CS329X: Human Centered NLP

Design Thinking

Diyi Yang

Stanford CS

Overview

Motivation: Why designs on top of NLP models are important

Design thinking:

Double Diamond

Problem reframing

Prototyping

Interviews and think aloud studies

Many slides credit to Sherry Wu

The biggest bottleneck for large language model startups is UX?

Motivating example: Build a Copywriting Tool

Build a tool that uses LLM to support copywriting

NLG task: users input the goal (e.g. advertising header) & provide context (e.g. product description), model outputs suggestions accordingly.

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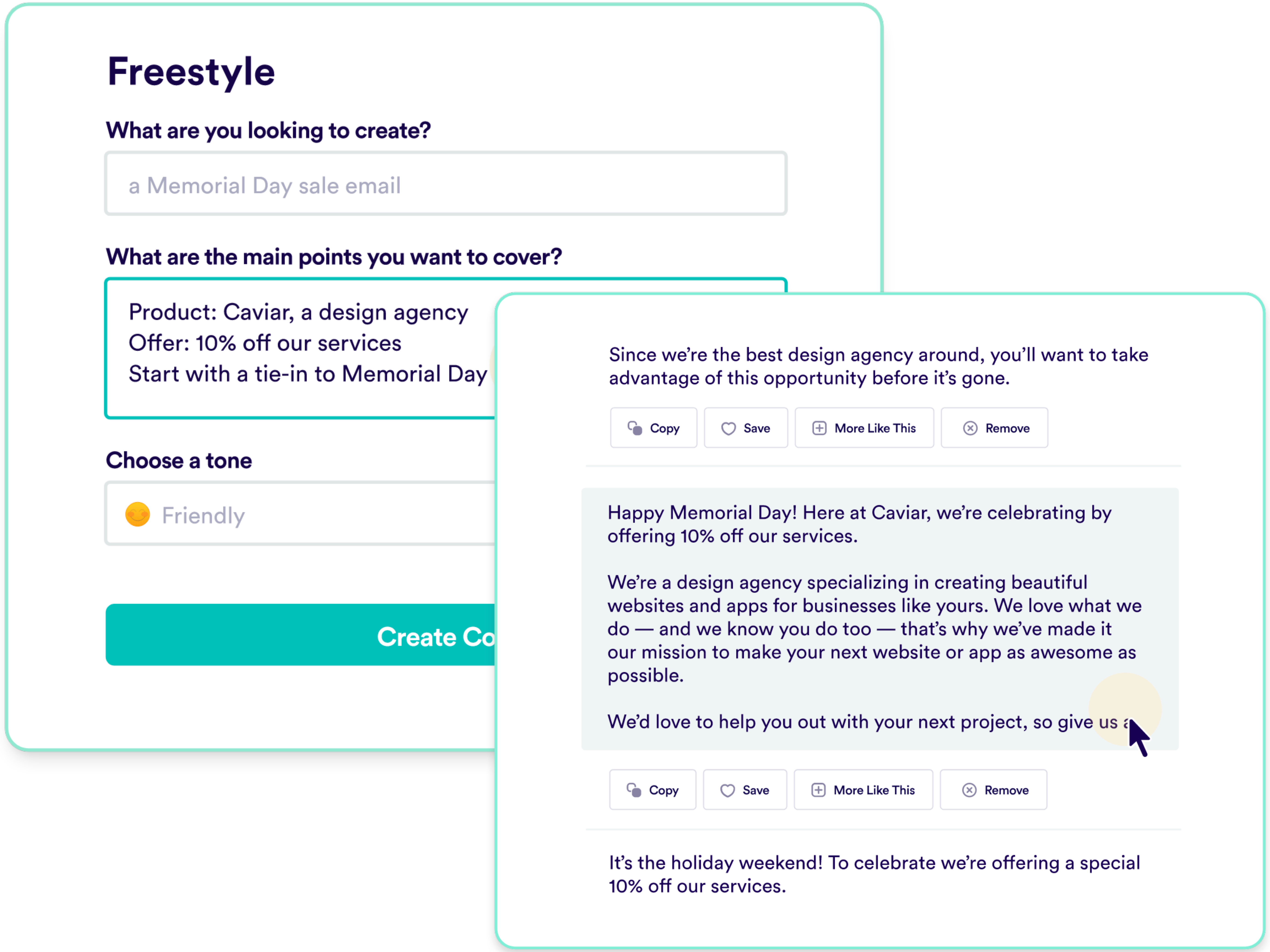


Freestyle

What are you looking to create?

a Memorial Day sale email

What are the main points you want to cover?

Product: Caviar, a design agency
Offer: 10% off our services
Start with a tie-in to Memorial Day

Choose a tone

Friendly

Since we're the best design agency around, you'll want to take advantage of this opportunity before it's gone.

Happy Memorial Day! Here at Caviar, we're celebrating by offering 10% off our services.

We're a design agency specializing in creating beautiful websites and apps for businesses like yours. We love what we do — and we know you do too — that's why we've made it our mission to make your next website or app as awesome as possible.

We'd love to help you out with your next project, so give us a

It's the holiday weekend! To celebrate we're offering a special 10% off our services.

