Does it matter who makes the promise?

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[Insert Abstract Here]

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1. Introduction

“*While people can sometimes identify certain characteristics of AI-generated language, they rely on other flawed cues that simultaneously impair their judgment*.” - Jakesch, M., Hancock, J. T., & Naaman, M.[[4]](#footnote-4)

As technology progresses, the integration of Artificial Intelligence (AI), specifically Large Language Models (LLM) like OpenAI’s ChatGPT-4, into various aspects of daily operations, most importantly human interaction, and communication has become inevitable. The proliferation of AI gives rise to important questions regarding the intricate nature of trust, cooperation, and promise-keeping between entities such as businesses and consumers (or any transactional relationships). The fundamental principles governing interpersonal relationships, such as the sanctity of promise-keeping and the warmth of trust, are being challenged and redefined in light of the growing significance of AI as an intermediary. Devoid of any emotion and morality, AI’s imminent takeover of essential channels of communication (both direct and indirect) may come at the expense of sincerity and moral responsibility that are inherent in human communication, despite potentially improving efficiency, creating a paradoxical situation.

In the context of a dynamic and ever-changing landscape, this research poses a series of crucial queries: How does the usage of AI-generated promissory messages influence the promise-keeping behaviour of participants in a trust game? What impact does the level of awareness (or the lack thereof) of AI’s involvement in generating promissory messages have on participants’ responses and beliefs, and how does it subsequently affect the degree of trust and cooperation? And lastly, would people prefer not to be sent a message at all compared to being sent an AI-generated promissory message?

To answer these questions, a study was conducted using an adapted and refined version of the trust game originally developed by Charness and Dufwenberg (2006). The experiment was conducted on Prolific, a widely used online research platform. A total of 180 participants were recruited to participate in a game that combined classic trust game dynamics with an AI-generated communication phase in a novel way. The participants were randomly and evenly assigned across three treatments - AI\_Known, AI\_Unknown and Baseline – with each treatment providing insights into various aspects of AI-awareness and its influence on decision-making. [Insert summary of results here or in another paragraph]

The research contributes to the growing body of academic literature concerning the impact of AI on human behaviour and economic transactions. It provides valuable insights into how AI-generated promissory messages can influence trust, cooperation, and promise-keeping behaviour in any transactional relationship. Not only so, but the findings of this research also hope to transcend beyond scholarly interest, encompassing practical implications and ethical considerations in the fields of commerce, technology, and human interactions. Therefore, it holds the potential to contribute to the formulation of necessary policies and guidelines regarding the incorporation of AI in human communication, particularly in sectors where trust plays a pivotal role, facilitating the development of more ethical and human-centric AI applications.

[Insert paragraph outlining the Breakdown of the sections here]

1. Background & Motivation

Trust, a fundamental component of human societies, has served as the anchor of relationships and economic transactions, whilst acting as the invisible hand guiding a myriad of human interactions (Arrow, [1972]). Intertwined with trust, promises encapsulate personal commitment and accountability, acting as the silent architects of societies and economies (Braver, [1995]). As suggested by the norm of promise-keeping, promises induce emotional commitments between a promisor and a promisee. The waltz of promise and trust, laden with emotional commitments and moral obligations, has forged relationships, induced cooperation, and established nations over the centuries. Symbolized by emotional commitments and moral obligations, the harmonious relationship of trust and promises, has been a cornerstone in the development of civilizations (Ostrom et al., [1992]). Within this delicate equilibrium of trust and promises, the nature of human communication has evolved defining generational cultural ideals and economic landscapes.

As we enter the complex domains of the 21st century, characterized by the relentless advancement in technology, we find ourselves at a crossroads. Here, we witness the collision of longstanding traditions of trust and promises with the cold, binary world of AI, especially LLMs, like OpenAI’s ChatGPT-4 (Radford et al., [2019]). This convergence sparks a series of reflections and concerns: Would the foundation of trust erode, implying a detachment from human accountability and attachment, if the promises made were generated by AI?

