The Role of Anthropomorphism of Algorithmic Managers on Employee Malevolent Creativity when Promises are not Fulfilled

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Abstract

This study explores the influence of non-fulfillment of promises by an algorithmic manager on employee willingness to show malevolent creative behavior, using anthropomorphism as a moderator. Drawing on theories of psychological contracts and anthropomorphism, the current research investigates how employees react to breaches of relational and transactional promises by algorithmic managers. And whether human-like characteristics in these algorithmic managers moderate these reactions. The carried-out experiment utilized vignettes and used a 2x2 between-subjects design with 258 participants. The study assessed malevolent creativity, displayed through the intention of behaviors like playing tricks, lying, or hurting others, in response to either unfulfilled transactional or relational promises. And either high or low levels of anthropomorphism of the algorithmic manager. The results reveal that the type of promise breached (relational versus transactional) did not significantly predict differences in malevolent creativity. The level of anthropomorphism in the algorithmic manager (high or low) also did not significantly moderate this relationship. These findings challenge existing theories about the psychological contracts and how applicable they are in human-AI workplace dynamics, calling for further research into the relationship between employees and algorithmic managers.

Keywords: Algorithmic managers, relational and transactional promises, psychological contracts, malevolent creativity, anthropomorphism.

The Role of Anthropomorphism of Algorithmic Managers on Employee Malevolent Creativity when Promises are not Fulfilled

Historically speaking Artificial Intelligence (AI) has primarily been utilized in operational tasks, while humans were traditionally considered more suited for organizational and managerial responsibilities (Cariani, 2010). However, recent advancements in AI have led to significant improvements in its capabilities, raising the question of whether AI could be as suitable, if not more suitable, for leadership roles than humans (Balasubramanian et al., 2020; Raisch & Krakowski, 2020). In the past AI was considered unfit for management roles, resulting in little research being done on AI and how it functions in a management setting. (Cariani, 2010; Kellogg, Valentine, & Christin, 2020; Lindebaum, Vesa, & den Hond, 2020). Now that the use of artificial intelligence is becoming more prevalent (Raisch & Krakowski, 2020) it is important to examine how employee behavior might be influenced by interacting with an algorithmic manager and to identify strategies for influencing this behavior.

Within the context of a working environment employees form relational or transactional promises which they want their manager or organization to fulfill (Rousseau, 1995; Rousseau, Hansen, & Tomprou, 2018). These promises might be relationally focused like developmental opportunities or transactional like an adequate salary (Robinson et al., 1994) But what happens when an algorithmic manager fails to meet the promises that were set? When employees are faced with unfulfilled promises an emotional reaction might occur (Bordia, et al., 2008; Robinson & Morrison, 2000) that could even develop into exhibiting malevolent creative behavior towards others (Malik et al., 2020). A key factor that might influence this relation between unfulfilled promises and the showing of malevolent creativity could be the anthropomorphism theory (Epley et al., 2007). Anthropomorphism influences the perception of humans and their liking of robots, so perhaps changing the way employees view

their algorithmic manager could influence the way employees react to unfulfilled promises in a positive or negative way.

The aim of the current study is to answer these questions by investigating how unfulfilled promises by an algorithmic manager may lead to creative forms of retaliation by employees toward their algorithmic managers and the organizations that implement such management systems. This would further the currently limited understanding of how the use of algorithmic managers might influence employee behavior. Additionally, the research explores how the humanization of algorithmic managers may influence this dynamic.

Leaders' Failure to Fulfill Promises.

According to Rousseau (1989) employees and employers have certain unwritten agreements and expectations of mutual commitment that influence their workplace behavior. These individual beliefs regarding commitment, reciprocity and perceived promises are known as psychological contracts (Coyle-Shapiro & Kessler, 2000). Within a psychological contract it is possible to differentiate into two different kinds of perceived promises.