The biggest bottleneck for large language model startups is UX

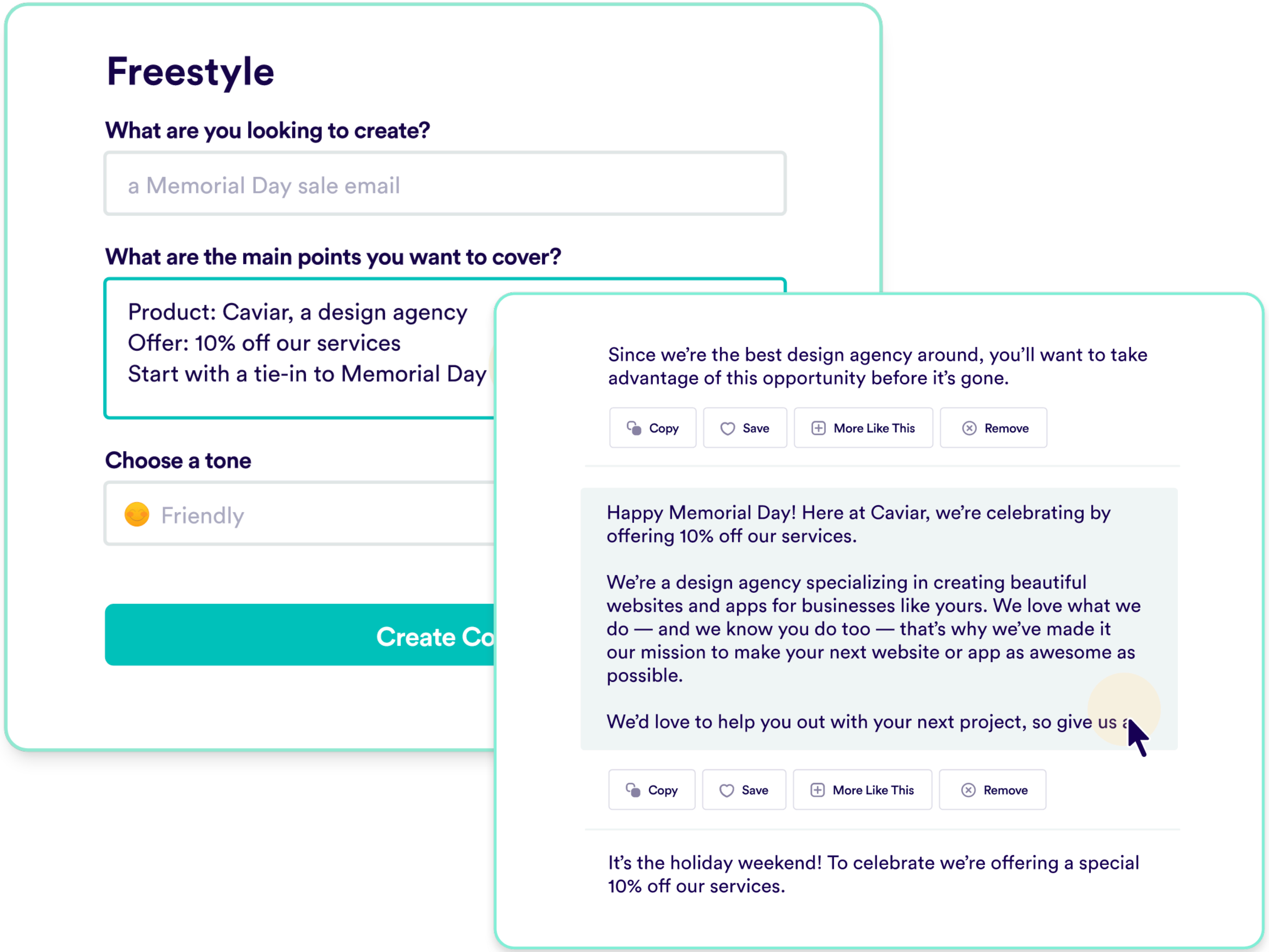
https://www.copy.ai/

Motivating example: Build a Copywriting Tool

There are multiple tools that do this.

Especially in NLG & when we rely on existing LLM services, **impossible / too time consuming** to compare output quality!

More **differentiable**: the "periphery" of the product around the core language synthesis engine.



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Motivating example: Build a Copywriting Tool

What aspects do you think would make a difference?

How should a user provide the input context?

How easy is it to understand how to provide this context, its purpose and impact on output?

Is it possible for the user to get really bad copy suggestions if they mess up the input context?

How many suggestions should be shown to the user?

Tradeoffs between variety vs. feeling overwhelmed?

How do you explain the idea of why there are multiple outputs?

How do you rank suggestions to help users know which one they should pick?

How do you explain what this ranking or score means to a user?

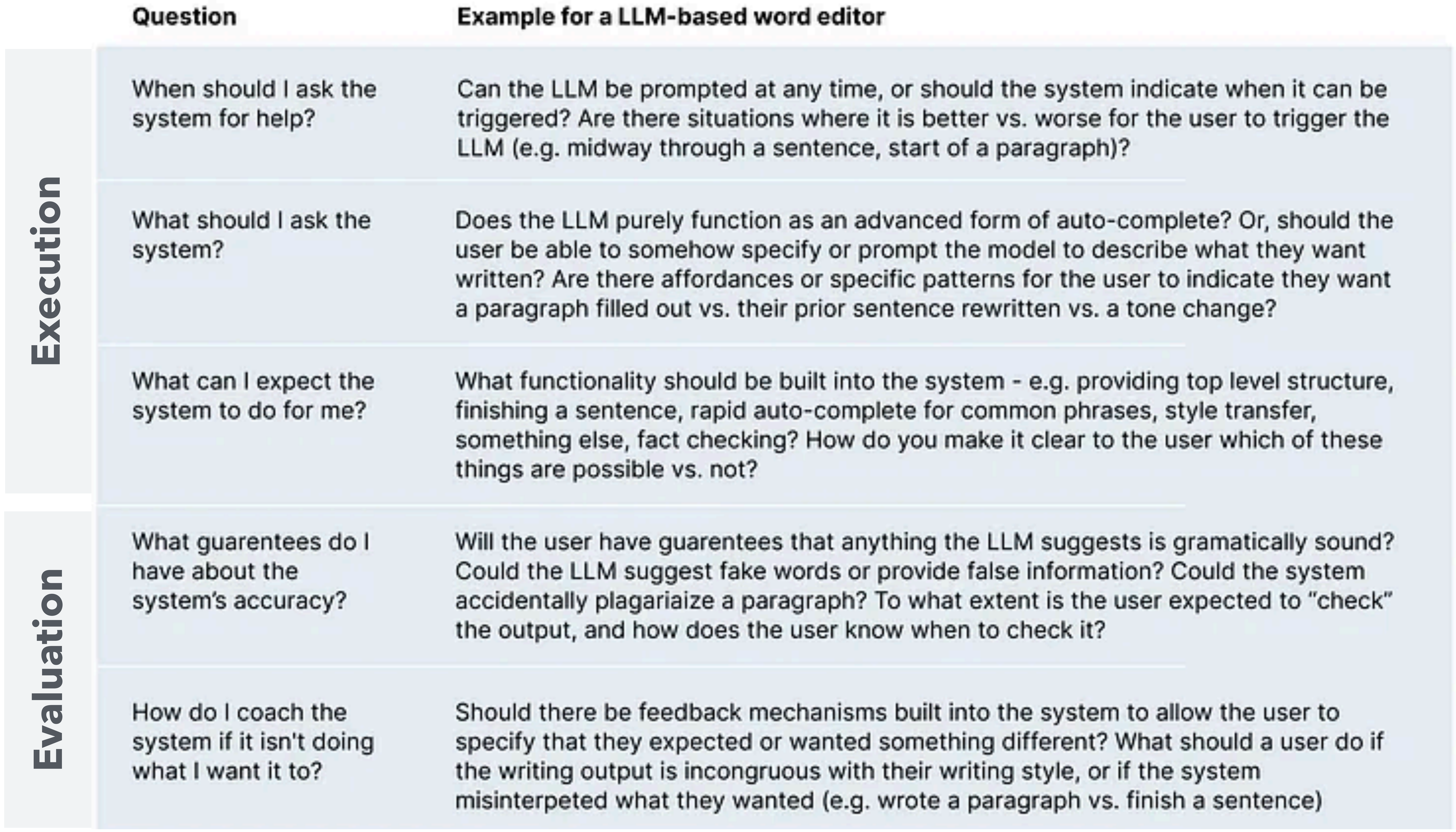
Should you "score" outputs at all?

How do you allow users to balance their personal preferences with what the model thinks is optimal?

Do you allow the user to "nudge" suggestions in a certain direction (tone, style, etc.)?

How do you avoid showing weird or odd suggestions which reduce user trust?

The biggest bottleneck for large language model startups is UX



	Question	Example for a LLM-based word editor
Execution	When should I ask the system for help?	Can the LLM be prompted at any time, or should the system indicate when it can be triggered? Are there situations where it is better vs. worse for the user to trigger the LLM (e.g. midway through a sentence, start of a paragraph)?
	What should I ask the system?	Does the LLM purely function as an advanced form of auto-complete? Or, should the user be able to somehow specify or prompt the model to describe what they want written? Are there affordances or specific patterns for the user to indicate they want a paragraph filled out vs. their prior sentence rewritten vs. a tone change?
	What can I expect the system to do for me?	What functionality should be built into the system - e.g. providing top level structure, finishing a sentence, rapid auto-complete for common phrases, style transfer, something else, fact checking? How do you make it clear to the user which of these things are possible vs. not?
Evaluation	What guarentees do I have about the system's accuracy?	Will the user have guarentees that anything the LLM suggests is gramatically sound? Could the LLM suggest fake words or provide false information? Could the system accidentally plagariaize a paragraph? To what extent is the user expected to "check" the output, and how does the user know when to check it?
	How do I coach the system if it isn't doing what I want it to?	Should there be feedback mechanisms built into the system to allow the user to specify that they expected or wanted something different? What should a user do if the writing output is incongruous with their writing style, or if the system misinterpeted what they wanted (e.g. wrote a paragraph vs. finish a sentence)