AI in recent years has made significant advancements, particularly in the field of LLMs, unlocking new horizons and facilitating the seamless integrations of AI across several industries. This ushered in a new era in which the lines dividing human and machine-generated communication, or texts are blurred and promises that once encompassed sincerity and authenticity are now replicated by computer algorithms. As Klockmann et al. (2021) suggest, AI lacks consciousness, moral reasoning, free will, or emotions, therefore, it cannot be held responsible for its actions and decisions. Nonetheless, this development is not without its repercussions and real-world implications. Incorporating AI in communication channels, more specifically, exchanging promises between entities such as enterprises and consumers, raises concerns regarding its impact on the pillars of trust and commitment. Hence, it is safe to say, that AI-generated texts lack genuine human emotions and morality, which in turn risks turning communication into a mere exchange of hollow words.

With the gradual incorporation of AI in the communication domain, there is growing concern about the potential deterioration of the fundamentals of trust that underlies the relationship between businesses and consumers. AI undeniably introduces wide-scale efficiency and advancement across various industries. However, this may potentially backfire as the sincerity and obligation associated with promises may be put at risk with the advent of AI-generated promissory messages, hence creating a paradoxical situation. Within the framework of the business-consumer dynamic, businesses may not feel the weight of their “words” or may not experience guilt when they fail to uphold promises made to consumers, which are AI-generated.

This paper dives deep into uncharted territory, examining the influence of AI on the dynamics of trust and promise-keeping behaviour between consumers and businesses. Businesses, as mentioned previously, may rely heavily on relaying AI-generated promissory messages to consumers, whilst utilising AI to conceal their self-interest. Therefore, this research aims to investigate the interpretation and response to promissory messages that are AI-generated. The motivation behind this research stems from the eagerness to gain insight into the rather complex dynamics between AI and the key components of trust, commitment and communication that bind our society.

In an era of increasing global digitization, it is essential to raise questions regarding its potential impact on the dynamics of trust and cooperation. The integration of AI into the domain of communication and promise-making (subsequently affecting promise-keeping) signals an important shift that bears significant repercussions. This encourages one to reflect on the ethical and moral aspects of allowing AI the ability to generate promises and exchange commitments. As AI evolves, the core of humanity built on the foundation of trust and cooperation developed over centuries, is posed by an impending threat. This raises the question; will humanity adapt or crumble when faced with the emotionless and calculated logic of AI? The question is multifaceted, and some or most aspects of it can only be answered in the long run.

1. Literature Review  
   1. Communication & Promise-Keeping Behaviour

Several psychological and economic experimental studies have demonstrated the significant impact of pre-play communication, particularly when it involves the exchange of promises, on subsequent levels of cooperation (Bicchieri and Lev-On, [2007]; Charness and Dufwenberg, [2006]; Ellingsen and Johannesson, [2004]; Kerr and Kaufmann-Gilliland, [1994]; Ostrom, Walker, and Gardner, [1992]; Sally, [1995]). Promises are not merely expressed affirmations; instead, they are a complex representation of moral and emotional obligations rooted deeply in our societal and individual values. The commitments serve as the core components in contributing to the establishment of trust, cooperative behaviour, and mutual respect across numerous fields, including, but not limited to, the economic, social, and organizational fields.

Among all the factors considered “unimportant” by the economic model, communication emerges as the most important determinant, as it significantly improves the cooperation rate (Ellingsen and Johannesson, [2004]). In their paper, the authors proposed a model in which agents exhibited simultaneous concern for both fairness and consistency, attempting to explain the outcomes of a hold-up problem that highlights the higher credibility of promises over threats.

Communication plays a vital role in the facilitation of promises, operating as the crucial link for the expression, comprehension, and fulfilment of promises. This suggests that the relationship between communication and promises is of utmost importance, as the clarity and sincerity of communication determine the efficacy and impact of promises in encouraging trust, cooperation, and mutual benefit. Charness and Dufwenberg (2006) provide valuable insight into understanding the psychological mechanisms that drive cooperative behaviour, such as guilt aversion[[5]](#footnote-5), and how communication and promises serve as powerful tools in fostering trust and cooperation. Additionally, the result of their study has two other implications. Firstly, the factor that contributes significantly to people's motivation to uphold their promises is guilt aversion. Secondly, the authors found that non-binding communication[[6]](#footnote-6), specifically written communication in their experimental setting, also has a positive effect on cooperation.