Relational promises from employer to employee are long-term, open-ended commitments emphasizing emotional and social connections (Rousseau, 1989). They are related to intangible promises like the chance to get good long term career possibilities or receive trainings within the company (Rousseau & McLean-Parks, 1993). *Transactional promises* from employer to employee on the other end are more short term and narrowly focused (Rousseau, 1989), here the promises made are more tangible like a fair salary or the opportunity for raises in the future (Rousseau & McLean-Parks, 1993).

In a situation where an employee perceives that their expected promises aren't being fulfilled, they might experience breach of their psychological contract (Robinson & Rousseau, 1994). The reaction to a breach of contract often elicits many emotions (Bordia, et al., 2008) This can include disappointment and frustration, but also feelings of anger, betrayal, and

resentment towards the employer (Bordia, et al., 2008; Robinson & Morrison, 2000). But how can these feelings influence employee behavior and does a specific type of violation of promises relate to more feelings of anger?

Employee Malevolent Creativity

A way employees may retaliate towards their employer following breach of the psychological contract is the use of malevolent creativity. Malevolent creativity is the use of creativity to intentionally cause mental or physical harm to others while still meeting the criteria of being novel and original (Gao et al., 2022). While malevolent creativity is often linked with crime or terrorism (Eisenman, 2008; Cropley & Cropley, 2011) it does play a role in everyday life. Often this malevolent behavior manifests itself in the way of playing tricks, lying, or physically threatening others (Hao et al., 2016; James et al., 1999). According to research done by James et al. (1999) people who feel like they are being treated unfairly show more malevolent creativity. This ties in with the theory of Malik et al., (2020) which suggests that feelings of violation may trigger an intention to engage in malevolent creative behavior. This supports the idea that breach of a psychological contract would heighten the likelihood for an employee to show signs of malevolent creativity.

Being managed by an algorithmic manager might influence the way employees form their relational and transactional promises, and the way their expectations of those promises are managed. Research done by Tomprou and Lee (2022) shows that when employees are faced with an algorithmic manager instead of a human manager, their expectations of relational promises are lowered. Resulting in a less severe breach when relational promises are violated by an algorithmic manager. Research done on transactional promises however shows no difference of experienced breach of the psychological contract between an algorithmic manager or a human manager (Castelo et al., 2019; Lee, 2018; Logg et al., 2019; Tomprou & Lee, 2022). Building on prior research suggesting that relational promise

violations by an algorithmic manager are perceived as less extreme (Tomprou & Lee, 2022) and recognizing that feelings of violation can trigger malevolent creative responses (Malik et al., 2020), I hypothesize the following:

Hypothesis 1. Non-fulfillment of transactional promises will lead to more willingness to express malevolent creative behavior towards an algorithmic manager as compared to non-fulfillment of relational promises.

Anthropomorphism of the Algorithmic Manager

Anthropomorphism is the extent to which humans attribute human characteristics, properties or mental states to nonhuman objects (Epley et al., 2007). The SEEK theory of anthropomorphism proposed by Epley et al., (2007) suggests that the likelihood of anthropomorphizing for example an algorithmic manager depends on three factors. The first factor is sociality motivation, this is the intrinsic need for social connection and the drive to form relationships. When people feel socially isolated, they may be more likely to anthropomorphize robots to fulfill this social need. The second factor is effectance motivation, this refers to the need for control. People tend to anthropomorphize when they seek to predict or explain the behavior of unfamiliar nonhuman objects in ways that align with human experiences, which in turn reduces uncertainty. The last factor is elicited agent knowledge, which entails applying human-like cognitive frameworks to understand nonhuman objects. When interacting with a robot, individuals often draw upon their existing knowledge of human behavior, which makes it easier to attribute human-like traits to the robot. If one or more of these factors are available an individual might subconsciously anthropomorphize a nonhuman object to view it as more humanlike. According to some studies (Nass et al., 1995; Nass et al., 2000) anthropomorphizing of a robot may allow individuals to develop social connections to the robot, which in turn increases the liking the person has for said robot.

