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Libuše Hannah Vepřek, Lynn Sibert, Linus Sehn, Leo Köpp & Daphne Friedrich

Beyond Effectiveness: Legitimising Predictive Policing in Germany[*]

There is no conclusive evidence that predictive policing is effective in reducing crime. Further, our interview partners, the representatives of the scientific-analytic branches of three German state police forces, do not claim that their predictive policing programs directly reduce crime rates. In this article we ask what — in the absence of effectiveness — are the core legitimised narratives employed to underpin the conception and implementation of predictive policing in Germany? Analysing our semi-structured in-depth interviews with representatives from the state criminal investigation departments in Berlin, North Rhine-Westphalia and Bavaria, we find five legitimised narratives. Those narratives can be separated into positive legitimisation narratives (efficiency and transparency within police administration) and negative ones (autonomy/independence, human control, transparency to the public, and soft-pedalling). The former give reasons for actively introducing this new technology, while the latter aim at pre-empting criticism. Interestingly, security-driven narratives remained absent from the interviews which we discuss at the end of this article.

Keywords: predictive policing, effectiveness, legitimisation narratives, digitization of police work

Jenseits von Effektivität – Zur Legitimierung von Predictive Policing in Deutschland

Die effektive Reduktion der Kriminalität durch Predictive Policing ist bislang nicht eindeutig erwiesen. Auch in unseren qualitativen Interviews erheben die Vertreter der wissenschaftlich-analytischen Zweigstellen der Landeskriminalämter Berlin, Nordrhein-Westfalen und Bayern nicht diesen Anspruch. In diesem Artikel untersuchen wir, wie vor dem Hintergrund des fehlenden Nachweises der Effektivität die Konzeption und Umsetzung von Predictive Policing in Deutschland legitimiert wird. Als Ergebnis unserer Analyse der qualitativen teilstandardisierten Interviews lassen sich fünf Legitimationsnarrative herauskristallieren. Diese Narrative können in positive Legitimationsnarrative (Effizienz und Transparenz innerhalb der Polizeiverwaltung) und negative Narrative (Autonomie/Unabhängigkeit, menschliche Kontrolle, Transparenz gegenüber der Öffentlichkeit und Abmilderung) unterteilt werden. Während Erstere die aktive Einführung dieser neuen Technologie positiv motivieren, zielen Letztere darauf ab, auf Kritik zu reagieren. Dagegen kommen sicherheitsorientierte Narrative nicht zur Sprache.

Schlagwörter: Digitalisierung von Polizeiarbeit; Effektivität; Legitimierungsnarrative; Predictive Policing; Vorhersagebasierte Polizeiarbeit

1. Introduction

"To say that Predictive Policing works to X percent is just not possible" (Int. NRW)[1] , states a representative of the state criminal investigation office of North Rhine-Westphalia (NRW) in 2018. The year before, the Max-Planck Institute Freiburg, Germany, released a sobering statement about the effect of predictive policing[2] against residential burglary, highlighting the difficulty to draw robust statistical inferences with regards to the effectiveness of the software PRECOBS (Pre-Crime Observation System) in lowering crime levels in examined urban areas (Gerstner, 2017, p. 85). The question arose, whether forecasts ensured lower burglary rates and hence better protection (Shapiro, 2017). In recent years similar research has been conducted to test the effectiveness (or absence thereof) of predictive policing systems: For example, Benbouzid (2016) on the effectiveness of PredPol, Shapiro (2017) on the difficulty of properly evaluating predictive policing applications and Hunt et al. (2014) on the null effect of the the Predictive Intelligence Led Operational Targeting (PILOT) program on property crimes. To date, the practical effect of predictive policing technologies on routine police work remains largely unclear (Egbert, 2018b, p. 254). Nevertheless, predictive policing programs are implemented in an increasing number of German states (currently six) and frequently accompanied by a shift towards a preventive orientation of police work and police operations. For an overview, see the report by Amnesty International (2019) or Mitsch (2015, p. 211).
Predictive policing is a strategy of proactive policing (National Academies of Sciences, 2017). It differs from conventional policing as it does not only react to crime once it has occurred rather it uses data from past crime to predict future crime. The absence of a clear verdict on the effectiveness of this strategy is disclosed by meta-analyses of quantitative evaluations of predictive policing programs (Sherman, Gartin & Buerger, 1989; Braga & Bond, 2008; Mohler et al., 2015). Most favourably, Braga, Papachristos, and Hureau (2014, p. 633) conclude that predictive policing "generates small but noteworthy crime reductions". In contrast, Meijer and Wessels (2019, p. 5) argue that results are mixed at best and, even more importantly, that "every individual predictive policing model [...] should be individually evaluated to determine its effectiveness". In other words, general claims about the effectiveness of predictive policing practices cannot be asserted. Only claims about a specific program used in a specific context provide insight. Hayes (2015) and Barrow and Rufo (2013) are more critical in their assessment. Hayes (2015, p. 161) puts it plainly: "the dirty secret of this futuristic approach, though, is that nobody knows for certain that it works". These two references are also quoted in the literature review section of the in-house evaluation of NRW's SKALA (System zur Kriminalitätsauswertung und Lageantizipation, engl.: System for Criminal Analyses and Situational Anticipation) program (Landeskriminalamt NRW, 2018, p. 31). Moreover, our literature review could not locate a single study on the effectiveness of a predictive policing program that has been independently replicated. More generally, Pridemore, Makel, and Plucker (2018, p. 17.4) acknowledge that, so far, there has been no systematic effort to assess the reproducibility of criminology's evidence base. Further, they argue that "[c]riminology is not immune to the replication crisis and on average our studies may be at greater risk of failure to replicate than those in many other fields".

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[1] Translation of all direct quotations from the interviews were translated from German to English by the authors.
[2] Other terms for predictive policing are "Smart Policing", "Crime Forecasting" and "Predictive Crime Mapping" (Gluba, 2014, p. 2).

As crime remains a "multifactorial phenomenon" (Egbert, 2018b, p. 255), the decline in the number of burglary cases in Germany cannot be directly traced back to the application of predictive policing. In our interview in September 2018, a representative of the Bavarian state criminal investigation office explains: "you cannot assign the success to the software because there are quite a lot of things that you do. Like a piano, you have to play it. There are a lot of things that we do and they together are successful and then it's just one of a lot of things and, therefore, it is hard to assign it and say: if we use PRECOBS now, we will have these arrests, this and that success. […] You cannot tie that to a product. And this just makes it difficult" (Int. Bavaria). The interviewees revealed here various understandings and aspects of effectiveness in the context of the use of predictive policing: effectiveness is mainly associated with the decrease in case numbers, on the other hand with accuracy and the occurrence of the software's probability plotting. Measuring the effectiveness of predictive policing is hereby further complicated by an inherent paradox (Vepřek, 2018): "we're working against our own forecast. […] We do everything to make sure that it doesn't happen and that's why we can't really measure our rates against it" (Int. NRW). Even though the effectiveness of predictive policing both in regard to the reduction of cases as well as the accuracy is uncertain, police forces all over the world invest in these technologies to predict future crime. This invites questions about what narratives are used to legitimise predictive policing techniques considering its unclear impact. So far, the study by Egbert (2018a) is the only one that examines the legitimisation narratives for predictive policing used by politicians. Egbert shows that politicians create a security-driven narrative to legitimise predictive policing techniques (Egbert, 2018a, p. 13). Given the variety of actors employing the narratives surrounding predictive policing (e. g. the media, corporations, police agencies), security is unlikely to be the only narrative available. However, so far there has been little research on other narratives, especially narratives employed by the police. Consequently, the research question we want to explore in this article is: if effectiveness is not a core legitimisation narrative postulated by German police officers, which values and narratives are presented by them to legitimise the conception and implementation of predictive policing?

