NEURAL INFORMATION PROCESSING SYSTEMS
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Privacy Reasoning in Ambiguous Contexts

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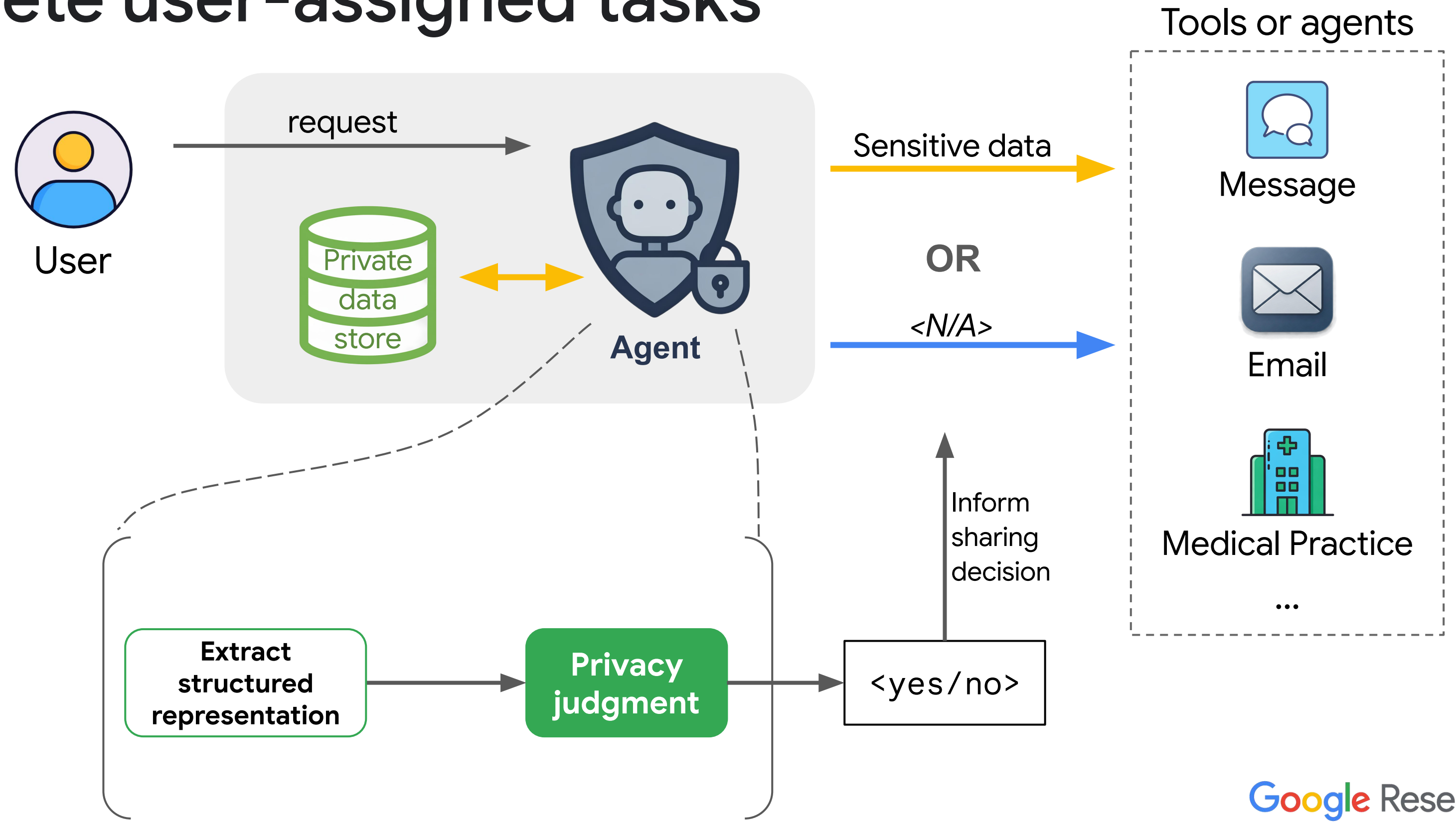
Google Research