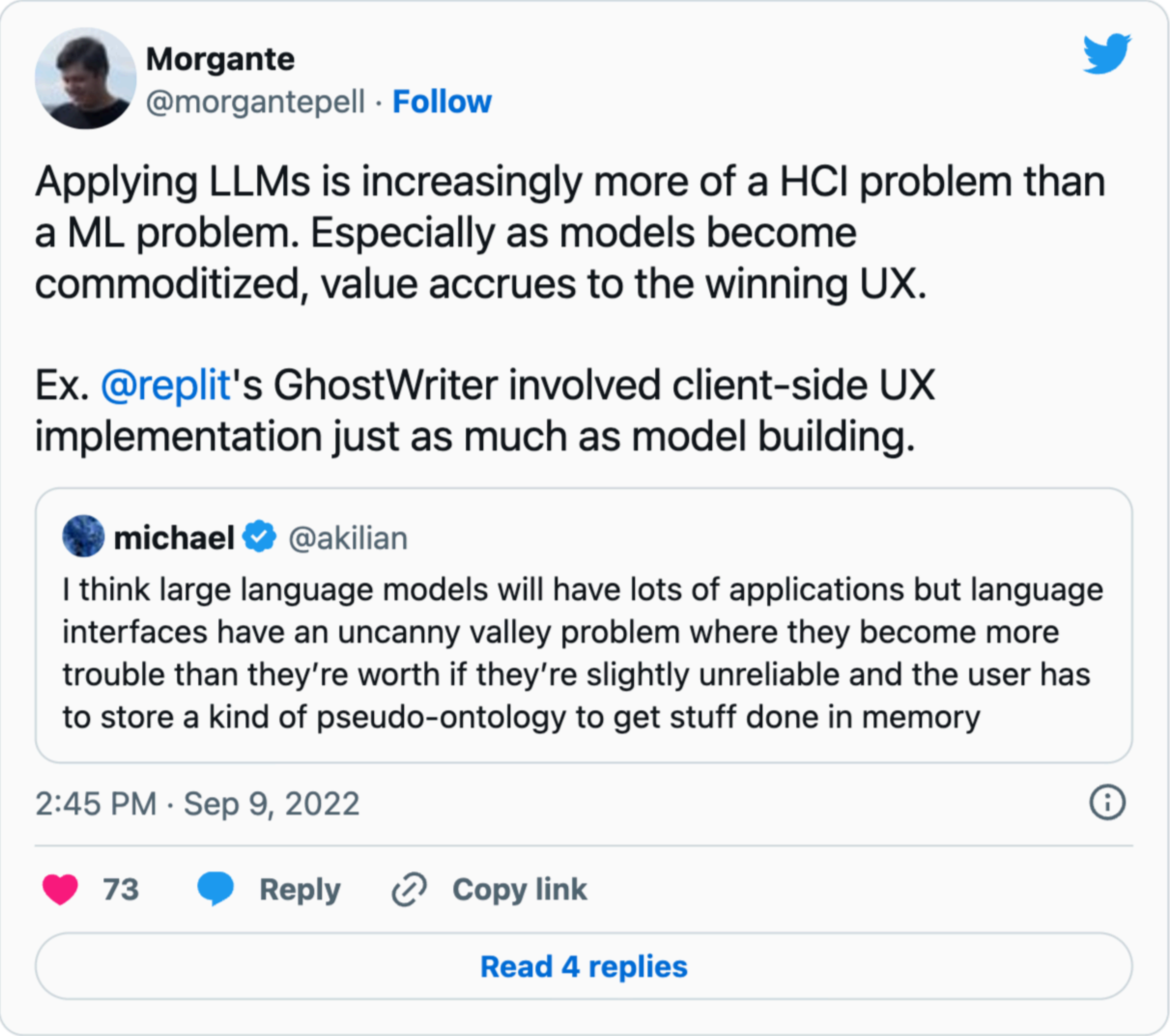
Some Quick Take-aways

These issues really only surface once someone starts trying to use the product…

This is how you go from "cool" to "useful."

These challenges are always present, regardless of system's accuracy (within some bounds).

Doesn't matter if the LLM accuracy is 80% or 95%, the user still needs to reason through failure modes and understand what to expect when interacting with the system.



Morgante
@morgantepell · **Follow**

Applying LLMs is increasingly more of a HCI problem than a ML problem. Especially as models become commoditized, value accrues to the winning UX.

Ex. @replit's GhostWriter involved client-side UX implementation just as much as model building.

> **michael** @akilian
> I think large language models will have lots of applications but language interfaces have an uncanny valley problem where they become more trouble than they're worth if they're slightly unreliable and the user has to store a kind of pseudo-ontology to get stuff done in memory

2:45 PM · Sep 9, 2022

Overview of This Lecture

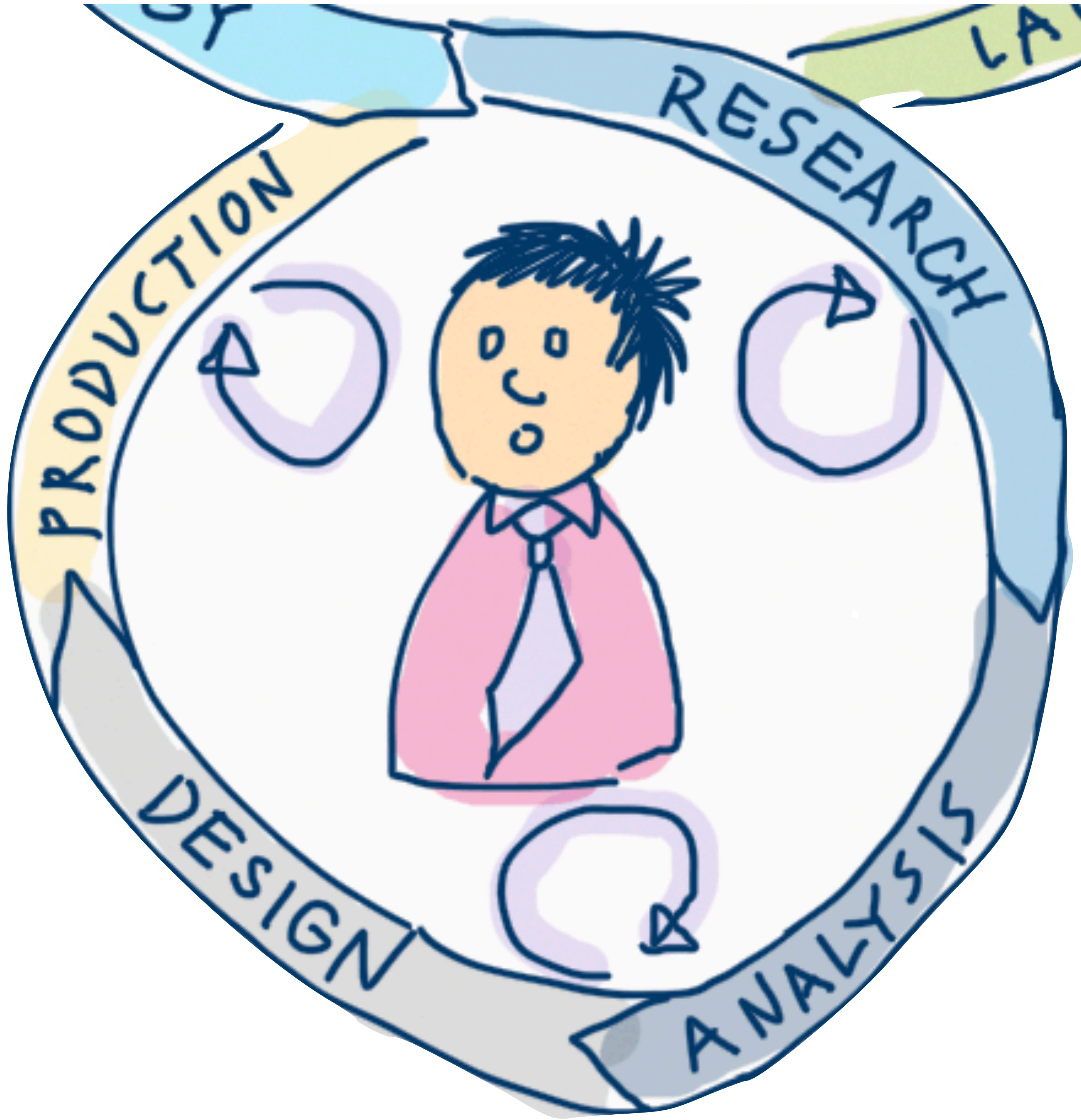
Motivation: Why designs on top of NLP models are important

Design thinking:

User-Centered Design

"People ignore design that ignores people." – Frank Chimero

User-centered design (UCD) is an iterative design process in which designers focus on the **users** and **their needs** in each phase of the design process.



