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Can criminal justice be predicted? Using regression analysis to predict judges' decisions on petitions for new criminal trials

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ABSTRACT

Predictability of legal decisions is usually considered a prerequisite for the rule of law, following the maxim 'like cases should be treated alike'. Yet, this presupposes that the case outcome can be predicted based on the *merits* of the case, rather than other factors. The purpose of this study was to test whether and to what extent legal decisions on petitions for new criminal trials can be predicted on the basis of other fairly superficial criteria that one could access without even reading the case file, e.g. which Court decided, whether the applicant had legal representation etc. To this end, all petitions for new criminal trials submitted to the Swedish Supreme Court and the six Courts of Appeal in the time period 2010–2020 (n = 3915) were reviewed. This data formed the basis of a regression model which was then used to predict decisions regarding petitions in 2021. On the basis of access to legal representation and crime type, the regression model predicted accurately 100 % of the decisions made in 2021. This raises questions about the evidentiary basis for the decisions and also the role of judges in situations where their decisions are fully predictable.

1. Introduction

Traditionally, in the context of criminal law, the concept of predictability has positive connotations [1–4]. In fact, unpredictability is often considered a threat to the rule of law [5,6]. Such a threat can materialize, for example, if cases with the same or similar enough material circumstances are treated differently [3,7–9] or if prosecutors and judges would be allowed to invent new crimes to be able to punish behavior they do not approve of [10–12]. Yet, as new potential applications of AI within the legal domain are unfolding on a steady basis [13–15], a somewhat different type of predictability has emerged and this type of predictability is not considered uniquely positive [16–19]. This refers to predictive modelling or automated legal decision making pertaining to the litigation phase. To illustrate, automated risk assessment programs have been used to assist criminal prosecutions in US states such as Wisconsin and Pennsylvania [20,21]. Specifically, in a case before the Wisconsin Supreme Court, *State v. Loomis* [20,21], the defendant challenged the use of a risk assessment program. The defendant argued that the program had considered group data rather than individual data for his sentencing, contradicting his due process rights. The Court majority underlined that while it could take the risk assessment into account, the final decision would have to be made by the Court itself [20,21]. Along the same lines, the General Data Protection Regulation of the European Union contains "the right not to be subject to a decision based solely on automated processing" (§71) [22]. Developments within different European countries seem aligned with this idea, as AI has been used for, for example, faster translations and anonymization procedures in countries like Sweden, while it has also been emphasized that AI is not intended as a replacement for judges [23]. Hence, the idea of a robotic judiciary [21] or artificial judge [24], transforming or even making redundant the role of human judges, appears to spur both fascination and fear [25,26]. Whether we like it or not, technological growth and particularly predictive modelling technology, has, evidently, already found its way into law enforcement agencies, law firms and Courts [27–29]. It remains to be seen exactly how and for what purposes such modelling can and should be used.

While this study focuses on predictive modelling in the context of criminal law, it should be noted that predictive modelling and AI has also made its way into civil law, for example in small claims matters [30,31], contract and tort law [32] as well as tax law [33]. Given the wide range of subfields in civil as well as criminal law it cannot be generally stated that the predictive modelling and AI would be more

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beneficial or more risky for either civil and criminal law. For some subfields of civil law that are streamlined enough, and also have a significant proportion of routine cases, fast and cheap decisions may be prioritized [34], just like when it comes to very frequent crimes such as speeding. Furthermore, the protection for an accused's due process rights is important, and often an argument against predictive modelling, but also for example the best interest of the child (in family law) is clearly worthy of protection [34]. The best interest of the child may be promoted by fast and cheap decisions but it also may not. In this paper, fairly serious crimes are addressed and, typically, these crime types trigger a more conservative stance and skepticism against predictive modelling. . Notably, this paper does not aim to argue for or against the application of AI and predictive modelling in criminal law (or any other legal field) but rather to raise the question: if we can predict judges' decisions 100 % accurately without AI, then maybe the problem is not AI but rather why judges decisions are so predictable.