Findings from Vanberg (2008) suggest that promises, once communicated give rise to a heightened sense of moral duty and ethical responsibility, prompting individuals to align their actions with communicated intentions. Vanberg’s (2008) study tested two theories to identify the motivation behind people’s promise-keeping behaviour: people intrinsically prefer to keep their promises (commitment-based explanation[[7]](#footnote-7) or CBE) and people dislike failing to meet others’ payoff expectations (expectations-based explanation or EBE[[8]](#footnote-8)). Of these two theories, the former corresponds more cohesively with reality (Qin et al. [2022]; Vanberg [2008]). The literature provided support for CBE as a cause of promise-keeping, with the aid of a dictator’s game, where the dictator’s promise subsequently affects behaviour towards the individual to whom the promise was made.

Bartolomeo et al. (2018) adopted a similar experimental as Vanberg’s binary-choice random-dictator game, including a partner-switching mechanism and treatment variable, switching probability (high (75%) or low (25%) (Ederer and Stremitzer, [2017]). The researchers manipulated the switching probability to induce variations in first-order[[9]](#footnote-9) and second-order[[10]](#footnote-10) beliefs. Like Vanberg’s (2008) results, the authors concluded that whilst promises have a substantial influence on trust and cooperation, the desire to fulfil promises is mostly driven by an inherent commitment to one’s word (CBE) as opposed to the expectation and beliefs that arise from the promise itself (EBE). Nevertheless, the intrinsic value attributed to the act of fulfilling promises remains unaffected by an individual’s judgment regarding the probability of the promise being kept. This study enhances our understanding by providing a multi-faceted explanation of why people may choose to keep their promises. It sheds light on the complex relationship between internal obligations and external anticipations, and its implications on trust, cooperation, and moral conduct within socio-economic settings.

* 1. AI’s Impact on Human Behaviour

Horton (2023), in his paper “Large Language Models as Simulated Economic Agents: What Can We Learn from Homo Silicus?”, explores the capabilities of LLMs like GPT-3 as an economic agent in stimulating decision-making heuristics using a series of economic experiments derived from Charness and Rabin (2002), Kahneman, Knetsch and Thaler (1986) and Samuelson and Zeckhauser (1988). His paper offers us a glimpse into the potential of AI to reflect and possibly influence human behaviour and communication. The experiments reveal that LLMs can emulate humans in a variety of scenarios, such as making decisions that are like those made in economic games and reflecting variations in moral judgements and preferences. The author also highlights the adaptability and responsiveness of LLMs to different prompts and its ability to stimulate complex human behaviour and beliefs, emphasizing the usefulness of LLMs in studying human behaviour, communication, and decision-making patterns.

In the context of examining how AI has an impact on human behaviour, particularly when it comes to communication and promise-keeping behaviours, Horton’s (2023) paper highlights the importance of using advanced LLMs as tools to understand and potentially predict human behaviour and interaction patterns. The study further demonstrates that well-programmed or effectively prompted LLMs can simulate nuanced human behavioural responses, adapt to different moral, economic, and political viewpoints and make decisions in a way that is like a human-like-decision making process. This makes it not only a valuable and low-cost tool but also a highly adaptable one for understanding the complexities of human communication.

Köbis et al. (2021) in their paper investigate the intricate and possibly detrimental influence of AI on human ethical and moral frameworks. The study examines the many functions of AI, particularly its function as a role model, advisor, collaborator, and delegate. The study sheds light on the ability of AI to shape human perceptions and choices, highlighting its gradual impact as a model and its powerful position as an adviser in altering human behaviour and ethical evaluations. As a partner, AI encourages partnerships that may be deemed unethical or immoral, enabling the diversion of ‘strategic blame’. On the other hand, while acting as a delegate, AI empowers humans to conceal their own responsibility for engaging in unethical behaviour, providing them with anonymity, and diminishing guilt and regret. The roles mentioned highlight AI’s significant influence on communication patterns and promise-keeping behaviour, which in turn may potentially lead to biased or unethical interactions and shifts in conventional norms of communication and morality.

