ensure that all algorithmic use can be certified to have gone through the most, very tough, robust testing to ensure that that is fair, and balanced.

5.11 Discussion

This reflective and problem-centred step shared results from the mixed method consisting of Phase 1 and 2 with the same tech/legal experts, and thought leaders to collect feedback from their expertise and reflect as to the relevancy of the gender data gap issue. The interviews allowed to explore multidisciplinary suggestions as to how to minimise consequences due to the feeding of biased data into potential AI led systems in the law enforcement and justice system.

A positive outcome was that despite the lack of data on organised crime in the women sphere, the gap can be overcome by different techniques (such as those presented herein but also other data mining processes, including web crawling, or through the use of synthetic data) (Strickland, 2022). Once data is available and is analysed, then different ways of modelling predictive algorithms can be considered. Different approaches were shared that were influenced by each expert's field of knowledge, and experience.

- One suggested model was through collating more data, by starting from looking at crime more generally, and then refining the mafia-related crimes data from it. Although a plausible venue to pursue, there is arguably a risk that by starting from crime in general, it would perpetuate the biases that are already in existence in the field. It is a renowned fact that women have lower arrest rates than men for all crime categories (except prostitution) (American Law and Legal Information, 2003). Women have even lower representation than males in serious crimes. Our subconscious bias leads us to believe that women's acts of violence, compared to men's, result in fewer and less harmful injuries. Women are more likely to be associated with petty crimes, involving less monetary loss or property damage. It is also indirectly accepted that women are less likely to recidivate. It is difficult to accept that women would be in long-term criminal careers and become involved with other criminal offenders. However, if they become part of a criminal group, then they would operate as their men's accomplices (Steffensmeier, 1983). It is a given that men are overwhelmingly dominant in organised and more lucrative crimes.

  The criminal justice system's greater "leniency" and patriarchal attitude toward women offenders may partly explain the reason for lower female offending rates and data. Equally, the police's and justice system's recent inclination to be less lenient toward females now may help explain latest increases in the number of female arrests (see Appendix). However, there seems to be relative differences between the likelihood of arrests or conviction of women and men as women defendants appear to have a lower chance of being jailed or imprisoned. This difference is arguably linked to different factors, such as pregnancy, childbearing responsibilities, the greater probability to express remorse, as well as perceptions that women are less dangerous and more responsive to rehabilitation (Daly and Chesney-Lind, 1988; Steffensmeier et al., 1995) (American Law and Legal Information, 2003). Consequently, all these generally accepted notions would be fed into a system that is seeking to break away to stereotypically think of the women according to the terms above.

In fact, Malcolm Dowden partly supported the same line of thought as Jonathan Bowker, based on the use of enriched data for a better performing model. However, he did express his concern that by having more data points, there is an increase in the risk of building-in inherent bias. For instance, location could easily become a point of bias. Additionally, contrary to what Bowker suggested of using dating scraping services, Dowden believes that privacy laws would obstacle their uses. Along the same lines was Yusra Hussain's position who believed that the most likely information that could be collated in the field of the mafia would be newspaper articles that are arguably limited in the data they could offer. However, Hussain did offer the technique of weighting data points differently, which could be a solution to the issue highlighted by Dowden and minimise/control the injection of biases into the system.

- With regards to sex-disaggregated data, Dowden followed Bowker's position of creating a multi-layered approach. Dowden suggested having segregated-data as part of a large dataset. For instance, take all criminal, investigation and conviction data, and find within that mafia related conviction data, and digging down further, there would be split data on male, female, mother, father, etc.

  There are also advocates of sex-disaggregated data to fuel a female model that would predict the likelihood of mafia association of a given woman, or would recommend sentence lengths. In fact, Dr Ryan found the use of disaggregated data justifiable in the circumstances as the subject of the thesis is female and the aim is to show a gap in the data, and a consequent way to gather the data related to females. Dr Venanzi also believed that it can definitely assist in increasing the gathering of female data, and Dr Arat went further to give examples of questions a female algorithmic model would be ideal for, stripped of as much bias as possible. Equally, in an arguably convincing line of thought, the non-practising barrister stated that pursuing data via disaggregation may not bridge the gender data gap, but it certainly offers a line of enquiry to research further data.

  Overall, the research's main hypothesis of using disaggregated data to fuel an algorithm through female data only has been largely accepted by the experts. The narrative style adopted above, dividing interview answers by expert was to show how depending on each interviewee's standpoint, suggestions made with regards to the most suitable digital technology differed. If a tool based on female data is to be pursued multi-disciplinarily, that would be beyond the scope

of the current thesis. The objective of the study was to test the hypothesis of a female model, and prepare the foundations to explore the possibility of a tool that would mitigate biases through the mafia case-study, which has wider application in other fields too.

- Other models suggested to bridge the gender data gap and creating a tool for predictive analysis, were those based on zero-knowledge proof or trained on pseudonymised or reversed gender data. The former was suggested only by Dr Ryan and it is a field of constant evolution that is worth monitoring closely. She also suggested making the models gender-neutral or gender-blind, or what other experts called pseudonymisation such as Bowker and Dr Venanzi. The main reason for the suggestion was in the apparent pursuit of equality in the data, which ignores the fact that most of the data available as widely explored is heavily male. Consequently, simply making the model gender-blind, does not necessarily remove gender indicators within the system which may be attached to other types of data. The former President of the Law Society suggested gender reversing – this is reinforced with scholars such as Lavendowski who suggest that ways to support bias mitigating techniques is through reverse engineering testing, and algorithmic accountability processes (Levendowski, 2018:597).
- Finally, a comparative approach was suggested by Hussain. She advised two separate models, and to compare the female dataset to male dataset to show which results are more likely to meet the mafia profile. When the results would then be presented to the police or judge, a tactic would be to strip the gender of the profiles to see how the public bodies would interpret the male and female profile. If the objectively thinking police or judge holds both of them to be associated with the mafia, or recommends a specific jail sentence without subconscious biases that may skew those analyses, then the gender indicator would be re-inserted. Consequently, each time a new piece of data is available, that new person would be checked against the female model, then the male model and the result given should be the same without discriminating.