Notably, while the overall trend in criminal jurisdictions worldwide seems to be an increased usage of AI-based methods, France has gone in the opposite direction with bans on judicial analytics and prompted criminal responsibility [35]. Specifically, the new law, found in Article 33 of the Justice Reform Act, prevents anyone from publicly revealing the patterns of judges' behaviors [36]. Allegedly, the ban was triggered in part by the use of machine learning to compare the behavior of judges in asylum cases, a study which found great discrepancies among individual judges [37]. Also, in the US, issues relating to ownership and copyright of Court decision data have resulted in lawsuits [38,39].

In many situations, it is still today unclear just how accurate or inaccurate different predictive models are. Yet, some informative data is available. For example, based on analysis of the textual content of 584 cases relating to e.g. torture, degrading treatment and fair trials, AI reached the same verdict as the European Court of Human Rights (ECtHR) in 79 % of the cases [40]. Both slightly higher and slightly lower accuracy levels have been found in relation to American legal data. To illustrate, AI trained using the Database for New Orleans Parish District Attorney's office involving in total 280 000 cases and 145 000 unique defendants, predicted prosecutors' charging decisions accurately in 88 % of cases (189/215, see Figure 7 p. 20) [21,41,42]. Furthermore, AI predicted accurately 82 % of verdicts in in asylum cases [21,42,43] as well as 70 % of US Supreme Court rulings and 72 % of the justices' votes [21,42,44].

This raises questions as to why some predictive models are better than others. What makes legal decisions predictable? A key explanation of predictability is consistency or uniformity of the data. In other words, if a model is able to identify variables that always, or very often, are present in cases with a certain outcome, but not in cases with the opposite outcome, then those variables have high predictive value. Possibly, this means that predictability would be greater in the lower courts and/or for very frequent decisions with fewer opportunities for judicial creativity compared to the innovative and novel situations associated with laying down precedent in the higher courts [38].

Based on experience and/or data, lawyers may have hunches as to what types of legal decisions are easier to predict than others. I had one such hunch myself, based on previous research into petitions for new criminal trials in Sweden. According to the Swedish Code of Judicial Procedure, the possibility to petition for a new criminal trial opens up after a Court's judgment, whether conviction or acquittal, has become legally binding and can no longer be appealed [45]. After a conviction has become legally binding, there is typically a pronounced interest to not reopen the case, for example because victims' families would not be able to rely on that a case is finally closed. This interest must be weighed against the interest of finding the material truth in a criminal case. The tradeoff between these interests in Swedish law has resulted in that petitions for new trials are only granted in very limited circumstances, e.g. that new evidence has appeared and this evidence probably would have resulted in an acquittal or a more lenient classification of the crime or sentence, had it been known in the original proceedings. Other bases for granting a new trial is that a claim has been substantiated that a judge deciding the case was partial or that an issue of law has been reconsidered by a superior Court, e.g. regarding the legality of a certain substance. The access to state funded legal counsel is very limited for convicted individuals who wish to apply for new trials and therefore, most commonly, they apply on their own without any legal assistance [46]. Occasionally, a legal counsel is appointed or works with the petition pro bono. Furthermore, prosecutors can also apply on behalf of a convicted individual. This is in line with prosecutors' neutrality obligations, and usually happens regarding issues of law, e.g. when it has become clear, through the judgment of a superior Court, that conduct previously considered illegal is not. Petitions by any of these actors should be submitted to the Court superior of the Court that convicted the individual, i.e. to an Appellate Court if the conviction is from a District Court and to the Supreme Court if the conviction is from the Appellate Court.

