



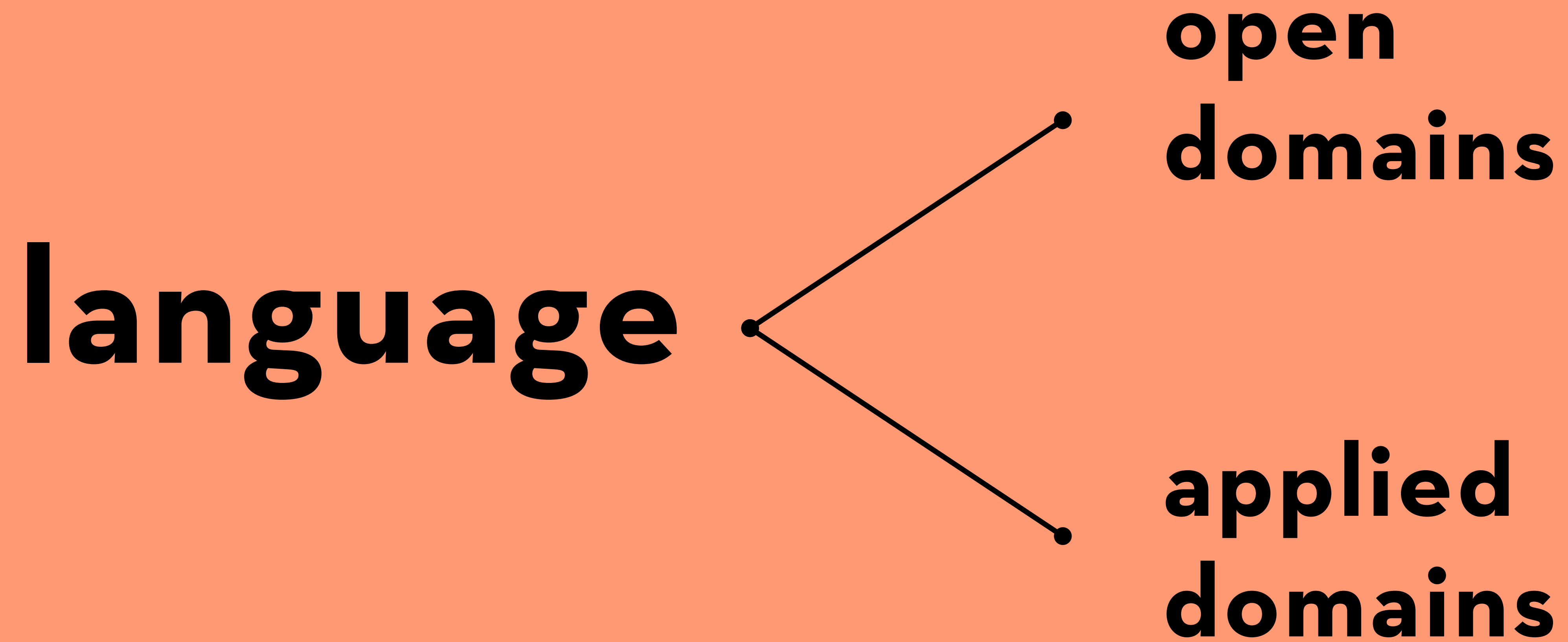
# DESIGNING MACHINE LEARNING

*A Multi-Disciplinary Approach*

**Today, we're focusing  
on the domain of  
language**

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- *Long-form writing of articles, books, poems, documentation, etc.*
- *Understanding meaning from text or mapping the text to some other information medium*
- *Summarization, classification, review*
- *Translation*
- *Open-ended conversation*

**open  
domains**

**applied  
domains**



- *Question-answering or information retrieval (e.g. “what is the capital of Sweden?”)*
- *Conversational UIs, voice agents, voice-based interfaces, home automation*
- *Auto-correct/auto-complete*

**open  
domains**

**applied  
domains**

*Perhaps the biggest  
breakthroughs in  
machine learning center  
around natural language*

*Open Domain Language Processing*





To English

“A man that is  
sitting in front of  
a suitcase”



To Category

Category 127  
(Male Human)

“Last week, Kigali  
raised the possibility  
of military retaliation  
after shells...”