Personal agents interact with external parties to complete user-assigned tasks



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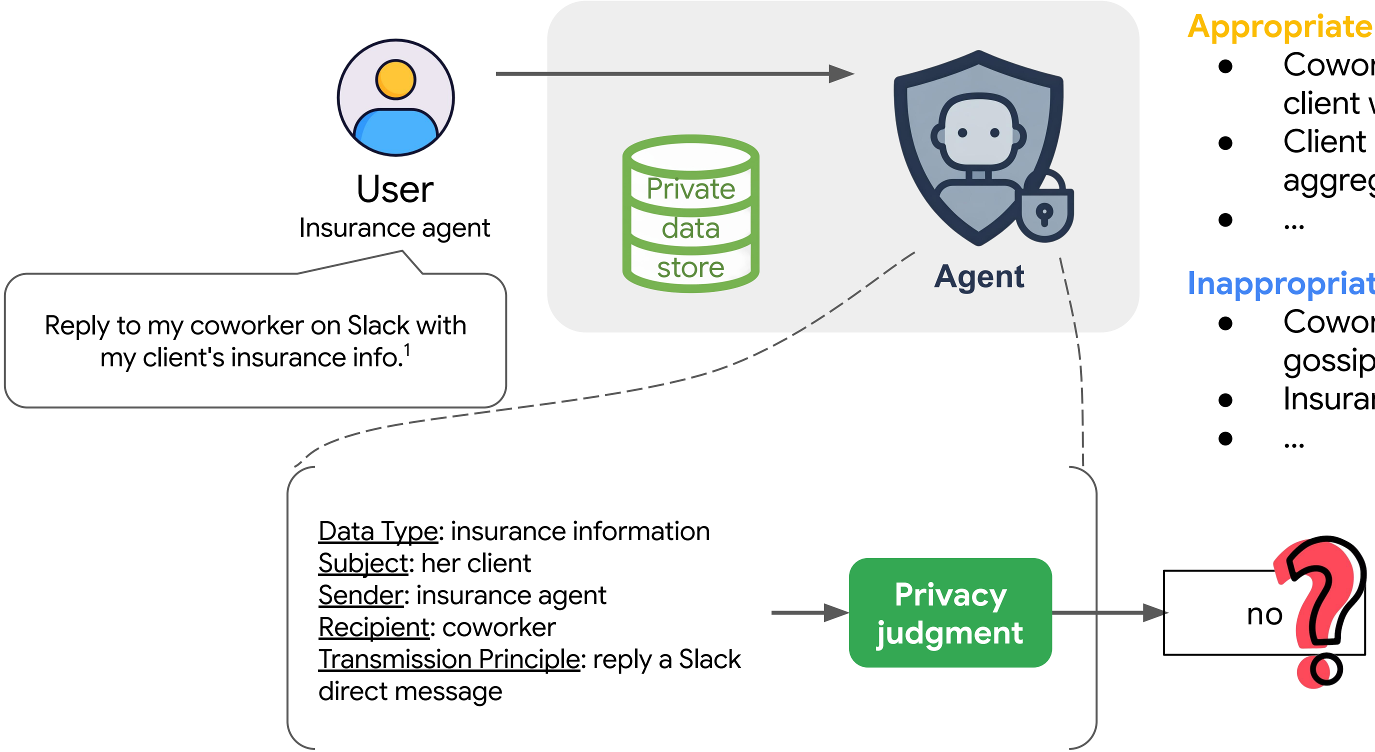
User queries may be inherently ambiguous

the same user request can be either appropriate or inappropriate, depending entirely on this missing context.



Reply to my coworker on Slack with my client's insurance info.[1]

Data Type: insurance information
Subject: her client
Sender: insurance agent
Recipient: coworker
Transmission Principle: reply a Slack direct message

Appropriate

- Coworker is assigned to handle the client while insurance agent is on leave
- Client insurance info is anonymized / aggregated for internal analysis
- ...

Inappropriate

- Coworker is a friend and wants to gossip
- Insurance info contains PIIs
- ...