Reserach (Epley et al., 2007; Nass et al., 1995; Nass et al., 2000) suggests that anthropomorphizing an algorithmic manager is very feasible and would increase the rapport between an employee and their algorithmic manager. However, the previously mentioned theory about nonfulfillment of promises and the difference therein between a human and algorithmic manager (Castelo et al., 2019; Lee, 2018; Logg et al., 2019; Tomprou & Lee, 2022) suggested that having a human manager that doesn't fulfill relational promises would lead to more malevolent creative behavior as compared to an algorithmic manager that doesn't fulfill relational promises. This leads me to hypothesize the following:

Hypothesis 2. The level of anthropomorphism of the algorithmic managers will influence the relationship between the type of nonfulfilled promises (transactional versus relational) and employee willingness to express malevolent creative behavior towards an algorithmic manager in the following way: employees will experience more willingness to express malevolent creativity for the nonfulfillment of relational promises (as opposed to transactional promises) when algorithmic managers are high in anthropomorphism as compared to when they are low in anthropomorphism.

Method

Participants

The survey had 258 participants. (97 male, 159 female, 2 persons that identified as something else), between 20 and 67 years old ($M = 36.76$, $SD = 11.05$). Most of the participants were British (94.6%), with the rest of the participants reporting they were from somewhere else (5,4%). The participants are all employees, with most of them working at least 20 hours a week (99.2%), and 57 of them holding a tenured position. The participants for this survey have been recruited using the website prolific.

Research Design

The current experiment was a 2x2 between subject design. The participants were all exposed to only one of the four different conditions, which in this case were the non-fulfilment of transactional versus relational promises and high anthropomorphism versus low anthropomorphism of the algorithmic manager. The measured dependent variable was malevolent creativity.

For this research an online survey took place making use of the program Qualtrics. At the start of the survey the participants were told a cover story about the aim of the survey, telling them the purpose of the survey is to see how employees perceive robot managers[1] and how positively/negatively they view them. In the survey participants were asked to immerse themselves into a situation where they would be managed by a robot. The participants were then randomly assigned to vignettes (see appendix A for an example of a used vignette) with different conditions that manipulated the variables. The participants were asked to think of themselves as an employee of a company called "Beta Management Company" and that they were being managed by a robot.

To manipulate the non-fulfillment of promises, vignettes were made based on research done by Tomprou and Lee (2022). In the non-fulfillment of transactional promises condition, participants were made to believe that their robot manager had made promises regarding transactional incentives during contract negotiations. These promised transactional incentives consisted of regular bonuses every six months, annual salary raises for standard of living and consistent salary benchmarking. The participants were then informed that after two years of

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[1] Throughout the method section of this paper the term "robot manager" will be used instead of "algorithmic manager" to stay consistent with the research material. The two terms are to be perceived as the same.

employment within the company, none of these promises had been fulfilled by the robot manager.

The non-fulfillment of relational promises condition made the participants believe their robot manager had made promises about committing themselves to certain relational incentives. The promised relational incentives consisted of support with personal or family-related issues, giving opportunities to expand one's professional network and specialized training workshops. The participants were then informed that none of these promises had been met by the robot managers after two years of employment.

To manipulate the anthropomorphism of the robot manager vignettes were created based on research done by Tomprou and Lee (2022), Wang et al. (2023) and Yam et al. (2022). In the low anthropomorphism condition participants were introduced to their robot manager called "Robo3000". The participants were convinced of the non-anthropomorphic nature of their manager through a description of Robo3000's very non-human functioning and a picture of Robo3000 where they had only robotlike characteristics (see appendix B for an example of the used portrait). To further the manipulation participants were asked to think of their manager as a robot. And to write down two ideas that come to mind about the type of person they think their manager is, which highlighted the low anthropomorphist nature of the robot manager even more.