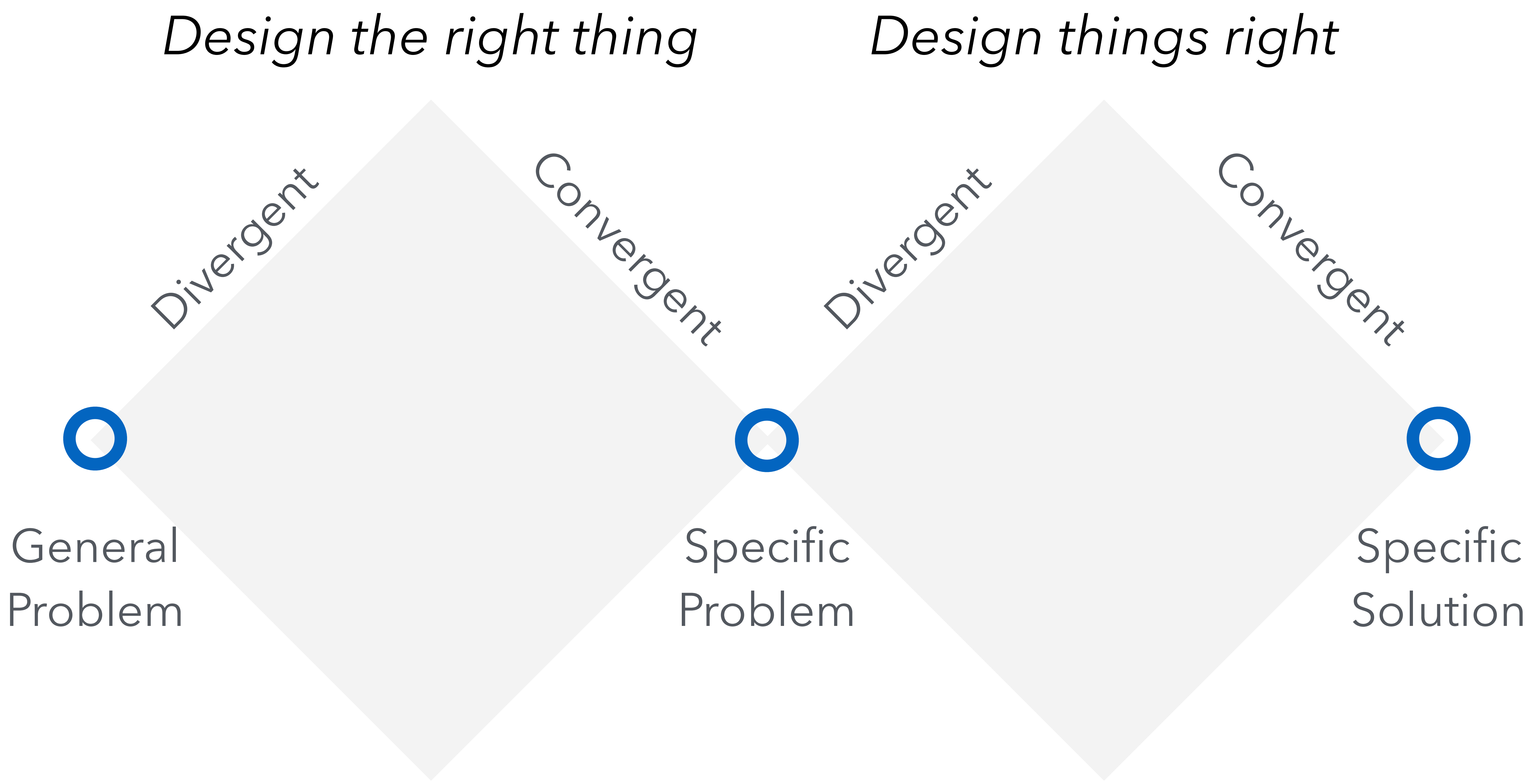
Design Process: “Double Diamond”

“Double Dimond” is a typical design process.
First Dimond finds the specific problem.
Second Dimond finds the specific solution.

Divergent + convergent thinking:

Divergent: think broadly, keep an open mind, consider anything and everything

Convergent: think narrowly, bring back focus and identify 1-2 key problems / solutions.



Design Process: “Double Diamond”

Discover: Understand the issue rather than merely assuming it. It involves speaking to and spending time with people who are affected by the issues.

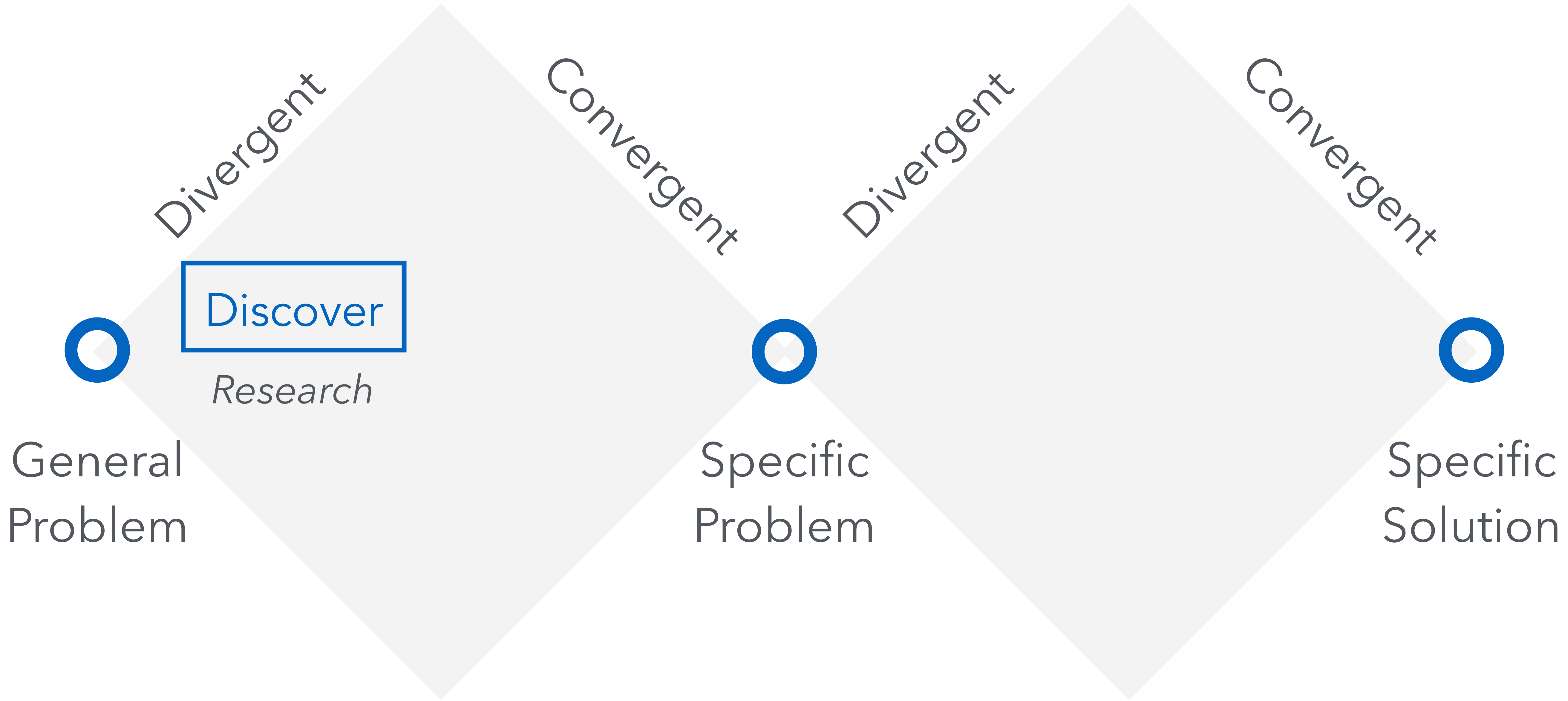
Methods:

