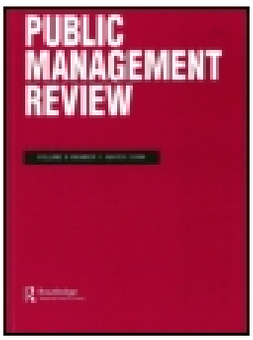

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Automation and discretion: explaining the effect of automation on how street-level bureaucrats enforce

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ABSTRACT

A dominant assumption in the street-level bureaucracy literature is that bureaucrats' discretion is curtailed by automated systems. Drawing on survey and factual data (n = 549) from Dutch inspectors, we test the effect of automation on enforcement style and whether this can be explained by discretion-as-perceived. Our results show that automation (1) increases bureaucrats' legal and accommodation style; (2) discretion-as-perceived does *not* mediate this effect; but (3) automation *does* decrease discretion-as-perceived. The main implication is that we do not find empirical evidence for curtailment and future research should move beyond discretion to understand effects of digital systems on bureaucrats' behaviour.

KEYWORDS Street-level bureaucracy; automation; discretion; digitalization; enforcement

Introduction

How decision-making is organized in public organizations is changing due to the worldwide adoption- and use of information technologies (ITs). In traditional bureaucracies, street-level bureaucrats are the ones with discretion and considerable autonomy. They use their discretion to decide how to implement written policies, while dealing with scarcity of resources such as time, in complex real life situations (Lipsky 2010; Maynard-Moody and Musheno 2000; Maynard-Moody, Musheno, and Musheno 2003; Tummers and Bekkers 2014). Public policies, then, become reality when street-level bureaucrats implement them when they meet citizens face-to-face (Bartels 2013; Zacka 2017). Zacka (2017) stresses 'public policy remains an abstraction until it is carried out. In an important respect, public policy *is* the sum total of the actions taken by street-level bureaucrats' (16, italics in original). The rise of IT systems, however, have fundamentally altered street-level bureaucrats' decision-making processes and, in turn, policy implementation practices.

At the very beginning, IT systems primarily facilitated the ordered and transparent documentation of street-level bureaucrats' decisions as well as helped process considerable higher caseloads by standardizing procedures (Bovens and Zouridis 2002). Increasingly, however, technologies routinize street-level bureaucrats' decisions and encounters with citizens (Bovens and Zouridis 2002; Zouridis, Van Eck, and Bovens 2020). To illustrate, street-level bureaucrats interact with citizens via telephone or

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email and make decisions based on electronic information. Some public services are even provided completely online (Breit and Salomon 2015; Buffat 2015). In this way, *street-level* bureaucracies morphed into *screen-level* bureaucracies (Bovens and Zouridis 2002). This is all part of a larger shift towards a 'digital-era governance' in which ITs are at the core of how service provision is structured and how bureaucrat and citizen interact (Dunleavy et al. 2006).

In addition, IT systems are also partially or fully taking over decision-making tasks from street-level bureaucrats (Young, Bullock, and Lecy 2019). One prominent IT is the automation of decision-making processes (Snellen 2002). Due to automation, street-level bureaucrats' discretion becomes bound by the forms and input required by the automated systems. Pre-programmed rules decide how citizens' cases are processed and how decisions are translated into action (Buffat 2015; Young, Bullock, and Lecy 2019; Zouridis, Van Eck, and Bovens 2020). In this way, not street-level bureaucrats but the programmers of 'systems' become the centre of public organizations with discretion (Bovens and Zouridis 2002). Bovens and Zouridis (2002) label such bureaucracies *system-level* bureaucracies. It is important to understand the implications of full or partial automation for street-level bureaucrats because it alters the way individual cases are handled. In the street-level bureaucracy literature, digitalization has been theorized to affect street-level bureaucrats' discretion in various ways (see Bovens and Zouridis 2002; Buffat 2015; Zuurmond 1998). While there is some evidence that discretion is constrained, more research is needed to understand how this works (Bullock 2019). Regardless, the limited and growing empirical backing that exists does support that full or partial automation affects citizens' everyday life. To illustrate, individual characteristics of citizens may be taken into account to a lesser extent by automated systems than by street-level bureaucrats which reduced unequal outcomes (e.g. Cárdenas and Ramirez de la Cruz 2017; Keiser 2010; Wenger and Wilkins 2009).

This paper answers *To what extent does automation affect how street-level bureaucrats enforce and how can this be explained?* In essence, this paper posits that this effect can be explained because automation alters the extent to which street-level bureaucrats experience discretion which, in turn, impacts their enforcement styles. Theoretically, this paper tests a dominant thesis in the street-level bureaucracy literature, namely that automation constrains the discretion of street-level bureaucrats (i.e. the curtailment thesis) which in turn, affects the way public policies are implemented (Buffat 2015; see also Bovens and Zouridis 2002; Zuurmond 1998).[1] In line with Buffat's argument (2015), we argue that existing literature on curtailment is of deterministic nature, assuming that once digital technologies are implemented, discretion will diminish or disappear. Using the concept of discretion-as-perceived (Thomann, van Engen, and Tummers 2018), this paper is to the best of the authors' knowledge the first to empirically assess whether automation at the frontline leads street-level bureaucrats to *experience* less leeway to make decisions and how it affects the way they enforce.

