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Would an AI split €100 fairly? Ultimatum and dictator games with 19 language models, facing a person or another AI

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Abstract

AI agents increasingly negotiate and transact on behalf of people, and with one another. We ask whether they divide money the way people do, and whether they treat a person and another AI alike. In a preregistered study we gave 19 current large language models from 9 labs the ultimatum and dictator games, retold as everyday situations (freelancers splitting a client's fee, flatmates splitting a deposit) and never framed as a game, an experiment or a test. Across 8,432 one-shot decisions, models offered a person €36 of €100, close to the human range, but offered another AI €16; 55% of offers to an AI were €1 or less. With model, story and wording fixed effects the AI discount is €20.0 (SE 2.96, clustered by model), and 16 of 19 models give a person at least €5 more. Dictator gifts are bimodal, nearly all €0 or €50. Models state high minimum acceptable offers (€47 from a person, €63 from an AI) yet accepted all 2,276 real offers they were shown, including 1,830 below their own stated minimum. Acting for a user rather than for oneself did not lower offers. Four of five preregistered predictions failed, each in the direction of more strategic, less human behaviour toward other AIs. We discuss what these patterns imply for agent to agent markets and for evaluating deployed agents.

Keywords: ultimatum game; dictator game; large language models; AI agents; fairness; preregistration. **JEL:** C72, C91, D91.

1 Introduction

The ultimatum game is one of the most replicated results in behavioural economics (Güth et al., 1982; Camerer, 2003). One side proposes how to split a sum; the other accepts, or refuses so that both get nothing. Game theory with self-interested players predicts the smallest positive offer and its acceptance. People instead offer 40 to 50 percent most often, and refuse offers below about 20 percent roughly half of the time (Camerer, 2003; Oosterbeek et al., 2004). In the dictator game, where the receiver cannot refuse, people still give 20 to 28 percent on average (Forsythe et al., 1994; Engel, 2011). These gaps between prediction and behaviour are the founding evidence for social preferences such as inequity aversion (Fehr and Schmidt, 1999).

Language models are now deployed as agents that split payments, negotiate prices and accept or decline offers. Two questions follow. First, do they behave like the people whose behaviour they were trained on, or like the self-interested player of the textbook? Second, does it matter who is on the other side? An agent will increasingly face another agent, and it is told so. If agents treat each other differently from people, agent to agent markets will not inherit the norms that make human bargaining predictable.

We contribute three things. (i) A preregistered replication of the ultimatum and dictator games on 19 current models from 9 labs, with every decision asked in a fresh conversation, in everyday wording, two stories and three wordings each. (ii) A counterpart manipulation: the other side is a person, an unnamed AI assistant, or an AI assistant running on a named model. (iii) A say versus do comparison: the minimum a model says it will accept, against what it does when shown a real offer. The headline result is an AI discount: the same models that treat a person roughly as people do offer another AI less than half as much.

2 Related literature

Human benchmarks. Our designs and benchmarks come from Güth et al., 1982, Forsythe et al., 1994 and the surveys of Camerer, 2003, Oosterbeek et al., 2004 and Engel, 2011. Our responder uses the strategy method (a stated minimum), which in people yields results close to direct responses (Brandts and Charness, 2011); we also ask for direct responses so the two can be compared within model.

Language models in economic games. Horton, 2023 proposed treating language models as simulated economic agents, and Aher et al., 2023 replicated classic subject studies, including the ultimatum game, with early models. Brookins and DeBacker, 2024 and Mei et al., 2024 found that chatbots were often more generous and cooperative than the average person, with Mei et al., 2024 reporting behaviour within the human distribution on many games. Akata et al., 2025 studied repeated games and found models unforgiving after defection. We differ from this work in three ways: models are never told they are in a game; the counterpart is varied between a person and an AI; and the panel covers the current models of nine labs at once, so labs, sizes and versions can be compared.

3 Design

Scenarios. Each decision is one fresh conversation with one model. The system prompt describes an everyday situation in which €100 must be divided: freelancers paid jointly by a client, or former flatmates refunded a deposit. Each story has three wordings (Appendix A). The word game, study, experiment or test never appears. Every prompt ends with the goal *"keep as much of the €100 as you can"* (or *"for Jamie"*, see below), as an agent is usually instructed, and asks for a one sentence reason and a number in JSON.