In summary, the first-hand possibility to gather such technical answers from thought leaders in the field were extremely enlightening and positive in confirming the need to support research trends that focus on ameliorating AI, having learned from past and current errors. The need for correcting biases through the bridging of data gaps is a recurrent theme and the project has sought to contribute towards the interdisciplinary sphere of research by bringing an array of perspectives while looking at a specific issue that has wider applicability. As tested through the final stage of the interview, the more mixed a group of experts is, the better chance there is to provide different perspectives, counterbalance each other

and spot any omissions. What also has come through from the experts' answers is the need to follow a coherent process when creating an AI system so to ensure its better performance, while keeping the human-in-the-loop.

5.11.1 Conclusion

The impact exploration and reflective piece were of key use to understand that there is not a perfect model. There are many ways of creating an AI model, as there are many ways to solve problems and respond to questions. The good side to the exchange of knowledge was to explore and understand that depending on the technical background of the experts, each interviewee had different views and suggestions to achieve a specific outcome. The overall position was that a predictive model can be created, and trained over the course of the years, which can be taught to do whatever is of interest. The better the cleaning of the data is, the better the outcome. However, the times for a robot judge are definitely not on the horizon for high-stake offences, such as mafia-type association, but a tool that could be a helping hand for a human judge might be. The crucial step is to raise awareness within key players, within judiciaries and law enforcement of the importance of addressing the explored questions, creating an understanding of the possible risks and the need to keep discussing gender issues as technologies evolve.

Overall, the reflective expert interviews enabled a process by which academic ideas and practical insights were shared, and external perspectives and experiences were brought into academia. The step improved the depth of the research and nurtured a virtuous cycle of engagement and further research. The problem-centred interviews (Döringer, 2021) offered a route to impact and increased the visibility and accessibility (Mitton et al., 2007) of the study beyond the UK, or Italy, and reach elites in America, Australia, Africa, and Asia who seek to further engage in discussions and proceed to practical collaborations in pursuit of influencing those leading (Christ, 2010) predictive justice changes.

CHAPTER 6 CONCLUSION

> *Ensuring there is a diverse talent pool furthering AI developments is vital for the success of the technology and society.*
>
> UK AI Council Chair Tabitha Goldstaub (DCMS et al., 2022a)

This thesis sought to contribute to the current research strand of evaluating the integration of emerging technologies in the public sphere, with a particular focus on issues deriving from data gaps. The chosen case-study to test the applicability of a predictive AI-Assistive Tool was that of the Italian mafia, looking at the gender data gap and the consequences of potentially relying on a system that may wrongfully convict people. The lack of detailed data, and more specifically female data, is a cause for concern as AI relies upon datasets to function, and the model is as good as the data fed into it. The study is one of the first, if not the first, to examine the common bias issues reported in predictive tools, within a unusual and original case-study of the mafia, which is the epitome of those very inequalities that are applicable to a wider range of settings within society. The study also combines with the exploration of the technical issues, a step further to advance suggestions made from various bodies (Veale, 2020) that are leading AI strategies, which is that of engaging with different practices and value the enrichment each field brings into the better implementation and functioning of predictive tools.

Findings demonstrated that available data on mafia women could be enriched through thorough research of newspaper articles, magazines, documentaries, and working collaboratively with the Italian National Statistics Office (ISTAT), and also the Ministry of Justice as the results of the study are sought to be taken forward. With the resources available, Table 1 was collated in Phase 1 of the mixed methodology which to the computer scientists' eye, amounts to a model itself. It was suggested, that if another 30 profiles were to be added of women that were either involved, but not sentenced, sentenced but with early release, as well as innocent women, the model's performance could be further improved. Nonetheless, the qualitative results presented in the study would be a good starting point to consider creating a model that is either predicting the likelihood of association of women with the mafia, or to recommend sentence lengths.

Phase 2 of the mixed methodology consisted in an exploration of diverse contributions from experts that would in practice be advisable to engage when radical changes are to be brought in the public sphere. Table 2 offered a numerical summary of Table 1, which was greatly appreciated by the technical experts that would churn the data to create a model. However, Table 2 was not particularly of attraction to legal and ethical experts that believe that numbers need to be accompanied by a story, and whose focus was to point out obstacles in the numbers. In fact, they appreciated the bias discussion in Phase 2, which invited the numerical as well as narrative thinkers to focus on a stereotypical image represented by organised crime, and specifically the apparent patriarchal society of the men of honour.

The questionnaire adopted for the purpose of Phase 2 was inspired by the rising use of unconscious bias tests today in promoting diversity and inclusion policies since the breaking news from Google in 2014 that revealed its poor workforce diversity numbers (Huet, 2015). The issue with implicit bias training is that it is not possible to train something that is not controllable, that is instilled in us. However, a specific bias (implicit or explicit) can be spotted, and acknowledged and one can only try to be mindful about it. In fact, with the open- and closed-ended questions asked during Phase 2, it was possible to gather answers that were mostly replicating images of the mafia that are generally accepted. It was interesting to see, following the scenario-based questions, how interviewees reacted to know the real stories of the mafia women they had just made assumptions about. The eye-opening stage where they realised their skewed way of looking at organised crime, and protective nature towards the women, was preparatory and affected the way they then faced the technical questions. It was clear they had at the forefront of their thinking the understanding of the gender data gap, the reason for it, and how the possible integration of predictive models would require an extra careful supervision in order to produce results that would be less biased.

Chapter 5 sought to explore and reflect challenges that AI technologies could present due to institutionalised and societal gender biases. Dwivedi et al. have explored those challenges in their multidisciplinary article, and grouped them as social, economic, data, organisational and managerial challenges, as well as technological, political, legal, policy, and ethical challenges (Dwivedi et al., 2021). This section has been structured to present multiple and consolidated views on different aspects of AI and predictive analysis modelling from the expert contributors (who are the same interviewees from Phase 2). The contributions were set out in largely unedited form to offer a sense of different lines of thoughts that varied from expert to expert, which highlights the importance of having diverse knowledge, that sees and solves a problem in many distinctive approaches.

