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RESEARCH NOTE

The Effects of Decision Fatigue on Judicial Behavior: A Study of Arkansas Traffic Court Outcomes

Rahul Hemrajani[1] and Tony Hobert, Jr.[2]

[1]National Law School of India University, Bangalore, India and [2]Winthrop University, Rock Hill, SC, Department of Political Science, Philosophy, Religion & Legal Studies
Corresponding authors: Rahul Hemrajani and Tony Hobert, Jr.; Emails: rahulhemrajani@nls.ac.in; hoberta@winthrop.edu

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Abstract
Judges who hear multiple cases a day may become exhausted by the time later cases are heard, increasing susceptibility to cognitive depletion, yet the role of workload fatigue in decision-making from hearing cases has rarely been tested in the U.S. One problem is the lack of public data—most U.S. courts do not maintain time-stamped records of case hearings. Using an original dataset of all traffic cases heard in Pulaski County, Arkansas in 2019 and 2020, we examine whether decision fatigue affects case outcomes. We find that charges are less likely to be dismissed in arraignment hearings at the end of a court session than in those at the beginning. This pattern, however, does not hold for trial hearings, suggesting that the effects of fatigue may be context-specific. We suggest policy recommendations to mitigate the effects of decision fatigue in lower courts—courts having the most contact with citizens.

Keywords: decision making; judicial behavior; legal realism; mental depletion; methods

Beyond policy preferences and ideology, judges—especially those of lower courts—are influenced by other motivators, including promotion, public opinion, and desire for leisure (Baum 2009), all of which a judge is better able to attain if they are time-efficient. To improve this time-efficiency, judges employ a range of heuristics—cognitive short-cuts—to render judgment more quickly (Perez 2016; Rachlinski, Guthrie, and Wistrich 2007). Despite this and other strategies, judges grow fatigued on the job, which may alter their judgments. Examining workload fatigue, Epstein and Knight (2013) find busier judges on appellate panels are more likely to render decisions that save time. Similarly, Cohen (2009) finds that judges penalize criminal defendants in busier counties.

In one of the most widely cited studies in judicial politics, Danziger, Levan, and Avnaim-Pesso analyzed the voting behavior of two Israeli parole boards and found "that when judges make repeated rulings, they show an increased tendency to rule in

favor of the status quo [which] can be overcome by taking a break to eat a meal" (2011, 6892). The original study emphasizes "the effects of short rest, positive mood, and glucose on mental resource replenishment" for judges (Danziger et al. 2011, 6892). As such, Glöckner (2016) terms this manifestation of decision fatigue "the hungry judge effect"—a widely-used term (e.g., Bublitz 2020; Chatziathanasiou 2022) that is something of a misnomer in studies like this one, as we are agnostic regarding the causal mechanism of the phenomenon.

Though oft-cited, Danziger et al. (2011) are not without detractors. Weinshall-Margel and Shapard (2011) claim the order of case presentation was non-random and dictated by legal representation. Glöckner (2016) claims the "hungry judge effect" could be an artifact of autocorrelation and judges' time management strategies, including selective case dropout. As one Law School professor summed it, "I would like to see something similar in another group of judges before I really believe it is a finding of general importance" (Corbyn 2011).

Our goal here is to expand this line of research and ascertain whether the "hungry judge effect" manifests in the U.S. context. Courts like the U.S. Supreme Court and Courts of Appeals generally hear few cases per day and have considerable time to deliberate before rendering a decision. By contrast, lower courts typically hear multiple cases a day and often reach some decision in each of them immediately (Abraham 1998), but hearing-level data from such lower courts is generally not available, making evaluation difficult.

Judges themselves recognize the consequences of decision fatigue in their work. Swenson et al. (2020) surveyed more than a thousand American judges and found "long hours of work without a break" among the most severe stressors, as was being "unable to hear as many cases as needed" (10–11). The most-reported effects of such stress include "fatigue and low energy" and "interference with attention and concentration" (13). This lack of energy and attention can lead to biased decision-making, which impacts the lives of litigants.

In line with past mental depletion research (Muraven and Baumeister 2000; Pocheptsova, Amir, Dhar, and Baumeister 2009; Shroff and Vamvourellis 2022), we emphasize the effect of fatigue on judges' mental states. We expect that judges grow more fatigued as they hear cases. Since this fatigue leads to depletion of cognitive capabilities, a judge is likely to be less deliberative about a case heard later in the session. Regarding dispositional outcome, we expect that the greater the continuous amount of time a judge spends hearing cases in a session, the more likely they will be to render the least mentally taxing decision in a case.