These insights contribute to the growing body of literature on IT systems from the perspective of street-level bureaucrats (e.g. Borry and Getha-Taylor 2019; Bovens and Zouridis 2002; Bullock 2019; Busch and Henriksen 2018; Cordella and Tempini 2015; Buffat 2015; Giest and Raaphorst 2018; Jorna and Wagenaar 2007; Keiser 2010; Wenger and Wilkins 2009) by showing that the use of digital decision-making support systems affects bureaucrats as follows: (1) it curtails their discretion-as-perceived and (2) makes them more legal and accommodative in their ways of enforcing policies. The

effect of using digital decision-making support systems on bureaucrats' enforcement styles, though, cannot be explained by their perceived discretion. Methodologically, this paper draws on survey data from Dutch food- and product safety authority inspectors (n = 549) including factual data. This paper, thus, focuses specifically on the way street-level bureaucrats enforce, since automation has been extensively studied and implemented in this field to combat unequal treatment of citizens by street-level bureaucrats (e.g. Bovens and Zouridis 2002; Miller and Keiser 2021).

The remainder of this paper is structured as follows: the conceptual underpinnings and expected relations are discussed first. Then, the methodological considerations and Structural Equation Modelling analyses and results will be depicted. This is followed by a discussion on the insights for the literature on IT in public management and policy implementation.

Conceptual framework and expectations

While public administration scholars address the IT phenomenon of automation, a definition is rarely made explicit (e.g. Bovens and Zouridis 2002; Miller and Keiser 2021; Wenger and Wilkins 2009; Zouridis, Van Eck, and Bovens 2020). In the Merriam-Webster (2019) dictionary, automation is defined as 'automatically controlled operation of an apparatus, process, or system by mechanical or electronic devices that take the place of human labor'. This definition, however, is missing important nuances when investigating automation in the public sector. First, while automation can take different forms, in the public sector it is primarily a decision support technology (Snellen 2002). Decision support technologies facilitate decision-making processes by street-level bureaucrats or other public employees by applying set rules to already data or entering data. Automation, then, ranges from case-handling systems used by street-level bureaucrats while processing cases (i.e. the back office) to full-fledge knowledge-based systems which automate the allocation of services to citizens (i.e. the front office) (Snellen 2002; Zouridis, Van Eck, and Bovens 2020).

Second, automation in public organizations does not have to fully have to replace humans but can also do so partially because various street-level bureaucrats decision-making tasks cannot (yet) be programmed into algorithms (see Young, Bullock, and Lecy 2019; Zouridis, Van Eck, and Bovens 2020). The work of street-level bureaucrats is, indeed, filled with numerous rules and regulations just like decision-making trees in automated systems. However, street-level bureaucrats' work is not defined by those rules and, in turn, not fully bound by them since reality never fully matches the circumstances they face at hand (Maynard-Moody, Musheno, and Musheno 2003; Wenger and Wilkins 2009). Lipsky (2010) even stated 'the essence of street-level bureaucracies is that they require people to make decisions about other people. Street-level bureaucrats have discretion because the nature of service provision calls for human judgment that cannot be programmed and which machines cannot substitute' (161). Street-level bureaucrats, then, are often still essential in acquiring data about citizens that need to be entered into digital systems, and in evaluating the appropriateness of the direction of actions suggested by digital decision support systems.

Automation and street-level enforcement

How does automation affect policy implementation practices of street-level bureaucrats, and more specifically, the way they enforce regulatory policies? How street-level bureaucrats enforce is often referred to in literature as their enforcement style. Enforcement style can be defined as 'the character of the day-to-day interactions of [street-level bureaucrats] when dealing with regulated entities' (May and Winter 2000, 145). Street-level bureaucrats' enforcement style is not fixed and varies along multiple dimensions (Mascini 2013; May and Winter 1999, 2000; Pautz 2010). Traditionally, enforcement style was thought to be two-dimensional (Mascini and Wijk 2009; May and Winter 1999, 2000; May and Wood 2003). However, May and Winter (2011) proposed that there could be more than two dimensions. Recent efforts have empirically followed up on this proposal and shown that there are, indeed, more dimensions to a street-level bureaucrats' enforcement style (e.g. de Boer 2019; Lo, Fryxell, and Van Rooij 2009).

de Boer's (2019) work set out solely to empirically investigate what dimensions underlie enforcement style and empirically reveals there are three dimensions. The first dimension is the legal dimension which entails the extent to which street-level bureaucrats apply rules rigidly and are oriented at the force of the law by stressing sanctions (see also the 'formalism' dimension of May and Winter 1999). An example of the legal dimension is an inspector focusing extensively on the strict protocols that must be met by inspectees. The second dimension is the facilitation dimension which encompasses the extent to which bureaucrats focus on the communicative function of the law by providing information and weighing mitigating circumstances (see also the 'facilitation dimension of May and Wood 2003). An inspector may, for example, be orientated at explaining rules to inspectees in a clear and concise manner. The third and final dimension, the accommodation dimension, entails the extent to which street-level bureaucrats take opinions of others, such as their peers, into account during an onsite visit. An inspector could, for instance, take how fellow inspectors apply specific protocols into account while going on on-site visits. Street-level bureaucrats can vary along these dimensions and together they make up their total enforcement style during inspection visits (de Boer 2019).