Multiple Perspective Framing

Field studies

Interviews

…



Design Process: “Double Diamond”

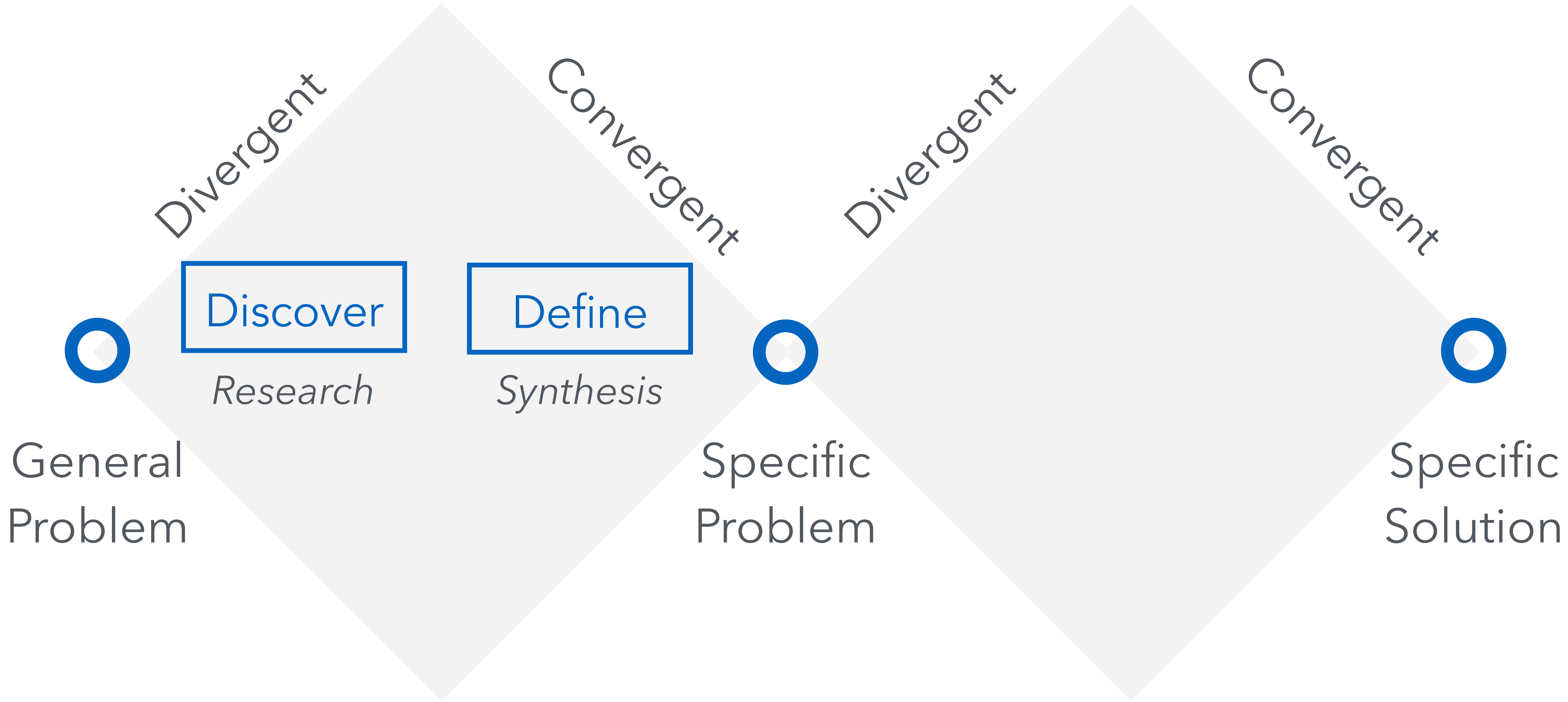
Define: The insight gathered from the discovery phase can help to define the challenge in a different way.

Methods:

Task analysis

Affinity diagrams.

…



Discover: Perspective Reframing

> “Within a design context, framing is often seen as the key creative step that allows an original solution to be produced.
> Designers report on the need to get to **‘the problem behind the problem’** (as initially presented by the client), and about creating a ‘fresh perspective.’ ”

– Bec Paton and Kees Dorst

The core of ‘design thinking and its application, https://www.sciencedirect.com/science/article/pii/S0142694X11000603g

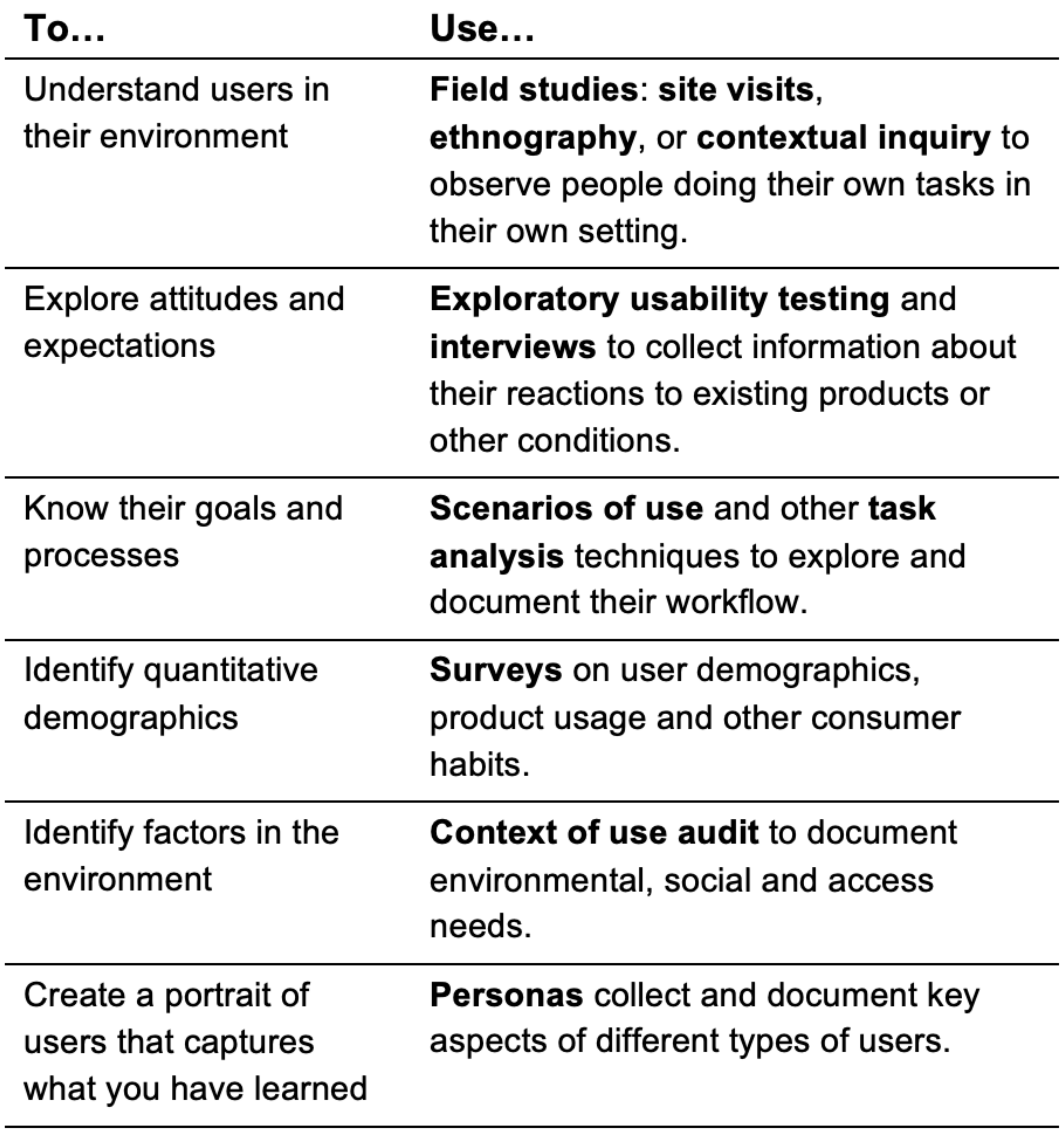
Discover & Define:
learn about users

These techniques focus on listening, observing and understanding the context in which people work and play.