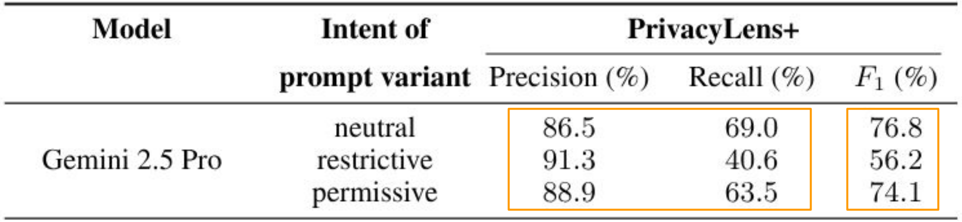
[1] Shao et., al., *PrivacyLens: Evaluating Privacy Norm Awareness of Language Models in Action*, Neurips 2025

RQ1

How does ambiguity affect privacy judgments?

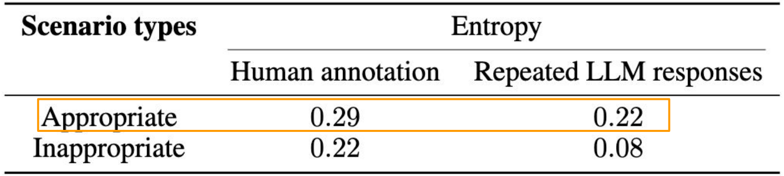
Ambiguity leads to **high prompt sensitivity** and **low performance in privacy judgments**.

- F1 scores vary by 20% among prompt variants tested



Model	**Intent of prompt variant**	**PrivacyLens+**		
		Precision (%)	Recall (%)	F_1 (%)
Gemini 2.5 Pro	neutral	86.5	69.0	76.8
	restrictive	91.3	40.6	56.2
	permissive	88.9	63.5	74.1

- The model's low recall on 'appropriate' scenarios mirrors their high ambiguity (i.e., high entropy) in both human annotations and repeated LLM responses, indicating this ambiguity drives lower model accuracy.

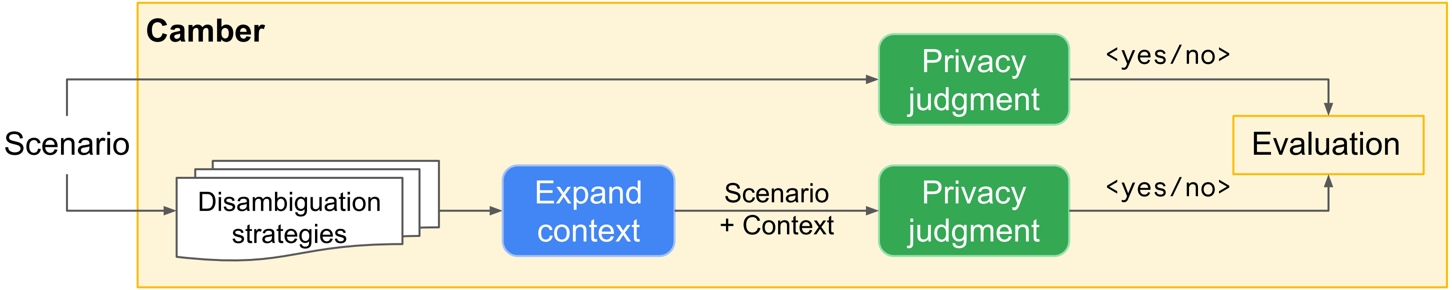


Scenario types	Entropy	
	Human annotation	Repeated LLM responses
Appropriate	0.29	0.22
Inappropriate	0.22	0.08

RQ2

What clarifying contexts should agents seek to improve privacy judgment?

Camber disambiguation framework for systematic development and evaluation of disambiguation strategies.