The research question was developed throughout an inductive and qualitative dynamic research approach following a "combined methodological approach" (Lal et al., 2012) of ethnography and grounded theory. The article is based on empirical research realised between May and November 2018. During this period, we conducted three semi-structured in-depth interviews (Schmidt-Lauber, 2001) with representatives of the state criminal investigation departments (LKA) in the German federal states Berlin, North Rhine-Westphalia and Bavaria. We spoke to persons holding positions within the police that are vital for the communication of predictive policing applications within the police and to the public. Speaking to these key actors enables us to consider the implications of implementing and working with predictive policing software as a socio-technical process that reaches both inside and outside the organization. To be precise, we interviewed chief analysts and representatives of the scientific-analytic departments which are "professionally and technically in charge" (Int. Bavaria). Therefore, this article excludes the perspective of operative forces like patrol police. The questions that we addressed to our field were very broad and open and did not address the issue of uncertainty of effectiveness. Instead, we asked about the historical processes that led to the introduction of predictive policing applications, the functionality of the systems, the cooperation with private companies and other criminal investigation departments, the underlying concept and subdivi-

sion of (urban) space, the implications of the predictive policing application on day-to-day police work, the relationship with the public, and finally about future developments of predictive policing applications.

All interviews have been recorded and transcribed. Using the qualitative data analysis software MAXQDA, we have analysed the empirical data following a methodology informed by the grounded theory approach (Glaser & Strauss, 1971; Götzö, 2014) drawing in particular on Charmaz conceptual elaboration of the method involving focused and comparative coding (2016). Only the early initial line-by-line coding (Charmaz, 2012) of the empirical data brought up the issue of uncertainty of effectiveness, and the in-depth analysis showed that the interviewees legitimised the predictive policing applications in their statements. The aim of our research is to add to existing studies on police work and predictive policing by addressing the legitimizing narratives of police representatives regarding predictive policing which has so far been little discussed on the basis of empirical material. We build on conceptual ideas of legitimacy and why legitimisation matters (Beetham, 2013). In order to contextualise the narratives employed by our interviewees, we provide a brief discussion of the "scientification of police work" (Ericson & Shearing, 1986) and the shift from post- to pre-crime interventions (Zedner, 2007). Subsequently, we briefly describe predictive policing focusing on the applications in Germany and the differences between the federal states Bavaria, North Rhine-Westphalia and Berlin. Eventually, we will turn to the main analysis and the results of our empirical research outlining the narratives we encountered in our interviews which legitimise the implementation and use of these predictive policing applications. The analysis of our data proposes that these legitimisation narratives are not only addressing the public but most notably also agents within the police forces, such as patrol police. The main narratives can be divided into positive legitimisation narratives, including efficiency and transparency within police administration, and negative narratives which comprise autonomy/independence, human control, transparency to the public, and soft-pedalling. Interestingly, our findings point to the absence of a security narrative which we will discuss in the concluding section.

2. Contextualising Predictive Policing

How can predictive policing be delineated from other law enforcement strategies? As mentioned above, predictive policing uses data from past criminal incidents to predict future crime. Police agencies "use algorithms to forecast where crimes are likely to occur and who might commit them, and to make recommendations for allocating police resources" (Shapiro, 2017, p. 458). Data are collected from disparate sources like geocoded and spatial real-time crime data and sometimes additional, crime-unrelated information like socio-economic or weather data. These data are used to identify patterns in the aggregated datasets (see National Academies of Sciences, 2017, pp. 2-7). Thereafter, those patterns are used by the authorities to "anticipate, prevent, and respond more effectively to future crime" (National Academies of Sciences, 2017).

One interviewee pointed out that "the primary mission of the police is to prevent [Strafverhütung], not to prosecute [Strafverfolgung]" (Int. NRW). It is worth elaborating that European police forces have gone through significant transformations in form and function since their emergence (Mladek, 2007). Following Foucault's analysis, police in the 17th century denoted everything that strengthened the state from within and, thus, included what would later be called as "political economy" (Foucault, 2007). Since the emergence of economics in the late

18th century and along with what Foucault calls modern governmentality, the institutions of police were separated from their positively strengthening functions and increasingly cut back to their negative functions: the repression and prevention of behaviour that fell outside the established limits of the acceptable (cf. Foucault, 2007, Lectures 1, 12 & 13). Concurrently with the ascent of economics as a pure science that demanded relevance in the government of (human) life, more and more aspects of the human condition have been subjected to scientific scrutiny. Such scientific scrutiny has enabled administrative intervention along the lines of what Foucault labelled 'biopolitics' (Foucault, 2008). More specifically, predictive policing is one of the latest manifestations of what Ericson and Shearing (1986) call the 'scientification of police work'. They argue that, already in the 19th century, prevention rather than prosecution was the primary vision of the police. However, only until the emergence of electronic surveillance and communication technologies in the second half of the 20th century, police deemed it possible to make this vision reality. For a particularly German example of the yearning for enhanced crime prevention through the use of computer technology, see the 1980 interview with the president of the Federal Criminal Office at the time, Horst Herold, who strongly advocated for increased use of computers for recording, mapping and analysing crime (Herold & Cobler, 1980, p. 148). Ericson and Shearing (1986) continue: "whether the concern is national security, private security, or community policing, the emphasis is increasingly on reducing risk and uncertainty by a panoptic vision that anticipates wrongdoing" (Ericson & Shearing, 1986, p. 148). In their risk mitigation strategies, state apparatuses are bound by the laws of economics and the spirit of efficiency. Zooming in on the more contemporary origins of administrators' obsessions with risk, McCulloch and Wilson (2016, p. 29) argue that the "rise of risk as a preoccupation in crime and justice from the late 1980s has deepened and extended the future focus of criminal law and criminal law–like tools". Zedner (2007) argues that the emerging pre-crime society is one in which "crime is conceived essentially as risk or potential loss, ordering practices are pre-emptive and security is a commodity sold for profit" (Zedner, 2007, p. 261).

In this gradual transformation of government, James Scott's (1998) concept of legibility as the powerful coupling of measurement and simplification plays a key role in enabling organised intervention by the state. Predictive policing requires a very high degree of legibility in the form of sufficiently large crime datasets that contain current, complete and correct data (Seidensticker, 2018). Firstly, predictive policing becomes difficult or impossible in areas in which there are no or only scarce data, as is the case in rural regions (Int. Bavaria; Int. NRW). For example, the model quality fluctuates depending on the seasons as there are generally more burglaries recorded in winter (Int. Bavaria; Int. NRW). Secondly, the accuracy of predictive policing models depends on the quality of the data inputs. Thus, it is of paramount importance that patrol officers diligently record correct crime data (Int. NRW). Moreover, to make predictions close to real-time, the data must be kept up to date in regular intervals. One interviewee emphasised that it is essential to "find the balance between [data] availability and quality" (Int. NRW). In this sense, predictive policing practices not only require legibility, they produce it by creating, enhancing or fusing data pertaining to urban life. Similarly, it not only requires but creates patterns about criminal behaviour that are reproduced by an algorithm (Kaufmann et al., 2019, pp. 675 f.).

3. Predictive Policing in Germany

Predictive policing techniques and different forecasting software are currently implemented in six German federal states: in Bavaria the software PRECOBS is used, which has also been used in Baden-Wuerttemberg until last summer and is being piloted in Saxony; in Lower-Saxony PreMap; in Hesse KLB Operativ; while the software SKALA is used in North Rhine-Westphalia; and KrimPro in Berlin (Kriminalitätsprognose, engl.: Crime Prognosis). The implementation of predictive policing is planned or probed in several other federal states, such as Brandenburg (Egbert, 2018b, p. 248; Knobloch, 2018, p. 13).

It is important to acknowledge that the application of predictive policing systems varies considerably from one country to another. However, this article focuses on the situation in Germany.