In this short article, we use an original dataset of all traffic cases disposed in 2019 and 2020 in Pulaski County, Arkansas to test whether fatigue affects case outcomes. We find evidence of mental depletion: judges are less likely to dismiss charges for cases heard at the end of a session compared to those heard at the beginning in arraignment hearings. Recent survey research indicates American judges experience on-the-job fatigue, and our study sheds light on its real-world effects. An overworked lower judiciary can lead to substantive effects on the quality of justice that it produces. We offer policy recommendations to reduce decision fatigue and ensure fairness to all litigants.

Depletion in Arkansas traffic court

Arkansas traffic courts are a particularly apposite context to test the hungry judge effect because these courts generally hear multiple cases each day and, in most cases,

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render decisions immediately. As one Arkansas traffic court judge put it, "I like to tell people the Supreme Court of the United States takes an average of 75 cases a year. I usually do that before noon on Wednesday" (Judge Vic Fleming, personal communication). Traffic courts are also typically lower-stakes environments than other courts, with most offenses being punished with only a fine and very few having short jail sentences (Fleming 2010). Such relatively low stakes likely enhance the effects of depletion. Arkansas has a robust data collection protocol for its traffic courts, and these data can be queried through a public website. Arkansas also does not allow jury trials or panel hearings for traffic infractions, ensuring that any case decision can be attributed to a single judge.

To better understand this context, we conducted several interviews with Arkansas Traffic Court Judge Vic Fleming, via phone and email. We also observed an arraignment session of the Little Rock District Court, 2nd Division (Traffic Court), noting the procedures, time elapsed for hearing dispositions, case scheduling, charge dismissals, and breaks taken by the court. We also conducted interviews with the chief clerk, the prosecuting attorney, the defense attorney, other clerks and court officers, and the presiding judge (Vic Fleming).

For any person found to commit one or more traffic infractions in Arkansas (hereafter referred to as the ticketed driver), the process is as follows: the ticketing officer submits the ticket (documenting all charged infractions) to the district court of the county in which the offense was committed. Usually, the ticket can be paid online or at the court window without the need for a formal hearing. These are "non-mandatory court" offenses for which the court does not schedule a plea and arraignment hearing (hereafter referred to as an arraignment). An arraignment is only scheduled if the driver refuses to pay or wishes to challenge the ticket. For some charges—typically Class B and unclassified misdemeanors—or when more than two charges are on a single ticket, jail time is a potential outcome, and an arraignment is mandatory.

The ticketed driver arrives at court on their scheduled day; cases are called up according to the order in which the clerks have processed them. The stack of docketed tickets (typically 50 to 500) is handed to the defense attorney and the prosecuting attorney. Consistent with our observations, the Chief District Court Clerk (who oversees the scheduling process) and both the defense and prosecuting attorneys confirmed that the case scheduling was random and that neither the number of charges nor their severity affects the order in which they are heard. Drivers still young enough to attend secondary school are allowed to "cut" line, having their case called before the judge as soon as they are processed so that they do not miss more school than is strictly necessary. Such cases accounted for less than 8% of all those we observed in the Little Rock District Court (abnormally high, we were told by both attorneys), which were in any event dispersed across the observation period without a discernible pattern. The software running the audio recording system notes the time of the start of a hearing and pushes this to the case status page; it is this time-stamp that we used for our time variable. Both the presiding judge and the clerk operating the system confirmed that these time-stamps are accurate.

At the arraignment, the ticketed driver can plead guilty, not guilty, or nolo contendere (no contest). In the case of a guilty or nolo contendere plea, a decision is rendered immediately by the judge. If the ticketed driver pleads not guilty and charges cannot be dismissed immediately, a trial is scheduled. During the trial, the judge hears and considers arguments from the prosecutor and the defense, and

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typically renders a decision (guilty, not guilty, or dismissed). During our observation, arraignment took anywhere from 22 seconds to 5 minutes and 25 seconds, with a median of about a minute. As per our interviews, trials take approximately 1–2 hours.

This system necessitates two levels of judicial decision-making. On the first level, for each charge, the judge must decide whether the ticketed driver is guilty. On the second level, if the ticketed driver is found guilty, the judge decides the punishment. Typically, this means the judge decides the fine amount to be paid for each charge, set within the bounds of a statutory minimum and maximum.