Some unanticipated challenges of AI adoption and readiness in the public sphere also came to light. Experts' responses have hypothesised on the preparedness of AI systems to perform manual police and judiciary functions such as, making arrests, bail hearings, emphasising that the technology could be robust enough to deliver performance benefits over existing processes if the main problem question is clearly defined, and relevant data is collated. However, the speed at which AI is travelling needs to be caught up by the establishment of AI comprehensive public policies and framework so to ensure a comprehensive effort is made and linear process is followed before the deployment of a tech tool. In fact, the specific evaluations offered by the interviewed experts and wider literature have presented unique insights into the AI field in criminal profiling and law enforcement from a range of perspectives. The interviewees offered several possible further research opportunities based on an assessment of the current thesis question, with an overview of different models that could be of use for predictive analyses. However, many questions remain unanswered and call for further research.

As human developers write the algorithms used in AI based systems, it is logical how inherent prejudices get slipped into intelligent decision-making models. The consequences of biased systems have been shown to be significant whether that is a tool based on facial recognition and recommending arrests, or one that fails to recognise that a woman is having a heart-attack because most of the data the system was trained upon was male. There is a real risk for such models to marginalise groups of people due to incorrect decision-making based on incomplete data. At present, there is no readily available answer that sees a model that suggests the likelihood of involvement of women in the mafia. On a parallel, it could be argued that there is yet to be released a predictive tool that is better functioning, in an unbiased way, whether that is in terms of race, gender or class.

It is crucial to address biases in the framework of justice systems because the freedom of persons, their equal access to justice and their right to a fair trial could be deeply affected (Solis and Evans, 2021), with a knock-on effect on the promotion of the UN Sustainable Development Goals (SDGs) explored in Chapter 2. Consequently, further projects are needed that specifically address different types of biases, which are attractive and important avenues for future study affirming UN SDGs number 5 and 16 ("Gender Equality" and "Peace, Justice and Strong Institutions" respectively). The lines of enquiry to follow, based on the overall responses given by the experts in Chapter 5, is to look at the future of AI with humans-in-the-loop, with a view of AI technologies aiding humans, but not replacing them. Despite the aspect of bias injection via humans, there is also an advantage of retaining human input at the centre of AI design and development so to keep its performance in check, and mitigating issues where

possible. Therefore, it is important to monitor and concentrate studies on the governance of emerging technologies before widespread adoption of them, as seen for instance in the USA with tools like COMPAS. It is advisable to humanly invest on greater AI checks at the start of the AI modelling process, so to minimise as much as possible the risk of unwanted consequences later, e.g. wrongful convictions and miscarriages of justice. The research suggests that the methodology adopted for the current study could be lifted-dragged-dropped into other scenarios where bias may affect the collection of diverse and inclusive data, so that data gaps can be nurtured.

Furthermore, keeping the human-in-the-loop ensures that AI algorithms are audited and monitored closely. However, the process of keeping implemented algorithms in check is a process that is likely to be complex and lengthy. Consequently, clarification is needed as to who would take on the onerous job, and how to standardise the process so to ensure that all tools are equally and scrupulously assessed and enforce the European Ethical Charter's principles explored in Chapter 2. In the scenario where a similar model to that of *Proton* is implemented in the justice system that predicts the likelihood of mafia association, who would monitor the performance of the model?

The thesis, in its set socio-legal limits, suggested extensive opportunities that are available for academic and practical research on AI technologies and related effects of the continuing transition to use of intelligent machines within the public sphere, with the focus on gender data gaps, and biases. As public bodies generally seem unable to keep up with the speed of evolution of AI in a regulatory context, studies such as the current project, have a valuable role to play towards the exploration of obstacles to AI in law enforcement and justice system, as well as the psychological sides of change in the workforce and society more generally. The study highlighted the potential for in-built biases within AI systems and implications of humans-in-the-loop working side by side to clever machines, which poses great challenges in the field of trust, transparency, ethics, and human safety considerations. Despite the pleasing idea of having a system that may assist in breaking through patriarchal attitudes towards women and certain crimes, a reality check is much needed. In fact, the implementation of these technologies requires ensuring that the workforce (e.g. police staff, judges, etc.) will be comfortable with the AI augmenting human skills and bettering them. The illusion of the possibility to get fully unbiased outcomes seems worth pursuing. This requires hushing attitudes of distrust and refusal to change within dusty and old systems, such as the criminal justice one.

Many different academic research, tests and experiments have been left for the future due to the limited scope of the current project, which for it to be taken to the next step requires a multidisciplinary

team to replicate in real life the methodology adopted. Next steps will involve the monitoring of progress being made in the AI field, specifically the UK's contribution to developing global AI technical standards through the recently established AI Standard Hub, which seeks to create tools aimed at improving the productivity of old systems (DCMS et al., 2022b).

It is also worth noting that as most of the research has been conducted during the COVID-19 pandemic, the ample nature of the study is sought to be pursued further after the PhD. Beyond highlighting the greater role that should be played by a diverse contribution from experts in assessing the impact of predictive models, the thesis supported the development of wider and interdisciplinary perspectives as witnessed in Phase 2 and Chapter 5 on the observations of the technology and innovation speed. The trajectory towards increasing applications using AI has the potential to introduce different technologies that could potentially be regrouped under the notion of "Deep Justice", which the project suggests and invites to be researched further. "Deep Justice" envisages predictive justice inclusive of law enforcement and modern courts geared with the technological tools of justice systems of the future (or present?), which will have implemented a form of AI that is reliable, least discriminatory and will affect many aspects of human lives, and society wholly. The way forward towards a fully functioning "Deep Justice" is not yet clear and the possible roadmap is still elusive at this time. It would be wise to encourage more open discussions, acknowledging the many benefits and risks of AI. This is in line with the UK Government National AI Strategy announced in September 2021 and the more recent press release informing of the £23 million in government funding supporting underrepresented groups including women, black people and people with disabilities to join the UK's world-leading AI industry (DCMS and Office for Artificial Intelligence, 2022). In fact, Obum Ekeke OBE (Head of Education Partnerships, DeepMind) stated that:

> *The next generation of AI researchers must be representative of the world around us if AI is to benefit the whole of society.* (DCMS and Office for Artificial Intelligence, 2022)

It is still early to say whether predictive justice will be able to go hand in hand in hand with old systems such as the police and the judiciary, but attempts made so far with examples like *Proton* or COMPAS in antiquated systems, leave us hopeful and craving for good changes. It is clear that today's decisions and investments are crucial for AI's tomorrow, and are likely to have an impact on all of our lives as well as the lives of future generations.