In Germany, predictive policing focuses on geospatial mapping, thus representing location-based or place-based predictive policing techniques in contrast to predictive profiling, which entails forecasting techniques and software building on personal data (related to individuals). To date, providers and users of predictive policing applications in Germany state that they do not take an index such as a 'heat list' into consideration for future projects. 'Heat lists' refer to one of the best-known and most controversially discussed predictive profiling practices, the 'Strategic Subject Algorithm' used in Chicago. The algorithm creates a risk assessment score, the 'Strategic Subject List' (SSL) or so-called 'heat list', which reflects an individual's likelihood of being involved in a shooting incident either as the victim or the offender. A recent evaluation study by Saunders et al. (2016) found that while the SSL did "not appear to have been successful in reducing gun violence", it did have a direct impact on the number of arrests (Saunders et al., 2016, p. 366).

Apart from the common opposition to predictive profiling, the specific software and techniques in the respective federal states differ significantly in terms of development and implementation of software and policing techniques, organisation of their implementation, type of software as well as theoretical and conceptual foundations and approaches to predictive policing (Knobloch, 2018, p. 19). There is a striking difference between federal states that decided to acquire a commercial software product such as PRECOBS (e. g. Bavaria) and federal states that opted for an in-house development (e. g. NRW and Berlin).

Intense cooperation with technology companies is regarded as indispensable – not only in the case of Bavaria, but also in NRW and Berlin. However, police departments do not only draw on external expertise: there is an increasing offer of coaching and training programs for police employees and, especially in data analysis units, police departments recruit IT-criminalists, computer scientists, programmers, data scientists and mathematicians (Int. NRW; Int. Berlin; Rolfes, 2017, p. 61). For example, as a response to increasing demand for internal expertise, Hamburg seeks to develop a new occupational profile for IT-criminalists. This addition followed a scientific evaluation of the current knowledge management structures within the police department (Polizei Hamburg, 2019). The teams in NRW and Berlin decided in favour of the in-house development of predictive policing software (Int. NRW; Int. Berlin).

Moreover, two types of (institutional) localisation of predictive policing can be distinguished: decentralised and centralised interpretation of probabilities. To be precise, the probabilities are always (Bavaria, Berlin, NRW) generated in one central department. Their interpretation, however, is conducted either centrally in one department (NRW) or decentrally by several departments (Berlin and Bavaria). Interpretation in this context means drawing conclusions

from these calculations in order to generate predictions and (partial) recommendations for mission planning. Bavaria and Berlin only transfer the calculated probabilities to specialised units within the respective police headquarters ("Präsidien" in Bavaria). These units then draw their own conclusions and either take them into account for mission planning or not. In North-Rhine Westphalia, on the other hand, there is a central analysis department, a "special service unit" (Int. NRW) that not only generates but also interprets the probabilities centrally, thus forwarding less abstract recommendations - instead of pure probabilities - to the several units that coordinate patrol police.

Predictive policing is seen as part of a development towards an improved information and knowledge management inside police departments (Bundeskriminalamt (BKA), 2020). For instance, predictive policing software did not replace any preventive service units (Präventionsdienststellen), which traditionally commissioned such tasks. Instead, the interviewees describe a close cooperation and coordination, e. g. prevention measures by the prevention unit in areas identified by predictive policing software (Int. NRW; Int. Berlin). Yet, knowledge transfer regarding predictive policing between different federal states and between states and the federal government remains informal and sporadic (Int. Bavaria).

The interviews revealed new organisational challenges in conjunction with this new technological innovation. Therefore, it is important to parse the implementation process of the specific predictive policing software and methods as well as their integration in the organisational structure of the police headquarters in Berlin, NRW and Bavaria. Predominantly, we draw on descriptions and information given by the interviewees as well as additional sources such as public documentation and press reports.

3.1. Comparison of Predictive Policing Programs in Germany

Predictive policing in Bavaria is shaped and characterised by close cooperation and interactions between the Bavarian criminal investigation department and the IfmPt. The IfmPt as the software provider may receive data from the police department and is involved in problem solving concerning PRECOBS and the further development and extension of the software (Int. Bavaria).

The LKA Berlin observed the development of predictive policing in Germany before starting a trial phase with a project group concluded in June 2017. The aim was to develop a predictive policing solution for residential burglaries (Int. Berlin). In a press report, the LKA Berlin claimed KrimPro to have a "seven-time better prognosis regarding future crimes compared to expected statistical chance" (Der Polizeipräsident Berlin, 2016) according to an internal evaluation.

The in-house development of the prediction software KrimPro, conducted by a small group of two to three programmers, has been realised in part with external support drawing on a contract with Microsoft (Abgeordnetenhaus Berlin, 2017) as well as on existing technical infrastructure and data processing systems (Belin, 2016, p. 86). KrimPro, according to the interviewee, pursues "a fundamentally different philosophy compared to PRECOBS in Bavaria" (Int. Berlin). Bavaria decided to base its implementation of PRECOBS on the near-repeat approach and generate predictions only for (usually less rural) areas that are affine to this approach, while Berlin claims: "we don't exclude anything. That means, all areas and sort of large spots where it is a bit more rural [or less densely populated], are included." (Int. Berlin). In NRW, predictions are generated for cities, not leaving out any parts of them, just like in the

city of Berlin, but excluding rural areas outside the cities similarly to Bavaria. Therefore, the team experiences the same challenges as their Bavarian counterparts when transferring prediction models from one urban area to another, especially with municipalities partially consisting of rural areas (e. g. Bonn, see Int. NRW).

Table 1: An overview of the three German predictive policing programs under investigation

	Bavaria	**Berlin**	**NRW**
Program	*PRECOBS*	*KrimPro*	*SKALA*
Software Development	External contractors	In-house (no dedicated dev. team)	In-house (dedicated dev. team)
Data Sources	Past crime data	Past crime data, some demographic data	Past crime data, comprehensive socio-economic data
Institutional Localisation	Decentralised	Decentralised	Centralised
Area of application	Selected urban centres, experimental support for rural regions	The entire state	Selected urban centres
Scientific Evaluation	Some (internal)	None	Comprehensive (internal and external)

In 2015, six major police departments in NRW integrated the program SKALA into their daily police work. After the end of the project phase in February 2018, SKALA was transferred to everyday operation and extended to 16 district police authorities in NRW (LKA NRW 2019). As in the case of Berlin, the state criminal police office opted for an in-house development which goes theoretically and conceptually beyond the near-repeat approach and integrates a wide range of criminological hypotheses to further explain the spatial and temporal distribution and patterns of residential burglaries (Int. NRW; see also Egbert, 2018b, p. 247; Egbert, 2018a, p. 97).

SKALA, like KrimPro, was built on software components with standardised interfaces to other existing information systems of the state police office. For the prediction models and monitoring, SKALA draws on data mining techniques using IBM SPSS Modeller (Seidensticker, 2018, p. 5). In addition, LKA NRW cooperated with the University of Konstanz to develop visualisation and data mining tools (Int. NRW). In LKA Berlin and LKA Bavaria no further scientific evaluation was pursued after the trial, whereas LKA NRW, cooperating with the Society for Innovative Social Research and Social Planning e.V. (GISS), surveyed the project and published an evaluation report after the completion of the development and trial of SKALA in February 2018 (Landeskriminalamt NRW, 2018).

While the IfmPt is promoting PRECOBS as a software only using police data, the police office in NRW decided to include significantly more categories – according to their theoretical assumptions – and therefore depends on purchasing aggregated external data on socio-economic factors like spending power, rent index and infrastructure (see Int. NRW; Egbert, 2018b, p.

247). In accordance with the risk terrain approach, attention is given to spatial and geographical features that increase the risk of crime in a specific area (Perry et al., 2013). In Berlin, the integration of additional data such as demographic information, data on infrastructure, income data etc. was found to decrease the quality of the model as many data points were redundant and the risk of spurious correlations increased (Int. Berlin). Even though most of the predictive policing software currently concentrates on indicators such as demographic composition of an area, traffic connections, purchasing power and mobility, there is a tendency to include more data sources as an extension of the application to car theft and other crimes is considered (see Int. NRW; Int. Bavaria; Rademacher, 2017, p. 372). Having described the specific predictive policing implementations, we will now turn to legitimisation narratives.

