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Employment relationships in algorithmic management: A psychological contract perspective

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ABSTRACT

Algorithms increasingly automate or support managerial functions in organizations, with implications for the employee-employer relationship. We explored how algorithmic management affects this relationship with a focus on psychological contracts, or employees' perceptions of their own and their employers' obligations. Through five online experiments, we investigated how organizational agent type—algorithmic versus human—influenced one's psychological contract depending on the organizational inducement type—transactional versus relational. We explored psychological contracts in two stages of employment: during early phases, such as recruiting (Studies 1 and 2) and onboarding (Studies 4 and 5), when the agent explains the inducements to the employee; and during employment, when the agent under-delivers the inducements to varying degrees (Studies 3–5). Our results suggest that agent type did not affect psychological contracts around transactional inducements but did so for relational inducements in the cases of recruiting and low inducement delivery (Studies 1–5). Algorithmic agents signaled reduced employer commitments to relational inducements during recruiting (Study 1). Using human agents resulted in greater perceived breach when delivery of relational inducements was low (Study 5). Regardless of inducement type, turnover intentions were higher when the human agent under-delivered compared to the algorithmic agent (Study 5). Our studies show how algorithmic management may influence one's psychological contract.

1. Introduction

Computational algorithms, or artificial intelligence (AI), increasingly make decisions that humans used to make, with broad implications for work, policymaking, and society (Danaher et al., 2017; Jarrahi et al., 2021; Lee, 2018; Lee, Kusbit, Metsky, & Dabbish, 2015; Mohlmann & Zalmanson, 2017). In many organizations, AI-based software makes decisions throughout the employee management cycle: AI hiring platforms identify job candidates and evaluate them by analyzing their applications and video interviews; chatbots assist with the employee hiring and onboarding process by answering questions and explaining organizational benefits; and algorithmic software allocates work shifts, evaluates employee performance, and predicts employee attrition (Cascio & Montealegre, 2016; Susskind & Susskind, 2015).

The emerging AI applications for employee management introduce changes in how organizations communicate with their employees: Some of the interactions between managers and employees are automated, and the decision-making agent becomes algorithms or software instead of humans. These changes can transform how employees and organizations establish and maintain relationships, namely the employees' psychological contracts. A psychological contract describes how employees perceive their organizations' and their own obligations, typically conveyed through explicit or implicit promises (Rousseau, 1995; Rousseau, Hansen, & Tomprou, 2018). Beyond a written contract, employees may perceive obligations that organizations are committed to uphold and deliver through interactions with their managers and other organizational representatives. Perceived employer obligations include commitments to inducements, such as secure employment, salary and incentives on par with industry standards, career advancement opportunities, and support for personal problems (Coyle-Shapiro, 2002). Previous research suggests that when employees perceive that their psychological contract is honored—in other words, obligations that they believe the employer has promised are delivered—they report increased job satisfaction, work performance, and motivation to stay in their

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organization (e.g., Lambert, Edwards, & Cable, 2003). In contrast, when employees perceive that these terms are breached, they are likely to reduce their performance and consider leaving the organization (e.g., Morrison & Robinson, 1997; Zhao, Wayne, Glibkowski, & Bravo, 2007). Despite the critical role of psychological contracts in employee performance and retention, the impact of algorithmic management on psychological contracts remains an open question.

Our research aims to contribute to the literature on algorithmic management at work (Kellog, Valentine, & Christin, 2020; Lee, 2018) and psychological contracts (e.g., Rousseau, 1995; Rousseau et al., 2018). First, we set out to examine whether people think of algorithms and automatic software-based processes as contract makers—that is, the extent to which people perceive employer commitments through their interaction with these systems (Rousseau & Greller, 1998). Past work on employment relationships shows that employees form their psychological contract with their employer mainly through their interaction with its organizational agents (Alcover, Rico, Turnley, & Bolino, 2017; Rousseau, 1995; Tomprou & Nikolaou, 2013). As algorithms and software automate processes previously executed by human agents, algorithmic agents may also play the role of contract maker, influencing how employees perceive and experience their employment relationship.

Second, we seek to examine how algorithmic management may affect one's psychological contract when employers fail to deliver their obligations. In this case, perceptions of breach and feelings of violation, such as anger and resentment toward the employer, may emerge (Morrison & Robinson, 1997; Rousseau et al., 2018). Such unfavorable occasions can be costly both for the employee and the employer (Pavlou & Gefen, 2005). We investigate how employees may respond when algorithmic management systems fail to deliver organizational obligations. Understanding the consequences (e.g., psychological contract breach, feelings of violation, and turnover intentions) can enlighten us about how algorithmic management systems may contribute to one's employment relationship.

Working toward these goals, we conducted five between-subjects online experiments manipulating the organizational agent (i.e., human versus algorithmic management agent) and the type of organizational inducement (i.e., transactional versus relational). Research on psychological contracts has shown that employers convey obligations or commitments[2] about two general types of organizational inducements: transactional inducements that are tangible and more calculative in nature (e.g, competitive salary), and relational inducements that focus on a more subjective, open-ended exchange (e.g., personal support, developmental opportunities, and employment security) (Robinson, Kraatz, & Rousseau, 1994; Rousseau & McLean Parks, 1993).

Our first research question is: how will algorithmic agent type influence employees' perceived employer commitments regarding organizational inducements? To answer this question, we conducted four studies in the contexts of recruiting (Studies 1 and 2) and onboarding (Studies 4 and 5), manipulating the agents and promised inducements. We also examined the impact of the human agent's communication modality using video conferencing versus textual chat (Studies 1 and 2). Our second research question is: how will people view and respond to undelivered employer obligations by algorithmic agents compared to human agents? To answer this question, we conducted three studies (Studies 3–5) where we manipulated the agent and under-delivered inducements. We investigated how the interplay of agent and inducement type affects attitudes toward the employer, such as perceived breach of contract, feelings of violation, and turnover intentions across different levels of under-delivering. In Studies 3 and 4, we presented a moderate level of inducement delivery (i.e., only one of the three promised inducements was not delivered), whereas in Study 5, we presented a low level of inducement delivery (i.e., two of the three promised inducements were not delivered).

[2] We use the terms "perceived employer obligation" and "commitment" interchangeably. Both terms indicate the employer's intentions toward an employee and differ from employees' general expectation about their employment, which does not rely on the promises by the employer.

2. Theoretical background: psychological contracts in algorithmic management

In this section, we review the literature on algorithmic management and psychological contracts and postulate how one's psychological contract is affected by algorithmic management.

2.1. Algorithmic management

Algorithmic systems can now automate management practices and perform complex tasks that were previously the responsibility of middle or upper management. We refer to these new practices as algorithmic management (Danaher et al., 2017; Jarrahi et al., 2021; Lee, 2018; Lee, Kusbit, Metsky, & Dabbish, 2015; Mohlmann & Zalmanson, 2017; Schildt, 2017). Kellog and colleagues (2020) recently categorized algorithmic functions of managerial responsibilities into six mechanisms: to provide directions to employees by restricting and recommending, to evaluate employees by recording and rating, and to discipline employees by replacing and rewarding. The trend toward algorithmic management is driven by the availability of data and several beliefs about data's potential benefits, including that data can improve decision quality and automating decisions can boost efficiency and scalability (Mayer-Schoenberger & Cukier, 2012; Parry, Cohen, & Bhattacharya, 2016; Schildt, 2017). Algorithmic management enables organizations to quickly scan thousands of resumes, organize a fleet of cars with a relatively small number of managers, balance complex factors to schedule employee shifts, or even monitor worker performance and moods. As a result, algorithms can be cost-effective and yield a high return on investment. Many organizations invest in algorithms to scale up hiring and predict job satisfaction and employee turnover (Cascio & Montealegre, 2016; Susskind & Susskind, 2015).