PUBLICATIONS

Publications in the spheres of gender, data and AI include:	
1	Perera S. [and supervisory team], under consideration, an article derived from the PhD thesis. Proposed title: "Identification of Gender Bias in the Judicial System and Caveats in AI Integration: The Mafia Woman as a Case-Study". An article derived from the methodology used for the purposes of the PhD thesis. It seeks to explore further applications of it in other fields and develops the notion of "Deep Justice" beyond the thesis.
2	Perera S. and Dowden M., in preparation, "Artificial Intelligence does Law, but can it do Justice?". Journal of Law, Technology and Trust
3	Perera S., 2022. "International data transfers in a dynamic regulatory environment". Society for Computers and Law Outsourcing Focus <https://www.scl.org/articles/12484-international-data-transfers-in-a-dynamic-regulatory-environment>
4	Perera S., 2018. "Life Peerages Act 1958" in Erika Rackley and Rosemary Auchmuty (ed) *Women's' Legal Landmarks Project* (Hart Publishing) <https://www.bloomsbury.com/uk/womens-legal-landmarks-9781782259794/>
5	Perera S., 2018. "GDPR in a post-Brexit era: Some new challenges?. PinG < https://www.pingdigital.de/ce/ping-privacy-in-germany-ausgabe-06-2018/_sid/DBGY-645723-OBqF/detail.html>
6	Harris M. and Perera S., 2018. "GDPR and Brexit: What's Next for the UK?. Computer Law Review 5/2018, 161-163 <www.cr-international.com>
7	Perera S., 2017. "Femininity and Women in Crime through the Lens of the Mafia Woman". Harvard, 25-27 September. Boston

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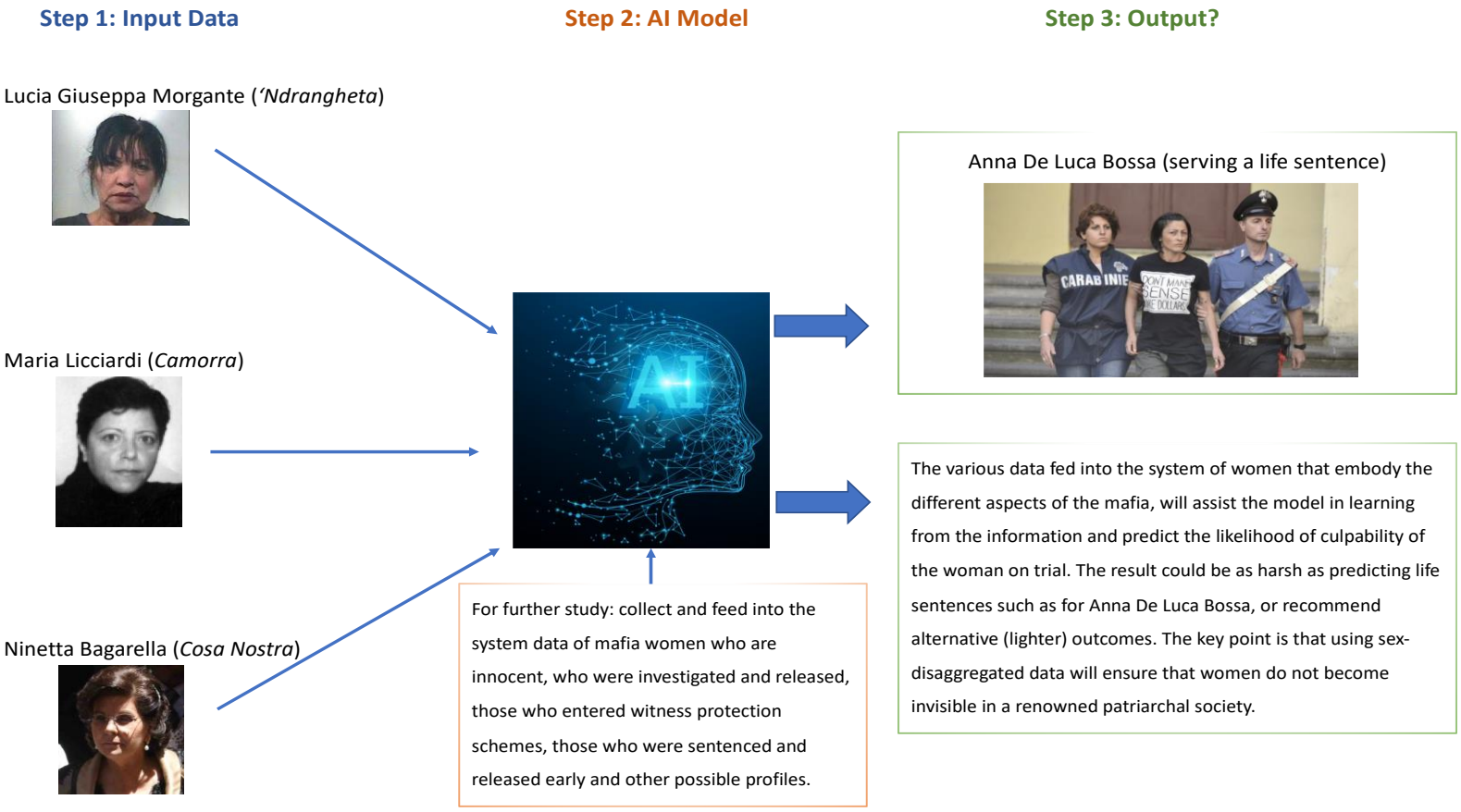
APPENDIX