4. Legitimisation Narratives

"In the beginning we had two aims in mind: efficiency and effectiveness" (Int. NRW). Initially, effectiveness was considered as a major justification for predictive policing. However, our interview partners are aware of the lack of verified evidence supporting claims about increased effectiveness. Instead, they rely on additional narratives to legitimise the use of predictive policing applications in Germany - not only in the context of the interview situation, but our empirical material also shows to what extent the interviewees reflect on the need to legitimize predictive policing within the police organization itself in different ways.

Before analysing these, it is necessary to recall why legitimisation of predictive policing matters. Historically, demand of legitimisation has evolved in liberal reaction to intrusive regimes. Civil rights were developed to form a sphere in which state intervention is only allowed in exceptional cases. Such exceptions can only be justified in compliance with other constitutional provisions by means of formal law, thus requiring approval of the people's representatives in parliament. Today all state authority (Art. 20 III Basic Law) is legally constrained by the requirement of legitimisation. Furthermore, legitimisation can be understood as a "multidimensional concept" (Beetham, 2013, p. xiv). It is strongly intermingled with the acceptance of power as it "concerns the normative dimension of power relations, and the ideas and practices that give those in power their moral authority and credibility" (Beetham, 2013, p. x). Whereas Max Weber's understanding of legitimisation focuses on the "belief" (Weber, 1921/1968, p. 213) in legitimacy, Beetham builds on Weber's ideas and sees belief as one of three elements of legitimacy. Following Beetham, power is legitimate when it, firstly, "conforms to established rules", secondly, when – congruently to Weber – "the rules can be justified by reference to beliefs shared by both dominant and subordinate", and thirdly, when "there is evidence of consent by the subordinate to the particular power relation" (Beetham, 2013, p. 16). Legitimacy demands active legitimisation work. This is highlighted by the criminologist Thomas Ugelvik who - in accordance with Martin J Smith (2009) - points out that the government is not characterised by the possession of legitimacy but by the "ongoing activity of legitimation". He continues: "Legitimacy does not appear magically and mysteriously out of thin air; it is the result of active work by government agents" (Ugelvik, 2016, p. 217). This can be encountered in every situation in which a relation of domination and subordination is present (Weber, 1921/1968). Our analysis furthermore connects to two different perspectives on legitimacy and legitimisation – the legitimacy of technology and organisational legitimacy. First, technology legitimacy is defined by Markard, Wirth, and Truffer (2016, p. 333) as a "commonly perceived alignment (or misalignment) of a focal technology with institutional structures in its context". In the given

context, the focal technology is predictive policing. Technology legitimacy is of crucial importance for novel technologies as it is a requirement for the allocation of resources (material, human and financial) and necessary in order to attain regulatory support. In predictive policing, technology legitimacy is especially salient because if suggestions of the software — no matter how accurate they might be — are not trusted by patrol police, the usefulness of the program decreases (Bennett, Moses & Chan, 2018, p. 814). Therefore, it is crucial to investigate the legitimisation narratives underpinning the state of technology legitimacy within the institutional structures of the police; without it, the technology would be rendered insignificant.

Second, legitimacy is vital to the existence and acceptance of various subjects and is a central concept of organizational institutionalism (Deephouse et al., 2017). A large corpus of scientific literature on institutional legitimacy scrutinises how it is established, maintained, and defended. We find it insightful for our research to analyse police departments as organisations that require legitimacy as much as private companies or NGOs without neglecting their special role as state organs. Deephouse et al. (2017) provide a particularly useful definition of organisational legitimacy: "Organizational legitimacy is the perceived appropriateness of an organization to a social system in terms of rules, values, norms, and definitions."(Deephouse et al., 2017, p. 9) These terms express different dimensions or criteria of legitimacy: "regulatory, pragmatic, moral, and cultural-cognitive" (Deephouse et al., 2017, p. 9). The authors argue similarly to Beetham, Weber and Ugelvik that legitimacy does not emerge out of thin air. They introduce four different states — accepted, proper, debated, and illegitimate — of organisational legitimacy (Deephouse et al., 2017, p. 10). As the legitimisation narratives employed by our interviewees illustrate, the predictive policing applications we investigate are questioned by different stakeholders and therefore can be assigned to the stage 'debated'.

Interestingly, the target of the legitimisation narratives employed by our interviewees is not only the public, but also — and perhaps more importantly — other agents within the police force such as patrol police, whose compliance with the software is of paramount importance for the "success" of the program. Nevertheless, the interviewees routinely face resistance of patrol police against predictive policing: "'what's that modern crap about?' and so on […] and: 'somebody thinks it is chic and modern, or the politicians want to boast with it, or our police leadership.' […] Those are these familiar, normal patterns." (Int. Berlin) The interviewee from the Bavarian LKA talks about the "long way" of "persuasion" that is to be followed (Int. Bavaria) in order to convince police forces of predictive policing systems. The interviews, therefore, must be understood in the context of the relatively new implementation of these techniques which are not yet fully integrated and accepted in the daily policing routine.

To understand the legitimisation work that our interviewees do, we have to consider both the internal and external stakeholders of predictive policing applications in Germany who are the sources of legitimacy (Deephouse et al. 2017, p. 14). In the following analysis of our empirical material, we will focus on the legitimisation work of the interviewees which directly addresses these stakeholders in order to comprehend the values and aims driving the conception and implementation of predictive policing applications in Germany.

The main returning narratives employed by the interviewees can be separated into positive legitimisation narratives (efficiency and transparency within police administration) and negative ones (autonomy/independence, human control, transparency to the public, and soft-pedalling). The former give reasons for actively introducing this new technology, while the latter merely aim at pre-empting criticism, e. g. by contrasting to the media discourse and films like Minority Report which focus on predictive profiling, discrimination by algorithms and privacy

issues. Interestingly, as will be outlined in the following, the negative legitimisation narratives in our study can be read as answers to those "myths", which have been created in the media and research literature that add to the hype of predictive policing (Perry et al., 2013, p. 1), that Perry et al. (2013) have extracted: "The computer actually knows the future", "The computer will do everything for you", "You need a high-powered (and expensive) model", and "Accurate predictions automatically lead to major crime reductions" (Perry et al., 2013, p. xix f.). The positive legitimisation strategies, by contrast, directly seek to justify predictive policing.

4.1. Efficiency

Efficiency is critical as the aim of the modern police is to minimise the costs that society can incur by future criminal activity (Ericson & Shearing, 1986). As the ubiquitously cited RAND research report on predictive policing (2013) discloses: "predictive policing is not fundamentally about making crime-related predictions. It is about implementing business processes" (Perry et al., 2013, p. 161). All our interviewees used an array of technology-business-related terms in describing various aspects of their programs. Data are retained in a "data warehouse" (Int. Berlin) to increase ease of access and compatibility with other industrial systems of data manipulation and visualisation. Furthermore, solutions are labelled "Enterprise" (Int. Bavaria) and pursue a "lean approach" (Int. Berlin) that includes building "prototypes" (Int. Berlin) and "web-applications" (Int. Berlin) that visualise the forecasting product of the predictive policing process on a single, highly interactive zoomable map (Int. NRW).

As an institution of the modern state, police operate under the primacy of doing more with less (Beck & McCue, 2009, pp. 1 and 5). In the case of predictive policing, this means analysing more data in less time (Int. Berlin), allowing the police to "react quickly to the development of offences and (criminological) phenomena" (Int. Bavaria). Connected to this primacy of doing more with less, our interviewees highlight the police as an institution facing budgetary constraints and the resulting need to optimise the allocation of resources. One official summed up this salient sentiment by saying: "we don't have unlimited forces, not even in Bavaria, such that we have to utilise these forces in a *targeted*, *optimised* manner" (Int. Bavaria, emphasis by the authors). In this resource-efficient way, the automation of certain analytic tasks, which in the past would have drawn on significant human resources, can be automated by machines now. That plays an important role in the practical integration of predictive policing into the daily routines of the police apparatuses. One interviewee remarks: "the computer does what an experienced crime analyst would do anyhow, just much, much faster and on the basis of more data" (Int. Berlin). Another interviewee asks: "how can we manage – possibly in an automated fashion – to include a burglary that just happened such that it immediately impacts the forecast and model. That would be a dream" (Int. NRW).