Conversely, Shiffrin and Mitchell’s (2023) paper investigate the potentials and limitations of LLMs like OpenAI’s GPT-3 in mimicking human behaviour and cognition. The study provides an analysis of LLMs such as GPT-3, highlighting their remarkable ability to generate human-like text and effectively tackle problem-solving tasks. But, despite such impressive performance and feats of these models, the underlying processes responsible for their successes and failures are still unknown to their developers. In order to get a better understanding of the decision-making processes, reasoning abilities, cognitive biases, and other psychological characteristics of GPT-3, the authors examine the idea of incorporating it as a subject in psychological studies. LLMs can generate responses like those of humans, however, it may lack explicit reasoning procedures or reflections used by human agents thereby highlighting the fundamental differences in cognitive processes between humans and AI models. Additionally, the authors raise concerns regarding the appropriateness of humanizing LLMs by attributing it to human cognitive terminology. Not to mention, with the increasing complexity of LLMs and the subsequent decline in human ability to fully comprehend it, the authors advocate reflecting on the ethical implications and inherent dangers associated with the implications of these models in society. Therefore, it is becoming increasingly important to examine this phenomenon as it aids in comprehending the impact of incorporating LLMs on human communication and adherence to commitments.

* 1. Flawed Heuristics

Jakesch et al. (2023) critically analyse the capability of people to differentiate AI-generated and human-generated language, whilst focusing on the implications of AI-generated messages on human behaviour and communication. The study uncovered that people often struggle to distinguish self-presentations made by humans as opposed to when they are AI-generated across various contexts, such as professional, romantic, and hospitality settings. The authors conducted a series of experiments, with a sample size of roughly 4,600 participants, which revealed that the participants’ ability to discern between AI-generated and human-generated information remained at chance levels[[11]](#footnote-11). The participants’ inability to accurately identify AI-generated language is primarily attributed to flawed heuristics and misconceptions, as many of them tend to associate human-like attributes, such as the use of first-person pronouns, a warm tone, and discussions about family, with human-generated language. By doing so, they often overlook the advancements and nuances present in AI-generated texts. The authors therefore argue that people, with such flawed heuristics, faced with AI systems generating content that is perceived as “more human than human”, could have adverse consequences, raising concerns regarding deception and manipulation.

The findings of this research have significant implications, especially in conjunction with the increasing prevalence and incorporation of AI in communication and its potential influence on promise-keeping behaviour. The research further highlights the inherent vulnerabilities and manipulative capabilities that AI introduces to the mix due to its ability to meticulously mimic human communication, which consequently has profound effects on trust and impression formation in interpersonal interactions. The capability of AI to generate language that is seemingly authentic and human-like might lead to increased vulnerabilities in terms of misinformation, deception, and fraud. Such concerns are especially relevant in contexts where trust plays a crucial role, such as professional settings and online platforms. The authors propose strategies and potential solutions to address the issue of deceptive capabilities of AI-generated languages. These strategies include the development of AI systems that are self-disclosing by nature or programming AI models such that it has distinct recognisable accents, to help preserve the integrity of human intuition and facilitate sincere human connections. The objective of these proposed solutions is to maintain utmost transparency and mitigate the potential risks associated with the impact of AI on human behaviour and interactions. Therefore, this contributes to the ongoing discussion on the ethical implications and responsible deployment of AI technologies in human communication.