Scheme of a possible representation of female AI algorithm[43]



ISTAT Supplementary Tables

Table A1. Numbers of reported/arrested mafia criminals by age range

Sex	**Male**								**Female**							
Age Range (years)	Up to 13	14-17	18-24	25-34	35-44	45-54	55-64	Over 65	Up to 13	14-17	18-24	25-34	35-44	45-54	55-64	Over 65
Type of Crime																
Mafia association	39	51	247	488	508	326	151	55	0	1	22	64	63	49	27	12

[43] Lucia Giuseppa Morgante's photo taken from: https://www.ilfattoquotidiano.it/2015/11/29/ndrangheta-25-anni-di-carcere-alla-moglie-18-al-marito-aurora-spano-e-il-terrore-mafioso-tra-pizzo-e-pestaggi/2247490/; Maria Licciardi's photo taken from: https://www.rvcj.com/youll-shocked-know-wealth-10-female-dons/maria-licciardi/; Ninetta Bagarella's photo taken from: https://fresno24.com/antonietta-bagarella-wife-toto-riina-who-is-the-widow-of-the-mafia-boss-and-what-does-she-do/ AI image taken from: https://www.shutterstock.com/image-vector/ai-artificial-intelligence-digital-brain-robotics-1444616174; Anna De Luca Bossa's photo taken from: https://www.stylo24.it/de-luca-bossa-arresto/ [accessed 7 August 2022]

Table A2. Numbers of reported/arrested criminals by territorial area/counties, gender and crime type

Type of Crime	Voluntary homicides related to the mafia		Extortions		Laundering money and other assets of illicit origin		Mafia association		Usury		Other Crimes	
Sex	M	F	M	F	M	F	M	F	M	F	M	F
Italy	139	27	8504	1005	3464	678	1865	238	569	132	288776	69408
North-West	0	2	1474	235	737	143	0	20	78	15	70562	15880
Piedmont	0	1	432	68	128	8	0	18	25	3	19748	4661
Valle d'Aosta	0	0	5	4	1	39	0	0	0	1	627	143
Liguria	0	0	130	25	105	10	0	1	8	5	7827	1760
Lombardy	0	1	907	138	503	86	0	1	45	6	42360	9316
North-East	0	0	966	173	514	159	29	12	39	10	52657	12412
Trentino- South Tyrol	0	0	81	8	27	6	0	0	0	0	4023	912
Bolzano	0	0	33	3	12	3	0	0	0	0	2110	471
Trento	0	0	48	5	15	3	0	0	0	0	1871	435
Veneto	0	0	363	66	235	60	0	8	24	7	18733	4397
Friuli-Venezia Giulia	0	0	55	11	63	19	0	0	2	2	5790	1390
Emilia-Romagna	0	0	467	88	189	74	29	4	13	1	24111	5713
Centre	0	0	1328	192	624	127	93	51	119	25	58311	15315

Tuscany	0	0	414	67	151	22	4	35	21	4	18556	4375
Umbria	0	0	66	4	3	5	0	0	2	2	4097	1139
Marche	0	0	134	20	102	31	0	15	13	3	6966	1902
Lazio	0	0	714	101	368	69	89	1	83	16	28692	7899
South	139	16	3431	320	1200	236	1138	96	282	63	72292	17188
Abruzzo	0	0	188	30	51	20	4	0	27	9	5880	1392
Molise	0	0	40	3	22	5	0	0	16	9	1504	328
Campania	112	9	1622	120	529	138	351	33	114	36	28935	6773
Apulia	0	5	895	84	325	8	284	33	64	6	19888	4417
Basilicata	0	0	95	15	30	4	38	7	0	0	3855	900
Calabria	27	2	591	68	243	61	461	23	61	3	12230	3378
Islands	0	9	1305	85	389	13	605	59	51	19	34954	8613
Sicily	0	9	1161	81	387	10	579	51	51	18	28810	7025
Sardinia	0	0	144	4	2	3	26	8	0	1	6144	1588

Table A3. Numbers of reported/arrested criminals by territorial area/counties, citizenship and crime type

Type of Crime	Voluntary homicides related to the mafia		Extortions		Laundering money and other assets of illicit origin		Mafia association		Usury		Other Crimes	
Sex	Italian (M/F)	Foreigner (M/F)	Italian (M/F)	Foreigner (M/F)	Italian (M/F)	Foreigner (M/F)	Italian (M/F)	Foreigner (M/F)	Italian (M/F)	Foreigner (M/F)	Italian (M/F)	Foreigner (M/F)
Italy	162	4	7515	1994	3198	944	2007	96	626	75	248090	110094
North-West	0	2	1141	568	624	256	15	5	75	18	49971	36471
Piedmont	0	1	351	149	97	39	15	3	25	3	15102	9307
Valle d'Aosta	0	0	8	1	33	7	0	0	0	1	507	263

Liguria	0	0	100	55	57	58	0	1	11	2	5577	4010
Lombardy	0	1	682	363	437	152	0	1	39	12	28785	22891
North-East	0	0	683	456	490	183	28	13	42	7	39706	25363
Trentino-South Tyrol	0	0	24	65	28	5	0	0	0	0	2794	2141
Bolzano	0	0	12	24	12	3	0	0	0	0	1310	1271
Trento	0	0	12	41	16	2	0	0	0	0	1444	862
Veneto	0	0	256	173	220	75	0	8	25	6	14104	9026
Friuli-Venezia Giulia	0	0	41	25	35	47	0	0	4	0	4534	2646
Emilia-Romagna	0	0	362	193	207	56	28	5	13	1	18274	11550
Centre	0	0	1036	484	503	248	133	11	119	25	47595	26031
Tuscany	0	0	286	195	111	62	34	5	15	10	13180	9751
Umbria	0	0	43	27	0	8	0	0	0	4	3372	1864
Marche	0	0	98	56	61	72	15	0	11	5	5690	3178
Lazio	0	0	609	206	331	106	84	6	93	6	25353	11238
South	153	2	3395	356	1259	177	1188	46	323	22	74403	15077
Abruzzo	0	0	159	59	57	14	3	1	27	9	5742	1530
Molise	0	0	35	8	21	6	0	0	25	0	1508	324
Campania	119	2	1609	133	613	54	376	8	146	4	29741	5967
Apulia	5	0	896	83	269	64	307	10	66	4	20934	3371
Basilicata	0	0	99	11	28	6	38	7	0	0	3838	917
Calabria	29	0	597	62	271	33	464	20	59	5	12640	2968
Islands	9	0	1260	130	322	80	643	21	67	3	36415	7152
Sicily	9	0	1140	102	322	75	610	20	67	2	29879	5956
Sardinia	0	0	120	28	0	5	33	1	0	1	6536	1196