My hunch told me that petitions for new criminal trials would be fairly easy to predict, in fact even without AI. For example, previous research has illustrated that, only with very few exceptions, petitions from private individuals are rejected [45]. Private individuals therefore end up submitting repeated petitions with similar content and, subsequently, face repeated rejection. For example, in the time period 2015–2020, one individual applied 39 times and had all petitions rejected [46]. This trend is unsurprising as the right to legal counsel is reduced when petitioning for a new trial and some private individuals, often incarcerated at the relevant time, spend years trying to convince lawyers or journalists to take on their cases pro bono, but without success. Failing to get qualified assistance, they face an enormously difficult task on their own. Prosecutors, who can also apply for new trials on behalf of private individuals tend to do so primarily when it comes to legal rather than factual errors [45,46]. For example, prosecutors may apply on behalf of individuals convicted of crimes involving narcotic drugs, if it later turns out that the substance is not classified as a narcotic drug. These applications are streamlined in the sense that all individuals convicted on that same basis would, most likely, be granted a new criminal trial. Hence, the available data points to trends in the decision making regarding petitions. It is possible that these trends can be used to predict also future decisions. If outcomes can be predicted with very high accuracies on the basis of such superficial criteria, it raises questions as to what extent the petitions are being reviewed in detail and depth for their *merit*. Regression analysis enables the prediction of future cases based on past cases and is therefore a valuable tool in this regard. In the legal field, regression analysis has many potentially relevant implications, one which is to better understand what variables are correlated with different decision outcomes [47,48]. It provides information distinctively different than what can be read in books of law or legal doctrine as to what variables should be decisive for judges decisions. Instead, regression analysis provides information about which variable may, in applied settings, in fact be decisive for judges' decisions. As such, regression analysis is silent on "the law in books" and instead more informative about "law in action" [49]. One important aspect to keep in mind when interpreting the result of regression analysis is that it can only provide information about correlations, not causality. In other words, when certain conditions are met, e.g. a petition for a new criminal trial is submitted by a prosecutor, it seems that the decision outcome is usually "granted" whereas when a convicted individual applies, the decision outcome is usually "rejected". This means that the variable legal representation can help us predict what the decision outcome will be. Yet, legal representation is not necessarily the reason why a petition is or is not granted. For example, having legal representation often correlates with other factors that would benefit a petition, for example the type and amount of evidence, the quality of the legal reasoning to support the petition, and so on.

Hence, the purpose of this research is two-folded:

(1) To conduct regression analysis on the basis of 3915 decisions regarding petitions for new criminal trials made during the time period 2010–2020 by the six Swedish Courts of Appeal and The Supreme Court. This entails all decisions made by the Courts during that time period. The regression analysis results in a model suggesting the relative importance of different variables and also provides an overall predictive value, that is, that by using certain variables, a certain percentage of the cases should, according to the model, be accurately classified as rejected or granted.
(2) To use the regression model to predict the outcome for 251 petitions for new criminal trials submitted in 2021. This provides essential information about how important factors such as legal representation, type of crime, and so on, appear to be. The predicted decisions is then compared to the actual decision to obtain an overall accuracy of the model.

2. Method

2.1. Regression analysis based on cases from 2010 to 2020

To enable the regression analysis, all petitions for new criminal trials which had been decided by the Swedish Supreme Court and the six Courts of Appeal were requested and received electronically. This enabled inclusion of a range of different types of cases during a 10-year time period. All decisions were reviewed and coded manually. The decisions were coded for the following variables: a) case number, b) Court, c) type of crime, d) does the applicant have legal representation; i.e. a prosecutor applying on behalf of a private individual, a private individual applying on his/her own, or with assistance from a defense counsel, and e) decision: approved or rejected [45,46].

After coding was completed, the regression analysis was initiated. To make informed decisions about in which order predictor variables go in to the model, an assessment has to be made as to what variables are more important. To enable such an assessment, preliminary chi-square analyses were conducted to see what variables were significantly associated with the case outcome and to what extent the variables changed the applicant's odds of being granted or rejected a new criminal trial. Hence, the order in which the variables were entered into the model was based on the odds ratios for the respective variables. Then, a logistic regression analysis using the enter method was conducted.