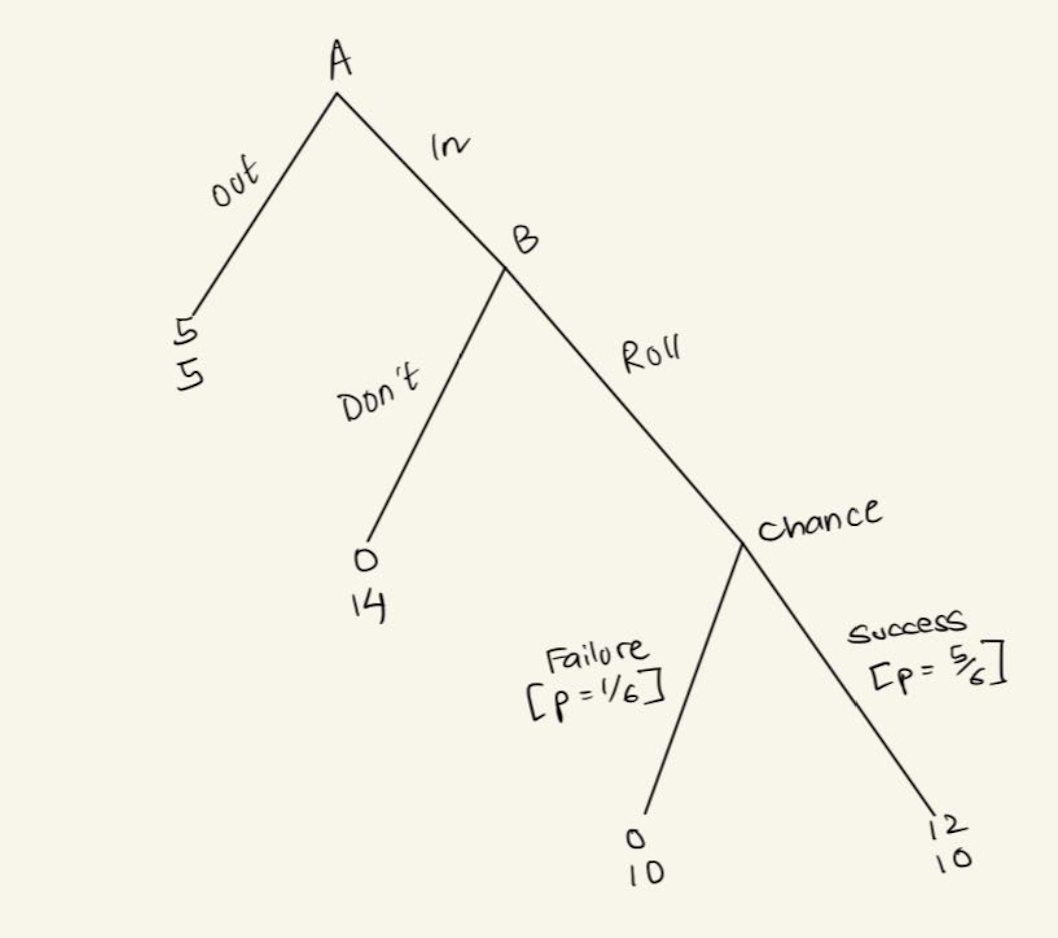
Hohenstein et al. (2023) investigate the intricate effects of AI, particularly smart replies, on human interaction and interpersonal relationships. The research uncovered that despite AI enhancing communication speed and injecting more positive language, it unexpectedly triggers negative perceptions when participants suspect its usage in conversation. This illustrates a contrast between AI’s practicality and its perceived implications. Furthermore, it was observed that the emotional tone of conversations was greatly influenced by the sentiment of AI-generated responses. This raises concerns about the possible alteration and standardization of personal communication styles and emotional expressions. Therefore, the authors emphasize the importance of comprehensive research to look into the long-term and wider social impacts of AI on communication, including its impact on promise-keeping behaviour.

1. Methodology  
   1. Experimental Design

The theoretical and experimental framework for this research is heavily based on Charness and Dufwenberg’s (2006) trust game with hidden actions, with certain refinements of our own. This research has been carefully designed to dive deeper into the domains of behavioural economics, primarily focusing on the decision-making process and promise-keeping behaviour within a trust game. That being said, the main objective of this research is to unravel the nuanced effects of AI-generated promissory messages on the level of trust and cooperation among participants and investigate how the awareness of AI’s involvement affects decision-making processes.