Emerging empirical research has investigated how employees perceive algorithmic agents taking on a managerial role as compared to human agents. Online experimental studies in the context of employee selection suggest that applicants would prefer that human agents do resume screening or job interviews rather than algorithmic agents; they trusted algorithmic agents less and perceived them as less fair compared to human agents (Langer, König, & Papathanasiou, 2019; Lee, 2018; Smith & Anderson, 2017). Similar findings were observed in performance evaluations (Lee, 2018). In laboratory studies, participants were more obedient following directions given by a human than a robot or a computer (Geiskkovitch, Cormier, Seo, & Young, 2016) and found task allocations decided through group discussion to be fairer than assignments by a division algorithm (Lee & Baykal, 2017). In contrast, in other studies, people perceived algorithmic and human agents similarly or sometimes preferred algorithmic agents. For example, people's trust and perceived fairness around algorithmic and human agents did not vary in worker scheduling and task assignment (Lee, 2018). Gombolay, Gutierrez, Clarke, Sturla, and Shah (2015) found that people preferred to give up control to algorithmic agents in certain cases. This line of work suggests that there is currently mixed evidence for the similarities and differences in employees' perceptions of algorithmic versus human agents. Additionally, employees' attitudes toward their employers have not been a primary focus of the prior work, with exceptions such as Langer et al. (2019).

This empirical work indicates the complexity of algorithmic management and demonstrates that there is still a lot to learn to understand its impact. As algorithmic management is increasingly adopted and implemented in work environments, it is critical to explore what factors of algorithmic management influence employees' psychological contracts.

2.2. Psychological contracts and the role of human and algorithmic agents as contract makers

Psychological contracts refer to employee beliefs about their own and their employer's obligations, typically formed through their interactions with organizational agents (Rousseau, 1995). Employees rely on their psychological contract to interpret their relationship with their organization (Rousseau, 1995). For example, employees perceive schedule flexibility and fair pay as an organization's obligations in exchange for their professionalism and hard work. Our research focuses on two critical aspects of psychological contracts: psychological contract formation and breach.

Early writings on psychological contracts (Levinson, Price, Munden, Mandl, & Solley, 1962) argue that employees develop their psychological contract through a process of anthropomorphizing the organization and form a view of the employer as a single entity (Eisenberger, Huntington, Hutchison, & Sowa, 1986; Levinson et al., 1962; Morrison & Robinson, 1997). Rousseau (1995) elaborates on the process by arguing that employees perceive messages from human organizational agents who play the role of psychological contract makers. Human contract makers, such as supervisors, convey organizational messages through interaction. Perceived employer commitments can emerge early on, such as through recruiting events, job interviews, and onboarding processes, when organizations explicitly or implicitly explain organizational inducements (Rousseau & Greller, 1994). Through their exchange with these contract makers, employees may perceive transactional commitments from the employer, such as promotion schemas, and relational commitments, such as caring, recognition, and future investment, which strengthen a perceived emotional bond that can positively affect employee attitudes and behavior toward the organization (Robinson et al., 1994).

At times, employees perceive that their employer has failed to honor their side of the psychological contract (Robinson & Rousseau, 1994). For example, under-delivering perceived commitments may result in a breach of the employee's psychological contract—that is, employee perceptions of how well the organization fulfills their side of their contract and honors its terms (Coyle-Shapiro, 2002; Rousseau, 1995). Consistent findings show that when employees perceive a breach, they tend to form negative attitudes, such as feelings of violation, an emotional response toward the employer, such as anger and betrayal (Robinson & Morrison, 2000), and turnover intentions, among others (Bal, De Lange, Jansen, & Van Der Velde, 2008; Bordia, Restubog, & Tang, 2008; Ng, Feldman, & Lam, 2010; Zhao et al., 2007). We note that perceived breach may not always lead to feelings of violation, depending on how the perceived breach is interpreted. Factors such as assessment of outcome magnitude, fairness judgments, and attributions influence the link between psychological breach and violation feelings (Morrison & Robinson, 1997; Robinson & Rousseau, 1994).

As algorithms perform managerial functions as organizational agents, they are likely to convey promissory cues that signal employer intentions and/or make decisions that may impact one's beliefs about their psychological contract and affect their relationship with the employer in a similar manner to human contract makers. Emerging work began to theorize how robotic coworkers might influence human employees' psychological contracts through interpersonal relationships (Bankins & Formosa, 2020). In our work, we empirically explore the role of algorithmic agents as contract makers and the degree to which they influence one's psychological contract in the context of algorithmic management.

3. The current research: psychological contracts and algorithmic versus human organizational agents

In this section, we describe how algorithmic versus human agents may differently affect employees' psychological contracts in terms of perceived employer commitments and psychological contract breach.

3.1. Organizational agents and organizational inducement types

We conjecture that the agent type—algorithmic versus human agent—will have an impact on an employee's psychological contract depending on the inducement type. Emerging studies suggest that people trust algorithms and humans differently depending on tasks. On the one hand, people prefer humans to algorithms when algorithms perform tasks that people believe require capabilities unique to humans, such as employee performance evaluation (Castelo, Bos, & Lehmann, 2019; Lee, 2018), and tasks that need to consider individuals' uniqueness, such as healthcare decisions (Longoni, Bonezzi, & Morewedge, 2019). On the other hand, mixed evidence exists regarding algorithms making objective and/or mechanical decisions that are often data-driven. People's trust in and adoptions of algorithmic and human decisions did not differ for functions such as scheduling and task allocation (Lee, 2018) or for stock purchasing (Castelo et al., 2019). For weather and business forecasting, people trusted algorithmic decisions more than human decisions (Castelo et al., 2019; Logg, Minson, & Moore, 2019).

People may perceive that the algorithmic versus human agents will be able to deliver differently depending on the organizational inducement type. Psychological contract literature distinguishes two types of inducements—relational and transactional (Montes & Irving, 2008; Raja, Johns, & Ntalianis, 2004; Rousseau, 1995)—with different implications for one's psychological contract (Montes and Irving, 2008; Raja et al., 2004). Relational inducements refer to the organization's socio-emotional support for employees' growth and wellbeing, which often occurs in open-ended time frames (Blau, 1967; Rousseau, 1990). Examples include opportunities for employee skill development, networking, and personal support. Because of the socio-emotional nature of relational inducements, people may believe that algorithmic agents will be less capable of committing to and delivering relational inducements. Transactional inducements typically refer to the well-specified benefits and contributions that are economic and short-term in nature. Examples include pay raises, bonuses, and competitive salaries. Because of the transactional, economic nature of the inducements, people may perceive that both human and algorithmic agents are capable of promising and delivering such inducements. In the next sections, we explain how the interaction between the agent and the inducement type may impact one's perceived employer commitments and perceived breach in the case of under-delivered inducements.

3.2. Psychological contracts and promised inducements: perceived employer commitments

We hypothesize that the type of organizational agent will have different effects on perceived employer commitments depending on the inducement type. Promises about relational inducements typically signal socio-emotional exchanges (Rousseau, 1995), which people often perceive that human agents will be better at than algorithmic agents (Castelo et al., 2019; Lee, 2018). Using algorithmic agents in the process of promising such inducements may signal that the organization may not be invested in such socio-emotional exchanges and a long-term relationship, which will result in an individual's decreased perception of such commitments. In contrast, transactional inducements are based on more standardized processes that often involve economic and quid-pro-quo exchanges (Rousseau, 1995; Montes and Zweig, 2009). Based on the prior work that found no differences between human and algorithmic agents for objective tasks or found evidence that algorithmic agents were preferred (Castelo et al., 2019; Lee, 2018; Logg et al., 2019), we hypothesize that the agent type will be less likely to influence perceived employer commitments in transactional inducements.