2.2. Testing of regression model with cases from 2021

To enable the testing of the regression model, all decisions regarding petitions for new trials to a convicted individual's advantage made during 2021 were requested from each Court, resulting in a total of 251 cases. Then, the predicted and actual decision categories were determined. The predicted decision category was determined on the basis of the variables identified as having the strongest predictive value under 1), that is, whether the petitioner had legal representation and 2) what type of crime the petition concerned. Thereafter, the actual decision made about the petition was noted and compared to the predicted decision. After this had been done for all petitions, the overall accuracy of the model (%) was calculated.

3. Results

3.1. Regression model based on cases from 2010 to 2020

The results of the chi-square analyses as illustrated in Table 1 decided in which order the predictors were entered into the regression model.

3.1.1. Applicant (legal representation)

The results in Table 1 illustrate that there was a significant association between whether the applicant had legal representation and whether the application was approved, $\chi^2(2) = 2730.78\rho < .001$.For example, the odds of an approved petition were 1361.66 times higher when the prosecutor applied compared to when a private individual without legal counsel applied. Similarly, for individuals who applied with assistance from legal counsel other than a prosecutor, the odds were 9.94 times higher than for those individuals who applied on their own.

Table 1
Chi-square tests for possible predictor variables to be entered into regression analysis.

Possible predictor variables	Largest difference in odds ratio	Order to be entered into regression model (enter method)
Applicant***	1362	1
Repeated application ***	1029	2
Type of crime***	129	3
Court***	5.53	4

Note. *** p <.001,

3.1.2. Repeated application

There was a significant association between whether the application was repeated or a first-time application and whether the application was granted or not, $\chi^2(1) = 97.88\rho < .001$. More specifically, the odds of a granted application was 1029.40 times higher if the application was a first-time application compared to a repeated (twice or more) application.

3.1.3. Type of crime

There was a significant correlation between whether the application concerned tax crime or drunk driving compared to other crime types, and whether the application was approved or not, $\chi^2(1) = 2624.45\rho < .001$.The odds of an approved petition were 128.72 times higher when the application concerned tax crime or drunk driving compared to other crime types.

Notably, the "other" category includes a wide range of crimes such as assault, sexual assault, rape, fraud, homicide, domestic violence, and so on. While all these crimes are distinctively different from one another, separating them did not significantly improve or change the model. For example, there were no differences in odds of a granted petition when comparing tax crime/drunk driving to rape or when comparing tax crime/drunk driving to fraud. Therefore these crimes were all included in the "other" category.

3.1.4. Court dealing with the petition

There was a significant correlation between which Court dealt with the application and whether the application was approved or not $\chi^2(6) = 572.70\rho < .001$. For example, the odds of an approved petition were 5.53 times higher in Svea Court of Appeal compared to the Supreme Court. Furthermore, the odds of an approved petition were 2.24 times higher in the Court of Appeal of Upper Norrland compared to Svea Court of Appeal.

In the next section, regression analysis using stepwise entry was used to evaluate whether and to what extent these variables alone or in interaction could be used to significantly predict the decision on a petition for a new trial.

3.1.5. Decision prediction based on legal representation, repeated application, type of crime and Court

A logistic regression was performed to examine whether the variables alone or in interaction significantly predicted decisions about applications for new trials. The decisions were dummy coded using the following codes, for decision, 0 = rejected, 1 = granted, for type of crime, 1 = tax crime or drunk driving, 2 = other crimes and, for

applicant, 1 = prosecutor, 2 = private individual with no legal counsel, 3 = private individual with legal counsel, for repeated application, 0 = no and 1 = yes, and for Court, 1 = The Court of Appeal of Western Sweden, 2 = The Court of Appeal of Southern Sweden (Skåne and Blekinge), 3 = Göta Court of Appeal, 4 = The Supreme Court, 5 = The Court of Appeal of Lower Norrland, 6 = The Court of Appel for Upper Norrland and 7 = Svea Court of Appeal.