The experiment was conducted on Prolific[[12]](#footnote-12), an online research platform. A total of 180 participants were recruited for the experiment, and the participants were based in the UK, \*ensuring a diverse and representative sample while maintaining the quality of responses\* [More to add here justifying the robustness of the sample]. The participants were randomly assigned to one of three treatments, with each group consisting of 60 participants (30 pairs). Within each treatment participants were randomly paired, ensuring each pairing was unique and non-repetitive, where they engaged in a one-shot trust game. The participants received a flat fee of £1.2 for participating. The additional rewards of the game were determined based on the outcomes of the games, and a random draw was carried out to determine which pair out of every 30 pairs in each treatment would receive the payment. For simplicity, the first movers/principals were referred to as Player A and the second movers/agents were referred to as Player B.

Our experimental trust game involved Player A to first decide whether they wish to choose IN or OUT. Choosing OUT yields £5 for each player. If IN is selected, Player B then decides to ROLL or DON’T ROLL a computer die. Before proceeding, it is important to note that Player A would only find out their own payoff and not Player B's payoff irrespective of what Player B chooses (ROLL or DON’T ROLL). If Player B opts for DON’T ROLL after Player A has chosen IN, Player B receives £14, leaving Player A with £0. Conversely, if Player B opts for ROLL, a computer die is rolled to determine Player A’s payoff; a roll of 1 assigns £0 to Player A, whilst a roll of 2-6 assigns £12 to Player A, and either way Player B secures £10. The game tree is illustrated in Figure 1.



A novel component of this version of the trust game is the incorporation of a communication phase prior to the decision-making stages, and this is where our experimental design differs from that of Charness and Dufwenberg (2006). Their experimental design consisted of a pre-play communication phase where Player B (agents) could send a free-form written message[[13]](#footnote-13) to Player A whereas, in our model, Player B conveys an AI-generated restricted promissory message[[14]](#footnote-14) to Player A before the decision-making commences. The criteria for the AI-generated message will be explained in detail in section 3.2. Anyhow, our research employed three distinct treatments:

* AI\_Known: The communication phase is followed by the decision-making stage. In this treatment, the origin of the message as being AI-generated is disclosed to Player A. This is common knowledge.
* AI\_Unknown: Like AI\_Known the communication phase is followed by the decision-making stage. However, in this treatment, Player A is left unaware of AI’s role in generating the message. This is common knowledge.
* Baseline: Here, the game comprises only the decision-making stages, devoid of any communication phase.

To clarify, if Player B in the AI\_Known treatment decides to not send a message, Player A will not be notified of the message otherwise being AI-generated.

The communication phase plays a crucial role in facilitating an examination of the interplay between AI-generated messages, and the participants’ knowledge of the message’s source. The primary focus of the examination is to identify how these interactions influence individuals’ beliefs, behaviour, trust, and cooperation. Player B, in this phase, is presented with the option to choose to send one of two non-binding messages, generated by AI, to Player A, in an attempt to influence Player A’s subsequent decision. They also have the option to not send a message to Player A at all.

Following the communication phase, the participants navigate through the decision phases, wherein they make decisions that are influenced by the messages they have received or no messages if Player B chooses not to send a message, and the structured framework of the game. Player B, when making their decisions, remains uninformed about Player A’s choices, understanding that whatever they choose will be inconsequential if Player opts OUT.

Lastly, first-order beliefs and second-order beliefs are elicited from both Player A and B. All Player A’s are asked to predict what the Player B’s they are paired with would do, i.e. would they ROLL or NOT ROLL, which is referred to as the first-order beliefs. Similarly, all Player B are then asked to predict what the Player A’s they are paired with guessed about their decision, which is referred to as the second-order beliefs. Every decision and interaction will be systematically recorded, analysed, and interpreted to draw meaningful conclusions about the interactions and responses between the players. The detailed experimental instructions will be included in the Appendix [Insert Appendix number].

Our design enables us to test multiple hypotheses related to the impact of AI-generated messages on decision-making, its role in shaping responses, how it affects beliefs, and the exploration of guilt aversion as a plausible determinant in decisions made by Player B.