There is empirical evidence that street-level bureaucrats' enforcement styles are – at least partly – determined by meso or macro level factors such as government support (Lo, Liu, and Li 2019; Zhan, Lo, and Tang 2014) or transparency (de Boer, Eshuis, and Klijn 2018). Automation is also a meso level factor, operating at the level of the organization. Bureaucratic organizations strive for consistency in how street-level bureaucrats decide and enforce because of individual street-level bureaucrats' predilections (see Kaufman 1956; Keiser 2010). The literature on IT systems in street-level bureaucracy assumes that automation of (parts of) decision-making processes will contribute to consistency in outcomes. Partly, because some parts of the decision-making process are taken over by machines, which operate based on a computerized set of rules (Busch and Henriksen 2018; Miller and Keiser 2021). These rules, then, are applied uniformly across cases. Moreover, consistency in decision-making is increased because the focus of street-level bureaucrats on clients and their individual characteristics is diminished or even completely eliminated (Cordella 2007; Keiser 2010; Miller and Keiser 2021).

To put it differently, whereas for street-level bureaucrats working *without* automated systems, their decision-making is oriented at the citizen-client they meet (see Maynard-Moody, Musheno, and Musheno 2003), street-level bureaucrats working *with* automated systems are steered away from focusing on the person they meet and towards the pre-programmed rules, promoting equal treatment (see Busch, Henriksen, and Sæbø 2018; Keiser 2010). Because of their very nature, digital systems contain codified rules, which serve as 'action prescriptions' (e.g. Hupe and Buffat 2014), it is expected that automation steers street-level bureaucrats towards the more rule-oriented legal dimension of enforcement style and away from the more (client) circumstances-oriented facilitation and accommodation dimension.

H1: When street-level bureaucrats work with automated decision support systems they will become more legal and less facilitative and accommodative

Perceived discretion as an explanation

Literature, thus, assumes that digitalization will make decisions by street-level bureaucrats more rule-oriented and less oriented towards citizens' circumstances (Busch, Henriksen, and Sæbø 2018; Miller and Keiser 2021). We propose that this can be explained by the curtailing effect IT systems have on street-level bureaucrats' discretion. Before we explain this curtailment thesis (Buffat 2015) further, it is important to clarify what is meant by discretion. Scholars use many different definitions depending, amongst others, on the discipline of origin (see Evans and Hupe 2020 for a recent overview). Prominent scholars in the field of public administration seem to agree that discretion is a freedom for street-level bureaucrats, within given constraints, to make decisions they see as fitting for the situation at hand (e.g. Evans 2010; Hupe and Hill 2007; Lipsky 2010; Thomann, van Engen, and Tummers 2018; Tummers and Bekkers 2014).

Various forms of discretion have been distinguished, of which discretion-as-granted and discretion-as-used seem most widely used (Hupe 2013). Whereas the former implies the freedom formally granted to street-level bureaucrats, the latter refers to what street-level bureaucrats actually do with this granted freedom. Thomann, van Engen, and Tummers (2018) make an important contribution to this distinction by conceptualizing and measuring discretion-as-perceived. Departing from the Thomas Theorem stating that 'if men define situations as real, they are real in their consequences' (Thomas 1928, 572), they argue that bureaucrats first need to experience they have discretion in order for them to actually use it. Discretion-as-perceived can be defined as 'the degree to which frontline workers perceive to possess discretion' (Thomann, van Engen, and Tummers 2018, 584). In this paper we thus focus on how the micro-level experience of discretion is affected by a meso level development, the implementation of automated decision making support systems.

We theorize that the effect of automation on enforcement style (i.e. hypothesis 1) can be explained by discretion-as-perceived. We do so by drawing on literature on the curtailing effects of automation on street-level discretion, coined by Buffat (2015) as the *curtailment thesis*. Curtailment entails the reduction or disappearance of street-level discretion. Automation can curtail discretion because street-level bureaucrats are fully or partly replaced by automated systems (Buffat 2015). To illustrate, getting fined for violating traffic rules or applying for student loans from the government, is almost

completely automated in some countries (Bovens and Zouridis 2002). The task of school principals to allocate students to either morning or afternoon classes is computerized (Cárdenas and Ramirez de la Cruz 2017). Case workers contact with unemployment benefit seekers is partially replaced by automated systems because information needed for the assessment is collected via telephone rather than face-to-face (Wenger and Wilkins 2009). In these examples, automated systems decide which service is allocated and which is not. Decisions, then, are not made by street-level bureaucrats with discretion but automatically through pre-programmed systems (Buffat 2015).

Some scholars have even started labelling the partial or full replacement of street-level bureaucrats' discretion by technologies. Young, Bullock, and Lecy (2019) coined the concept 'artificial discretion', which they define as 'cases where artificial intelligence is used to augment or automate the exercise of administrative discretion' (p. 303). Busch and Henriksen (2018) use the term digital discretion and define it as 'the use of computerized routines and analyses to influence or replace human judgements' (p. 4). Zouridis, Van Eck, and Bovens (2020) coined the term automated discretion but they do not provide a clear-cut definition. All these concepts are in line with the shift of viewing discretion to be part of the intellectual property of street-level bureaucrats to that of system-level bureaucrats (i.e. programmers) (Bovens and Zouridis 2002; Busch and Henriksen 2018).