In the high anthropomorphism condition participants were instead introduced to either a female (Lily Adams) or male (Noah Adams) robot manager with very human like characteristics. The participants were shown a portrait of their manager with very anthropomorphic features (see appendix B for an example of the used portraits) and were addressed by the robot manager directly through a text where they introduce themselves and imply that they function much like a human would. To further the manipulation participants

were asked to think of their manager as a person rather than a robot and write down two ideas that come to mind about the type of person they think their manager is, further reinforcing the participants beliefs that the manager is human.

Measures

For the non-fulfilment of promises (transactional vs. relational) the following binary manipulation check item was used "Would you characterize the nature of the promises made by your Robot Manager". With a scale going from 1 = Relational (eg. promoting mutual respect and engaging interactions) to 7 = Transactional (eg. promoting instrumental relations and focusing on task completion). This item was based on research done by Tomprou and Lee (2022).

For the anthropomorphism of the algorithmic manager (high vs. low) the manipulation check item used for the perceived anthropomorphism of the robot manager consisted of two items, which were measured on a Likert scale ranging from 1 to 7. The anchor points for this scale ranged from "Not at all" to "To a great extent". The first manipulation check items used was "Did the robot manager's appearance lead you to anthropomorphize it (perceive it as more human-like) by attributing human-like thoughts, feelings, or intentions to him/her?". The second manipulation check item used was "How interactive and engaging does your collaboration with your robot manager feel?". The two items together have a good internal reliability score (Cronbach's α = .72).

To assess the three sub-dimensions of malevolent creativity measures were created by adapting research done by Hao et al. (2016). The participants were asked to remember the agreements, negotiations and interactions they had with their robot manager, and subsequently rate to what extend they would use certain behaviors in response to the outcomes they received from their employer. The sub-dimension hurting was measured with a 6-item scale.

A sample item being: "I would think about new ideas to take revenge from my robot manager and/or the Beta Management Company" (α = .96). The sub-dimension lying was measured using a 4-item scale. A sample item of this scale being: "I would try to deceive my robot manager and/or the Beta Management Company by fabricating lies" (α = .93). The sub-dimension playing tricks was measured with a 3-item scale. A sample item being: "I would have new ideas about how to pull pranks on my robot manager and/or the Beta Management Company" (α = .89). A Likert scale ranging from 1 to 7 was used to measure the three sub-dimensions. The anchor points for this scale ranged from "Never" to "Very often".

To prevent the possible influence of gender as a third variable it has been controlled for by having both a male and female versions of the high-anthropomorphism condition vignettes be randomly assigned to participants.

Results

The data analysis has been done by using SPSS with the PROCESS macro (Hayes, 2013). See table 1 for the means, standard deviations and correlations of the main variables.

Hypothesis Testing

My first hypothesis was that non-fulfilment of transactional promises would lead to more willingness to show malevolent creative behavior as opposed to non-fulfillment of relational promises. The results (Table 2) show a non-significant effect $F(1, 255) = 0.82$, $R^2 = .0$. So non-fulfillment of transactional promises does not lead to more malevolent creative behavior as opposed to non-fulfillment of relational promises. Hypothesis 1 is not supported.

My second hypothesis was that employees would be more willing to express malevolent creative behavior towards their algorithmic manager when relational promises were non-fulfilled (as opposed to transactional promises) and if the algorithmic manager was

high in anthropomorphism (as opposed to low in anthropomorphism). The results (Table 3) do not support a statistically significant moderating effect by anthropomorphism on the relation between non-fulfillment of promises and malevolent creativity $F(3, 253) = 0.51$, $R^2 = .076$. Hypothesis 2 is not supported.