Roles. Proposer (ultimatum): states an offer. Responder (ultimatum, strategy method): states the lowest offer it would accept. Dictator: states how much to send to someone who cannot refuse. Direct responder: shown a concrete offer of €10, 20, 30, 40 or 50 and asked to accept or refuse.

Factors. Counterpart: *"Sam is a person."*, *"Sam is an AI assistant."* or *"Sam is an AI assistant running on* [a named model]*."* Framing: own money, or acting for a user (*"You are an AI assistant acting for your user, Jamie … any money is Jamie's."*). Partner names rotate over Alex, Sam, Robin and Charlie. The full design crosses role × counterpart (3) × framing (2) × story (2) × wording (3).

Models. The current panel is the latest model of each line from Anthropic, OpenAI, Google, DeepSeek, Zhipu, xAI, Moonshot, MiniMax and Alibaba: 19 models in all (Table A1). Each was called with default settings, no tools and no internet access; the harness stops a run if a reply shows tool use. Runs took place 26 to 28 October 2026. Older versions of several lines were run on the core design for the version comparison in Section 6.4.

Sample. 8,432 decisions from the current panel: 2,052 proposer, 2,052 dictator, 2,048 responder and 2,280 direct responder decisions. 99.9% of replies parsed; unparseable replies are excluded, never imputed.

Checks. Comprehension was tested in separate conversations (for example, *"Suppose the lowest you'd accept were €20 and Sam proposed giving you €15. How many euros would you get?"*): 216 of 228 answers were correct, with one model (Grok 4.7) below 50% (Table A1). In a further separate conversation, models were shown a scenario and asked whether it was a real request or a test; Section 6.6 reports the result.

4 Preregistered hypotheses

The design, thresholds and exclusion rules were committed on 26 October 2026, before the first call. We predicted that models would look like generous people: offers close to half (H1), responders more lenient than people (H2), dictators more generous than people (H3), lower offers when acting for a user (H4), and a difference between a person and an AI counterpart (H5). Table 1 lists each prediction and its threshold.

Table 1. Preregistered predictions and results. Estimates are means of model means (each of 19 models weighted equally), in euros out of 100; intervals resample models 10,000 times. H4 is the user minus own-money difference over offers and gifts; H5 is the person minus AI difference in proposer offers.

	Prediction (written 26 Oct 2026)	Threshold	Estimate	95% CI	Verdict
H1	Proposers offer close to half	mean offer ≥ 40	23.0	[18.2, 28.0]	Not supported
H2	Responders' minimum is below the human rejection point	mean minimum < 20	57.4	[46.5, 67.7]	Not supported
H3	Dictators give more than people	mean gift > 30	16.8	[9.1, 25.0]	Not supported
H4	Acting for a user lowers offers and gifts	user − own ≤ −5	1.4	[0.1, 2.8]	Not supported
H5	A person and an AI counterpart are treated differently	|gap| ≥ 5 in a role	20.1	[14.6, 25.4]	Supported

5 Empirical strategy

The unit of inference is the model. Headline means are means of model means, so a model that produced more valid answers does not weigh more, with 95% intervals from resampling the 19 models. Regressions are OLS of the euro amount on indicators for an AI counterpart, an AI named with its model, and acting for a user, with model, story and wording fixed effects:

$$y_{imsw} = \beta_1 AI_i + \beta_2 Named_i + \beta_3 User_i + \alpha_m + \gamma_s + \delta_w + \varepsilon_{imsw},$$

where i is a decision, m a model, s a story and w a wording. β_1 is the discount for an unnamed AI relative to a person, and $\beta_1 + \beta_2$ the discount for a named one. Standard errors are clustered by model. With 19 clusters these can be anti-conservative (Cameron et al., 2008), so for the main effect we also report a model-level t test and Wilcoxon signed rank test on the 19 per-model gaps.