Zouridis, Van Eck, and Bovens (2020) state that full replacement primarily happens in service provision characterized by 'easy' cases which are 'easily processed by the system by straightforward subsumption of facts under rules' (p. 321). Young, Bullock, and Lecy (2019) make a similar argument by classifying decision-making tasks in public organizations as either determinist of nondeterministic. In deterministic tasks limited rules are needed to accurately make a decision. These tasks are, thus, especially suitable for machines to make decisions about. Nondeterministic tasks, however, are depending on competing contingencies, values or too much or little information. A singular optimal solution is, therefore, hard for machines to generate. Regardless, in services including the processing of 'harder' nondeterministic tasks, automation is also used to take over decision tasks of street-level bureaucrats (e.g. Cárdenas and Ramirez de la Cruz 2017; Keiser 2010; Wenger and Wilkins 2009). Automation in nondeterministic tasks is often justified as a way to eliminate human subjectivity and potential biases or, at the very least, monitor it (e.g. Busch and Henriksen 2018). Based on this we formulated the following hypothesis:

H2: When street-level bureaucrats work with automation they perceive to have less discretion

In line with Thomann, van Engen, and Tummers (2018) we theorize that discretion-as-perceived is a precondition for street-level bureaucrats' use of discretion, meaning that they first need to experience they have discretion for them to actually use it. Therefore, the focus in this paper is not on the formal discretion granted to street-level bureaucrats, but on the 'degree to which frontline workers perceive to possess discretion' (Thomann, van Engen, and Tummers 2018, 584). Moreover, street-level bureaucrats could have ample formal discretion, but still feel they have only limited leeway because of restrictions in their direct working context, such as the use of digital systems. In

those cases, it is likely that discretion-as-perceived is a better predictor of street-level bureaucrats' behaviour than the formal discretion they have been granted.

In the street-level literature a certain degree of discretion is believed to be necessary for street-level bureaucrats to take into account citizen-clients circumstances (Lipsky 2010). In order for street-level bureaucrats to help citizen-clients, they need to feel they can interpret or deviate from rules, as they see fit for specific cases (e.g. Maynard-Moody, Musheno, and Musheno 2003). Likewise, street-level bureaucrats' facilitative and accommodative enforcement style also presuppose a certain degree of discretion (de Boer, Eshuis, and Klijn 2018). Bureaucrats make use of their leeway when they consider circumstances at hand, educate citizen-clients (i.e. facilitation) and take into account opinions of other stakeholders (i.e. accommodation) (de Boer 2019; Lo, Liu, and Li 2019). This means that laws and rules are not applied uniformly across cases.

Conversely, when street-level bureaucrats mainly focus on the law and rules, they behave like typical agents of the state (Maynard-Moody, Musheno, and Musheno 2003; Zacka 2017), not differentiating between citizen-clients when this is not stated in the law. Whereas focussing on enforcing the law and rules could be a discretionary choice (see e.g. Zacka 2017), it likely also results from an (experienced) lack of discretion. Following a top-down perspective on policy implementation, reducing street-level bureaucrats' discretion would prevent them from following their own hunches and interpretations (e.g. Keiser 2010). Applied to this particular case, a focus on rigid rule application and force of the law (i.e. the legal dimension), is often formulated in terms 'of reducing discretionary administration' (Lo, Liu, and Li 2019, 100). Likewise, the facilitation and accommodation dimension of enforcement style presuppose a certain degree of discretion for bureaucrats to vary in their application of them (de Boer et al. 2018). Hence, when street-level bureaucrats experience having only limited discretion, it is expected that they will become *more* legal and *less* facilitative and accommodative.

H3: When street-level bureaucrats perceive to have less discretion, they will become more legal and less facilitative and accommodative

Method

Case

The data for this research was collected at the *Netherlands Food and Consumer Product Safety Authority (NVWA)* which is one of the largest Dutch inspectorates. The core task of the NVWA is regulating food, consumer products, animal welfare and nature. Some inspectors, for instance, visit slaughterhouse and restaurant owners and inspect their compliance with hygiene regulations. Other inspectors visit farmers and inspect whether they comply with pesticide regulations. These inspectors are seen as classic street-level bureaucrats since they face stressors (e.g. limited time and resources), have considerable autonomy and have discretion when conducting face-to-face inspection visits (Lipsky 2010). Regardless, inspectors are a particular type of bureaucrat because, for instance, they deliver obligations rather than services, they often interact with a heterogeneous group of powerful individuals rather than vulnerable groups, their interactions with citizen-clients is often not voluntary and there is no clear exit option for citizen- clients (Nielsen 2015; Sparrow 2011; Van de Walle and Raaphorst 2019; Winter and May 2015)

In 2018 the NVWA started developing and rolling out a new central ICT system for all NVWA inspectors tasked with executing inspections called INSPECT. INSPECT was part of the NVWA 2020 programme in which the NVWA is set to develop and innovate her way of working. INSPECT was entailed to support inspectors across all NVWA domains by automating several manual enforcement tasks that had to be executed during the entire process of inspections, which includes desk work (e.g. preparation and administrative tasks) and on-site visits. During the execution of their inspection tasks, inspectors used the available information that the system INSPECT provided them, but primarily added their own observations to it which, in turn, led to a verdict concerning the compliance of entrepreneurs. This verdict could include consequences such as fines in the case of non-compliance. Inspectors could deviate from this verdict but only after getting permission from their supervisors making INSPECT a partially automated system.