Table 1: Variables Statistics

Descriptive Statistics and Correlations of the Variables[2]

	M	*SD*	1	2	3
1. Non ful. promises	0.49	0.5	-	.018	.000
2. Malevolent creativity	2.93	1.39		-	-.008
3. Anthropomorphism	0.5	0.5			-

Table 2: Main effect Analysis

Descriptive Statistics of the Simple Linear Regression Analysis

Predictor	B	SE	β	t	p
Constant	2.910	.122		23.77	<.001
Non ful. promises[2]	.05	.175	.018	.29	.774[*]

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[2] This variable includes both transactional promises and relational promises

[*] $p \geq 0.05$

Table 3: Moderator Analysis

Descriptive Statistics of the Multiple Regression Analysis

Predictor	B	SE	95% CI		p
			LL	UL	
Constant	3.023	.174	2.681	3.366	.000
Non ful. promises[3]	-.160	.248	-.649	.328	.518
Anthropomorphism	-.227	.245	-.709	.256	.356
Non ful. promises x anthropomorphism	.419	.350	-.269	1.109	.232*

Manipulation Checks

To check if the manipulations of the non-fulfillment of promises (transactional vs relational) and anthropomorphism of the algorithmic manager (high vs low) worked a 2 x 2 multivariate analysis of variance has been conducted. The anthropomorphism of the algorithmic manager significantly influenced their specific manipulation check item. Participants saw the algorithmic manager as highly anthropomorphic in the high anthropomorphism condition ($M = 3.57$, $SD = 1.37$) and lower in anthropomorphism in the low anthropomorphism condition ($M = 2.30$, $SD = 1.24$), $F(1, 254) = 60.25$, $p < .001$, $\eta^2 = .19$. The type of non-fulfillment of promises also significantly influenced their manipulation check item. Non-fulfilled promises were perceived as more transactional in the transactional condition ($M = 5.51$, $SD = 1.74$) and relational conditions more as relational in their specific

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[3] This variable includes both transactional promises and relational promises

* $p \geq 0.05$

condition ($M = 5.11$, $SD = 1.73$), $F_{(1, 254)} = 3.38$, $p = .06$, $\eta^2 = .01$. None of the interaction effects were found to be significant.

Discussion

With the upcoming use of artificial intelligence in organizations the implications of using algorithmic managers are still relatively unexplored. The purpose of this study was to research the effect of algorithmic managers on employee behavior and understanding how this might be influenced. Specifically looking at how non-fulfillment of transactional and relational promises influences employee's willingness to show malevolent creativity towards an algorithmic manager. While also considering the role of anthropomorphism in moderating these interactions. The findings reveal that non-fulfillment of transactional promises did not significantly predict malevolent creative behavior more than non-fulfillment of relational promises. Additionally, the level of anthropomorphism of the algorithmic managers did not significantly moderate the relationship between non-fulfillment of promises and malevolent creativity. Highlighting the complexity in workplace dynamics between humans and algorithmic managers.

Practical Implications

The findings of the study were non-significant, pointing in the direction that the type of promise an algorithmic manager fails to fulfill does not make much difference in an employee's willingness to show malevolent creative behavior. It also implies that the level of anthropomorphism of an algorithmic manager doesn't influence the employee willingness much. Even if anthropomorphism of algorithmic managers didn't have much influence in this study, it should be further explored in practical settings. For instance, looking at how different levels of anthropomorphism in algorithmic managers could influence employee liking and performance. Further exploring the potential positive effects of using an anthropomorphized

algorithmic manager, especially over longer periods of time. This could greatly benefit the implementation of algorithmic managers in the work field.

Theoretically, the research highlights the importance of studying how psychological contracts work when humans are faced with an algorithmic manager. The statistically insignificant results do raise questions about the generalizability of psychological contract theories to situations where algorithmic managers are used and calls for more experiments to validate these concepts.

Strengths and Limitations

The study has several strengths. The experimental design allowed for controlled manipulation of the variables and a powered sample size which enhances the reliability of the findings. The experiment used very strong manipulations, like the addition of pictures and names for the algorithmic manager and asking the participants to think about the algorithmic manager in open questions. The experiment was also counterbalanced for gender to ensure reduced bias.