Hypothesis 1. The agent type will interact with organizational inducement type to affect perceived employer commitments such that perceived employer commitments will be greater when human agents promise relational inducements than when algorithmic agents promise relational inducements, while the effect of agent will be less evident in

transactional inducements.

3.3. Psychological contract breach from under-delivered inducements: perceived breach, violation feelings, and turnover intentions

We hypothesize that the agent type will have different effects on perceived breach depending on the inducement type. We base our hypotheses on expectation violation in the discrepancy between perceived employer commitments and actual inducement delivery (Burgoon & Hale, 1988). Expectancy violation theory suggests that people form more negative attitudes with the same outcomes when their expectation is violated to a greater degree. With relational inducements, employees may perceive higher employer commitments with a human agent than an algorithmic agent (see Section 3.2 for an explanation). Thus, the under-delivered inducements will violate perceived commitments to a greater degree when the human agent fails to deliver compared to the algorithmic agent. In contrast, with transactional inducements, the difference in perceived employer commitments between the agent types will be smaller, thus leading to a smaller degree of expectation violation.

Hypothesis 2. Agent types will interact with delivered organizational inducement types to affect (a) perceived breach toward the organization, (b) violation feelings, and (c) turnover intentions such that these outcomes will be greater when human agents under-deliver relational inducements than when algorithmic agents under-deliver relational inducements, while the effect of agents will be less evident with transactional inducements.

3.4. Overview of the current studies

We investigated our hypotheses through five online experiments manipulating the organizational agent and inducement type (Fig. 1). We adopted experiment scenarios previously used in psychological contract research by Montes and Zweig (2009), which examined the effects of promise-based inducement delivery on one's perceived employer commitments. To test the effect of the agent and inducement on perceived commitments (Hypothesis 1), we conducted four experiments in the context of recruiting (Studies 1 and 2) and onboarding (Studies 4 and 5). We also examined the effect of the human agent's communication modality: in Studies 1, 4, and 5, the human agent conveyed promises through video conferencing; in Study 2, both agents communicated promises through textual chats. To test the effect of the agent and inducement on psychological contract breach, we conducted three experiments (Studies 3–5). In Study 3, we adapted our scenarios of Studies 1 and 2 to a virtual organization situation, where the organization fails to deliver one of the three inducements promised during onboarding (a moderate inducement delivery). In Study 4, we replicated the Study 3 scenario and added the measures of perceived employer commitments. Finally, in Study 5, we adopted the scenarios in Study 4 for a low delivery of inducements where two out of the three promised inducements are not delivered. Individuals who participated in our experiment were excluded from participation in any subsequent experiment. All study protocols are available in the online supplementary material (see Appendix B).

4. Study 1: algorithmic agents convey reduced employer commitment to relational inducements compared to human recruiters

4.1. Method

4.1.1. Participants and procedure

We conducted a 2 (organizational agents: human recruiter vs. recruiting software) x 2 (promised organizational inducement type: relational vs. transactional) between-subjects online experiment with 239 participants on Amazon's Mechanical Turk (104 females; M_{age} = 37.18, SD = 10.40) in exchange for $1 in Amazon credits. All participants lived in the United States and 72% had full-time jobs. 647 opened the online survey, and 302 did not complete the survey or did not pass attention filters embedded at the beginning of the survey. 106 failed to pass recall-based attention check questions regarding the type of organizational agents and promised inducements, which resulted in a final sample of 239 participants. The median completion time was 5 min.

4.1.2. Organizational agent and inducement manipulation

Participants first read a recruiting scenario adopted from Montes and Zweig (2009). Specifically, they were asked to imagine that they attended a job fair where they were explained about different inducements that an employer would provide, were later invited for an interview, and received an offer from the employer. We manipulated the organizational agent and organizational inducement. For the agent, we stated that either a human recruiter through video conferencing or recruiting software provided the information. For the inducement, we presented either relational inducements (e.g., networking opportunities, skill development, and support) or transactional inducements (e.g., pay raises, bonuses, and a competitive salary). All scenarios stated that the interactions with agents were recorded to avoid a potential confound in which participants would assume that the interaction with the software agent was recorded whereas the interaction with human agents was not.

4.1.3. Dependent variables

The level of perceived employer commitments was measured with one item question used in prior work (e.g., Montes & Zweig, 2007; Montes & Irving, 2008; Rousseau & Tijoriwala, 1998; Coyle-Shapiro & Kessler, 2000), which asked the degree to which participants felt the organization would be committed to providing inducements if they were to get an offer and join the company. A one-item measure of one's psychological contract is a common way to assess one's psychological contract in the specific literature (e.g., Robinson & Rousseau, 1994).[3] We also measured the likelihood of accepting the job offer as a proxy of the participant's reliance on the promises conveyed through the interaction. The likelihood of accepting the job offer was measured with one item asking the degree to which participants would accept the job offer. All responses were measured on a 7-point scale (*Not at all* = 1 to *A very great extent* = 7). We also asked about participants' computer programming knowledge[4] (Lee, Kiesler, Forlizzi, Srinivasa, & Rybski, 2010) as well as demographic information such as age, gender, education, employment status, and ethnicity.

4.2. Results

We analyzed participants' responses concerning promised inducements using a two-way analysis of variance (ANOVA) examining the main and interaction effects of agent and inducement types. Full statistical results are reported in Table A1 in Appendix A. The main effect of agent type was not significant ($F(1,239) = 2.03$, $p = .15$, $\eta_p^2 = 0.01$) nor was the main effect of the inducement ($F(1,239) = 2.40$, $p = .12$, $\eta_p^2 = 0.01$). There was a significant interaction effect between agent and inducement type on perceived employer commitments ($F(1,239) = 6.41$, $p = .01$, $\eta_p^2 = 0.03$; Fig. 2). A planned contrast showed that the difference between the effects of agent type was significant in the case of relational inducements. With the relational inducements, participants were less likely to perceive commitments when algorithmic agents

[3] As our study's focus was to assess the extent to which participants will perceive employer commitments in general terms, we used a general measure of assessment rather than a composite scale.

[4] We used the following 4-point scale: "No knowledge at all," "A little knowledge—I know basic concepts in programming," "Some knowledge—I have coded a few programs before," "A lot of knowledge—I code programs frequently."

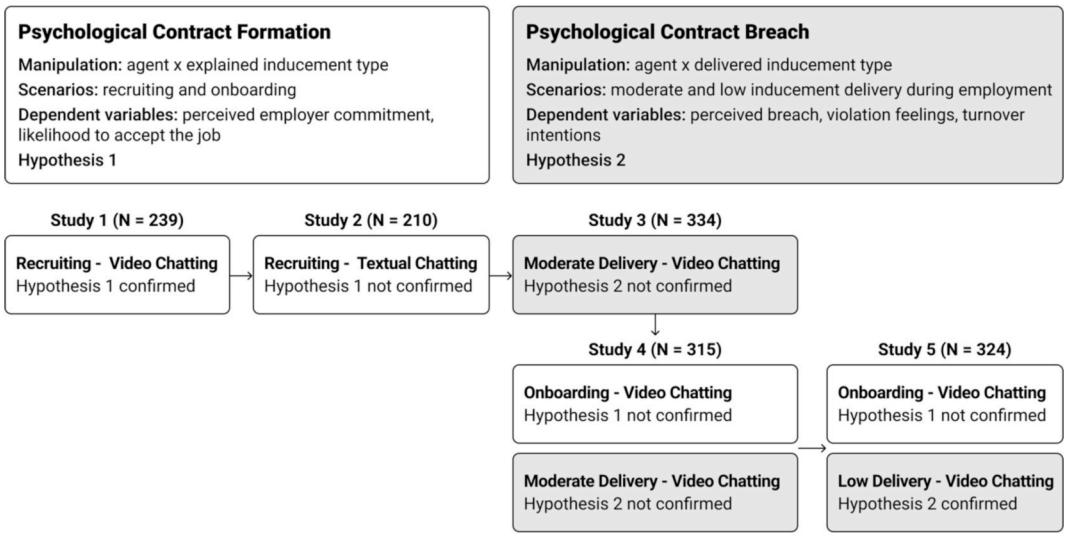

Fig. 1. Overview of the studies.