Table A4. Numbers of reported/arrested mafia criminals by gender over the course of 10 years

Year	**2008**		**2009**		**2010**		**2011**		**2012**		**2013**		**2014**		**2015**		**2016**		**2017**		**2018**	
Gender	**M**	**F**	**M**	**F**	**M**	**F**	**M**	**F**	**M**	**F**	**M**	**F**	**M**	**F**	**M**	**F**	**M**	**F**	**M**	**F**	**M**	**F**
Type of Crime																						
Mafia Association	2236	119	1777	106	2357	127	2086	81	1689	89	2085	143	2299	147	2375	107	2434	131	2083	113	1865	238

Consent Form & Participant Information Sheet

CONSENT FORM FOR INTERVIEWS

Please insert your initials in the appropriate boxes (no ticks)	**Yes**	**No**
Taking Part		
I have read and understood the project information sheet dated 21/08/20.		
I have been given the opportunity to ask questions about the project.		
I agree to be interviewed.		
I agree to my interview being audio recorded.		
I agree to be contacted by the researcher again, and to take part in additional interviews, if needed.		
I understand that my taking part is voluntary and I can withdraw from the study up to when the interview data is anonymised.		
Use of the information I provide for this project only		
I understand that I may be quoted anonymously in the thesis or any publications arising from it.		
I understand that my personal information and the data I provide are stored in a password protected research computer and the University's One Drive system.		
Use of the information I provide beyond this project		
I understand the primary data will be destroyed on awarding of the PhD.		

Name of participant…….. Signature ……Date ……

Researcher …….. Signature …….. Date ……

Project contact details for further information:

Supuni Perera (Doctoral Researcher)

PARTICIPANT INFORMATION SHEET

ORGANISED CRIME AND ARTIFICIAL INTELLIGENCE (AI)

You are being invited to take part in a research project. Before you decide on whether to take part, it is important for you to understand what the research is about and what it will involve. Please take time to read the following information carefully before you decide whether or not you wish to take part. Please ask me (email: s.vidanelageperer.18@unimail.winchester.ac.uk) if there is anything that is not clear or if you would like more information.

Purpose of the research

The research aims to question traditional constructions of femininity in the criminal justice system, and explore how women in organised crime, specifically mafia women, are interpreted, and understood in the Italian system. The main aim being explored is whether women's existence is rendered invisible and if so, how that invisibility contributes in women being made invisible when society is moving to a future driven by Artificial Intelligence.

The research will take place in 3 Phases. Phase 1 collates mafia women profiles through the assistance of mafia experts. Phase 2 collates information on the practical side of modelling an AI system based on unconscious bias, and the possibility of correcting that model once that bias is revealed with the engagement of AI experts and legal practitioners. Finally, Phase 3 communicates to interested experts in the field the outcomes of Phase 1 and 2.

The research asks the following questions:

1. Is there gender data gap when looking at the female side of the mafia?

2. If the information on the mafia women is uncovered, can that data affect how an AI model predicts the culpability of the mafia woman?

3. Is the reason why the woman is under-represented due to the lack of data collected specifically on her?

4. If so, and the gender data gap is bridged, could AI experts build an AI model trained on female data only to ensure she is not rendered invisible again?

Why have I been chosen?

As an AI expert, you have been chosen to assist with the project's Phase 2 of the methodology, which requires the collection of mixed-data through a 3-stage semi-structured interview.

Do I have to take part?

It is up to you to decide whether or not to take part. If you do decide to take part you will be given this information sheet to keep and be asked to sign a Consent form.

What if I change my mind after the interview has taken place?

If, following the interview and as long as the data has not been fully anonymised, you wish to withdraw and no longer want the collected data for the purposes of the research to be used, please inform the researcher (email: s.vidanelageperer.18@unimail.winchester.ac.uk) as soon as possible. You do not have to give a reason for your withdrawal nor why you would want for the collected data to be destroyed.

Once the request has been received, the data will not be included in the research project.

What do I have to do? What will happen to me if I take part?

It is likely that the first interview for Phase 2 will take between 1-2 hours, over the telephone or virtual meeting. Breaks will be scheduled ahead or during the meeting, if needed.

It is likely that experts may be contacted after the first interview, for follow up questions, or possibly other interviews if needed, and participants are available.

No preparation ahead is required. A mix of open and closed questions will be asked on the topic of AI, modern courts and organised crime predominantly to inform the research and enrich it with the experts' knowledge.

What are the possible disadvantages and risks of taking part?

As the participants are professionals in their respective fields, there is less risk of any disadvantages or harm being caused, whether psychological or physical.

Will I be recorded and how will the recorded media be used?

The audio recordings of your interview made upon your consent during this research will be used only for the transcribing process, which once finalised will enable the immediate and complete deletion of the audio recording. No other use will be made of the recording without your written permission, and no one outside the project will be allowed access to the original recordings.

Will my taking part in this project be kept confidential? What will happen to the results of the research project?

Personal data may be kept confidentially for up to 5 years, but will be destroyed upon award of the PhD. All the information collected during the course of the academic research will be kept strictly confidential. You will not be able to be identified in any reports or publications, unless you have given permission to not anonymise yourself, and accepted to be identified by your name, field of expertise, years of expertise and place of work at the beginning of the interview.