4.2. (In-)Transparency

Our interviewees repeatedly brought up notions of transparency, which we interpret as legitimisation attempts and which we cluster into two domains. The first concerns transparency within the organisational context of the police. The second concerns transparency between the police and the general public including possible future victims and perpetrators of crime. Within the police apparatus, transparency serves a variety of ends; most importantly it is

thought to enable independence and increase acceptance and compliance of patrol police. Transparency towards the public, however, is seen to be more problematic, which will be outlined in the following section.

An interviewee in charge of the SKALA program contrasted the transparency of their program (in this context, transparency refers to knowledge of the basis for correlations produced by algorithms as well as full operability by police) against buying a ready-made non-transparent solution from a private company (i. e. PRECOBS) (Int. NRW). Interestingly, the interviewee from the PRECOBS program seemed to read from the same script, arguing that the German PRECOBS solution is much more transparent than its US-counterpart PredPol: "PredPol is a blackbox [...] you have no opportunity to exert influence. For us, it was very, very important that the last decision is made by a human, actually a colleague, and not a machine" (Int. Bavaria). Here, the function of transparency is to enable knowledge production and mediation independent from private companies or, in fact, machines.

The second context in which transparency is central within the police regards compliance and acceptance. Critics within the police are confronted by giving them access to information about the programs and some background on how the forecasts were produced. Asked about the role of transparency, one interviewee remarked that "it's very important [...] to convince police officers on multiple levels [of the hierarchy]. It's not always easy, but our colleagues — in Munich especially — do a great job at presenting [the software] and convincing [other police officers]" (Int. Bavaria). Another interviewee stated that the motivation behind using a simpler decision-tree algorithm as the basis for producing forecasts was the fact that it is "very transparent" (Int. NRW), i. e. easier to understand or test for those working on it and "easy to explain" (Int. NRW) to those questioning its authority. However, the interviewee added that they are exploring other more complex algorithms such as neural networks to increase the software's performance in the future. Overall, the intricacies of the algorithmic decision-making process of the software are only legible to the technical staff within the responsible units. In that sense, transparency within the police is hierarchical: only a select few comprehensively understand the software's workings (for the purposes of maintenance and development) while the majority of those carrying out the software's suggestions only need to understand "enough" for them to comply.

When it comes to what Hood and Heald (2006, pp. 27 f.) call "inwards transparency" present "when those outside can observe what is going on inside", our interviewees see transparency in a more ambivalent light. While we expected that ambivalence, the reasons submitted were surprising. Expecting that the most unease about being transparent towards the public would stem from the idea that intelligent criminals could use this information to 'game' the algorithms and, thus, render them obsolete at best and damaging at worst. However, this was never brought up. Rather, one interviewee – after weighing the (dis-)advantages of making police data of past offences public as it is done in the US and UK – remained cautious and said it can be done "if society is ready for it and wants it [...], but you have to think about it and proceed in a structured and cautious manner" (Int. Berlin). What the interviewee feared is that publishing crime data could lead to overreactions of citizens as they might cry out for "a phalanx of officers" (Int. Berlin) should they live in a crime hotspot or stop trusting the police if they were informed that they are at risk without the police doing anything about it (Int. Bavaria). In defence of not publishing any crime-related data in Bavaria, the official argued that they "already had problems communicating [the intricacies of probabilistic statistics] to our colleagues" (Int. Bavaria), implying it would be even more difficult explaining it to those outside

of the police. While the interviewee from NRW shared the fear that the population might "panic" (Int. NRW), they are cooperating with the Fraunhofer Institute to develop an app that will send registered people a push-notification if their living-quarter is at higher risk than usual. "We work on [the app] at the moment, to ensure that it does not produce fear, but rather that it is taken as just an information [on] prevention tips from the police or you can make an appointment".

In sum, all our interviewees seem to share the view that the forecasts should not be communicated fully or unedited to the public. However, they diverge on the question of exactly how much should be shared and in what format. Generally, it becomes clear that "transparency is [...] not simply 'a precise end state in which everything is clear and apparent', but a system of observing and knowing that promises a form of control" (Ananny & Crawford, 2018); control over patrol police or the public at large.

4.3. Autonomy and Independence

Autonomy and independence matter to our interviewees. In the function of law enforcement officers, they seek to participate actively in the software development and prediction process: "exactly, being able to help shape that is the right expression, to help shape. We did not just want to be a licensee but really wanted the opportunity to say: 'hey, we have ideas and demands! How can we deal with them?' This, I have to say, has worked very well so far over the years" (Int. Bavaria). The ability to assert and implement one's demands seems to matter for three reasons.

Firstly, autonomy and independence matter as a way to navigate the field of tension between political demands, market pressures and limitations in terms of resources, accessible data, software and external expertise in which law enforcement agencies exist (Gluba, 2014; Byrne & Marx, 2011). For example, business relations between the police and the private (IT-)industry have become completely normal. One official explicates: "cooperation with the private sector is important because the police cannot solve problems on their own in isolation as they did in the 60s, 70s and 80s. Today, problem solving only works in cooperation and as long as it is regulated, I welcome that" (Int. NRW). In this vein, smaller or larger parts of the software development process are contracted out, proprietary software is used (e. g. Int. NRW) and data are bought from private data brokers (Int. NRW). In the case of Berlin's KrimPro, external computer science expertise was only sometimes brought in to assist with specific problems (Int. Berlin), while in the case of Bavaria, the whole software package was bought from a private company with an emphasis on cooperative development.

With regard to the in-house development of predictive policing software, our interviewees were eager to maintain an internal grip on the decisions related to the programming of the software, thus avoiding black boxes: "that's why we said to ourselves, our claim or our philosophy was that we say: transparent, no black box, maintainable by the police – where the police does not have to be a police officer – [...], that we can operate it *internally* (Int. NRW, emphasis by the authors)". Similarly, control over data matters to our interviewees: "we want to retain data sovereignty, like say: ok, data stay with us" (Int. NRW). Consequently, complete independence and autonomy are not achievable. However, the law enforcement agencies seek to maintain a robust sphere of unobstructed influence to implement their own vision of policing.

Secondly, our interviewees valued the ability to develop the software themselves since it allows them to direct the path the program would take: "but now we want to rebuild it, build it ourselves, and take full autonomy, also for the care, repair, when it should be necessary, and also for further development. If we say, okay, maybe we'll try it with other offences . . . or just have a new idea on how we could refine it a bit" (Int. Berlin). Such autonomy ensures greater flexibility for the agencies. One interviewee states: "I see more advantages, that you have a lot more options, like I'm saying, with models, with functions and also it is much more flexible, if you want to implement functions and algorithms yourself" (Int. NRW).

Lastly, autonomy is of importance to legitimate state entities, such as our interviewees, because it is a prerequisite for accountability. Police accountability encompasses both control by the public and the public demand for officials to give an account of their reasons and an explanation why a particular decision was made (Moses and Chan, 2018, p. 817). If an actor is held accountable for an action to some subject, the latter needs to know about the action and the action needs to be ascribable to the actor. Accountability of police officers, thus, requires actions that can be ascribed to police forces and information (transparency) about these actions. Only then can police be held accountable. The ascription of actions requires enough autonomy of the actor or else it would have to be ascribed to the entity the decision-maker depends on, e. g. a private corporation. Eventually, however, holding a private entity accountable for typical police intervention would not comply with a modern state's monopoly on the use of force. Therefore, ascribing accountability for predictive policing activities to the police itself is crucial to legitimising it in a modern state.

4.4.   Humans as Interpreters of Results and Decision-makers (Control)

Predictive policing remains a merely supportive tool and will not "revolutionise police work" (Int. Berlin). This argument takes issue with the second myth extracted by Perry et al. (2013, p. xix): "the computer will do everything for you". The interviewees emphasised the supportive function by solely employing diction such as "investigative aid" (Int. Berlin), "component" (Int. NRW) and "instrument" (Int. Bavaria).