If depletion theory holds in this context, we are likely to see a change in decision-making at both levels as the judge hears more cases. Like the mental depletion literature cited by Danziger et al. (2011)—e.g., Muraven and Baumeister (2000); Pocheptsova et al. (2009)—we emphasize the effect of fatigue on judges' mental states. Psychology research posits that decision-making draws upon a finite cognitive resource, particularly depleted when choices require self-control (Baumeister et al. 2006; Vohs et al. 2008). According to this perspective, resource depletion leads individuals to opt for choices that conserve this mental resource. Like Danzinger et al. (2011a), we call this the "status-quo" option.

The least mentally taxing decision at the first level is confirmation of the charge. When asked, Judge Fleming explained that this is the case because charges are typically based upon officer testimony that is treated as one or more assertions of fact (e.g., testimony regarding readings from light detection and ranging (LIDAR), breathalyzer, etc.). Such testimony can generally only be countered with evidence that directly challenges those assertions—a weighing of evidence that could only take place at a trial. During arraignments, such evidence is generally afforded the benefit of the doubt, and the default choice is to confirm a charge. This leads to the following hypotheses:

> *Charge Dismissal Hypothesis*: The more time that a judge has spent hearing cases since the last break, the lower the likelihood that they will dismiss a charge in a case.

The least mentally taxing decision at the sentencing level is likely to be the statutory maximum fine, since this is what people who did not go to court pay "at the window". This leads to the following hypotheses:

> *Fine Imposition Hypothesis*: The more time that a judge has spent hearing cases since the last break, the higher the fine they are likely to impose in a case.

Both our observations and interviews indicated that judges have little discretion in deciding cases, though mitigating details (e.g., the ticketed driver has a clean record) may convince the judge to dismiss minor charges in a case involving multiple charges. For example, in a case involving a suspended license, speeding, and driving without wearing a seatbelt, a judge may dismiss the no-seatbelt charge. Similarly, a judge has considerable discretion in dismissing FTA (Failure to Appear) and duplicative charges. In terms of depletion theory then, we expect to find that:

> *Dismissal Ratio Hypothesis*: The more time that a judge has spent hearing cases since the last break, the lower the proportion of charges that will be dismissed in a case.

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As stated above, the depletion effect of time is most likely to manifest in scenarios wherein judges make many decisions in rapid succession with relatively low stakes. Consequently, we expect to observe our hypotheses in arraignment hearings, rather than trials. In other words, we do not expect to see such heuristic decision-making (or mental depletion) during trials, where stakes are higher and judges have more time to consider evidence.

Data

We built an automated web-scraper running on a headless browser to query the Arkansas judiciary website for each case number and obtain the relevant case information. We ran the web-scraper for all case numbers disposed in 2019 and 2020 in Arkansas's most populous county (Pulaski). Through pattern-based string-matching, we gleaned information about the judge, officer, attorneys, and parties involved in each case. We also obtained data regarding plea hearings, trials, and total payments made in the case. Our dataset was comprised of 46361 charges in 26192 cases, including the following variables: case number, charge number, charge code, charge description, ticketed driver's name, age, whether the driver was present, the judge, officer, attorney, violation date, disposition date, plea, plea hearing date, plea hearing time, trial date, trial time, and disposition.

Variables

Our main dependent variable was disposition. To ensure consistency and to standardize the variable, we coded dismissal as a dichotomous category. All cases dismissed for any reason or where the court held that the defendant was not guilty were treated as "dismissed". All other cases, such as no contest or guilty verdicts, were treated as "not dismissed". Overall, 36.35% of traffic charges were dismissed. Most of these were charges that had to be dismissed before a hearing could be scheduled because the ticketed driver could not be located or sent a summons. Once a hearing is scheduled, a charge in an arraignment has a 21.7% chance of being dismissed, and a charge in a trial hearing has a 21.1% chance of being dismissed. This is in line with our observations during our visit, where we observed that one out of every five charges was dismissed. Our second dependent variable was the total fine amount paid in the case. Our third dependent variable was the ratio of the number of dismissals to the number of charges in each case.

Our primary explanatory variable was the time a judge spent deciding cases since a session began (i.e., time between the start of the session and when the case was decided). The morning session begins at 8:30 AM and the afternoon session begins at 1:00 PM. We did not find any systematic ordering to case scheduling, and an Arkansas traffic court judge told us cases are not ordered purposefully. Cases of all types have a near-equal probability of being heard across the day. To preempt concerns addressed in previous literature, we controlled for case type in our main model.[1] We also controlled for the judge, whether the ticketed driver had an attorney, number of charges in each case, and whether the ticketed driver pled guilty to any charge.

[1]Removing the case type control does not affect our main results.