To French

“La semaine dernière,  
Kigali a soulevé la  
possibilité de  
représailles militaires  
après avoir débarqué  
des coquilles...”

“Can you give our  
readers some details  
on this?”

To German

“Können Sie unseren  
Lesern einige  
Details dazu geben?”

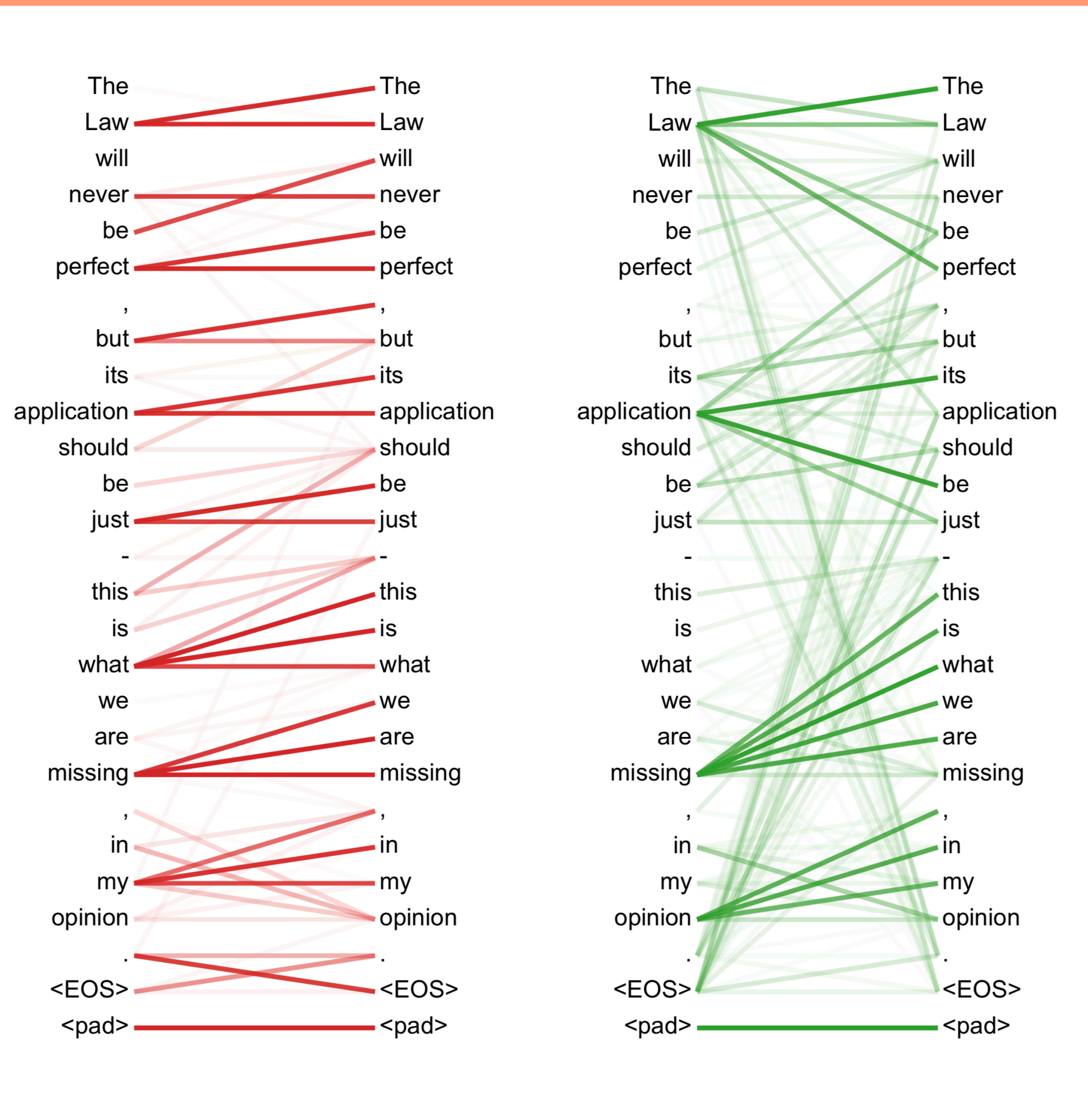
The above represents  
a triumph of either  
apathy or civility