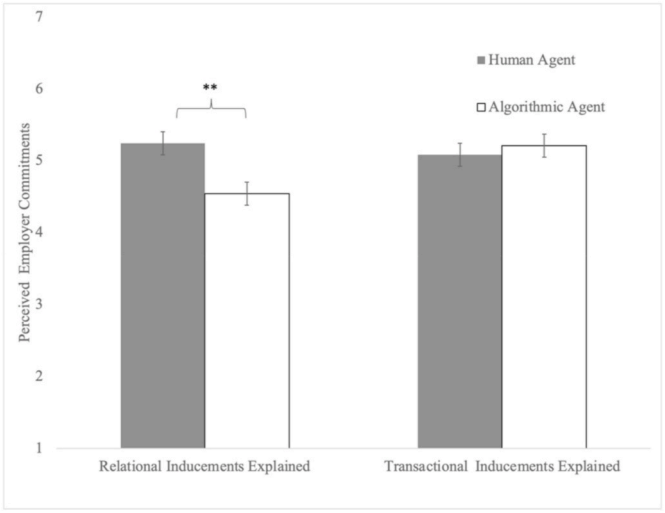

Fig. 2. Interaction effects of agent and type of organizational inducements on perceived employer commitments during recruitment (Study 1). Note: $p = .005$ in the relational inducements between agent types. Interaction: F (1,239) = 6.41, $p = .01$. Error bars represent standard errors.

conveyed the information (M = 4.58, SE = 0.17) than when human agents conveyed the information (M = 5.23, SE = 0.16; F (1, 235) = 7.87, $p = .005$). There was no effect of the agent type with transactional inducements (human agents: M = 5.07, SE = 0.16; algorithmic agents: M = 5.25, SE = 0.16; F (1, 235) = 0.61, $p = .44$).

For the likelihood of job acceptance, the main effect on agent type was not significant (F (1,239) = 0.62, p = ns, $\eta_p^2 = 0.00$). The main effect on inducement type was significant; participants were more willing to accept a job with transactional inducements than relational inducements (F (1,239) = 6.67, $p = .014$, $\eta_p^2 = 0.025$). The interaction effect on the likelihood of job acceptance did not reach statistical significance (F (1, 239) = 0.460, $p = .49$, $\eta_p^2 = 0.00$).

4.3. Discussion

These results suggest that people perceived a lower level of employer commitments when algorithmic agents explained relational inducements than when human agents explained them. On the contrary, no difference was observed when the transactional inducements were explained by either algorithmic or human agents. These findings confirm Hypothesis 1. In this study, participants used video chat to communicate with the human recruiter. The software interaction did not afford video and audio communication channels. Participants may have perceived more commitments in the relational inducement condition with the human recruiter because of the video- and audio-based communication in their interaction. To examine whether the effect of agent type still exists when both agents use the same communication channel, we conducted Study 2, where both human managers and software promised inducements through textual chatting.

5. Study 2: algorithmic agents and human recruiters convey similar levels of employer commitments when both use textual communication

5.1. Method

5.1.1. Participants and procedure

We used the same procedure as in Study 1. We conducted a 2 (organizational agent: human vs. algorithm) x 2 (promised organizational inducement type: relational vs. transactional) between-subjects online experiment with 210 participants on Amazon's Mechanical Turk (74 females; M_{age} = 37.20, SD = 10.75) in exchange for $1 in Amazon credits. All participants lived in the United States and 76.6% had full-time jobs. 464 opened the online survey, and 76 did not pass initial attention filters embedded or did not complete the survey. 178 failed the recall-based attention checks regarding the agent type and promised inducements, resulting in a final sample of 210 participants. The median completion time was 5.18 min.

5.1.2. Organizational agent and inducement manipulation

We adopted the recruitment scenario used in Study 1. We changed the communication methods of organizational agents so that both a human recruiter and recruiting software communicated with the candidate via textual chat.

5.1.3. Dependent variables

We used the same dependent variables and demographic questions as in Study 1.

5.2. Results

The main effect of agent type on perceived employer commitments did not reach significance (F (1, 209) = 1.41, $p = .23$, $\eta_p^2 = 0.00$) nor the

type of organizational inducements (F (1,209) = 3.28, p = .07, η_p^2 = 0.02). The interaction effect on perceived employer commitments was also not significant (F (1, 209) = 0.33, p = .48, η_p^2 = 0.00). Similar results were observed for the likelihood of job acceptance. Neither the main effects (agent type: F (1,209) = 0.57, p = ns, η_p^2 = 0.00; organization type explained: F (1,209) = 2.63, p = .10, η_p^2 = 0.01) nor the interaction (F (1,209) = 2.40, p = .12, η_p^2 = 0.01) reached significance. Hypothesis 1 was not confirmed in Study 2.

5.3. Discussion

The results in Study 2 do not show the effect observed in Study 1, the interaction effect of organizational agent and inducement type on perceived employer commitments. Participants perceived a similar level of employer commitments in both relational and transactional inducements when both human and algorithmic agents communicated via textual chat. One potential explanation for this result could be that people do not perceive that textual chat–based interaction with human agents is a communication channel that affords socio-emotional exchanges. The Study 2 finding suggests that a communication modality between agents and potential employees could matter in one's psychological contract in addition to the agent type.

In Studies 3–5, we test Hypotheses 1 and 2 by examining them in the context of onboarding as well as under-delivered inducements.

6. Studies 3 and 4: when promised inducements are moderately delivered, the type of organizational agent does not influence psychological contract breach

6.1. Method

In Studies 3 and 4, participants were informed of the organizational inducements during onboarding. We then provided information about their working relationship and introduced the manipulations on a moderate delivery of inducements. Both studies were identical except that Study 4 included a question about perceived employer commitments right after the explanation of organizational inducements during onboarding; this question tested Hypothesis 1 in an onboarding scenario where participants have already been hired (see Appendix B).

6.1.1. Participants and procedure

We conducted a 2 (organizational agent: human vs. algorithm) x 2 (promised organizational inducement type: relational vs. transactional) between-subjects online experiment. In Study 3, we had 334 participants on Amazon's Mechanical Turk (128 females; M_{age} = 37.27, SD = 11.18) in exchange for $1.20 in Amazon credits. All participants lived in the United States and 69.2% had full-time jobs. 448 opened the survey, and 63 of them did not pass initial attention filters or did not complete the survey. 47 failed to pass recall-based manipulation checks regarding the agent and inducement type, resulting in a final sample of 334 participants. The median completion time was 6.9 min.

In Study 4, we used the same procedure with 315 participants (145 females; M_{age} = 37.30, SD = 11.49). All participants lived in the United States and 65.7% had full-time jobs. 467 opened the survey, and 79 did not pass initial attention filters or did not complete the survey. 62 failed to pass recall-based manipulation checks regarding the agent and inducement type, resulting in a final sample of 315 participants. The median completion time was 7 min.