Furthermore, the tool "is only an offer. That means that there is no automatism according to the motto: notification arrives, deployment must take place. [...] So, it really contains a relatively high voluntariness" (Int. Berlin). Although 'voluntariness' must always be understood "in quotation marks" (Int. Berlin) and, hence, is not entirely tangible, the final decision remains with the local specialised police units (Fachdienststellen). They may interpret the outcome, then make their own decision. It is (currently) possible for patrol police to decide not to act according to the computed "prognosis" and decide not to patrol suggested areas. 'Voluntariness', thus, means facultative consideration of computed probabilities of crime when planning police missions and patrols. Therefore, it plays a crucial role in the legitimisation of predictive policing within the police itself. A certain degree of independence remains with the local specialised units and in the end also with the patrol officer. The decision-making power remains with humans as interpreters of the outcome of the software.

By highlighting predictive policing technology to be only one of many aspects leading up to the decision and by ensuring that unabridged control at the last instance of decision-making remains with human police officers, the interviewees avoid transferring decades of discussion

about automated decision-making[3] to the situation established by predictive policing technology. Thus, when officers applying predictive policing software in Germany stress the merely supportive deployment of the software, they are complying with what Eberle (1987, p. 464) depicts as an irrelevant change of the decision-making process: an autonomous machine proposal without direct effect. In that case, even Zeidler's (1959) demand for human control at the last instance is fulfilled. Hence, any decision, whether automatically generated or not, can be ascribed to the police, which can therefore be held accountable. Either the interviewees emphasise human control based on a legal opinion on decision-making by police authorities or they follow moral incentives symmetric to the ones underlying the legal discussion. Either way, they (un)consciously acknowledge interests of the public and of patrolling officers in human control of the interaction between[4].

4.5.   Downplaying – Not Minority Report

Whereas the human control narrative seems to be also directed at the concerns of police patrol to be replaced, the last narrative we would like to present is an aggregation of different aspects that aim at de-emphasising the impact of predictive policing software as well as the worries that are present in public discourse. In the latter, the comparison of predictive policing with the science-fiction film "Minority report" is recurring. All interviewees referred to the film in a negative way: "we often encounter this misconception that they think we have to catch the perpetrator; they think of Minority Report and other ideas from Hollywood. Recently, there was this film about predictive policing in the cinema […]. It was about personal data and arresting individuals [but] we're all about computing statistical probabilities for specific spaces. […] We really compute spatiotemporal probabilities only" (Int. NRW).

The distinction from German predictive policing applications to person-focused policing that aims at calculating an individual's probability to commit or fall victim to crime and that is known as "predictive profiling" is crucial to our interviewees. "We do not use any person-focused prediction technology because we do not use any personal data. We are purely case-based" (Int. Bavaria). The representative of North Rhine-Westphalia explains that predictive profiling is not the "classical predictive policing", as the standard definition of predictive policing in Germany excludes "individual forecasts". The type of data used in predictive policing represent an important aspect in the public and medial discussion as well as in scientific literature (Egbert, 2018a; Brantingham et al., 2018, p. 5). The discussion might be influenced by the American context, in which especially the question of (racial) bias or the one-sided focus on specific ethnic groups is a dominant aspect (Egbert, 2018b, p. 258). In contrast, the interviewees in our cases stressed the exclusion of personal data in German predictive policing applications. Still, it remains questionable to what extent meta-data have to be considered such as the place of residence, i. e. might also unintentionally allow for personal references (Vepřek,

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[3] § 35a VwVfG (German Administrative Procedures Code), which explicitly allows for automated administrative deeds thereby resolving large parts of the discussion by i. a. Zeidler (1959) and Bull (2017), is not applicable as police missions planning is not an administrative deed (Ramsauer, 2018, § 35a Rn.8).
[4] Although the Bavarian officer reacts to public insistence on human control by repeatedly stressing the technology's supportive function at the first stage of decision-making, the interviewee describes concerns raised as a "hype which emerged out there and which you still feel partly, [which] is not justified at all. So that's what we tried to communicate again and again and, of course, in the press it was presented in a different way. Thank God it has calmed down" (Int. Bavaria).

2018, p. 22). We also encountered different handling practices and propensities to use "personal" data during our interviews: for example, the Berlin LKA interviewee stated that they would never – even if it would improve the system – cross this line of privacy. Due to data protection (Art. 2 I, 1 I Basic Law) issues associated with person-focused predictive policing, delineating from predictive profiling is essential to legitimise predictive policing.

In line with the distinction of predictive profiling is the accentuation of the computation of "probabilities" (see penultimate quote: Int. NRW). Although often (incoherently) used interchangeably in our interviews, the interviewees try to draw a sharp distinction between "predictions" that forecast the future and "likelihoods" which are only about numbers and do not describe a determined scenario (Int. NRW; Int. Berlin). This argument contradicts the assumption, spread by the myth "the computer actually knows the future" (Perry et al., 2013, p. xix). "You are relatively quickly sobered when you realise that this is all about numbers and only about likelihoods" (Int. NRW).

The narrative that attenuates predictive policing is furthermore supported by the saying "business as usual" (Int. Berlin). Our interviewees state that the application of predictive policing tools would generally not entail any major changes in police work. Before the invention of geo-information systems in the 1990s and later predictive policing applications, police used to stick pins to a wall to map crime (Gluba, 2014). "This is why", explains the representative of the Bavarian LKA, "predictive policing, the term, is incredibly overstated. The police have been dealing with this for a very long time" (Int. Bavaria). The interviewee in Berlin declares that, in using these tools, "the only new thing" (Int. Berlin) is the reason for which patrol police are sent to a particular area (Int. Berlin).

5. Conclusion and Discussion

As described at the beginning of this article, there exists no clear verdict on the effectiveness of predictive policing. However, predictive policing programs are implemented in an increasing number of German states despite the uncertainty about the practical effect of these technologies on routine police work. Therefore, the question we sought to answer in this paper was: if effectiveness is not a core legitimisation narrative postulated by German police officers, which values and narratives are employed by our interviewees to legitimise the conception and implementation of predictive policing? We conducted and analysed three semi-structured, in-depth interviews with representatives of the state criminal investigation departments in Berlin, North Rhine-Westphalia and Bavaria. There are five legitimisation narratives emerging from our research, three of them negative and two positive. Firstly, the interviewees used efficiency as a positive narrative. Efficiency was used to directly justify the use of predictive policing programs. This "efficiency" narrative was employed notwithstanding the lack of a clear verdict on the effectiveness of predictive policing in the scientific literature and practical application. Secondly, our interviews were dominated by negative legitimisation narratives, seeking to disassociate predictive policing from popular "myths" and criticisms aiming at the lack of transparency, increased dependence and loss of control associated with the implementation of predictive policing. Consequently, relevant legitimisation narratives targeted these criticisms by arguing for autonomy/independence and the importance of human control. That said, transparency as a narrative was used both, positively justifying predictive policing within the police administration and negatively to pre-empt public criticism.

According to Beetham (2013), power is legitimate when it 1) conforms to established rules, 2) is justified by shared beliefs and 3) the subordinated party has consented to it. Hence, legitimisation work, through the narratives presented in this paper, is necessary. Egbert (2018a) has posed a related question concerning the legitimisation of predictive policing by politicians in Germany. His research shows that narratives used by politicians focus on security (Egbert, 2018a, p. 13). Such security-driven narratives are absent from our interviews. An explanation for these different outcomes may be the target audience. Politicians direct their legitimisation narratives at the public while, as has been stated by our interviewees (see above p. 13: Int. Berlin, Int. Bavaria), representatives of state criminal investigation departments directed most of the narratives at patrol officers. That said, the absence of security narratives points towards a possible methodological limitation of our research. The interviews are a small sample from a subgroup of all the actors involved in the legitimisation of policing techniques. Therefore, our findings may not be representative of the entire spectrum of legitimisation narratives available. However, our research does provide an in-depth account of the narratives employed by police agencies. Moreover, while our findings may not be generalised to other actors, our research includes three of the currently six federal states with active predictive policing programs. Since half of all the available cases in Germany have been examined, our findings are highly relevant for German police agencies. That said, as pointed out in "Section 3" the legal framework as well as other contextual factors vary between different countries. Thus, our findings may only have limited application outside of Germany. We therefore invite scientists to take our research as a starting point for further urgently needed empirical surveys.