The goal of INSPECT was to enhance efficiency and ensure uniformity of process execution for NVWA inspectors by 2020 (Nederlandse Voedsel- en Warenautoriteit 2018; Rijksoverheid 2019). INSPECT can, therefore, be classified as a particular type of technology, namely a decision support technology. This type of technology aids decision-making of individuals and is mainly used during the implementation of policies by street-level bureaucrats (Snellen 2002). INSPECT, thus, is a rather passive vehicle for the generation of data, which does 'not change without human intervention' (Young, Bullock, and Lecy 2019, p. 302–303). In April 2019, three months after the data collected for this study, the Minister of Agriculture, Nature and Food quality announced that she had stopped the development of INSPECT because the costs were too high and the project management poor, harming timely completion (Rekenkamer 2019).

Data

The data was collected in the autumn of 2018 using an online questionnaire with active organizational support from the NVWA. Notably, this questionnaire was used to collect both perceptual and factual data minimizing possible common source bias. The sampling frame consisted of all inspectors of the NVWA who conducted on-site inspection visits ($n = 1153$). Respondents were assured that their answers would be anonymous and confidential. Moreover, it was made clear that this research was done by a research institute, not the NVWA to ensure respondents could answer freely and honestly. The questionnaire was validated to fit our research context using expert interviews with a senior staff committee ($n = 5$). In total, 757 inspectors filled in our questionnaire resulting in a response rate of 65.7%. Our final sample consisted of 549 inspectors since 208 respondents were excluded because they did not finish the complete questionnaire.

Sample characteristics

The final sample is largely representative of the total population. Regarding sex, 66.9% are men and 33.1% are women in the total population. Our sample consists of 70.8% men and 28.0% women. In the total population, the average age is 50.8 and has 13.4 years of work experience. Inspectors in our sample are on average 51.1 years old (SD = 10.7) and have 18.7 (SD = 12.0) years of work experience. Notably, 82 inspectors in our sample work with INSPECT during their on-site inspection visits.

Measures

The core variables in this study are: (1) enforcement style; (2) discretion-as-perceived and (3) automation (see Appendix A for a full overview of the items used).

Enforcement style

Enforcement style was measured using the three-dimensional validated scale by de Boer (2019) with a 10-point answer scale. This scale is developed building on the classic work of, amongst others, May and Winter (1999, 2000) and has already been empirically applied to study explanations of enforcement style (see de Boer, Eshuis, and Klijn 2018; Klijn et al. 2020). The three dimensions of enforcement style (i.e. legal, facilitation and accommodation) were measured by 4 or 5 items and proved reliable with ω ranging between 0.77 and 0.80.

Discretion-as-perceived

Discretion-as-perceived was measured on a 10-point scale using a single item, namely 'working with the intervention policy feels like a harness in which I cannot easily move'. This item is based on the operational powerlessness dimension of policy alienation, which has also been used to measure perceived discretion (e.g. Tummers and Bekkers 2014; Thomann, van Engen, and Tummers 2018). The item was slightly adapted (i.e. policy was changed into intervention policy) to fit our enforcement context.

Automation

Automation is not a perceptual variable, but a factual measure whether inspectors work with INSPECT or not. Due to privacy rules of the Netherlands Food and Product Safety Authority we were unable to obtain this information directly from the organization through secondary data and it was therefore asked to the respondents directly using the following question: 'are the verdicts of your inspection automatically generated by INSPECT?' Inspectors could answer yes or no.

Controls

Several demographics were included as control variables (gender and work experience). Rule obedience, measured on a 10-point scale, was included as the third control variable since it has been empirically shown to correlate with street-level bureaucrats' enforcement style (de Boer, Eshuis, and Klijn 2018).

Findings

Analyses were conducted using the statistical program R. The following packages were used: 'lavaan' (Rosseel 2011), 'psych' (Revelle 2014), 'semTools' (Pronprasertmanit et al. 2013). Since our independent variable (i.e. automation) is binary, the parameters in our models were estimated using the WLSMV-estimator. The WLSMV-estimator is the best option for nominal or ordinal predictors since it does not assume normally distributed data (Brown 2015 and see; van Engen 2017 for application).

Table 1 displays the descriptive statistics and correlations between the core variables in this study. The correlations between automation and the legal and accommodation dimension of enforcement style are statistically significant (with 0.13 and 0.09

Table 1. Means, Standard Deviations and Correlations.

		M	SD	1	2	3	4	5	6	7	8
1	Automation (1 = yes)	0.16	0.37	1							
2	Perceived discretion	5.64	2.40	−0.11**(0.01)	1						
3	Legal style	7.81	1.12	0.13***(0.00)	−0.12**(0.01)	1					
4	Facilitation style	7.80	1.26	0.05(0.30)	0.17***(0.00)	0.46***(0.00)	1				
5	Accommodation style	6.08	1.65	0.09**(0.05)	0.08*(0.07)	0.18***(0.00)	0.29***(0.00)	1			
6	Rule obedience	7.26	1.66	0.08*(0.07)	−0.20***(0.00)	0.47***(0.00)	0.18***(0.00)	0.18***(0.00)	1		
7	Work experience	18.73	12.04	−0.01(0.85)	0.11**(0.02)	−0.05(0.26)	−0.05(0.31)	−0.05(0.22)	−0.08*(0.08)	1	
8	Gender (1 = Male)	0.71	0.46	0.00(0.99)	0.05(0.22)	0.01(0.77)	0.02(0.72)	0.11**(0.01)	−0.02(0.72)	0.38***(0.00)	1

Note: P-values between brackets

respectively). Automation does not correlate significantly with the facilitation dimension which contradicts our theoretical expectation. Automation significantly correlates negatively with perceived discretion (−0.11). Perceived discretion, in turn, significantly correlates with all three dimensions of enforcement style (with −0.12 for legal, 0.17 for facilitation and 0.08 for accommodation).