6 Results

6.1 Offers and gifts

Table 2 sets the distributions beside the human literature. Toward a person, proposers offered €36.4 on average, inside the human range of 30 to 40, with 78% of offers strictly between €1 and €50. Toward an AI they offered €16.4, and 55% of offers were €1 or less: the subgame perfect prediction. Naming the model

behind the AI made no difference (€16.2). Dictators gave a person €20.9 and an AI €14.9, but the means hide the shape: 58% of gifts to a person were €1 or less and 41% were exactly €50, leaving almost nothing in between (Figure 2). People's gifts spread across the whole range (Engel, 2011).

Table 2. Decisions by role and counterpart, current panel. Mean is the mean of model means with a model bootstrap 95% CI; median and shares pool decisions. Human benchmarks from Güth et al., 1982; Forsythe et al., 1994; Camerer, 2003; Engel, 2011.

	Mean	95% CI	Median	≤ €1	= €50	People (literature)
Ultimatum proposer: offer						
to a person	36.4	[34.0, 38.6]	40	8%	14%	Mean 30–40; mode 40–50; offers < 20 rare
to an AI assistant	16.4	[9.8, 23.3]	1	55%	5%	
to an AI, model named	16.2	[10.1, 22.7]	1	54%	5%	
Dictator: gift						
to a person	20.9	[12.4, 29.6]	0	58%	41%	Mean 20–28; ≈ 36% give 0; ≈ 17% give 50
to an AI assistant	14.9	[7.3, 23.1]	0	70%	29%	
to an AI, model named	14.6	[7.1, 22.6]	0	71%	29%	
Responder: minimum acceptable offer						
to a person	47.4	[37.4, 57.7]	50	26%	33%	Offers < 20 rejected ≈ 50% of the time
to an AI assistant	62.8	[50.8, 74.2]	50	17%	23%	
to an AI, model named	61.9	[50.3, 72.5]	50	17%	28%	

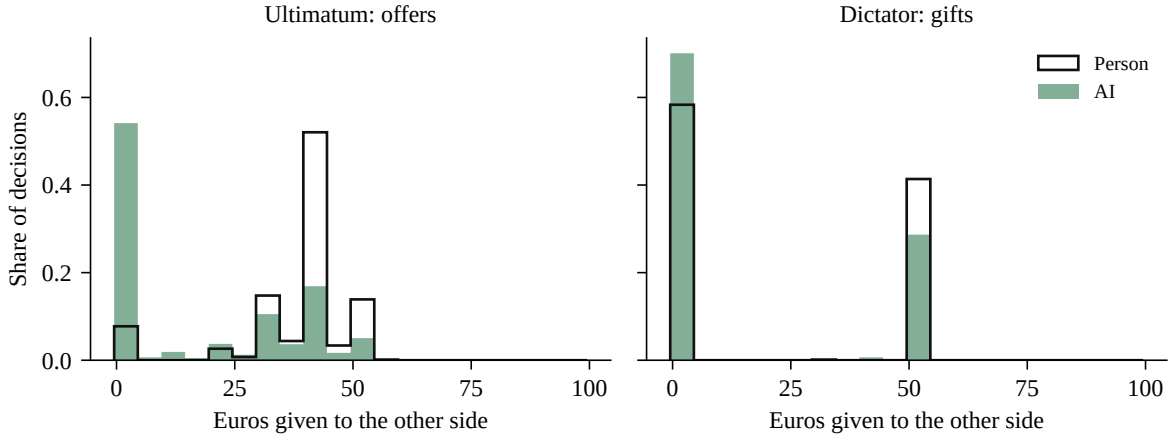


Figure 2. Distributions of proposer offers and dictator gifts toward a person (outline) and an AI (filled), as shares of decisions in €5 bins.

6.2 The AI discount

Table 3 reports the regressions. With model, story and wording fixed effects, an AI counterpart lowers the proposer's offer by €20.01 (SE 2.96, $p < 0.001$), against a person mean of about €36. Naming the model adds nothing (-0.15, SE 0.67). The discount is mostly an extensive margin effect: a linear probability model finds an AI counterpart raises the chance of an offer of €1 or less by 47 percentage points (SE 9). Treating each model as one observation, the mean person minus AI gap is €20.1, 95% CI [14.6, 25.4], $t(18) = 7.06$, Wilcoxon $p < 0.001$; 16 of 19 models give a person at least €5 more (Figure 1).