They are **exploratory** and often **open-ended**, allowing for bottom-up analysis.

They include both small-scale **qualitative** techniques and **quantitative** data analysis.

Quesenbery, Whitney, and W. Whitney. "Choosing the right usability technique: Getting the answers you need." *User Friendly 2008-Innovation for Asia* (2008).



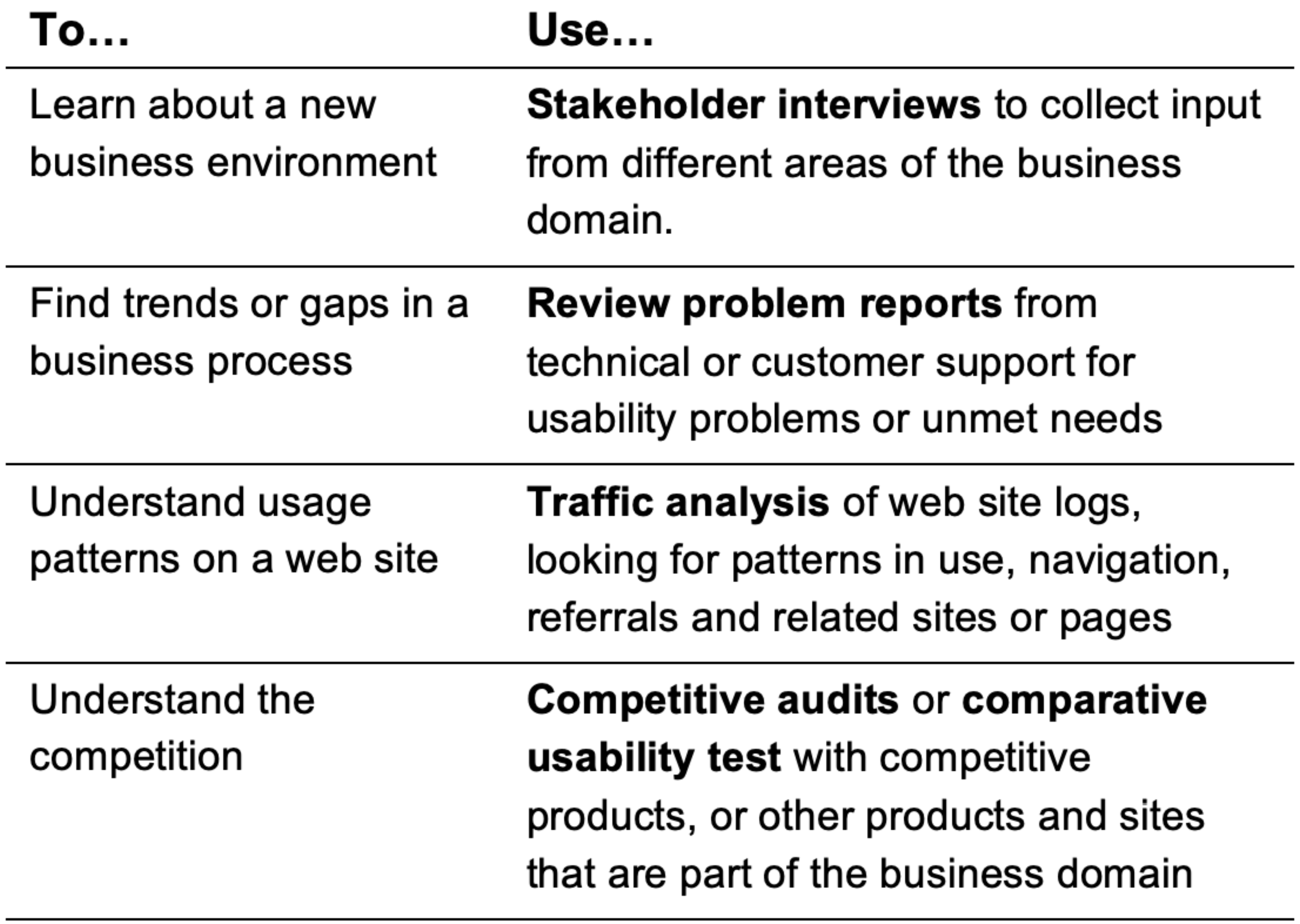
To...	Use...
Understand users in their environment	**Field studies: site visits**, **ethnography**, or **contextual inquiry** to observe people doing their own tasks in their own setting.
Explore attitudes and expectations	**Exploratory usability testing** and **interviews** to collect information about their reactions to existing products or other conditions.
Know their goals and processes	**Scenarios of use** and other **task analysis** techniques to explore and document their workflow.
Identify quantitative demographics	**Surveys** on user demographics, product usage and other consumer habits.
Identify factors in the environment	**Context of use audit** to document environmental, social and access needs.
Create a portrait of users that captures what you have learned	**Personas** collect and document key aspects of different types of users.

Discover & Define: *learn the business environment*

These techniques focus on **what is happening in the business or personal domain**.

They are a snapshot of the competitive environment, trends surrounding the product and actual use of the product.

Quesenbery, Whitney, and W. Whitney. "Choosing the right usability technique: Getting the answers you need." *User Friendly 2008-Innovation for Asia* (2008).



To...	Use...
Learn about a new business environment	**Stakeholder interviews** to collect input from different areas of the business domain.
Find trends or gaps in a business process	**Review problem reports** from technical or customer support for usability problems or unmet needs
Understand usage patterns on a web site	**Traffic analysis** of web site logs, looking for patterns in use, navigation, referrals and related sites or pages
Understand the competition	**Competitive audits** or **comparative usability test** with competitive products, or other products and sites that are part of the business domain

Discover & Define: Interview

A method of asking questions & listening

Use planned interview protocol with open ended questions

Ask about what you can’t observe

Let people tell you what they know about themselves:

- What they do
- How they do things
- Their opinions on current activities
- How much they like one thing compared with another

> *“**Go to the user, watch** them do the activities you care about, and **talk with them** about what they’re doing **right then**.”*

Quesenbery, Whitney, and W. Whitney. "Choosing the right usability technique: Getting the answers you need." *User Friendly 2008-Innovation for Asia* (2008).

Discover & Define: Interview

	Structured	Semi-structured	Unstructured	Focus group
Pre-defined questions?	✓	✓	✘	✓
Open-ended questions?	✘	✓	✓	✓
Fixed order of questions?	✓	✘	✘	✘
Fixed number of questions?	✓	✘	✘	✘
Can ask additional questions?	✘	✓	✓	✓

Semi-structured is **most common**.

Allows for **exploratory** studies.