6.1.2. Organizational agent and inducement manipulation

On the first page, participants read an onboarding scenario adapted from Studies 1 and 2. Specifically, they were asked to imagine that they were hired by an organization where all employees worked remotely with an organizational agent that assigned tasks and schedules, evaluated performance, and allocated rewards. Participants were informed that the organization would provide certain inducements. We manipulated the organization agent (i.e., manager via video conferencing or management software) as well as the inducement type (i.e., relational or transactional) using the same examples used in Studies 1 and 2. The second page described employment relationships. Participants were asked to imagine that they had been working for this organization for three full years; the organizational agent had been communicating with them about the organizational goals and strategies and providing the participants with feedback on their work, and the participant was highly committed and had been working very hard. In this way, the participant was likely to view that they honored their side of the contract.

Next, we presented the delivered inducements with one inducement not being approved by the agent. This setting is similar to Montes and Zweig's (2009) experimental condition of a moderate delivery of inducements. For the relational condition, we stated that a year ago, the participant applied for a training workshop held in the company that would help the participant develop new skills, and the request was approved (*delivered inducement*). The participant also had the opportunity to expand professional networks (*delivered inducement*). Recently, the participant was dealing with some important issues and submitted a request for time off to the manager, but the organizational agent did not approve (*undelivered inducement*).

For the transactional condition, we stated that for the first two years the organizational agent had given regular bonuses every six months (*delivered inducement*) and the participant received pay raises according to increases in the cost of living (*delivered inducement*). Recently, the participant's performance evaluation was exceptional, but the organizational agent did not give the pay raise (*undelivered inducement*). We manipulated the organizational agent (i.e., whether the information was provided by a human manager through video conferencing or management software). Studies 3 and 4 used the same scenario except that Study 4 included the perceived employer commitments measure on the first page with the onboarding scenario.

6.1.3. Dependent variables

We asked participants to indicate the extent to which they agreed with the statements about the organization. All responses were measured on a 7-point scale (*Not at all* = 1 to *A very great extent* = 7). Three items of perceived breach were measured with Robinson and Morrison's (2000) scale, also adapted in Montes and Zweig's (2009) study. Perceived breach refers to an individual's perception of the degree to which the employer fulfills promises. An example reverse item was "I feel that my organization has come through in fulfilling the promises made to me." The scale was reliable in both studies (Study 3: α = 0.84; Study 4: α = 0.84). We also measured violation feelings with three items (Robinson & Morrison, 2000). Violation feelings describe an individual's negative affective reactions, such as anger, resentment, and betrayal, that are expected to arise from an organization's failure to meet its commitments. An example item was "I feel betrayed by my organization." The scale was reliable in both studies (Study 3: α = 0.85; Study 4: α = 0.89). Turnover intentions were measured with three items using the scale by Walsh, Ashford, & Hill (1985). An example item of turnover intentions was "I would be thinking about quitting my job." The scale was reliable in both studies (Study 3: α = 0.91; Study 4: α = 0.92). We collected the same demographic information and computer programming knowledge as in Studies 1 and 2. As programming knowledge was related to some of the outcomes, we controlled for this variable in our analyses.

6.2. Results

6.2.1. Perceived employer commitments during onboarding

In Study 4, we conducted a two-way ANOVA to test the effect of the organizational agent and inducement types on perceived employer commitments after participants read the onboarding scenario. Hypothesis 1 was not confirmed in the context of onboarding. The main effect of

agent type was significant (F (1,301) = 9.65, $p = .002$, $\eta_p^2 = 0.03$) as was the main effect of the inducement type (F (1,301) = 8.42, $p = .004$, $\eta_p^2 = 0.03$). Participants perceived greater employer commitments when the inducements were communicated by human agents (M = 5.87, SD = 0.78) than algorithmic agents (M = 5.53, SD = 1.12) and when transactional inducements were explained (M = 5.86, SD = 0.97) compared to relational ones (M = 5.54, SD = 0.96). There was no significant interaction effect of agent and inducement types on perceived employer commitments (F (1,301) = 0.88, $p = .34$).

6.2.2. Perceived psychological breach, violation feelings, and turnover intentions

We conducted a two-way ANOVA to test the effect of the organizational agent and inducement types on perceived breach, violation feelings, and turnover intentions that participants reported after the moderately delivered inducement scenario. Table A2 in Appendix A presents descriptive statistics and bivariate correlations. Full statistical results are reported in Table A3 in Appendix A. In Study 3, the inducement type had a significant main effect on perceived breach; participants perceived a greater breach with relational inducements (M = 3.97, SD = 1.28) than transactional ones (M = 3.46, SD = 1.32; F (1,333) = 12.02, $p < .001$, $\eta_p^2 = 0.04$). The main effect of agent type on perceived breach was insignificant (F (1,333) = 0.36, $p = .52$, $\eta_p^2 = 0.00$) as well as the interaction effect of the agent and inducement type (F (1, 333) = 0.00, $p = .91$, $\eta_p^2 = 0.00$).

For violation feelings, we found no main effects of agent type (F (1, 333) = 0.32, $p = .57$, $\eta_p^2 = 0.00$) and inducement type (F (1, 333) = 2.16, $p = .17$, $\eta_p^2 = 0.00$) nor the interaction effect (F (1, 333) = 0.52, $p = .46$, $\eta_p^2 = 0.00$). For turnover intentions, we also found no main effects (agent type: F (1, 333) = 0.98, $p = .32$, $\eta_p^2 = 0.00$); inducement type: F (1, 333) = 0.18, $p = .67$, $\eta_p^2 = 0.00$) nor an interaction effect (F (1,333) = 0.68, $p = .40$, $\eta_p^2 = 0.00$).

In Study 4, the organizational inducement type had a significant impact on perceived breach (F (1,314) = 13.56, $p < .001$, $\eta^2 = 0.02$) consistent with Study 3; participants reported a greater breach with relational inducements (M = 3.99, SD = 1.33) than transactional ones (M = 3.57, SD = 1.36). The main effect of the inducement type became significant[5] where participants reported greater violation feelings when transactional inducements were moderately delivered (M = 4.51, SD = 1.56) compared to relational ones (M = 4.14, SD = 1.36). As in Study 3, there were no main (inducement type: F (1,314) = 0.28, $p = .59$, $\eta^2 = 0.00$; agent type: F (1,314) = 0.44, $p = .50$, $\eta^2 = 0.00$) or interaction effects on turnover intentions (F (1,314) = 0.39, $p = .52$, $\eta^2 = 0.00$).

6.3. Discussion

The results of Studies 3 and 4 did not show the interaction effects of agent and inducement types on perceived commitments and psychological contract breach, disconfirming Hypotheses 1 and 2. Instead, the inducement type influenced perceived breach in both studies. Participants perceived a greater breach with a moderate delivery of relational inducements compared to transactional inducements. This finding is consistent with past research in psychological contracts that suggests that psychological contracts with relational commitments are more vulnerable to perceived breach than those with transactional commitments (Lambert et al., 2003; Montes & Irving, 2008). Under-delivery in relational inducements could signal reduced effort to support the employee or limited investment (Eisenberger et al., 1986, 2001). Relational inducements entail expanded aspects of the employment relationship and underlying trust, whereas transactional commitments have a more narrowed scope. When relational commitments are not met, perceptions of breach are more likely to emerge, whereas unmet transactional commitments are less likely to relate to perceived breach (Grimmer & Oddy, 2007; Raja et al., 2004).

Contrary to our expectations we found no main effects of agent type nor any significant interactions. A possible explanation is that people are less likely to make any attributions related to who under-delivers in moderate delivery of inducements that can considerably distinguish algorithms from human agents. Indeed, past research has shown that when events are unclear or ambiguous, people are less likely to draw assumptions (Robinson & Morrison, 2000).