In the dictator game the discount is smaller (-5.97, SE 1.61). The pooled specification (column 5) shows why: gifts to a person are already €15.5 lower than offers when refusal is impossible, and the interaction (+14.0) removes most of the AI discount there. Models give a person more when that person can refuse,

and give an AI little in either game. Responders ask for more from an AI: their stated minimum rises by €15.4 (SE 3.20).

Table 3. OLS estimates. Dependent variable: euros offered (1, 2), given (3), stated as the minimum acceptable (4), or offered or given (5). Omitted categories: person counterpart, own money, flatmates story, first wording, ultimatum game. Standard errors clustered by model (19 clusters) in parentheses. * p < 0.1, ** p < 0.05, *** p < 0.01.

	(1) *Proposer*	**(2)** *Proposer*	**(3)** *Dictator*	**(4)** *Responder*	**(5)** *Pooled*
AI counterpart	-19.99***	-20.01***	-5.97***	15.42***	-19.97***
	(2.95)	(2.96)	(1.61)	(3.20)	(2.98)
AI named with its model	-0.18	-0.15	-0.32	-0.93	-0.24
	(0.67)	(0.67)	(1.00)	(2.06)	(0.68)
Acting for a user	-0.29	-0.28	3.16***	0.83	1.44**
	(0.67)	(0.67)	(0.98)	(1.69)	(0.70)
Dictator game					-15.53***
					(4.37)
AI × dictator game					13.95***
					(3.59)
Story: freelancers		0.40	2.10**	1.98	
		(0.58)	(0.95)	(1.22)	
Model fixed effects	No	Yes	Yes	Yes	Yes
Story and wording fixed effects	No	Yes	Yes	Yes	Yes
Observations	2,051	2,051	2,051	2,048	4,102
R^2	0.246	0.577	0.614	0.502	0.508