The results are illustrated in Table 2. Three variables came out significant. Whether the applicant had legal counsel significantly predicted decisions on applications for new criminal trials, Wald $X^2(7) = 777.27$, $p < .001$, see b for the respective categories of applicants in Table 2. Also, whether the application was a repeated application or a first-time application also significantly predicted the decisions, $b = -2.582$, Wald $X^2(1) = 6.54, p = .011$, and so did the type of crime, $b = -4.07$, Wald $X^2(1) = 513.74, p < .001$. Since adding the variable repeated application did not improve the model (92.70 % both before and after), it was excluded from further analysis.

The percentage of cases accurately predicted is stated as the added effect of variables already entered in the table, with 95.70 % of the cases accurately predicted when using the constant and the two predictor variables: 1) applicant (legal representation) and 2) type of crime.

Note that these predictions were made without any reference whatsoever to the substance or merits of the case raised by the applicants. In other words, without even reading the applications, and only looking for two variables 1) whether the applicant had legal representation and 2) what type of crime the petition concerned, 95.70 % of the petitions could be accurately classified into one of the two categories: 1) Approved or 2) Rejected.

3.2. Testing of regression model with cases from 2021

The regression model was tested with cases from 2021 that had not been included as a basis for the model. This was in order to test the predictive value of the model, that is, whether the outcome for also other petitions, decided later on, could be predicted accurately using the older data.

Based on the final model, the expected probabilities and the expected group membership of the outcome variable were calculated.

Table 3 lists the different expected probabilities, that is, the strength with which a certain outcome is predicted, ranging from 0 to 1 where numbers lower than 0.5 suggest a rejection (more strongly the lower the closer to 0 the number) and numbers over 0.5 suggest an approval (more strongly the closer to 1 the number is). Also, Table 3 lists the predicted group memberships depending on 1) Representation, that is, whether an individual applied on his/her own, had legal counsel or the prosecutor applied on the individuals behalf alternatively the prosecutor seconded the application, and 2) Type of crime, that is, whether the application concerned either a tax crime or drunk driving or other types of crimes.

Table 2
Predictors of decisions on applications for new criminal trials using logistic regression analyses (enter method).

Decisions on applications for new criminal trials		
Variable	*b*	Cases accurately predicted based on variable (%)
Constant	-0.945***	72.00 %
Applicant		92.70 %
Individual without legal counsel v. prosecutor	−7.216***	
Individual with legal counsel v. prosecutor	−4.920***	
Repeated application	−2.582***	92.70 %
Type of crime	−4.045***	**95.70 %**

Note. Model $X^2(4) = 3593$, $p < .001$. $R^2 = .603$ (Cox & Snell R Square), $= .869$ (Nagelkerke R Square). *** $p < .001$.

Table 3
Predicted probabilities and group membership based on representation and type of crime.

Representation	Type of Crime	Predicted probability	Predicted group membership
Prosecutor	Tax crime or drunk driving	0.99737	Approved
Legal counsel	Tax crime or drunk driving	0.81050	Approved
No counsel	Tax crime or drunk driving	0.39719	Rejected
Prosecutor	Other	0.86685	Approved
Legal counsel	Other	0.06832	Rejected
No counsel	Other	0.01117	Rejected

As illustrated in Table 3, if, for example, a prosecutor applied on behalf of an individual regarding a tax crime or drunk driving, the model predicts that the application will be approved, with a high probability (0.99737). If, for the same crime type, instead of a prosecutor, the individual is represented by legal counsel, the prediction is also that the application will be approved, although the probability of an approval is slightly lower (0.81050). The lowest probability of an approval was found for individuals who apply without any legal representation for other types of crimes than tax crime or drunk driving (0.01117). Due to the dichotomous nature of the decision variable (approve or reject), when the predicted probability is lower that 0.5, the predicted group membership is rejected, and vice versa, when the predicted probability is 0.5 or higher, the predicted group membership is approved.

All petitions for new criminal trials decided by the six Courts of Appeal and the Supreme Court in 2021 (n = 251) were thus reviewed with reference to 1) representation and 2) crime type and based on these two variable the predicted probability and the predicted group membership (approved/rejected) were established. These predictions were then compared to the actual decision regarding the petition.