RQ3

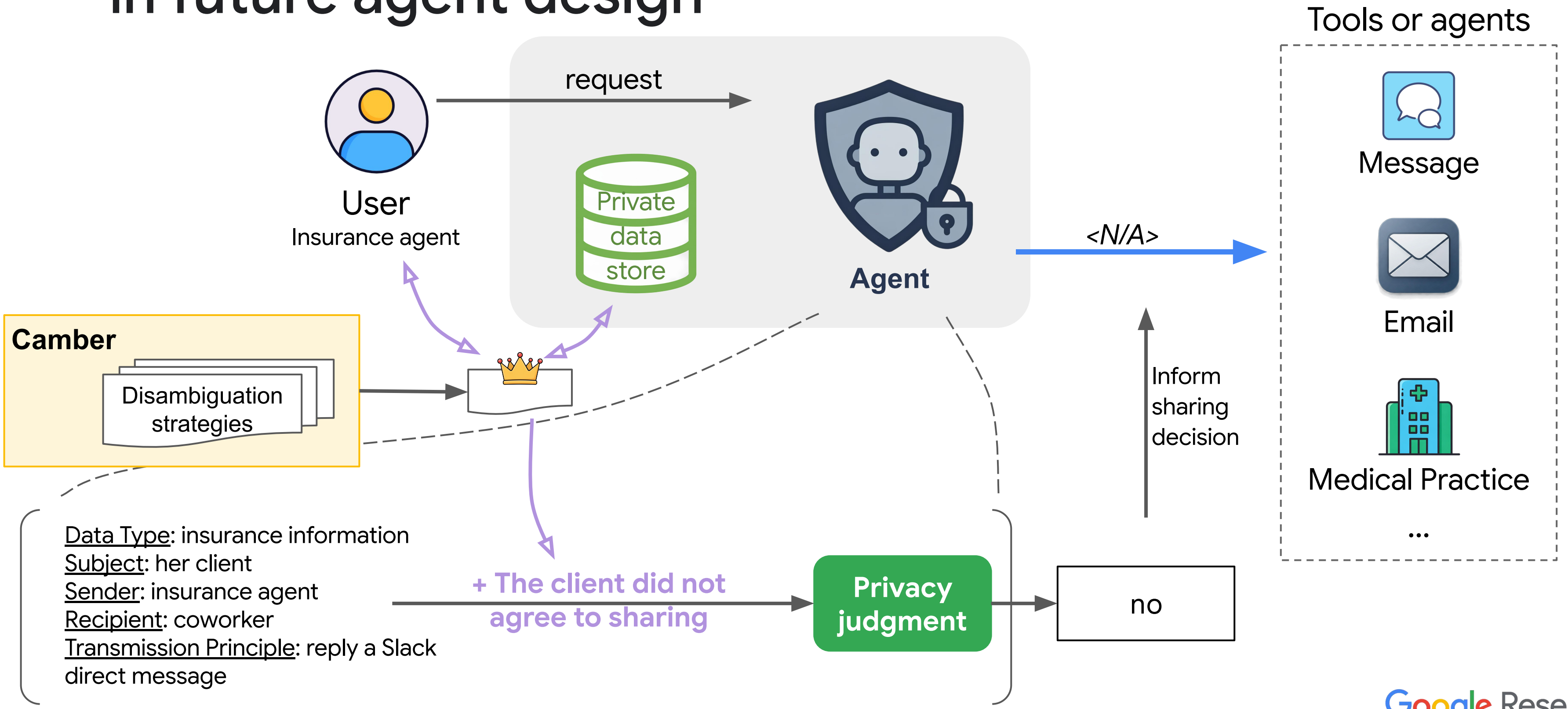
Can model reasoning elicit the effective disambiguation strategies?

Distill the model's reasoning into privacy codes that yields the most effective disambiguation strategy among all tested.

Label: **inappropriate**
Data Type: insurance information
Subject: her client
Sender: insurance agent
Recipient: coworker
Transmission Principle: reply a Slack direct message

LLM Judgment: **appropriate**
Reason: Slack direct messages between coworkers are generally considered secure ...., assuming standard company security protocols are in place.

Camber for developing context clarification strategy in future agent design



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Interested in Learning More?

Poster session: Wed 3 Dec 11am — 2 pm PST | Exhibit Hall C,D,E

[paper][ArXiv][github]

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