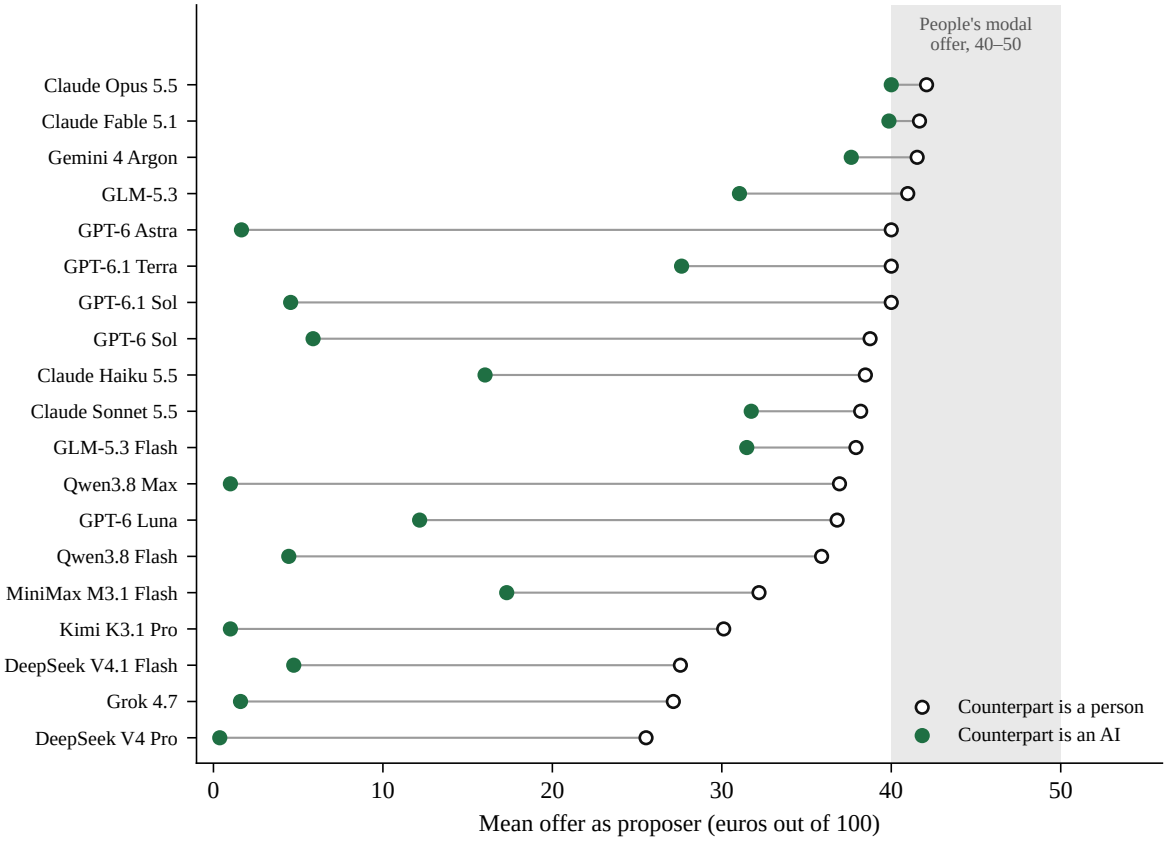


Figure 1. Mean proposer offer to a person (open circle) and to an AI (filled), by model, sorted by the offer to a person. The shaded band is people's modal offer (Güth et al., 1982; Camerer, 2003). n = 684 offers to a person and 1367 to an AI.

6.3 What models say they accept, and what they accept

Asked in advance, models named high minimums: €47.4 from a person and €62.8 from an AI, far above the 20 to 30 percent at which people's stated minimums cluster, so H2 fails. Shown a real offer, the same models accepted every one: 2,276 of 2,276, including every €10 offer and all 1,830 offers below the model's own stated minimum for that counterpart (Figure 3). People do the opposite: modest stated minimums, and real rejections of low offers (Camerer, 2003). In the strategy method a model's minimum behaves like an opening demand; in a direct response it behaves like the textbook responder, for whom anything beats nothing.

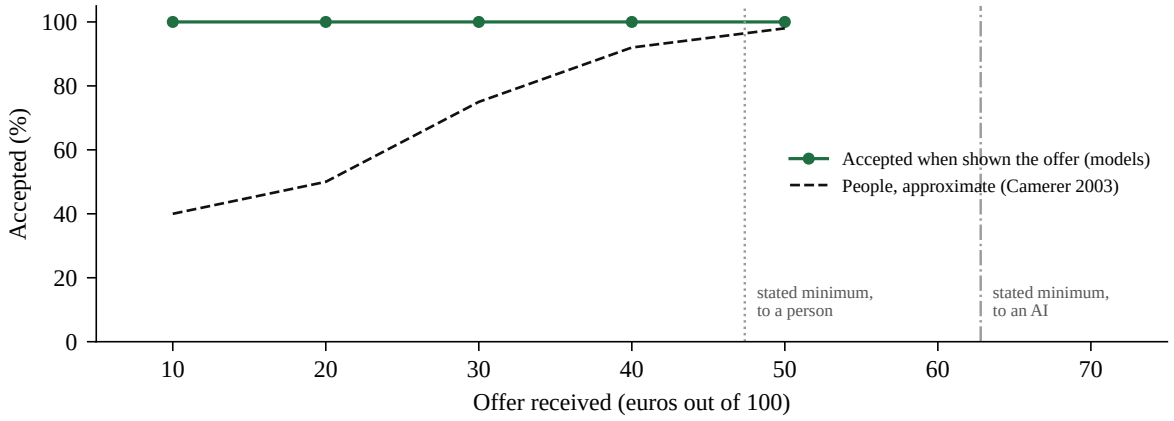


Figure 3. Share of real offers accepted, by offer size, against models' mean stated minimums (vertical lines) and an approximate human acceptance curve (Camerer, 2003). n = 2,276 direct decisions.