Three control variables were also correlated with our independent (i.e. automation), dependent (i.e. legal, facilitation and accommodation) and mediating variables (i.e. perceived discretion). The correlates between rule obedience and automation (0.08), perceived discretion (−0.20), legal (0.47), facilitation (0.18) and accommodation (0.18) were all statistically significant. Work experience only significantly correlated with perceived discretion (0.11). Gender only significantly correlated with accommodation (0.11). Since only rule obedience correlated with both the independent and dependent variable in our study and, therefore, potentially explain part of their covariance it was included as a control variable in our model.

To further test our expected relationships, Structural Equation Modelling (SEM) is used, specifically a fully latent structural regression modelling (Kline 2015). SEM is a suitable method because of the multiple regressions theorized and the latent nature of the dependent and mediator variables. The model ($\chi 2 = 129.84$, $df = 93$, $p = .006$) fit is good with CFI = .977, TLI = .971, RSMEA = .029, PCLOSE = .999 and SRMR = .062.

Figure 1 and Table 2 display the result of the hypothesized direct and indirect effects. Hypothesis 1 predicted that street-level bureaucrats who work with automation will become *more* legal and *less* facilitative and *less* accommodative. The standardized coefficients for the legal dimension of enforcement style is statistically significant (with St.B = 0.097, $p = 0.044$). In line with our expectations this indicates that the more street-level bureaucrats work with automation the *more* legal they become. The standardized coefficients for the accommodative style is also statistically significant, but in the opposite direction as hypothesized (with St.B = 0.109, $p = 0.064$). Contrary to our expectations, the more street-level bureaucrats work with automation the *more* accommodative they become. Notably, this finding is significant at the .10-level. Lastly, the standardized coefficient for the facilitation dimension of enforcement style is, contrary to our expectations, *not* statistically significant. Hypothesis 1 is rejected.

Our second and third hypothesis addressed the indirect effect of automation on enforcement style through the mediator perceived discretion. Hypothesis 2 expected that when street-level bureaucrats work with automation they will perceive to have less discretion. The standardized coefficient is statistically significant (with St.B = −0.086, $p = 0.069$). This indicates that when bureaucrats work with automation they, indeed, perceive less discretion. Notably, the significance level of this finding is .10. Hypothesis 2 is accepted.

The third hypothesis predicted that when street-level bureaucrats perceive less discretion, they will become more legal, and less facilitative and less accommodative. Contrary to our expectations, the standardized coefficient for the legal dimension of enforcement style is not statistically significant (with St.B = 0.014, $p = 0.800$). In line with our expectations, the standardized coefficient is significant for the facilitation and accommodation dimension (with St.B = 0.249, $p = 0.000$ and St.B = 0.124, $p = 0.063$ respectively). This indicates that when bureaucrats perceive more discretion they will become more facilitative and accommodative. It has to be noted that this finding is significant at the .10-level. Hypothesis 3 is rejected.

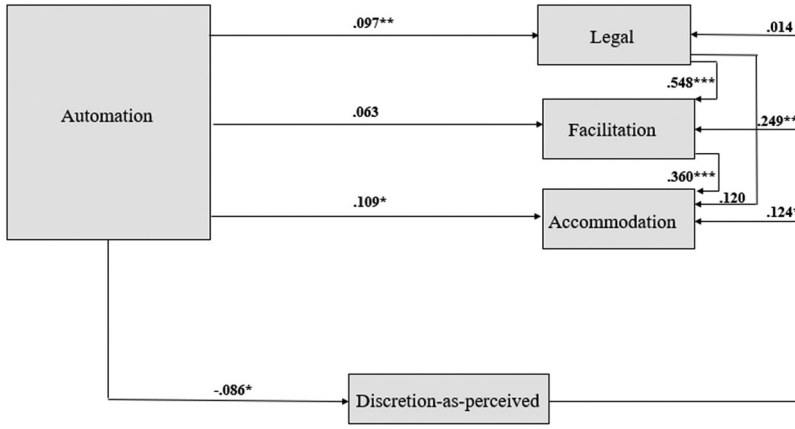

Figure 1. Graphical representation of SEM results.

When testing the indirect effects of automation on the street-level bureaucrats' legal, facilitation and accommodation enforcement style *via* perceived discretion, no statistically significant effects are found (with St.B = −0.001, $p = 0.799$; St.B = −0.021, $p = 0.100$; St.B = −0.011, $p = 0.202$ respectively). To put it differently, the direct effect of automation on street-level bureaucrats' enforcement style is not explained by their perceived discretion.

Conclusion and discussion

Drawing on the curtailment thesis (Buffat 2015) and by using the notion of discretion-as-perceived (Thomann, van Engen, and Tummers 2018), this study has tested the effect of automation on how street-level bureaucrats enforce (i.e. their enforcement style). The findings showed that (1) when street-level bureaucrats work with an automated decision-making system they become more legal and more accommodative in their enforcement style, but it does not affect their facilitation enforcement style. Moreover, the results showed that (2) this effect *cannot* be explained by the perceived discretion of street-level bureaucrats. Regardless, it was found that (3) automation *does* lead to less perceived discretion and when street-level bureaucrats perceive more discretion they become more facilitative and more accommodative in their enforcement style. These results contribute to the literature in two ways.