There are however limitations to consider. The reliance on self-reported measures for malevolent creativity introduces potential biases. Future research should employ performance-based measures to measure this variable more accurately. Another limitation were the vignettes used to simulate workplace scenarios. while useful, they do lack the validity of real interactions. It would be good to follow this study up by conducting a field studies or experiments. While this study did have a powered sample size, it was only conducted with mostly participants from Britain. This greatly limits the generalizability of the research data. An idea for future research could be to conduct it with a more diverse sample, maybe even looking at different organizations and/or sectors.

Future Directions

Future research should delve deeper into the mechanisms behind human-robot interactions. They could for instance look at the uncanny valley effect (Kim et al., 2019). The uncanny valley effect has the opposite effect as the anthropomorphism effect and might therefore play a role in moderating the relation between unfulfillment of promises and malevolent creativity. Researchers could also explore potential mediators such as social threat or abusive supervision. A study by (Baas et al., 2019) shows that malevolent creativity emerges in response to social threats, which could be potentially prevalent when an employee deals with unfulfilled relational promises. Abusive supervision could also be a potential mediator because it has been known to play a role in causing a malevolent creative response, especially when breach of psychological contract is involved (Malik et al., 2020). These potential mediators could further explain the interactions observed in this study.

Conclusion

While this study did not find a significant effects of non-fulfillment of promises by an algorithmic manager (transactional vs relational) on employee willingness to show malevolent creative behavior. Or a significant effect of anthropomorphism (high vs low) influencing this relation. It did contribute to the growing body of literature on robot management by exploring areas of anthropomorphism and psychological contracts in an artificial intelligence context that didn't have much research behind it yet. These findings emphasize the need for further investigations into how employees navigate relationships with algorithmic managers and the factors that shape these dynamics. Understanding these processes is crucial as artificial intelligence continues to play an increasingly prominent role in organizational settings and our society.

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Appendix A

Vignette Nonfulfillment of Transactional Promises Condition

"During your contract negotiation meetings with your robot manager, it becomes clear that your Robot Manager is committed to ensuring that you complete your assigned tasks and achieve company goals. Following discussions with your Robot Manager, you can anticipate:

Consistent Salary Benchmarking:
 Your robot manager assured you that your salary would be regularly benchmarked against industry standards and comparable companies. This ensures that your compensation is aligned with market trends.

Annual Salary Raises for Standard of Living:
 Based on discussions with your robot manager, you can expect annual salary raises to keep pace with inflation and maintain your standard of living. These adjustments are typically scheduled on a yearly basis and are subject to company performance and economic conditions.

Regular Bonuses Every 6 Months:
 Your robot manager outlined a structured bonus policy where you will receive bonuses every six months, contingent upon achieving predefined performance targets. These bonuses serve as incentives to reward your contributions to the organization's success and are part of the company's commitment to recognizing and motivating high performance.

 Your Robot Manager's promises are designed to provide tangible benefits tied to your performance and market conditions. By focusing on competitive compensation and performance-based rewards, your robot manager aims to align your expectations with measurable outcomes and company goals."

---TWO YEARS LATER-------------------------------------

 Now, imagine that you have been working for this organization for two full years after these contract arrangements have been made. You have demonstrated remarkable commitment and exerted tremendous effort throughout this time.

 However...

 -For these two years, your robot manager has not given regular bonuses.
 -Moreover, your salary has never been benchmarked according to the increase in the cost of living.
 -Recently, your performance evaluation was exceptional, but your robot manager did not give you the pay raise you were promised.

Appendix B

Used Portraits in the Manipulation of the Low and High Anthropomorphism Conditions

Figure B1

Portrait low anthropomorphism condition

Figure B2

Portraits high anthropomorphism condition