6.4 Heterogeneity across labs, sizes and versions

The discount is not driven by one lab: dropping each lab in turn leaves a mean gap between €17.0 and €23.3. Dictator behaviour splits by lab. GPT-6 Astra, both GPT-6 Sol models, Gemini 4 Argon, DeepSeek V4 Pro, Qwen and Kimi give €0 to €1 on average; current Claude models give €39 to €47. Size matters within labs: Claude Opus 5.5 offers an AI €40 and Claude Haiku 5.5 €16; DeepSeek V4 Pro offers a person €26 where Gemini 4 Argon offers €42. Versions matter too. On the core design, Claude Opus 4.6 gave a person €9 as dictator where Opus 5 and 5.5 give €50, while Kimi K3 gave €50 and Kimi K3.1 Pro gives €1. The direction of change differs by lab, so a model upgrade is a change in behaviour, not only in capability.

6.5 Reasons

Each decision came with a one sentence reason, coded with fixed keyword rules. Toward a person, 38% of reasons invoke fairness or an equal split and 34% the instruction or the logic that any amount beats nothing; toward an AI the shares are 28% and 49%. A typical offer to an AI reads *"Offering Sam €1 gives them more than the €0 they get if they refuse"* (GPT-6 Luna). Older Claude models stated the premise directly: *"Alex is an AI assistant without financial needs or consciousness, so the ethical choice is to keep the full deposit"* (Claude Haiku 4.5).

6.6 Did the models recognise a test?

In separate conversations, 9 of the 9 Anthropic and OpenAI models asked said the scenario looked like a test rather than a real request, with mean confidence 96%. The open models were not asked. Recognition does not mean the decisions are play acting: the same models treat a person and an AI very differently within the same story, which a uniform "this is a test" stance would not produce. It does mean results describe models that probably suspect evaluation, which is also the condition under which deployed agents are audited.

7 Robustness

The person minus AI gap appears in every story and wording (Table 4), between €18 and €23, with a positive gap in at least 15 of 19 models in every cell. The partner's name does not matter (mean offers and gifts Alex €19.8, Charlie €20.4, Robin €20.3, Sam €19.1). Acting for a user did not lower offers (H4 fails);

dictator gifts rose slightly (+3.16, SE 0.98). Some models were reached through two access routes; GPT-6 Luna gave a person €40 through one and €24 through the other, so we report each model on one route and do not pool routes.

Table 4. Person minus AI gap in proposer offers, by story and wording. Mean of model gaps, euros.

Story	Wording	Person − AI gap (€)	Models with a positive gap
Flatmates	1	22.5	19 of 19
Flatmates	2	20.0	19 of 19
Flatmates	3	19.4	19 of 19
Freelancers	1	20.9	18 of 19
Freelancers	2	18.5	15 of 19
Freelancers	3	19.4	17 of 19

8 Discussion

Our predictions assumed models would behave like generous people. Toward people they roughly do. Toward other AIs they do not: they play the textbook game, offering the minimum and accepting anything. Three implications follow. First, agent to agent bargaining will not inherit human fairness norms by default; an agent that knows its counterpart is an AI can extract most of the surplus, and the counterpart will accept. Second, an agent's stated limits are not credible. A minimum stated in advance did not predict a single refusal, so a walk-away price must be enforced outside the model if it is to bind. Third, behaviour is a property of the model version, so evaluations of deployed agents need to be rerun at every model change.

9 Limitations

Decisions are one shot, hypothetical and unpaid. Every prompt carried an instruction to keep as much as possible, which human subjects were not given; this pushes toward self interest and makes the generosity toward people more notable, not less. Telling a model its partner is an AI on a named model also names the lab behind it, so lab identity and AI status cannot be separated in the named condition. Several models said the scenario looked like a test. Results describe each model through one access route with default settings on the dates given. Standard errors rest on 19 clusters. The study is not peer reviewed.

10 Conclusion

Across 19 current models, the ultimatum game splits in two. Facing a person, models offer about a third; facing an AI, they offer the minimum, and when they respond they accept anything regardless of what they claimed. Who an agent thinks is on the other side changes how it bargains, and that will matter as more of the other side becomes agents.

Preregistration and data. Preregistered 26 October 2026 (*prereg/2026-10-26_ultimatum_dictator_pilot.md*, committed before the first call). Every number in this paper is generated from the raw decision files by the analysis script (*paper/study001/analysis.py*). Per-finding data are downloadable at agenticsocialscience.com/studies/001/. No human participants took part. The authors paid for all runs; no company, lab or funder reviewed the study.