First and foremost, our findings contribute to the debate on the implications of IT systems on administrative discretion. A dominant thesis in the literature is that ever-increasing digitalization erodes or curtails street-level bureaucrats' discretion, by partially or completely taking over parts of the decision-making process (Bovens and Zouridis 2002; Buffat 2015). The underlying assumption is rather deterministic, assuming that once digital technologies are implemented, discretion will diminish or disappear (Buffat 2015). Whereas there are some qualitative studies which show street-level bureaucrats' persistent use of discretion in digitized working environments (e.g. Jorna and Wagenaar 2007; Wastell et al. 2010), there is a need for more empirical insight into the effect of automation on street-

Table 2. Result of SEM.

	Dependent variables											
	Legal style			Facilitation style			Accommodation style			Perceived discretion		
Independent variables	*z*	*St.SE*	St.B	*z*	*St.SE*	St.B	*z*	*St.SE*	St.B	*z*	*St.SE*	St.B
Direct effects												
Automation	2.015	0.153	0.097**(0.044)	1.082	0.200	0.063(0.279)	1.850	0.203	0.109* (0.065)	−1.817	0.203	−0.086* (0.069)
Perceived discretion	−0.254	0.027	0.014(0.800)	3.750	0.035	0.249** (0.000)	1.858	0.034	0.124* (0.063)	-	-	-
Indirect effects via perceived discretion												
Automation	−0.255	0.015	−0.001(0.799)	−1.643	0.045	−0.021(0.100)	−1.276	0.029	−0.011(0.202)	-	-	-
Total effects												
Automation	1.992	0.153	0.096**(0.046)	0.724	0.197	0.042(0.469)	1.696	0.200	0.099*(0.090	-	-	-

Note: P-values between brackets, included control: rule obedience (with significant St.B for perceived discretion, legal, facilitation and accommodation)

level bureaucrats' degree of discretion (Bullock 2019). By using the concept 'discretion-as-perceived' (Thomann, van Engen, and Tummers 2018), we show that bureaucrats who work with IT decision-support systems, indeed, *experience less discretion* than street-level bureaucrats who do not work with them. This, then, provides a human angle of view to a rather technologically deterministic assumption (Buffat 2015). Future research is needed to distill the implications of bureaucrats experiencing less discretion more broadly. Studying the impact on bureaucrats' motivation at work or interpersonal or institutional trust using natural experiments may be a fruitful starting point.

Second, whereas we find a direct effect of automation on enforcement style, this cannot be explained by discretion-as-perceived. Our results suggest that discretion-as-perceived is not necessarily a precondition for behaviour (e.g. Thomann, van Engen, and Tummers 2018). That is to say, automation can affect (intended) behaviour directly, without affecting the degree to which street-level bureaucrats experience having discretion. This indicates that, despite the empirical evidence for the curtailment thesis, the debate about the implications of automation for street-level bureaucrats, should go beyond the dominant focus on its effects on bureaucrats' discretion. To explain the direct influence of digital systems on bureaucrats' behaviour, we suggest two alternative explanations that move beyond discretion-as-a-perceived: (1) characteristics of the digital system and (2) characteristics of the task.

The characteristics of the digital system could explain the direct effect on bureaucrats' behaviour (Busch and Henriksen 2018). Working with an automated decision-making support system could steer street-level bureaucrats towards rules because they make up those systems rather than their leeway to interpret rules within their context at hand. Notably, this study found that automation results in street-level bureaucrats being *more* legal and *more* accommodative in their enforcement style, both being focused more on rules or routines (see also Busch and Henriksen 2018), but had no effect on their facilitation, which is focused more on involving client-specific factors. In a way, automation – at least to some extent – alters the choice architecture of street-level bureaucrats because they have to fill in their observations in that system. In this way, automated systems could nudge street-level bureaucrats towards 'desired' behaviour (e.g. Battaglio et al. 2019; Thaler and Sunstein 2009; Tummers 2019). Both the legal and accommodation dimension of enforcement style could be seen as more 'desired' behaviour because focusing on rules (i.e. the legal dimension) as well as taking into account other perspectives (i.e. the accommodation dimension) could improve consistency in outcomes (e.g. Raaphorst and Loyens 2020; Pires 2011; Rutz et al. 2017; Tuijn et al. 2014). Enhancing consistency was one of the main reasons why this automated system was implemented in the first place. Nudges may even benefit bureaucrats because it helps them to make difficult decisions or choices (Battaglio et al. 2019). Future research could investigate how automation could be beneficial for difficult decisions street-level bureaucrats must make on a daily basis.

In addition, the characteristics of the task that bureaucrats must fulfill could explain why automation directly affects bureaucrats' way of enforcing (Bullock 2019; Lee 2018; Nagtegaal 2021; Young, Bullock, and Lecy 2019). To illustrate, Bullock (2019) argues that the type of tasks matters for how bureaucrats' complete tasks because some are more complex and uncertain than others (see also, Lee 2018). These complex and uncertain tasks require human discretion to be executed successfully (see Nagtegaal

2021; Young, Bullock, and Lecy 2019). In turn, low-level complex tasks are more suitable to be automated because there is less need for human intervention to begin with (Bullock 2019; Young, Bullock, and Lecy 2019). We posit that the facilitation dimension of enforcement style is a more complex and uncertain task than the other two dimensions, as facilitation involves the task of taking into account the sometimes unpredictable circumstances of clients. At the same time, it involves explaining rules and regulations to clients which suggests a great deal of uncertainty since bureaucrats must determine *if* and *how* they explain the law based on the client they meet during on-site visits (de Boer 2019). Since facilitation is complex and uncertain, we theorize, automation does *not* affect it directly but *does* affect the more low-complex enforcement style dimensions of accommodation and legal. Future research could test this assumption by further investigating the impact of automation on the implementation of tasks at the individual-level. A comparison between effects on tasks that vary in terms of complexity and uncertainty may be especially fruitful to fully understand the implications of automation (Bullock 2019; Lee 2018).