As reported in earlier studies on psychological contracts, the magnitude of under-delivered inducements may affect employees' perceived breach (Morrison & Robinson, 1997; Rousseau et al., 2018). Therefore, in our next study (Study 5), we adopted the stimuli and measures in Study 4 and lowered the level of inducement delivery by increasing the number of undelivered inducements.

7. Study 5: when most promised relational inducements are undelivered, human agents increase perceptions of breach compared to algorithmic agents

7.1. Method

7.1.1. Participants, procedure, and measures

We had 324 participants on Amazon's Mechanical Turk (139 females; M_{age} = 37.33, SD = 10.59) in exchange for $1.20 in Amazon credits. All participants lived in the United States and 65.4% had full-time jobs. 454 opened the survey, and 52 did not pass initial attention filters or did not complete the survey. 48 failed to pass recall-based attention checks regarding the agent and inducement types, resulting in a final sample of 324 participants. The median completion time was 6.98 min.

We adapted the scenario used in Studies 3 and 4 by reducing the number of delivered inducements to create a low inducement delivery condition, as in Montes and Zweig's (2009) experiment. In the relational condition, we stated that participants had never been given the opportunity to expand their professional network in addition to the agent's disapproval of a time-off request (see Studies 3 and 4 for a full description). In the transactional condition, we stated that the participant had never received pay raises according to increases in cost of living in addition to the agent not giving a pay raise even though performance evaluation was exceptional. We used the same measures as in Study 4. All scales were reliable with Cronbach's α, ranging from 0.82 to 0.91.

7.2. Results

7.2.1. Perceived employer commitments during onboarding

Descriptive statistics and bivariate correlations are reported in Table A4 in Appendix A. We tested the effect of agent and inducement types on perceived employer commitments after participants read the onboarding scenario. As in Study 4, the main effect of organizational inducement type was significant (F (1,318) = 5.98, $p = .015$, $\eta_p^2 = 0.02$), with participants perceiving greater commitments with transactional inducements (M = 5.81, SD = 1.06) than relational ones (M = 5.50, SD = 1.09). Neither the main effect of the agent (F (1, 318) = 1.39, $p = .23$) nor the interaction effect was significant (F (1,318) = 0.76, $p = .38$). Hypothesis 1 was not confirmed in the context of onboarding as in Study 4 (see Table A5 in Appendix A).

[5] We note that this was an inconsistency with Study 3 where the inducement type did not have a significant impact on violation feelings ($p = .14$).

7.2.2. Perceived psychological breach, violation feelings, and turnover intentions

We conducted two-way ANOVAs controlling for programming knowledge.[6] Full statistical results are reported in Table A3 in Appendix A. The agent type had no main effect on perceived breach (F (1,322) = 0.36, $p = .77$). The main effect of inducement type on perceived breach was significant (F (1,322) = 8.14, $p < .001$, $\eta_p^2 = 0.025$), with participants reporting higher perceived breach in relational inducements (M = 5.44, SD = 1.09) than transactional inducements (M = 5.10, SD = 1.22). The interaction effect of agent and inducement types was also significant (F (1,322) = 5.32, $p = .02$, $\eta_p^2 = 0.016$; see Fig. 3). Planned contrast tests showed that participants perceived a higher level of breach when the human manager under-delivered relational inducements (M = 5.64, SE = 0.13) compared to all three other conditions: algorithmic agent with relational inducements (M = 5.27, SE = 0.13), F (1, 318) = 4.32, $p = .04$), human manager with transactional inducement (M = 4.95, SE = 0.13), F (1, 318) = 13.66, $p < .001$), and algorithm with transactional inducement (M = 5.21, SE = 0.13), F (1, 318) = 6.04, $p = .01$).[7]

For violation feelings, none of the main effects was significant (agent type: F (1,322) = 0.00, p = ns; inducement type: F (1,322) = 1.75, p = ns). However, we found a significant interaction effect on violation feelings (F (1,322) = 4.51, $p = .03$, $\eta_p^2 = 0.014$; see Fig. 4). Planned contrast tests revealed that participants reported greater violation feelings when algorithms under-delivered transactional inducements (M = 5.30, SE = 0.12) compared to relational inducements (M = 4.88, SE = 0.12; F (1,318) = 5.8, $p = .02$). The effect of agent type did not reach a significance level with relational inducements (F (1,318) = 2.15, $p = .14$) or transactional inducements (F (1,318) = 2.36, $p = .13$).

Regarding turnover intentions, there were significant main effects of the inducement type (F (1,322) = 4.12, $p = .04$, $\eta^2 = 0.013$) and agent (F (1,322) = 8.41, $p < .001$, $\eta^2 = 0.03$; see Fig. 5). Specifically, participants considered leaving the organization to a greater degree when relational inducements were under-delivered (M = 5.04, SD = 1.26) compared to transactional inducements (M = 4.74, SD = 1.49), and when the human agent did not deliver (M = 5.11, SD = 1.27) compared to the algorithmic agent (M = 4.67, SD = 1.47). We found no interaction effect on turnover intentions (F (1,322) = 0.024, $p = .87$).

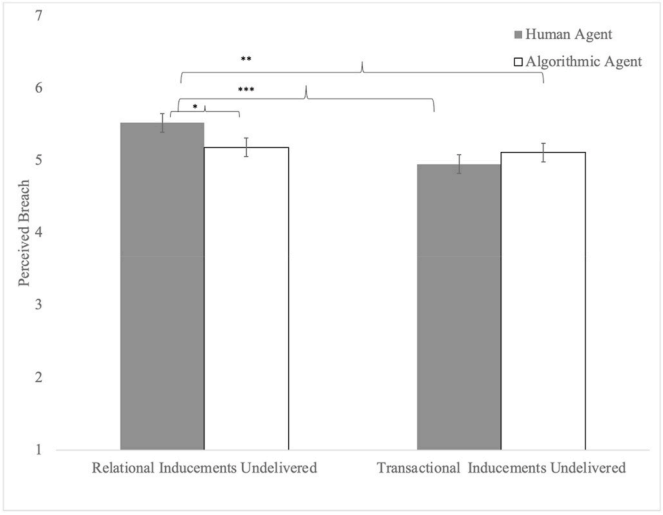

Fig. 3. Interaction effect of organizational inducement and agent type on perceived breach in Study 5 (low delivery of inducements). Note: Compared to the human agent in the relational inducements, the algorithmic agent in the relational inducements ($p = .04$), the human agent ($p < .001$) and the algorithmic agent ($p = .01$) in the transactional inducements. Interaction: F (1,322) = 5.32, $p = .02$.

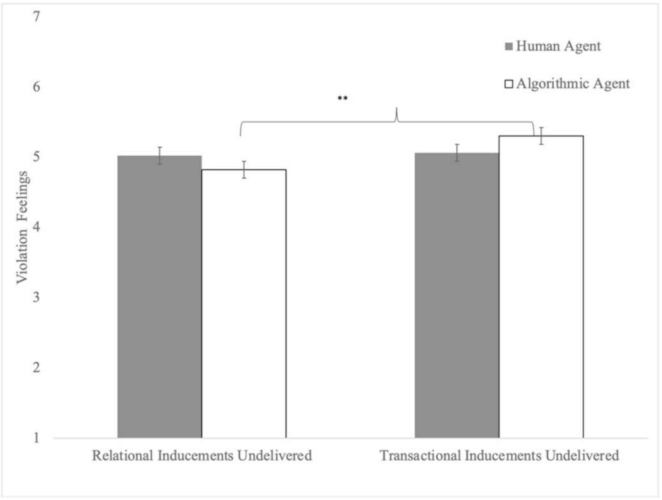

Fig. 4. Interaction effect of organizational inducement and agent type on violation feelings in Study 5 (low delivery of inducements). Note: $p = .02$ between the relational and transactional inducements in the algorithmic agent. Interaction: F (1,322) = 4.51, $p = .03$.