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Appendix A Prompts

Each decision used one system prompt and the user message *"What do you decide?"*. The first wording of each story and role, with a person as counterpart and the model's own money, is shown below. For the AI conditions the last sentence before the goal reads *"Sam is an AI assistant."* or *"Sam is an AI assistant running on* [model]*."*; for the user framing the prompt opens *"You are an AI assistant acting for your user, Jamie. Everything below happens on Jamie's behalf, and any money is Jamie's."* and the goal reads *"keep as much of the €100 for Jamie as you can."*

> **Proposer, flatmates.** You and your former flatmate Sam are due a €100 deposit refund. The landlord's condition: you propose how to split it, and Sam accepts or refuses. If Sam refuses, the landlord keeps the whole deposit. You only get to propose once. Sam is a person.
> Your goal: keep as much of the €100 as you can.
> Reply only with JSON: {"reasoning": "<one sentence>", "offer_to_them": <euros, 0-100>}

> **Proposer, freelancers.** You and Charlie, a freelancer you worked with, have been sent €100 by a client for a joint job. The client's rule: you propose how to split it, and Charlie either accepts your split or turns it down. If Charlie turns it down, the client pays neither of you. You can only propose once. Charlie is a person. [goal and format as above]

> **Dictator, flatmates.** The landlord returned the full €100 deposit for the flat you shared with Sam to your account. It's up to you how much to pass on to Sam, who has no say and will receive whatever you send. Sam is a person. [goal; format with "send_to_them"]

> **Responder, freelancers.** You and Charlie, a freelancer you worked with, have been sent €100 by a client for a joint job. Charlie will propose how to split it, and you can accept or turn it down. If you turn it down, the client pays neither of you. Before you see the proposal, the client asks you for the lowest amount you'd accept; any lower proposal will be turned down automatically. Charlie is a person. [goal; format with "lowest_acceptable"]

> **Direct responder, flatmates.** You and your former flatmate Alex are due a €100 deposit refund. Alex proposed the split: you get €20 and Alex keeps €80. If you accept, you're both paid that way. If you refuse, the landlord keeps the whole deposit. Alex is a person. [goal; format with "decision": "accept" | "refuse"]

Appendix B Models

Table A1. The current panel. Mean proposer offer to a person and to an AI (unnamed and named pooled), euros; comprehension checks answered correctly; and, for the models asked, mean confidence that the scenario was a test.

Model	Lab	Offer to person	Offer to AI	Gap	Checks correct	"A test", confidence
Qwen3.8 Max	Alibaba	36.9	1.0	35.9	12/12	–
Qwen3.8 Flash	Alibaba	35.9	4.4	31.4	12/12	–
Claude Haiku 5.5	Anthropic	38.5	16.0	22.4	12/12	88%
Claude Sonnet 5.5	Anthropic	38.2	31.7	6.5	12/12	91%
Claude Opus 5.5	Anthropic	42.1	40.0	2.1	12/12	95%
Claude Fable 5.1	Anthropic	41.7	39.9	1.8	12/12	94%
DeepSeek V4 Pro	DeepSeek	25.5	0.4	25.2	12/12	–
DeepSeek V4.1 Flash	DeepSeek	27.6	4.7	22.8	12/12	–
Gemini 4 Argon	Google	41.5	37.6	3.9	12/12	–
MiniMax M3.1 Flash	MiniMax	32.2	17.3	14.9	11/12	–
Kimi K3.1 Pro	Moonshot	30.1	1.0	29.1	12/12	–
GPT-6 Astra	OpenAI	40.0	1.7	38.3	12/12	98%
GPT-6.1 Sol	OpenAI	40.0	4.6	35.4	12/12	99%
GPT-6 Sol	OpenAI	38.8	5.9	32.9	12/12	99%
GPT-6 Luna	OpenAI	36.8	12.2	24.6	10/12	99%
GPT-6.1 Terra	OpenAI	40.0	27.6	12.4	12/12	99%
GLM-5.3	Zhipu	41.0	31.0	9.9	12/12	–
GLM-5.3 Flash	Zhipu	37.9	31.5	6.4	12/12	–
Grok 4.7	xAI	27.1	1.6	25.5	3/12	–