As with any research, this study has methodological limitations. First, single survey research has often been critiqued because of common source bias and an overestimation of estimated relations (see Podsakoff et al. 2003). Here, this critique only has limited merit since our independent variable (i.e. automation) is a factual measure. Notably, due to privacy reasons we were unable to collect this data from secondary sources and integrate it with our survey data. Whether respondents worked with the automated system INSPECT or not was, thus, asked. Regardless, this measure does not address nor was formulated in such a way to measure perceptions. Second, this study uses cross-sectional data and, therefore, no conclusions can be drawn about causality. Future research could use field experiments to dissect the causal mechanisms between automation and street-level bureaucrats behaviour (see Hansen and Tummers 2020 for an overview). Third, for discretion-as-perceived a one-item measure is used. However, discretion-as-perceived may be more complex than that, potentially harming our construct validity (e.g. Thomann, van Engen, and Tummers 2018; Tummers and Bekkers 2014). Future research needs to pay attention to extending the operationalization of discretion-as-perceived. Finally, a note of caution is needed because some of our findings are significant at the .10-level due to our specific empirical setting. This means that for those findings there is a 10% chance (as opposed to 5%) that a difference exists while there is no actual difference (see for instance George et al. 2020 for similar reporting). This has to be kept in mind when interpreting and, more importantly, generalizing our results. Future research needs to collect more independent data on automation and street-level bureaucrats' enforcement to assess its impact.

This study also has theoretical limitations. First, a specific type of street-level bureaucrat, namely inspectors, were studied. There is empirical backing that inspectors are similar to other classic street-level bureaucrats (see e.g. Van de Walle and Raaphorst 2019). Regardless, inspectors are a particular type of street-level bureaucrat, namely one that is oriented at regulation rather than providing a service. Future research could dissect whether our results hold for more service-oriented street-level bureaucrats in other professional contexts, such as nurses or social workers. Second, INSPECT is a specific type of automated technology, namely the decision support type (Snellen 2002). It is therefore likely that our results generalize to other decision support technologies which 'serve as an aid to decision-making processes, by applying specific rules individually, or collectively entered data' (Snellen 2002, 185). However, future

research needs to dissect whether our findings also apply to other technologies such as database, networking, personal or office automation (Snellen 2002). Finally, this study has investigated discretion-as-perceived and *not* discretion-as-granted (Hupe 2013). This means that no conclusions can be drawn about changes in the actual room for discretion of bureaucrats. Future research is needed to investigate *if* and *how* (partly) automated systems such as INSPECT affect bureaucrats' actual room for discretion and their behavioural reactions to it.

This study shows that automation *does* affect the way street-level bureaucrats enforce but we also cannot empirically explain this. We suggest that this direct effect may be due to the characteristics of the IT system or the task that bureaucrats execute. As public organizations continue to automate decision-making processes of street-level bureaucrats, it is important for future research to move beyond the dominant focus on discretion as a mechanism that explains this effect, as we do not find empirical evidence for that claim. Only then can we fully grasp what happens to frontline behaviour when parts of the decision-making process are automated.

Note

1. Besides the curtailment thesis, Buffat (2015) outlines the enablement thesis, which proposes that digital technologies provides bureaucrats with additional action resources, such as time or knowledge, and could help bureaucrats in decision making. This paper focuses only on the curtailment thesis, since this thesis underlies much research on digitalization, assuming that it makes decisions more consistent and less subjective (e.g. Bovens and Zouridis 2002; Busch and Henriksen 2018; Miller and Keiser 2021).

Disclosure statement

No potential conflict of interest was reported by the author(s).

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Appendix A. Survey items core variables

	Factor loadings
Enforcement style	
Legal style (ω = .80)	
During inspections, I focus on:	
· Implementing the intervention policy by following the letter of the law	0.56
· Enforcing in an unambiguous way	0.76
· Making strict agreements with [inspectees]	0.71
· Executing the inspection as complete as possible	0.69
· Upholding high standards for compliance with rules and regulations for [inspectees]	0.56
Facilitation style (ω = .80)	
During inspections, I focus on:	
· Transferring my professional knowledge to [inspectees]	0.73
· Giving indications to [inspectees] on how to improve compliance	0.84
· Being as helpful as possible to clients	0.76
· Considering the circumstances of [inspectees]	0.43
Accommodation style (ω = .77)	
During inspections, I consider:	
· The opinions of inspectors from my team about enforcing	0.70
· The opinions of inspectors from other teams about enforcing	0.75
· The opinion of my team leader about enforcing	0.58
· The opinions of directors/head inspectors about enforcing	0.66
Discretion-as-perceived	

To what extent do you agree with the following statement: working with the intervention policy feels like a harness in which I cannot easily move

Automation
Are the verdicts of your inspection automatically generated by INSPECT?

Rule obedience
In general, I am someone who follows the rules even if I disagree with them