It remains open to what extent predictive policing in Germany will achieve full legitimacy especially within the police itself (patrol police). As predictive policing is being extended from residential burglaries to other criminal offences, future research might delve into how this will change daily police work and the way law enforcement works generally. Further research may also fruitfully investigate the focus on human control as a legitimisation narrative. During our interviews, apparent human oversight (exemplified in 'transparency' and 'autonomy and independence' as well as 'human control' narratives, all of which are indispensable to accountability) was vital to justify an increased reliance on software. One reason may be a general distrust in the calculations machines have to rely on. However, a more promising line of inquiry is likely to focus on the lack of democratic legitimisation of such programs since legislators have to subscribe to technological approaches they do not fully comprehend and, thus, cannot authorise in all their details. This will be particularly interesting with regards to artificial intelligence, which gradually finds its way into policing activities. Thus, new questions and legitimisation work by police forces might emerge as predictive policing applications change continually and therefore call for steady adjustments, or in the words of an interviewee: predictive policing is "like a piano, you have to play it" (Int. Bavaria).

References

Abgeordnetenhaus Berlin (2017). *Schriftliche Anfrage des Abgeordneten Hanno Bachmann (AfD) vom 16. März 2017 (Eingang beim Abgeordnetenhaus am 16. März 2017) und Antwort Einsatz des Predictive Policing bei der Berliner Polizei*. Retrieved from http://pardok.parlament-berlin.de/starweb/adis/citat/VT/18/SchrAnfr/s18-10732.pdf (2019, October 1).

Amnesty International (2019). *Übersicht über die Änderungen der Polizeigesetze in den einzelnen Bundesländern*. Retrieved from https://www.amnesty.de/sites/default/files/2019-04/Uebersicht-

ueber-die-Aenderungen-der-Polizeigesetze-in-den-einzelnen-Bundeslaendern-Maerz2019_0.pdf (2019, June 11).

Ananny, M., & Crawford, K. (2018). Seeing without knowing: Limitations of the transparency ideal and its application to algorithmic accountability. *New Media & Society*, 20(3), 973–989. https://doi.org/10.1177/1461444816676645

Barrow, L.M., & Rufo, R.A. (2013). *Police and Profiling in the United States: Applying Theory to Criminal Investigations*. Boca Raton: CRC Press.

Beetham, D. (2013). *The Legitimation of Power*. Houndmills: Macmillan.

Belina, B. (2016). Predictive Policing. *Monatsschrift für Kriminologie und Strafrechtsreform / Journal of Criminology a Penal Reform*, 99(2), 85–100. https://doi.org/10.1515/mkr-2016-0202

Benbouzid, B. (2016). *Who Benefits from the Crime?* Retrieved from http://www.booksandideas.net/Who-Benefits-from-the-Crime.html (2017, December 29).

Bennett Moses, L., & Chan, J. (2018). Algorithmic prediction in policing: assumptions, evaluation, and accountability. *Policing and Society,* 28(7), 806–822. https://doi.org/10.1080/10439463.2016.1253695

Bowers, K.J., & Johnson, S.D. (2014). Near Repeats and Crime Forecasting. In G. Bruinsma, & D. Weisburd (Eds.), *Encyclopedia of Criminology and Criminal Justice* (p.3242-3254). New York: Springer.

Braga, A.A., & Bond, B.J. (2008). Policing Crime and Disorder Hot Spots: A Randomized Controlled Trial. *Criminology*, 46(3), 577–607. https://doi.org/10.1111/j.1745-9125.2008.00124.x

Braga, A.A., Papachristos, A.V., & Hureau, D.M. (2014). The Effects of Hot Spots Policing on Crime: An Updated Systematic Review and Meta-Analysis. *Justice Quarterly*, 31(4), 633–663. https://doi.org/10.1080/07418825.2012.673632

Brantingham, P.J., Valasik, M., & Mohler, G.O. (2018). Does Predictive Policing Lead to Biased Arrests? Results from a Randomized Controlled Trial. *Statistics and Public Policy*, 5(1), 1–6. https://doi.org/10.1080/2330443X.2018.1438940

Bull, H.P. (2017). Der 'vollständig automatisiert erlassene' Verwaltungsakt - Zur Begriffsbildung und rechtlichen Einhegung von 'E-Government'. *Das Deutsche Verwaltungsblatt* (7), 409–417.

Byrne, J., & Marx, G. (2011). Technological Innovations in Crime Prevention and Policing. A Review of the Research on Implementation and Impact. In E. De Pauw, P. Ponsaers, K. van der Vijver, et al. (Eds), *Technology-Led Policing* (p. 17-39). Antwerpen: Maklu.

Charmaz, K. (2012). The Power and Potential of Grounded Theory. *Medical Sociology Online*, 6(3), 2-15.

Charmaz, K., & Keller, R. (2016). A Personal Journey with Grounded Theory Methodology. Kathy Charmaz in Conversation With Reiner Keller. *Forum Qualitative Social Research*, 17(1).

City of Chicago (2017). *Strategic Subject List.* Retrieved from https://data.cityofchicago.org/Public-Safety/Strategic-Subject-List/4aki-r3np (2019, July 27).

Clarke, R.V., & Cornish, D.B. (1985). Modeling Offenders' Decisions: A Framework for Research and Policy. *Crime and Justice* (6), 147–185.

Deephouse, D.L., Suchman, M.C., Bundy, J., et al. (2017). Organizational Legitimacy: Six Key Questions. In R. Greenwood, C. Oliver, T. Lawrence, & R. Meyer (Eds.), *The SAGE Handbook of Organizational Institutionalism* (Chapter 1). Thousand Oaks: SAGE Publications.

Der Polizeipräsident Berlin (2016). *Kollege Computer hilft bei der Kriminalitätsprognose*. Retrieved from https://www.berlin.de/polizei/polizeimeldungen/pressemitteilung.507506.php (2019, January 13).

Egbert, S. (2018a). About Discursive Storylines and Techno-Fixes: The Political Framing of the Implementation of Predictive Policing in Germany. *European Journal for Security Research*, 95–114. https://doi.org/10.1007/s41125-017-0027-3

Egbert, S. (2018b). Predictive Policing in Deutschland. Grundlagen, Risiken, (mögliche) Zukunft. In *Texte und Ergebnisse des 42. Strafverteidigertages Münster vom 2. bis zum 4.3.2018* (p. 241–265). Berlin: Organisationsbüro der Strafverteidigervereinigungen.

Ericson, R.V., & Shearing, C.D. (1986). The Scientification of Police Work. In G. Böhme, & N. Stehr (Eds.), *The Knowledge Society: The Growing Impact of Scientific Knowledge on Social Relations* (p129-159). Dordrecht: Springer Netherlands.

Foucault, M. (2007). *Security, Territory, Population: Lectures at the Collège de France, 1977-78*. New York: Palgrave Macmillan.

Foucault, M. (2008). *The Birth of Biopolitics: Lectures at the Collège de France, 1978-1979*. New York: Palgrave Macmillan.

Gerstner, D. (2017). Predictive Policing als Instrument zur Prävention von Wohnungseinbruchdiebstahl. Evaluationsergebnisse zum Baden-Württembergischen Pilotprojekt P4. *forschung aktuell - research in brief* , 50(1), 1-97.

Glaser, B.G., & Strauss, A.L. (1971). *The Discovery of Grounded Theory. Strategies for Qualitative Research*. New York: Aldine.