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Methods

Most cases in our dataset did not have a plea and arraignment hearing scheduled, indicating that these tickets were paid at the window. Only 11862 out of 33178 cases (16513 out of 46451 charges) came to court for any type of hearing. Out of these, only 1153 cases (1793 charges) came up for trial. We tested our hypotheses sequentially. For our first hypothesis, we used a linear probability model to test whether time of hearing predicted charge dismissal.[2] Reasoning that results would depend on the context of the hearing, we did this for a sample of all hearings (Model 1a), as well as arraignments (Model 1b) and trials (Model 1c) separately. For Model 1a, to account for the difference between arraignments and trials, we added a control for whether the hearing was a trial.

Since we could not ascertain the fine paid for each individual charge, we tested whether time of last hearing affected the total fine paid at a case-level using linear regression (Model 2). Finally, we tested whether the time of the hearing affected the ratio of charges dismissed at the case-level through linear regression (Model 3).[3]

Results

The results for all models are presented in Figure 1 (Supplementary Table A1). We find that judges are less likely to dismiss charges in hearings taking place later in the session. When considered separately, time since the last break affects charge dismissals in arraignments but not trials. Substantively, each hour since the beginning of a session decreases the baseline probability of dismissal of a charge by around 3% in arraignments. All else being equal, the rate of dismissal in arraignments falls from around 30% at the start of the session to under 18% at its end (Figure 2). In Model 2, we find that time of hearing is not a significant predictor of fines. In Model 3, we find that judges dismiss a lower proportion of charges in cases heard later in the day. Each hour decreases the ratio of total charges dismissed in a case by 0.03.

Not surprisingly, offense type is the most important predictor of dismissals and fines and has the largest effect size.[4] Coefficients for the judge dummy, however, were not significant, indicating no differences between the dispositional and sentencing practices of different traffic court judges. The results of the models are robust to simple t-tests between different time periods, using logistic regression, additional controls, interacting offense type and session time, interacting judges and session time, as well as varying of the assumption that judges break for lunch at 12:00 PM (Supplementary Appendix).

Conclusion

Our results indicate support for the Charge Dismissal Hypothesis and the Dismissal Ratio Hypothesis. We find that the more time a judge has spent hearing cases, the

[2]We use the linear probability model to aid interpretability. In the Supplementary Appendix, we also show that the results do not change when we use logistic regression.

[3]Ratio regressions that have a ratio as a dependent variable and the denominator for the ratio variable as a predictor are valid and do not bias our results. See Firebaugh (1988).

[4]Note that since our model is based on specifically testing our hypotheses, control variables added to the models may not be interpretable (Hünermund and Louw 2020). Nonetheless, we have described our results and leave it for future research to examine these effects more carefully.

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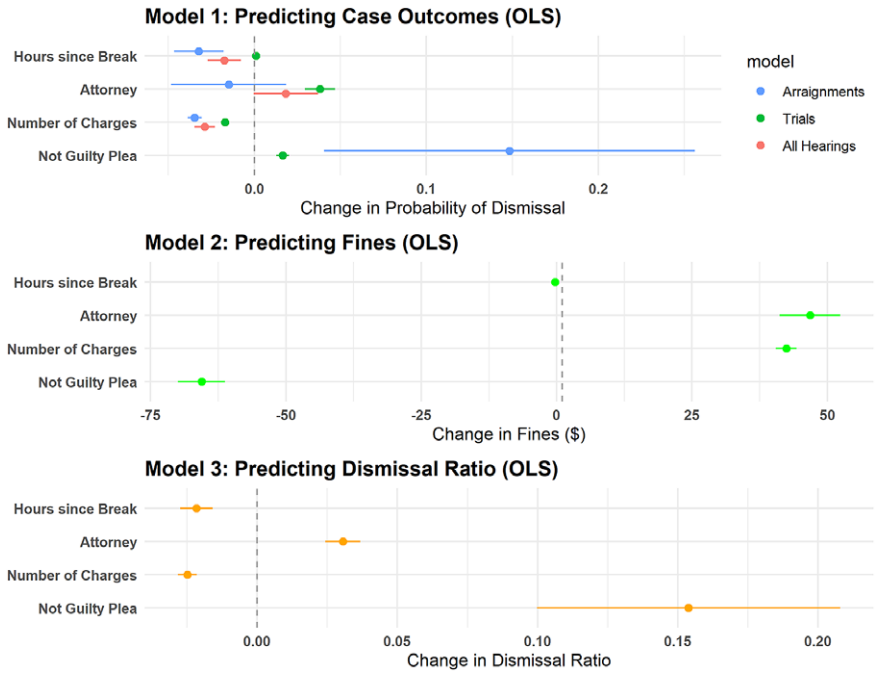

Figure 1. Dot represents coefficient values and whiskers represent 95% confidence intervals. Controls for case-type and judges are included in the model but not shown here.