In the Online Supplementary Material all predictions and decisions for all 251 petitions are outlined in **Table S1**. To illustrate the procedure followed, Table 4 below contains a few examples from different Courts.

Because the predicted and the actual decisions were the same in all cases, the model's prediction accuracy was 100 %. As outlined in **Table S1** in the Online Supplementary Material the prediction accuracy was still 100 % when all 251 petitions were analyzed.

Hence, without any knowledge of the substance or merits of the applications, but only using information about 1) whether the applicant has legal representation and 2) type of crime, the model predicted, 100 % accurately, all the petitions for new criminal trials decided by the Courts in 2021.

3.3. Further testing

To ensure that the results pertaining to 2021 were not an outlier, an additional regression model was created on the basis of data between 2010 and 2019. This data was then used to predict decisions during 2020.

Using the same procedure as for the data 2010–2020, a logistic regression was performed to examine whether the variables alone or in interaction significantly predicted decisions about applications for new criminal trials.

The results are illustrated in Table 5. Three variables came out significant. Whether the applicant had legal counsel significantly predicted decisions on applications for new criminal trials, Wald $X^2(7) = 777.98$, $p < .001$, see b for the respective categories of applicants in Table 5. Also, whether the application was a repeated application or a first-time application also significantly predicted the decisions, $b = -2.105$, Wald

Table 4
Examples of Predicted and Actual Decision Categories for Petitions Decided in 2021.

Court	Case No.	Representation	Type of crime	Predicted decision	Actual decision	Prediction
Supreme Court	6	No counsel	Other	Rejected 0.01117	Rejected	Accurate
Svea CoA	201	Legal counsel	Other	Rejected 0.06832	Rejected	Accurate
Göta CoA	208	No counsel	Other	Rejected 0.01117	Rejected	Accurate
Western Sweden CoA	218	Prosecutor	Drunk driving	Approved 0.99737	Approved	Accurate
Southern Sweden CoA	247	Legal counsel	Other	Rejected 0.06832	Rejected	Accurate
					Prediction accuracy	**100 %**

Note. In the table, "CoA" stands for Court of Appeal. To protect the identity of the individuals involved in the cases, the Courts' case numbers were omitted and all cases were assigned a number between 1 and 251.

Table 5
Predictors of decisions on applications for new criminal trials (2010–2019) using logistic regression analyses (enter method).

Decisions on applications for new criminal trials		
Variable	*b*	Cases accurately predicted based on variable (%)
Constant	-0.937***	71.90 %
Applicant		92.70 %
Individual without legal counsel v. prosecutor	−4.920***	
Individual with legal counsel v. prosecutor	−2.296***	
Repeated application	−2.105***	92.70 %
Type of crime	−4.066***	**96.50 %**

Note. Model $X^2(4) = 3593$, $p < .001$. $R^2 = .603$ (Cox & Snell R Square), $= .869$ (Nagelkerke R Square). *** $p < .001$.

$X^2(1) = 506.483, p < .001$, and so did the type of crime, $b = -4.066$, Wald $X^2(1) = 514.00$, $p < .001$. Since adding the variable repeated application did not improve the model (92.70 % both before and after), it was excluded from further analysis.

Similar to the regression model built on data from 2010 to 2020, the additional regression model built on data from 2010 to 2019 could accurately predict 96.50 % of the petitions as either approved or rejected, based on the two variables: 1) whether the applicant had legal representation and 2) what type of crime the petition concerned.

With the additional regression model, the expected probabilities and predicted group memberships were very similar to those obtained using the first regression model, see Table 6.

The predicted probabilities and predicted group memberships outlined in Table 6 were used to predict outcomes for petitions decided in 2020. These predictions were then compared to the actual decisions regarding the petitions. As illustrated by **Table S2** in the Online Supplementary Material, when all petitions for new criminal trials decided by the six Courts of Appeal and the Supreme Court in 2020 (n = 250) were reviewed with reference to 1) representation and 2) crime type, 98.80 % of the petitions were classified accurately.