Gluba, A. (2014). *Predictive Policing – eine Bestandsaufnahme*. Retrieved from https://netzpolitik.org/wp-upload/LKA_NRW_Predictive_Policing.pdf (2019, June 1)

Götzö, M. (2014). Theoriebildung nach Grounded Theory. In C. Bischoff, K. Oehme-Jüngling, & W. Leimgruber (Eds.), *Methoden Der Kulturanthropologie* (p. 444-458). Bern: UTB.

Hayes, W.J. (2015). *Case studies of predictive analysis applications in law enforcement*. Retrieved from https://calhoun.nps.edu/bitstream/handle/10945/47957/15Dec_Hayes_William.pdf?sequence=1 (2019, June 1).

Herold, H., & Cobler, S. (1980). *Sebastian Cobler: Herold gegen Alle. Gespräch mit dem Präsidenten des Bundeskriminalamtes.* Retrieved from https://socialhistoryportal.org/sites/default/files/raf/0019801000_03_0.pdf. (2019, January 2)

Hood, C., & Heald, D. (Eds.) (2006). *Transparency: The Key to Better Governance?* Oxford: Oxford University Press for The British Academy.

Kaufmann, M., Egbert, S., & Leese, M. (2019). Predictive Policing and the Politics of Patterns. *The British Journal of Criminology*, 59(3), 674–92. https://doi.org/10.1093/bjc/azy060

Knobloch, T. (2018). *Vor die Lage kommen: Predictive Policing in Deutschland*. Retrieved from https://www.stiftung-nv.de/sites/default/files/predictive.policing.pdf (2019, June 12)

Lal, S., Suto, M., & Ungar, M. (2012). Examining the Potential of Combining the Methods of Grounded Theory and Narrative Inquiry: A Comparative Analysis. *The Qualitative Report*, 41(17), 1-22.

Landeskriminalamt NRW (2018). *Abschlussbericht Projekt SKALA*. Retrieved from https://lzpd.polizei.nrw/sites/default/files/2018-07/180628_Abschlussbericht_SKALA.PDF (2018, July 11).

Landeskriminalamt NRW (2019). *Projekt SKALA - Predictive Policing in NRW*. Retrieved from https://lka.polizei.nrw/artikel/projekt-skala-predictive-policing-in-nrw (2020, September 11).

Markard, J., Wirth, S., & Truffer, B. (2016). Institutional dynamics and technology legitimacy – A framework and a case study on biogas technology. *Research Policy*, 45(1), 330–344.

McCulloch, J., & Wilson, D. (2016). *Pre-Crime: Pre-Emption, Precaution and the Future*. New York: Routledge.

Meijer, A., & Wessels, M. (2019). Predictive Policing: Review of Benefits and Drawbacks. *International Journal of Public Administration*, 42(12), 1031-1039. https://doi.org/10.1080/01900692.2019.1575664

Mitsch, W. (2015). Vorbeugende Strafbarkeit zur Abwehr terroristischer Gewalttaten. *Neue Juristische Wochenschrift*, 68(4), 209–212.

Mladek, K. (2007). *Police Forces: A Cultural History of an Institution*. New York: Palgrave Macmillan.

Mohler, G.O., Short, M.B., Malinowski, S., et al. (2015). Randomized Controlled Field Trials of Predictive Policing. *Journal of the American Statistical Association*, 110(512), 1399–1411. https://doi.org/10.1080/01621459.2015.1077710

National Academies of Sciences, Engineering, and Medicine (2017) *Proactive Policing: Effects on Crime and Communities*. Washington: The National Academies Press.

Perry, W.L., Price, C.C., Smith, S.C., et. al. (2013). *Predictive Policing: The Role of Crime Forecasting in Law Enforcement Operations*. Santa Monica: RAND.

Polizei Hamburg (2019). *Projekt: „Entwicklung Berufsbild Kriminalitätsanalytik".* Retrieved from https://www.polizei.hamburg/content-blob/11904620/9c1c50c88eb00be720cb98cf0feec677/data/projektbeschreibung-berufsbild-kriminalitaetsanalytiker-do.pdf (2019, October 13)

Pridemore, W.A., Makel, M.C., & Plucker, J.A. (2018). Replication in Criminology and the Social Sciences. *Annual Review of Criminology*, 1(1), 17.1-17.20. https://doi.org/10.1146/annurev-criminol-032317-091849

Rademacher, T. (2017). Predictive Policing im deutschen Polizeirecht. *Archiv des öffentlichen Rechts*, 142, 366–416.

Ramsauer, U. (2018). § 35a. In F. Kopp, & U. Ramsauer (Eds.), *Verwaltungsverfahrensgesetz Kommentar Kopp/Ramsauer* (p. 800–806), München: C.H. Beck.

Rolfes, M. (2017). Predictive Policing: Beobachtungen und Reflexionen zur Einführung und Etablierung einer vorhersagenden Polizeiarbeit. *Potsdamer Geographische Praxis*, 12, 51–76.

Saunders, J., Hunt, P., and Hollywood, J.S. (2016). Predictions put into practice: a quasi-experimental evaluation of Chicago's predictive policing pilot. *Journal of Experimental Criminology*, 12(3), 347–371. https://doi.org/10.1007/s11292-016-9272-0

Schmidt-Lauber, B. (2001). Das qualitative Interview oder: Die Kunst des Reden-Lassens. In S. Göttsch, & A. Lehmann (Eds.), *Methoden der Volkskunde: Positionen, Quellen, Arbeitsweisen der Europäischen Ethnologie* (p. 165-186). Berlin: Dietrich Reimer Verlag.

Schweer, T. (2015). Vor dem Täter am Tatort. Musterbasierte Tatortvorhersagen am Beispiel des Wohnungseinbruchs. *Die Kriminalpolizei*, (1), 13–16.

Scott, J.C. (1998). *Seeing like a State: How Certain Schemes to Improve the Human Condition Have Failed*. New Haven: Yale University Press.

Seidensticker, K., Bode, F., & Stoffel, F. (2018). *Predictive Policing in Germany*. Retrieved from: http://nbn-resolving.de/urn:nbn:de:bsz:352-2-14sbvox1ik0z06 (2019, July 12)

Shapiro, A. (2017). Reform predictive policing. *Nature*, 541, 458–460.

Sherman, L.W., Gartin, P.R., & Buerger, M.E. (1989). Hot Spots of Predatory Crime: Routine Activities and the Criminology of Place. *Criminology*, 27(1), 27–56. https://doi.org/10.1111/j.1745-9125.1989.tb00862.x

Smith, M.J. (2009). *Power and the State*. London: Red Globe Press.

Ugelvik, T. (2016). Techniques of legitimation: The narrative construction of legitimacy among immigration detention officers. *Crime, Media, Culture: An International Journal,* 12(2), 215–232. https://doi.org/10.1177/1741659016648180

Vepřek, L.H. (2018). Programmierte (Un)gleichheiten Mit Data Mining in die Polizeiarbeit der Zukunft?! *Kuckuck Notizen zur Alltagskultur*, (2), 18-24.

Weber, M. (1921/1968). *Economy and Society. An Outline of Interpretive Sociology*. Berkeley: University of California Press.

Zedner, L. (2007). Pre-crime and post-criminology? *Theoretical Criminology,* 11(2), 261–281. https://doi.org/10.1177/1362480607075851

Zeidler, K. (1959). Über die Technisierung der Verwaltung - Eine Einführung in die juristische Beurteilung der modernen Verwaltung. Karlsruhe: C.F. Müller.

Kontakt | Contact

Libuše Hannah Vepřek | Institute for European Ethnology and Cultural Analysis | Ludwig-Maximilians-Universität, Munich | l.veprek@ekwee.uni-muenchen.de

Lynn Sibert | Institute for Sociology | Technische Universität Berlin | l.sibert@campus.tu-berlin.de

Linus Sehn | John-F.-Kennedy Institute | Freie Universität Berlin | sehn@zedat.fu-berlin.de

Leo Köpp | Faculty of Law| Humboldt-Universität Berlin | leo.koepp@hu-berlin.de

Daphne Friedrich | Law Student | Bucerius Law School in Hamburg | daphne.friedrich@law-school.de