Who can I contact for further information?

For further information about the research or your interview data, please contact:

Supuni Perera

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SO22 4NR

Email: s.vidanelageperer.18@unimail.winchester.ac.uk

Dr Vincenzo Scalia

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University of Winchester

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Winchester

SO22 4NR

Email: vincenzo.scalia@winchester.ac.uk

Work Phone: 01962 826401 ext 6401

If you have concerns/questions about the research you would like to discuss with someone else at the University, please contact:

Thank you for reading this information – please ask any questions if you are unsure about anything.

This work has been scrutinised by the RKE Ethics Committee and received approval (Ref: RKEEC200201). Contact details (in case of concerns over ethics): ethics1@winchester.ac.uk; (in case of concerns over data handling) stephen.dowell@winchester.ac.uk (Compliance Officer).

21 August 2020

Interview Schedule

Part 1 – aimed to gather info on the experts' general knowledge of organised crime/mafia (and understand how unconsciously biased the answers may be):

1. How would you describe a mafia boss?
2. If you picture a family in Southern Italy, say Sicily, who would you imagine being the leader of a criminal organisation in that specific setting?
3. What sort of criminal activities do you think the mafia might engage in?
4. Do you think the woman of the *mafioso* (mafia man) engaged in criminal activities is aware of these?
5. What do you think the role of the woman is in the mafia?
6. What do you think the role of the wife is in the mafia?
7. What do you think the role of the mother is of a *mafioso*?
8. What do you think the role of a brother is of a *mafioso*?
9. What do you think the role of a sister is of a *mafioso*?
10. What do you think the role of the children might be of a *mafioso*?
11. What do you think happens to the mother/wife/sister/daughter of a *mafioso* when the *mafioso* ends up in jail?
12. Do you think she might be coerced to do the *mafioso*'s dirty work?
    a. If yes, then why?
    b. If no, then why not?
13. Do you think the woman would be able to detach herself from the organisation?
    a. If yes, then why?
    b. If no, then why not?
14. Do you think the woman would be able to take the role of a leading *mafioso* if coerced?
    a. If yes, then why?
    b. If no, then why not?
15. Do you think the woman would willingly want to take a leading role in the mafia organisation?
    a. If yes, then why?
    b. If no, then why not?

Part 2 - 3 blind cases studies are presented to the interviewees of women that may or may not have been held accountable for criminal charges and questions asked on the basis of the limited facts given to the interviewee. Actual facts related to these women will be shared at the end of this semi-unconscious bias test.

Scenario 1

- Subject A [Annina Lo Bianco, *'Ndrangheta*]

Age: 39 [in 2020]
Married: Yes
Mafia Affiliation: via husband
Children: 3
Location: Reggio Calabria

Facts: A wife of a mafia boss [Gregorio Malvaso]. She was taking care of their 3 children. The mafia boss was arrested in 2014 and when searching the family home, guns and drugs were found.

Questions based on a scale from 0 to 10, where zero is the lowest score and 10 the highest:

1. On a scale from 0 to 10, how much was the woman carrying out the tasks of a mother in upbringing the 3 children?
2. On a scale from 0 to 10, how much do you think Subject A was involved in the children's life with a father that was absent due to running an illegal business?
3. On a scale from 0 to 10, how much do you think Subject A was involved in her husband's private life?
4. On a scale from 0 to 10, how much do you think Subject A thought that her husband was doing an ordinary job?
5. On a scale from 0 to 10, how much do you think Subject A was aware of her husband's illegal business?
6. On a scale from 0 to 10, how much do you think Subject A contributed to her husband's illegal activities?
7. On a scale from 0 to 10, how much do you think Subject A contributed in raising the 3 children according to mafia culture?
8. On a scale from 0 to 10, had Subject A been aware of her husband's criminal profile, how likely would it be that she would have left the family for the sake of her children and herself?
9. On a scale from 0 to 10, had Subject A been aware of her husband's criminal profile, how likely would it be that she would have stayed with him in the criminal environment?
10. On a scale from 0 to 10, where 0 is Not Guilty and 10 represents Guilty, how guilty is Subject A of mafia association based on the facts?
11. On a scale from 0 to 10, where 0 is Not Guilty and 10 represent Guilty, how innocent is Subject A of mafia association?
12. [Open questions] Do you think that the criminal justice system may have convicted Subject A?
13. Based on the initials facts I gave you, describe what role she must have had in the family setting (A victim, an innocent housewife, a criminal…)

Thank you – if interested, I will give you the actual facts for Subject A at the end of the interview.

Scenario 2

- Subject B [Mariangela di Trapani, *Cosa Nostra*]

Age: 52 [in 2020]
Married: Yes
Mafia Affiliation: family and husband affiliated
Children: Yes (one son)
Location: Resuttana, Sicily

Facts: A daughter of a mafia clan and wife of a mafia boss [Salvino Madonia] who has been in prison since 1992 under the Italian hard prison regime, allowing very little to no contact with the outside world. He had killed a renowned entrepreneur who had refused to pay the mafia protection money he had been asked for and condemned the organised crime through an open letter published in a Sicilian

newspaper. Subject B married him while he was in prison in 1992 and he is currently spending his life sentence in my hometown's prison in Italy (Viterbo).