* 1. AI-generated Messages Protocol

The messages used throughout the experiment were pre-generated to maintain consistency and for the participants to generate the messages themselves would have required them to input game-specific prompts, potentially resulting in respondent fatigue. Moreover, if the participants generated their own promissory messages using ChatGPT-4, this would have resulted in all prompts being unique, making it difficult to identify whether the treatment differential was due to the messages itself or because of the messages being AI-generated.

Player B could choose from two AI-generated promissory messages to send to their corresponding Player A, or they could choose not to send a message. We tried to minimise the number of messages to choose from for Player B to avoid the contemplation cost resulting from the paradox of choice. Therefore, they were presented with a simple, single-line AI-generated promissory message and a long and detailed message, encapsulating the complexity and richness of modern-day LLMs generating prowess. Also, we carefully input instructions onto ChatGPT-4 to ensure the prompts generated were as human-like as possible using the messages participants wrote in Charness and Dufwenberg’s (2006) experiment as a reference. The detailed instructions used, and the list of prompts generated on ChatGPT-4 can be found in the appendix [insert a reference to the appendix here].

* 1. Expected Outcomes and Hypotheses

We devised multiple hypotheses for our research based on our experimental design. Here, we test the impact of AI-generated promissory messages on decision-making, its role in shaping responses, how it affects beliefs and the exploration of guilt aversion as a potential factor influencing the decision-making process of Player B. The hypotheses are as follows:

* H1: The awareness of AI-generated promissory messages will lead to more conservative and less trust-based actions from both the players, thereby significantly decreasing overall game payoffs.
  + Payoffs if a message is sent: AI\_Unknown > AI\_Known ≥ Baseline.
  + Payoffs if no message is sent: AI\_Unknown = AI\_Known ≠ Baseline
* H2: AI-generated messages will lower guilt aversion in Player B since they did not write the messages themselves reducing the psychological costs associated when breaking the promise.
  + Probability of Player A to choose IN: AI\_Unknown > AI\_Known ≥ Baseline.
  + Probability of Player B to ROLL: Baseline > AI\_Known ≥ AI\_Unknown.
* H3: Trust and cooperation will be higher in the AI\_Unknown treatment due to perceived human commitment to fulfil promises subsequently resulting in higher alignment in first and second-order beliefs within pairs.
  + Probability of pairs guessing each other’s beliefs accurately: AI\_Unknown > AI\_Known > Baseline.

1. Results

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3. Postdoctoral Researcher at The Max Planck Institute for Evolutionary Biology, Germany. Email: [ben.grodeck@gmail.com](mailto:ben.grodeck@gmail.com) [↑](#footnote-ref-3)
4. Human heuristics for AI-generated language are flawed. *Proc. Natl. Acad. Sci*, **120**(11), e2208839120 (2023) [↑](#footnote-ref-4)
5. Guilt aversion: Human behaviour in various social contexts is affected by a basic disposition to experience guilt when letting down the payoff expectations attributed to others (Dufwenberg and Gneezy (2000), Charness and Dufwenberg (2006), Battigalli and Dufwenberg (2007)). [↑](#footnote-ref-5)
6. This is referred to as Cheap Talk [↑](#footnote-ref-6)
7. Commitment-based explanation implies people are likely to honor a promise once they have given their word (Vanberg (2008), Bartolomeo et al. (2018)). [↑](#footnote-ref-7)
8. Expectation-based explanation implies people will keep their promises only if they raise their counterpart’s expectations (Charness and Dufwenberg (2006), Bartolomeo et al. (2018)) [↑](#footnote-ref-8)
9. first-order beliefs refer to the first mover’s/principal’s/Player A’s expected payoffs at the end of the game. [↑](#footnote-ref-9)
10. second-order beliefs refer to the second mover’s/agent’s/Player B’s guess of the first mover’s/principal’s/Player A’s expected payoffs at the end of the game. [↑](#footnote-ref-10)
11. The accuracy rates were between 50% and 52% [↑](#footnote-ref-11)
12. The experimental survey was created on Qualtrics and later imported to Prolific. [↑](#footnote-ref-12)
13. Define free form messages. [↑](#footnote-ref-13)
14. Define restricted messages. [↑](#footnote-ref-14)