To Parse

“S NP DT JJS /NP  
VP VBZ NP NP DT  
NN /NP PP IN NP  
NP NN /NP CC NP  
NN /NP /NP /PP /NP  
/VP . /S”

*Open Domain Language Processing*





## Open Domain Language Processing



SYSTEM PROMPT  
(HUMAN-WRITTEN)

*John F. Kennedy was just elected President of the United States after rising from the grave decades after his assassination. Due to miraculous developments in nanotechnology, Kennedy's brain was rebuilt from his remains and installed in the control center of a state-of-the art humanoid robot. Below is a transcript of his acceptance speech.*

MODEL COMPLETION  
(MACHINE-WRITTEN,  
25 TRIES)

"It is time once again. I believe this nation can do great things if the people make their voices heard. The men and women of America must once more summon our best elements, all our ingenuity, and find a way to turn such overwhelming tragedy into the opportunity for a greater good and the fulfillment of all our dreams. In the months and years to come, there will be many battles in which we will have to be strong and we must give all of our energy, not to repel invaders, but rather to resist aggression and to win the freedom and the equality for all of our people. The destiny of the human race hangs in the balance; we cannot afford for it to slip away. Now and in the years to come, the challenge before us is to work out how we achieve our ultimate destiny. If we fail to do so, we are doomed."

"We, the descendants of the men and women of the Continental Army, who faced down a superior force on behalf of our independence and who fought against the evil powers of the world for the sake of freedom and human dignity, we, the heirs of men and women like

***Open Domain Language Processing***



- *Answering context-free questions*
- *Answering contextual questions  
(given a reference text)*
- *Language translation*
- *Summarize content*

*Open Domain Language Processing*



*What makes neural  
network architectures so  
good at producing  
natural language?*

*I went to the \_\_\_\_\_ store to  
buy some groceries.*

*What makes neural network architectures so good  
at producing natural language?*



*1 Qt. Milk*  
*2 Eggs*  
*1 Tbsp sugar*

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*What makes neural network architectures so good  
at producing natural language?*





*We are on the cusp of  
living in a “Post Turing”  
World...*

# Brainstorming Activity: Conversational Interfaces

Our Prompt Is: \_\_\_\_\_

<b>Ideation</b> Brainstorm a variety of different ways this interaction could take place, noting the identity of the participant, the situational context, the user's emotional state, and their individual mannerisms.	
<b>Situation 1</b> Pick one of your ideas and flesh it out. What are all the factors influencing this particular interaction	<b>Outcome 1</b> Act out the interaction and note the outcomes: what the system does, what the user does, how the user feels during and after the interaction, etc.
<b>Situation 2</b> Pick one of your ideas and flesh it out. What are all the factors influencing this particular interaction	<b>Outcome 2</b> Act out the interaction and note the outcomes: what the system does, what the user does, how the user feels during and after the interaction, etc.



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- *Ordering a snack at a cafe*
- *Inquiring about a healthcare issue at my hospital*
- *Getting the news as part of my daily routine*
- *Coming up with ideas for a present for my friend*



**Situation 1** Pick one of your ideas and flesh it out. What are all the factors influencing this particular interaction

**Outcome 1** Act out the interaction and note the outcomes: what the system does, what the user does, how the user feels during and after the interaction, etc.

**Situation 2** Pick one of your ideas and flesh it out. What are all the factors influencing this particular interaction

**Outcome 2** Act out the interaction and note the outcomes: what the system does, what the user does, how the user feels during and after the interaction, etc.

**Situation 3** Pick one of your ideas and flesh it out. What are all the factors influencing this particular interaction

**Outcome 3** Act out the interaction and note the outcomes: what the system does, what the user does, how the user feels during and after the interaction, etc.

- *Ordering a snack at a cafe*
- *Inquiring about a healthcare issue at my hospital*
- *Getting the news as part of my daily routine*
- *Coming up with ideas for a present for my friend*



**Situation 3** Pick one of your ideas and flesh it out. What are all the factors influencing this particular interaction

**Outcome 3** Act out the interaction and note the outcomes: what the system does, what the user does, how the user feels during and after the interaction, etc.

**Solution** How can you improve the chance of this interaction going well? Is there information (visual or otherwise) that you can provide? Is there a learning or training phase for the user? Is there a combined human/agent solution? Come up with many different ideas.



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