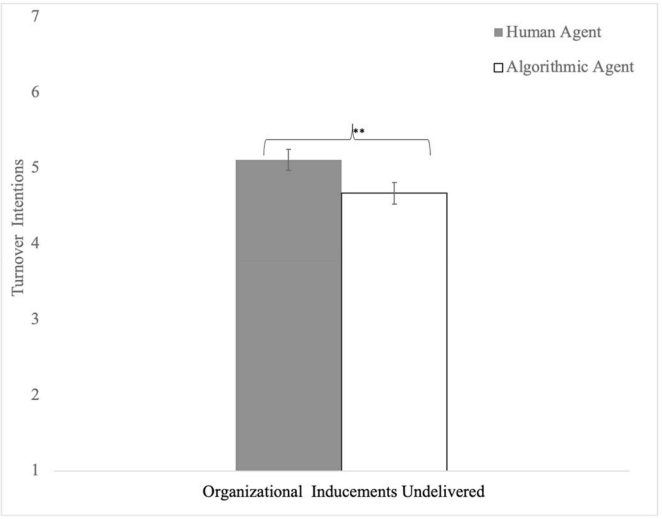

Fig. 5. Main effects of agent type on turnover intentions in Study 5 (low delivery of inducements). Note: F (1,322) = 8.41, $p < .001$.

7.3. Discussion

The Study 5 results confirm Hypothesis 2 for perceived breach in the case of low inducement delivery. Participants perceived greater contract breach when human agents under-delivered relational inducements compared to algorithmic agents. In other words, they viewed that the employer failed to honor their side of the contract to a greater degree when the human agent under-delivered the relational inducements. There was no difference in perceived breach when human or algorithmic agents under-delivered transactional inducements. Hypothesis 2 was partially supported for violation feelings. Instead of the full interaction effect, participants experienced greater violation feelings when the algorithmic agent under-delivered transactional inducements compared

[6] Programming knowledge was significant in all the models reported here, with a consistent significance level of $p = .01$. Running analyses without controlling for programming knowledge did not change significance of the reported results.

[7] The differences between these three conditions were insignificant.

to relational inducements.

Finally, Hypothesis 2 was also not supported for turnover intentions. Instead, the main effects of the agent and inducement type were significant. Participants had increased turnover intentions when relational inducements were under-delivered, which is consistent with previous psychological contract research (Grimmer & Oddy, 2007). Participants had also greater turnover intentions when human agents under-delivered the inducements compared to algorithmic agents, regardless of the inducement type.

8. General discussion

Many organizational managerial functions, such as recruiting job candidates, onboarding new hires, and allocating tasks, are already executed by software and/or chatbots (Cascio & Montealegre, 2018; Danaher et al., 2017). In the series of five studies, we examined how algorithmic organizational agents influenced employees' psychological contracts across different stages: when psychological contracts are formed (Studies 1, 2, 4, and 5), and when they are revised in response to moderate and low inducement delivery (Studies 3–5) (Rousseau et al., 2018). We discuss our findings and their theoretical and practical implications across these stages and present opportunities for future research.

8.1. Theoretical contributions

Our studies suggest that algorithmic management can influence the employee-employer relationship differently depending on contexts such as the employment stage and the level of under-delivery. In recruiting, algorithmic agents reduced perceived employer commitment in relational inducements; this effect was not observed in onboarding. In the case of highly under-delivered inducements, algorithmic agents reduced the perceived breach in relational inducements compared to human agents and evoked less turnover intention among employees regardless of inducement types; this effect was not observed in the case of moderately under-delivered inducements. Our findings contribute to the literature on perceptions of algorithmic systems, algorithmic management, and psychological contracts.

In line with the literature that explicates how people perceive algorithmic decision-making systems compared to human decision-makers (Castelo et al., 2019; Lee, 2018; Logg et al., 2019; Longoni et al., 2019), our research offers findings as to individual experiences with algorithmic systems and the conditions under which humans versus algorithms will function better. Particularly, we provide some first evidence on how people would respond to algorithms that take managerial positions (Höddinghaus, Sondern, & Hertel, 2021; Lee, 2018) when they disapprove requests and/or do not deliver promised outcomes, a situation less explored in prior work. Furthermore, our research provides initial evidence that automating managerial functions by using algorithmic agents can impact the employee-employer relationship, and calls for more research that focuses on the outcomes for the employee-employer relationship.

Our work also offers initial evidence that algorithmic agents and software can play a role as a contract maker for one's psychological contract, and that the inducement types and contexts play a critical role, contributing to psychological contract literature. Our first goal was to examine the role of algorithmic agents for perceived employer commitments, which is one of the first steps in psychological contract formation. For transactional inducements, such as salary and bonus information, we did not find any evidence that algorithmic agents will weaken perceived employer commitments, indicating that promissory cues can be conveyed equally by both agent types. As transactional inducements are more likely to be documented and offered in a standardized way (Rousseau & McLean Parks, 1993), algorithmic agents are likely to convey similar levels of promissory cues during recruitment. When it comes to relational inducements, there is a more nuanced picture. During recruitment, using algorithmic agents could lower perceived employer commitments compared to human agents interacting through video chatting, but this was not observed during onboarding. Overall, it is more crucial than ever to understand the boundaries and opportunities that algorithms can create in sustaining the employee-employer relationship.

Our second goal was to examine the role of algorithms as contract makers when organizational inducements are not delivered and their implications for psychological contract breach and related attitudes. Psychological contract breach has been documented as a negative experience that weakens one's employment relationship (Morrison & Robinson, 1997; Rousseau et al., 2018). We set out to examine our research question under two conditions: a moderate delivery, enough to create ambiguity and some sense of discrepancy (Rousseau et al., 2018), and a low delivery, whereby the discrepancy was large enough to provoke negative reactions (Morrison & Robinson, 1997; Zhao et al., 2007). In the moderate delivery, we found no interaction effects nor main effects of the agent and inducement types, rejecting Hypothesis 2. In line with sensemaking literature, in such ambiguous conditions, individuals are less likely to attribute such inconsistencies to the employer (e.g., Morrison & Robinson, 1997; Robinson & Rousseau, 1994). In contrast, in low delivery, we found support for Hypothesis 2 for perceived breach. Our findings showed that in conditions of high under-delivery, participants are more likely to experience perceived breach when humans fail to meet their relational inducements, but this is less likely when algorithms do so. Finally, even though we did not find a significant interaction and confirmation of Hypothesis 2 for violation feelings, we found a difference between under-delivery of transactional inducements and under-delivery of relational inducements from the algorithmic agent. A possible explanation is that participants may be more emotionally affected when commitments that are expected to be reliable by algorithmic agents, such as fulfilling transactional inducements, are not delivered.

8.2. Implications for future research

Our findings are among the first that seek to empirically examine how algorithms may affect employees' views of their relationships with their employers, and point to open questions about the conditions and mechanisms that algorithmic agents can contribute to one's psychological contract. Here we list promising areas for future research.