Table 6
Predicted probabilities and group membership based on representation and type of crime.

Representation	Type of Crime	Predicted probability	Predicted group membership
Prosecutor	Tax crime or drunk driving	0.99621	Approved
Legal counsel	Tax crime or drunk driving	0.86701	Approved
No counsel	Tax crime or drunk driving	0.34412	Rejected
Prosecutor	Other	0.86572	Approved
Legal counsel	Other	0.07021	Rejected
No counsel	Other	0.01201	Rejected

Hence, the further testing pertaining to a subset of the data used for the original analysis, suggests that the results obtained were not random or unique to the year 2021. The slightly higher accuracy rate for year 2021 (100 %), compared to 2020 (98.80 %), is likely due to the fact that the regression model benefited from the additional data of 2020. In other words, the data of 2020 helped the model make more accurate predictions for 2021.

4. Discussion

The purpose of this study was to test whether and to what extent legal decisions on petitions for new criminal trials can be predicted on the basis of fairly superficial criteria that one could access without even reading the case file, for example which Court is deciding, whether the applicant has legal representation, and so on. Using a regression model based on decisions made in 2010–2020 (n = 3915), decisions regarding petitions made in 2021 were predicted. The results suggest that 100 % of the decisions made in 2021 could be predicted accurately on the basis of 1) whether the applicant had legal representation and 2) what type of crime the application concerned. This percentage should be seen in the context that the decision outcome was dichotomous (approval or rejection) and therefore, 50 % accuracy is expected by pure guessing.

The results in this study raise primarily three questions: a) why were the decisions on petitions for new criminal trials so easy to predict?, and, if 100 % of judges' decisions can be predicted accurately without even opening the case file, then b) how do we know that the petitions are decided based on their material content and merits?, and c) why do we need judges?

When considering a) why the decisions were easy to predict, it should be emphasized that the regression model was built on archival data. As such, we cannot know whether the two identified predictor variables; legal representation and crime type, are the real explanations as to why the petitions were approved or rejected. We do know, however, that those variables are strongly correlated with certain outcomes. It is possible, and even likely, that the variables are also correlated with other variables that are alternative or supplementary explanations of the outcome. For example, whether the applicant has legal representation is likely to be correlated with the evidence and the quality of the legal reasoning referred to in the application. Generally, with better evidence and legal reasoning, the odds of an approved petition should improve. Yet, this is a circular argument. If applicants can only be granted new trials if they have sufficient evidence and legal reasoning supporting

their case, and this requires legal representation, then the odds of success may be more strongly related to legal representation than anything else, i.e. not necessarily what the merits of the case would have been, had the applicant had access to legal representation.

The reasoning above highlights that we simply do not know the answer to question b), that is, whether the petitions are decided based on their material content and merits. There is a risk that they are not. This can be both because individual petitioners are unable to put forward a persuasive case and because judges, consciously or subconsciously, have expectations that those petitions will not be sufficient. The powerful impact of expectations on perceptions and decision making should not be forgotten [50]. Adding to this uncertainty, the Courts rarely or never use other than standard phrases to motivate their decisions, e.g. "the applicant has not showed any circumstances motivating that the petition is granted". Formulating such standard phrases would of course be possible even if the case files has, in fact, never been opened. Furthermore, it is likely that at least some of the private individuals who would be able to persuade the Courts, if they had legal representation, will never get access to legal representation, due to procedural rules, financial issues, and so on.