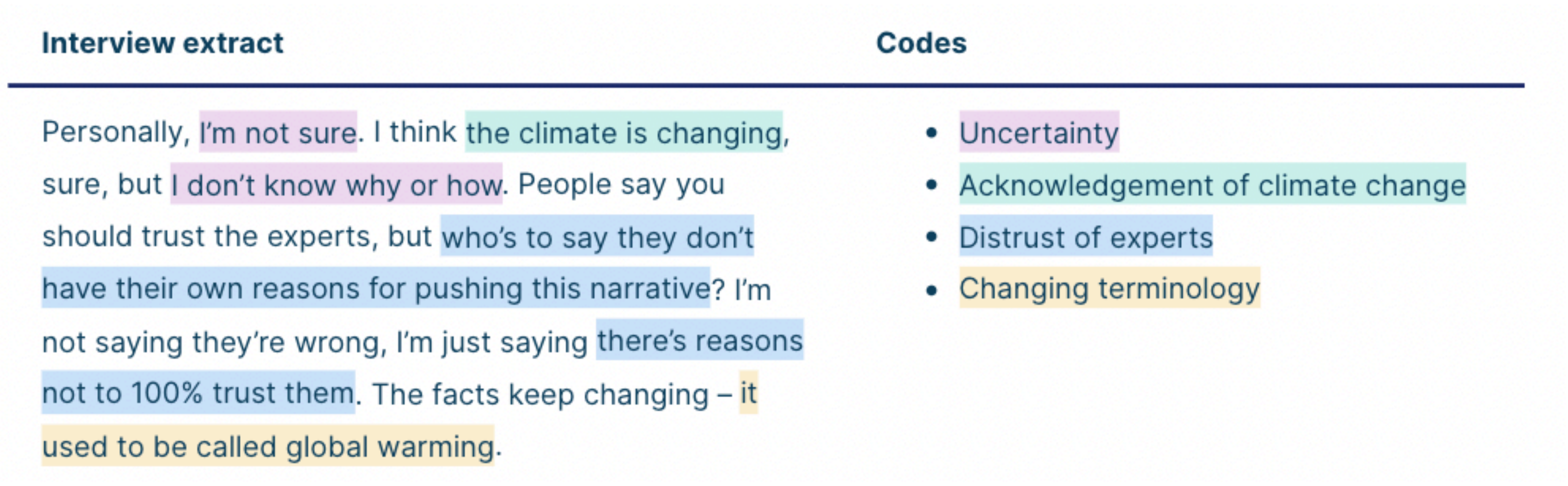
Provides comparable, reliable data, and the flexibility to ask follow-up questions.

https://www.scribbr.com/methodology/semi-structured-interview/

Semi-Structured Interviews: Thematic analysis

Identify common themes from transcriptions – topics, ideas and patterns of meaning that come up repeatedly

Define codebook, multiple coders, compute annotator agreement



Interview extract	Codes
Personally, I'm not sure. I think the climate is changing, sure, but I don't know why or how. People say you should trust the experts, but who's to say they don't have their own reasons for pushing this narrative? I'm not saying they're wrong, I'm just saying there's reasons not to 100% trust them. The facts keep changing – it used to be called global warming.	• Uncertainty • Acknowledgement of climate change • Distrust of experts • Changing terminology

How to Do Thematic Analysis | Step-by-Step Guide & Examples. Scribbr. Retrieved December 25, 2022, from https://www.scribbr.com/methodology/thematic-analysis/

How many participants to interview?

Depends on Goals, Context, Resources/Timing.

As many as you

need for finding new things out (data saturation)

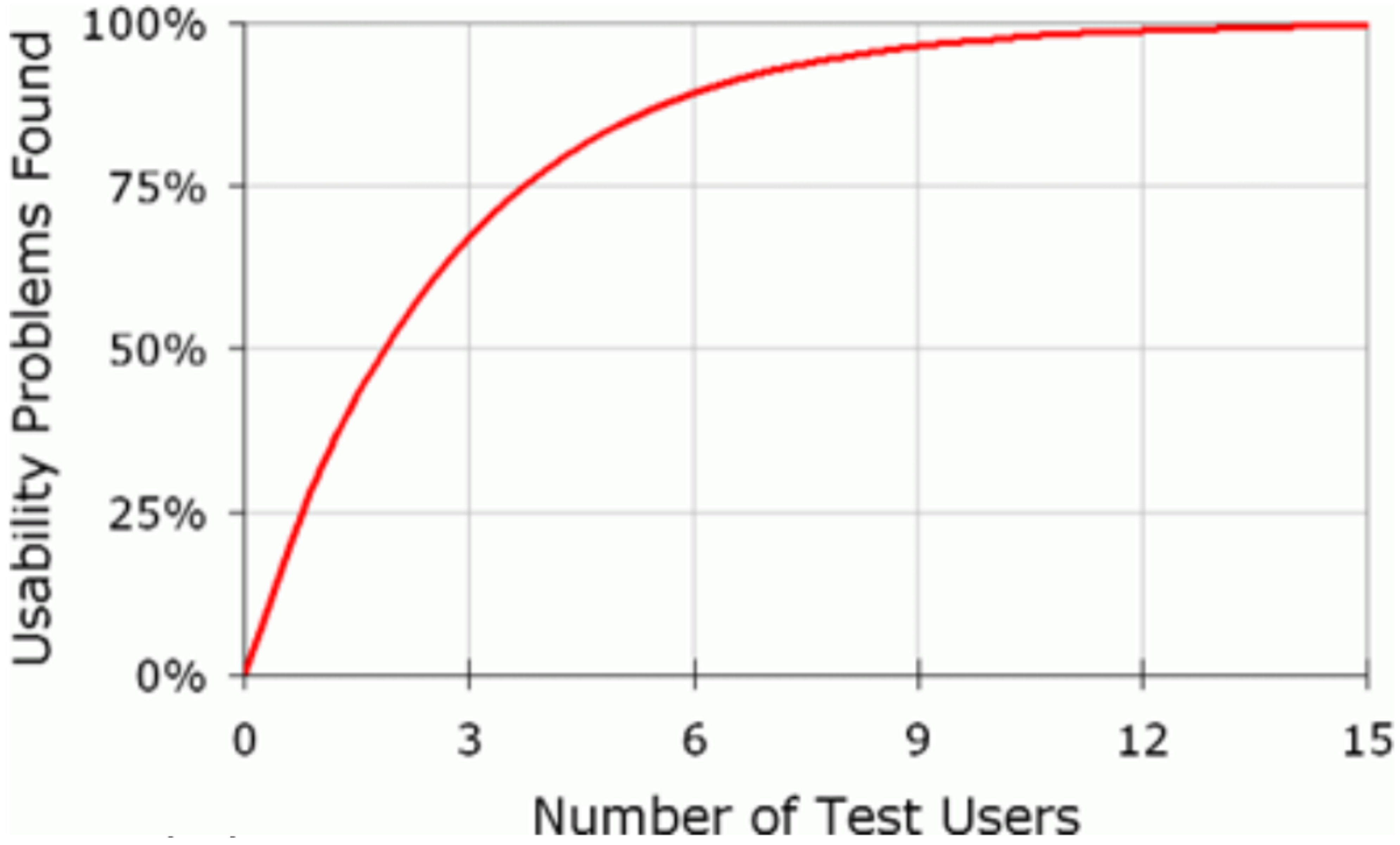
can afford (time, incentives, etc.)

have time to analyze (2x+ per participant)

Magic: 12 is a good number (minimum of five)