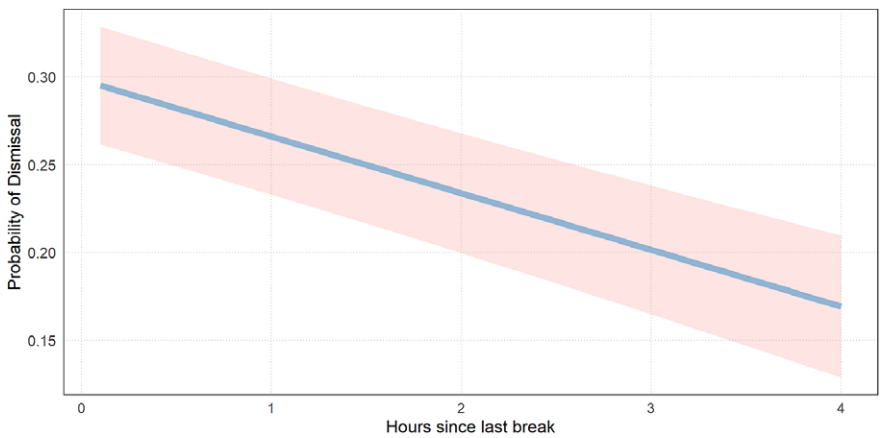

Figure 2. Predicted probability of dismissals of Speeding charge (Model 1a). Red line shows predicted probability with 95% confidence intervals. Other variables are kept constant at the median or reference category. Plea is kept constant at "Guilty."

higher the likelihood of dismissing individual charges at the plea and arraignment hearing. This pattern, however, does not hold for trial hearings, suggesting that the effects of fatigue may be context specific.

There are two reasons results might differ between the two stages of hearing. First, less time is allocated to arraignments than to trials. An Arkansas traffic court judge

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informed us he could get through as many as forty plea hearings in an hour, while a trial might take one or two hours. Trials involve weighing evidence and evaluating the circumstances of a case. By contrast, dismissals in plea hearings may be based on quick heuristic considerations about the ticketed driver and the offense. Second, arraignments have lower stakes than trials. Not dismissing a charge at the arraignment stage simply means the ticketed driver can opt to dispute the charge at trial. Not dismissing a charge at the trial stage means the ticketed driver must be punished.

Like Danziger et al. (2011), our data and models cannot clearly identify the causal mechanism of decision fatigue. It is possible that decision fatigue is due to the loss of blood glucose levels, which in turn leads to cognitive depletion. It is also possible that what we are seeing here is an indication of gambler's fallacy or quotas by the judge (Chen, Moskowitz, and Shue 2016). Further work, using more refined data regarding the order in which individual cases were heard, may shed some light on this.

Regardless of why it happens, decision fatigue—at least in Arkansas traffic court—may influence the fairness of the judicial process. Persons accused of the same offense whose hearings take place at different times should be judged equally. Based on our findings, we make three policy recommendations. First, we recommend the formulation of clear guidelines to limit the time judges spend judging. Like rules regarding maximum hours of service for Commercial Motor Vehicle drivers (FMSCA 2013), we recommend research to ascertain the time threshold at which mental depletion becomes more likely for judges and that judging be limited to this amount of time. Second, in studies of mental fatigue and workplace stress for police officers (Gershon et al. 2009), researchers recommend mitigating the deleterious effects of mental fatigue through learning and practicing self-awareness. Likewise, we recommend that judges receive training on how to self-assess their levels of mental fatigue.

Critically, our study demonstrates a lack of data on hearings in lower courts. Most courts do not keep a record of time spent on each hearing, impeding research on workload and judicial fatigue. We suggest that all courts should have a record of hearings, including the start and end times of each stage of hearing in every case. This can be done through video recordings, audio transcripts, or even a simple time-stamped record. Careful data collection will facilitate better understanding of judicial workload at the lower courts to ensure equal justice for all.

Supplementary material. The supplementary material for this article can be found at http://doi.org/10.1017/jlc.2023.21.

Competing interest. The authors have no competing interests to disclose.

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Data availability statement. Replication files for this article are available in the online version. Contact the corresponding author, Tony Hobert, Jr., at hoberta@winthrop.edu

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