Questions:

1. On a scale from 0 to 10, how much was the woman carrying out the tasks of a mother in upbringing the only son?
2. On a scale from 0 to 10, how much do you think Subject B was involved in the child's life with a father that was absent due to running an illegal business?
3. On a scale from 0 to 10, how much do you think Subject B was involved in her husband's private life?
4. On a scale from 0 to 10, how much do you think Subject B thought that her husband was doing an ordinary job?
5. On a scale from 0 to 10, how much do you think Subject B was aware of her husband's illegal business?
6. On a scale from 0 to 10, how much do you think Subject B contributed to her husband's illegal activities?
7. On a scale from 0 to 10, how much do you think Subject B contributed in raising the only son according to mafia culture?
8. On a scale from 0 to 10, had Subject B been aware of her husband's criminal profile, how likely would it be that she would have left the family for the sake of her son and herself?
9. On a scale from 0 to 10, had Subject B been aware of her husband's criminal profile, how likely would it be that she would have stayed in the criminal environment?
10. On a scale from 0 to 10, where 0 is Not Guilty and 10 represents Guilty, how **guilty** is Subject B of mafia association?
11. On a scale from 0 to 10, where 0 is Not Guilty and 10 represents Guilty, how **innocent** is Subject B of mafia association?
12. [Open Q] Do you think that the criminal justice system may have convicted Subject B?
13. Based on the initials facts I gave you, describe what role she must have had in the family setting (A victim, an innocent housewife, a criminal…)

Scenario 3

- Subject C [Rosetta Cutolo, *Camorra*]

Age: 83 [in 2020]
Married: No
Mafia Affiliation: Brother affiliated
Children: No
Location: Naples, Camorra.

Facts: A sister of a mafia boss [Raffaele Cutolo]. A pious-looking woman, lived alone with her mother near Naples for years tending her roses. She has a love-hate relationship with her brother who was imprisoned for mafia association.

Questions:

14. On a scale from 0 to 10, how much do you think Subject C was involved in her brother's life?

15. On a scale from 0 to 10, how much do you think Subject C thought that her brother was doing an ordinary job?
16. On a scale from 0 to 10, how much do you think Subject C was aware of her brother's illegal business?
17. On a scale from 0 to 10, how much do you think Subject C contributed to her brother's illegal activities?
18. On a scale from 0 to 10, how much do you think the mafia brother contributed in influencing Subject C according to mafia culture?
19. On a scale from 0 to 10, had Subject C been aware of her brother's criminal profile, how likely would it be that she would have left the family for the sake of herself?
20. On a scale from 0 to 10, had Subject C been aware of her brother's criminal profile, how likely would it be that she would have stayed in the criminal environment?
21. On a scale from 0 to 10, where 0 is Not Guilty and 10 represents Guilty, how guilty is Subject C of mafia association?
22. On a scale from 0 to 10, where 0 is Not Guilty and 10 represent Guilty, how innocent is Subject C of mafia association?
23. Do you think that the criminal justice system may have convicted Subject C?
24. Based on the initials facts I gave you, describe what role she must have had in the family setting (A victim, an innocent housewife, a criminal…)

[Facts for Subject A: *When the husband was arrested, she was put in house arrest because she was pregnant. For the love of her husband, when the police arrived to arrest him and search the house, she tried to hide anything in the house that was illegal, especially by placing guns and drugs underneath her clothes. She was very aware and accepted that her husband's life was around weapons and drugs. However, she later decided to collaborate with the state against the 'Ndrangheta for the sake of her children.*]

[Facts for Subject B: *Mariangela Di Trapani is known as La Padrona (the female boss) and was arrested twice, first time in 2008 and then in 2017 with charges of having managed one of the most powerful clans (or cosche in Italian, i.e. families) of Cosa Nostra in Sicily. She was 49 years old when arrested the second time and the link between those bosses in prison and those outside with the responsibility of re-strengthening the organisation after it had weakened due to the death of the boss par excellence, Totò Riina (Kington, 2017; Massaro, 2017; Tondo, 2017). Hers was the task of bringing back the heydays of Cosa Nostra and she was trusted to do it as she was considered to resemble a man in her behaviour*. *The prosecutors asked for a sentence of 13 years and 4 months, but the judge only acknowledged a light involvement with the organisation and sentenced her for 4 years.*]

[Facts for Subject C: s*he was the power behind her brother for over 15 years, passing on his orders from jail and cultivating his devoted followers outside. Without her the NCO would have collapsed. She ruled in the headquarters of the NCO: the Castle Mediceo. The castle was bought for several billion lire at the time and provided direct contact for Cutolo from the prisons. In February 1993, she gave herself up after police found where she had been hiding. Cutolo appeared at the entrance, saying 'I am tired of being a fugitive'. She had been sentenced in absentia in 1990 to nine years in prison on charges of mafia association, later reduced to five years. Prosecutors alleged she had been running her brother's organisation. She was acquitted on nine murder charges. Rosetta had persuaded the authorities she was harmless, and her image definitely helped. Her brother Raffaele Cutolo has always maintained that Rosetta knew nothing of his criminal activities and did only what he asked.*]

Part 3 – Gaining an AI expert's perspective (to stress-test if the solution I offer of creating a "female algorithm" is viable from their expert view).

9. [Share Table A on screen] If presented with a Table A, highlighting variables, would a computer scientist be able to create an AI model that predicts the culpability of a woman in the mafia?
9. How would an AI expert's unconscious bias affect the creation and training of an AI Assistive model for the judiciary?
9. Focussing on the mafia example only, in a system where the male criminal model is that which is likely to be accepted, would an alternative way towards narrowing down the gender data gap, be that of creating a "female algorithm" fuelled by female data only?
9. Is it possible to correct the gender data gap and unconscious bias by creating an AI model fuelled by female data only? Or would that nurture discrimination and not uphold transparency?
9. Through an AI system trained on female data, is it possible to limit women's data invisibility, which may be likely to happen if we were to train the model on male data too?
9. How easy or difficult is it to create such an AI model?
9. Could the AI model be put in practice straight away?
9. As an AI expert, what other information may you need to limit the replication of bias in the AI model?
9. Do you see this method of using specific data for specific contexts being useful and applicable in other situations? (E.g. women terrorists?) Could sex-disaggregated data aid in solving the implementation of AI tools in other wider aspects?
9. Are there any renowned disadvantages in using sex-disaggregated data to train a model?
9. Does an AI model trained on sex-disaggregated data have also an ability to nurture gender data gap?

Last questions:
1. any other contacts you suggest I could speak to?
2. any other general comments which I may not have had the opportunity to ask?

This is the end of our interview – thank you and please let me know if you have any questions after this.