Regardless of whether the decisions on petitions for new criminal trials are based on the material content or not, if a regression model behaves exactly the same way that judges do, then c) why do we need judges? Arguably, if the cases were just decided on the basis of the two identified predictor variables, the waiting times to receive decisions would probably be shorter, which would be in line with the idea of a speedy criminal procedure. Furthermore, it would probably be cheaper than having human judges decide. The reasoning here is intentionally provocative but would we really, as is commonly pointed out, miss the human element? [38] If judges make 100 % predictable decisions and do not necessarily motivate them at all, then the process is already fraught with transparency issues [38]. Against this, it can be argued that the results observed here only refer to a specific type of decision and only examines prediction accuracy for one year (2021), verified by additional analysis pertaining to another year (2020). There is clearly no evidence that prediction accuracy would be as high for other types of decisions and for other time periods. However, even if using the two predictor variables would generate the exact same decisions as judges for all legal decisions made for ever and ever more, it is likely that we, or at least many of us, would still be averse to the idea of not having human legal decision makers. Even if we realize that human decision makers are not flawless, those flaws are more familiar and less intimidating to us than potential flaws in predictive models or automated systems. Importantly though, such an attitude may be based more strongly in beliefs and motivations to trust judges, rather than empirical facts suggesting that judges, in fact,do a better or different job than anyone or anything else could.

Importantly, often, automated decision making is perceived as a threat to fundamental legal concepts such as procedural fairness, contestability, transparency, accountability and individualization. These concepts are often believed to be better promoted through maintaining existing systems with human discretionary decision making. This research does not purport to determine whether this is the case or not. Instead it focuses on how such concepts may be threatened even when judges maintain their full discretion, without any involvement of AI. As pointed out above, judges' decisions for 2021 could be accurately predicted on the basis of two simple variables accessible without opening a case file and without using AI. This raises questions pertaining to fundamental legal concepts such as procedural fairness, transparency, and individualized justice, issues already discussed in the literature on AI in the legal context [51,52]. Hence, predictive modelling can, and should, be seen as a possibility to evaluate underlying trends in legal decision making, and should not automatically be associated with AI, and how AI may one day replace judges.

5. Conclusion

This study started off by exploring two different but related types of predictability in legal decisions, particularly in the context of criminal law and procedure. Clearly, criminal law should be predictable in the sense that like cases should be treated alike, prosecutors and judges cannot freely invent new crimes, and so on, but not all types of predictability are necessarily attractive. If, for example, judges' decisions can be predicted on the basis of fairly superficial criteria, that one can have access to without even opening a case file, this makes most of us slightly uncomfortable. The example of petitions for new criminal trials in Sweden used in this research highlights that the latter form of predictability may be at play. At the same time, it is unknown exactly why and whether the same or even similar results would be found for other types of decisions or other time periods. It is possible that there are also other types of decisions in the context of criminal law that are easy to predict. This may entail, for example, decisions on whether to grant leave to appeal or decisions on whether to approve petitions for fixed sentences. Future research should examine predictability of such decisions as well as other more complex decisions including legal precedent.

In sum, and as an answer to the question posed in the title of this paper; whether criminal justice is predictable, the following can be said. The results found in this study suggest that some types of legal decisions made in the context of criminal law are predictable, while nothing is known about other types of decisions. However, regardless of to what extent also other decisions can be predicted, arguably, many of us, for a foreseeable future, would still have a preference for human decision makers. This may have to do with factors such as relatability and accountability. As such, it is unlikely that judges will be replaced by algorithms or predictive models any time soon. A more reasonable approach is probably to use such models to understand trends in decision making and to seriously consider what those trends mean. With petitions for new criminal trials specifically, it seems motivated to ask how we can ensure that the petitions are decided based on their merits rather than something else, while the implications will of course vary for different types of decisions. Regardless, it appears that predictive modelling can unlock new understandings of legal decision making. Such understandings can, in fact, help us understand what steps need to be undertaken to promote the rule of law. In other words, also predictability stemming from modelling and algorithms can be positive for criminal justice, if interpreted and used wisely.

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CRediT authorship contribution statement

Moa Lidén: Conceptualization, Methodology, Formal analysis, Investigation, Resources, Data curation, Writing – original draft, Writing – review & editing, Supervision, Project administration.

Declaration of competing interest

The author declares no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Appendix A. Supplementary material

Supplementary data to this article can be found online at https://doi.org/10.1016/j.scijus.2023.12.001.

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