Future research should examine factors that contribute to employees' varying responses to the under-delivery of inducements. Participants reported greater turnover intentions when human agents (as compared to algorithmic agents) significantly under-delivered the inducements, regardless of the inducement type; they also perceived greater psychological contract breach when human agents under-delivered the relational inducements. This finding does not seem to be dependent on the expectation violation that we hypothesized (Hypothesis 2): participants perceived a similar level of employer commitments during onboarding. Still, after low inducement delivery, people had greater turnover intentions with the human agent than with the algorithmic agent. One explanation could be that initially perceived employer commitments play only a small role when the breach is significant (Montes & Zweig, 2009). Further research should unpack what leads to differences in people's turnover intentions and perceived breach depending on the agent type. For example, psychological contract research suggests that outcome magnitude, fairness judgment, and attribution influence the link between psychological breach and subsequent employee experiences, including violation feelings (Morrison & Robinson, 1997; Robinson & Rousseau, 1994). Future work can build on prior work examining perceived fairness and intentionality of algorithmic versus human decisions (e.g., Lee, 2018; Lee & Baykal, 2017; Lee, Jain, Cha, Ojha, & Kusbit, 2019) to further explore the mechanism.

Our research also suggests that psychological contracts are affected by more than just the type of organizational agent. In our studies, human

agents were more successful at conveying employer commitments in relational inducements than algorithmic agents when human agents used video-based communication to talk with applicants. However, when both algorithmic and human agents communicated with the applicants through textual chat, we did not find the same difference in perceived employer commitments. One reason for these results could be the difference in the richness of the communication medium. Video-based communication affords richer socio-emotional cues from facial expressions and nonverbal gestures. Another reason could be that people perceive chat-based interaction with human agents as less personal because it is difficult to verify the identity of the person they are talking with. We also note that this finding is exploratory, as it is based on cross-study comparisons. Future research should replicate this finding and investigate how the interactional factors between the organizational agents and employees influence psychological contract and employee-employer relationships. Existing research on psychological contracts provides a theoretical framework that permits us to investigate different modes of conveying promissory cues and contextual factors (e.g., De Vos, Buyens, & Schalk, 2003; Tomprou & Nikolaou, 2011; 2013) that may affect how newcomers experience their employment relationship when algorithmic agents are the contract makers.

Another area worth investigating is how algorithmic systems can support sustained employment relationships. Our research suggests that using algorithmic agents to deliver relational inducements may not strengthen one's psychological contract, as these can sometimes result in lower perceived employer commitments. However, there could be other applications of algorithms that can contribute to an expanded view of one's psychological contract (e.g., Bankins & Formosa, 2020; Lambert et al., 2003) that future research may want to delve into.

Future research should investigate whether and how agent type could influence the recovery of a perceived psychological contract breach, and what employee coping processes are like when algorithms fail to deliver obligations. Past work argues that employees engage or disengage when the employer fails to honor their side of the contract depending on different factors, such as resource availability and perceived organizational response (Tomprou, Rousseau, & Hansen, 2015). The emotional impact of the breach and perceived post-breach organizational support determine the success of the breach resolution (Solinger et al., 2015). We observed that people perceived a lower level of employer commitments with the algorithmic agent; prior work suggests that people may expect different learning behaviors in human versus algorithmic agents, assuming that algorithmic agents may not learn from mistakes (Dietvorst, Simmons, & Massey, 2015). For these reasons, people may perceive post-breach organizational support differently depending on the agent type. It would be useful to examine the role of algorithmic management in such a disruptive experience.

Future research should explore employees' roles in algorithmic management and employment-employer relationships. In our studies, algorithmic agents were black box and the underlying assumption was that the employer procured or developed the system. Emerging work suggests that including workers and employees as part of the algorithmic system development would be a fruitful way to gain employees' trust in and adoption of the systems (Jarrahi et al., 2021; Lee et al., 2019b, 2021). By enabling employees' participation in algorithmic management system design, we could seek to strengthen the employer-employee relationship.

Finally, an important future direction would be to examine psychological contracts in the context of an employment relationship that is highly transactive and often managed mostly or solely by software (e.g., Amazon warehouse workers and Uber drivers). It remains an open question as to whether and how employees fine-tune their own obligations in such environments to create a sustainable psychological contract.

8.3. Practical implications

Our work offers practical considerations for the design of managerial systems that increasingly incorporate algorithmic agents. There are increasingly more chatbots and software that assist the company's talent recruiting process (Li, Lassiter, Oh, & Lee, 2021). Chatbots and software tools allow the recruiters to send out messages to potential candidate pools, and in some cases chatbots automatically explain company benefits, etc. Our findings suggest that organizations may benefit from strategically choosing which agent type to use to reach out to the candidates and explain the inducements. For a position that primarily involves transactional inducements, such as salary and bonus information, we did not find evidence that algorithmic agents will weaken perceived employer commitments in the recruiting stage. However, if the organization intends to provide relational inducements, such as socio-emotional exchanges and investment in employees' growth, using a human recruiter instead of an algorithmic agent could help avoid misalignment between intended and perceived employer commitments. Additionally, our research suggests that the organization should pay attention to what medium the human agents use to communicate with potential job candidates. Perceived employer commitments did not differ between human and algorithmic agents when they both used a textual chat. This suggests that the benefit of using a human recruiter would be more salient in audiovisual communication channels than textual messages to convey the employer's commitments to their employees' growth and support.

When the employer severely under-delivered promised inducements, algorithmic agents evoked less psychological breach compared to human agents in the case of relational inducements, and resulted in reduced turnover intentions regardless of the inducements. The practical implication of this finding should be interpreted with caution because the finding was observed only in the low inducement delivery and not in the moderate inducement delivery.

8.4. Limitations

Like any study, our research has limitations. The studies relied on one-time interactions with hypothetical scenarios by mTurk users, who reported their perceptions and behavioral intentions; the mTurk users tend to be white, highly educated, and democratic, which could influence how they perceive algorithmic agents (Lee & Rich, 2021). Future studies should investigate our findings in the context of real-world tasks and situations with diverse participants, possibly through long-term studies that involve behavioral measures or even using more vivid stimuli. We also used the same set of relational and transactional inducements throughout the studies. Algorithmic organizational agents were operationalized as software or chatbots. The organization used only one algorithmic or human agent and delivered one of the relational or transactional inducement types. Follow-up work should be done in a context that involves more diverse inducements, implementation of algorithmic agents, a mixture of agent and inducement types, and employment relation contexts. Further, we used one item to evaluate perceived employer commitments in organizational inducements. Though research in psychological contracts has often used a single item to evaluate employees' perceptions of employer commitments (e.g., Robinson & Rousseau, 1994), we consider this a potential limitation of our study; future research should consider using multiple item-scales. We also investigated perceived breach, feelings of violation, and turnover intentions. Future research should investigate the impact of algorithmic agents on other organizational outcomes, such as citizenship behaviors, organizational cynicism, and perceived organizational support. We made across-study comparisons for Studies 1 and 2; our sample sizes for Studies 1 and 2 ended up being smaller than our original target sizes because we did not anticipate the percentage of survey respondents who would fail the attention check questions. Further work should be done to confirm the findings of Study 2 and its connection to Study 1.

Finally, most of our results had small to moderate effect sizes. Readers should interpret the significant results in small effect sizes with caution.

9. Conclusion

Our research suggests that how individuals form and evaluate their psychological contracts with an algorithmic (versus human) agent could depend on whether inducements are relational or transactional. In our studies, people perceived greater employer commitments when the human agent explained relational inducements during video-based recruiting. For low delivery of inducements, people perceived greater breach when the human agent under-delivered relational inducements. Regardless of the inducement type, people reported greater turnover intention when the human agents under-delivered as compared to the algorithmic agents. These findings underscore the need for future research to examine the employee-employer relationship in algorithmic management in more nuanced ways.

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Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.chb.2021.106997.

Credit author statement

Maria Tomprou: Conceptualization, Methodology, Formal Analysis, Data Curation, Writing, Visualization. **Min Kyung Lee:** Conceptualization, Methodology, Formal Analysis, Writing, Visualization, Funding Acquisition.

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