Make sure to choose representative users

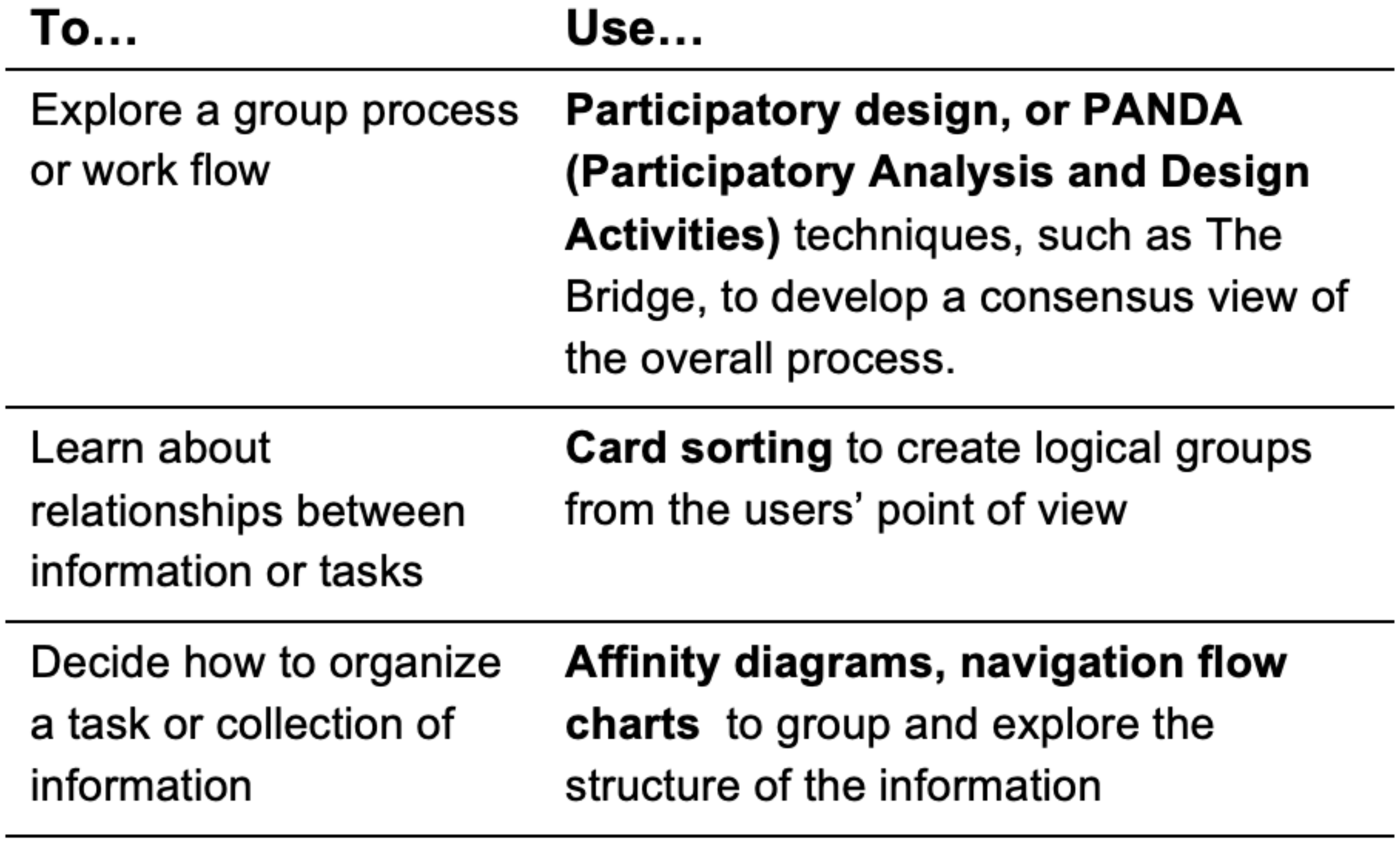
Or stop when findings start to converge



Nielsen, J., & Landauer, T. K. (1993). A mathematical model of the finding of usability problems. INTERACT'93 and CHI'93.

Discover & Define:Task & Information analysis

These techniques focus on the information or actions that users will need to meet their goals

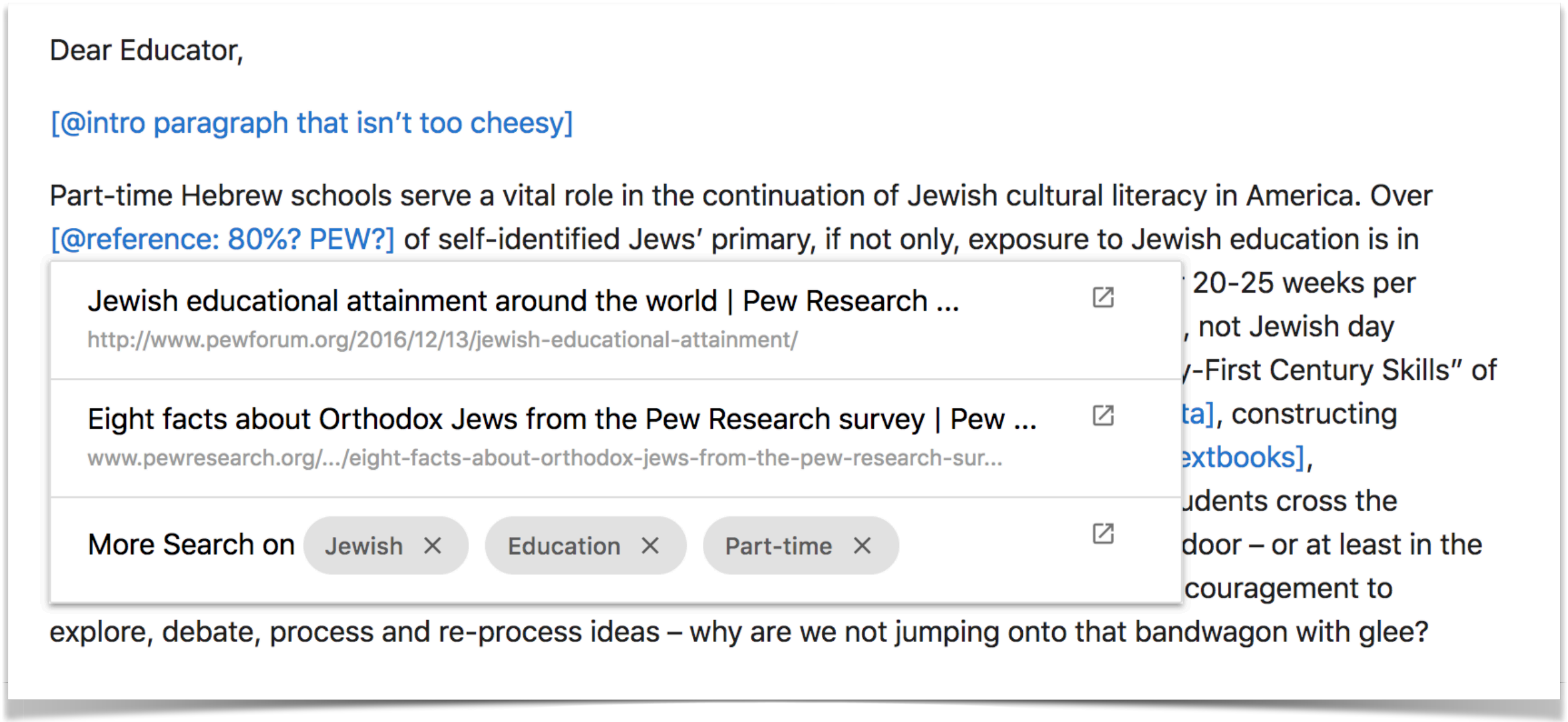


To…	Use…
Explore a group process or work flow	**Participatory design, or PANDA (Participatory Analysis and Design Activities)** techniques, such as The Bridge, to develop a consensus view of the overall process.
Learn about relationships between information or tasks	**Card sorting** to create logical groups from the users' point of view
Decide how to organize a task or collection of information	**Affinity diagrams, navigation flow charts** to group and explore the structure of the information

Quesenbery, Whitney, and W. Whitney. "Choosing the right usability technique: Getting the answers you need." *User Friendly 2008-Innovation for Asia* (2008).

Case: Improve Word Editor

Add intelligent language functionality into a Word document editor, to improve individual users' writing experience.



Dear Educator,

[@intro paragraph that isn't too cheesy]

Part-time Hebrew schools serve a vital role in the continuation of Jewish cultural literacy in America. Over [@reference: 80%? PEW?] of self-identified Jews' primary, if not only, exposure to Jewish education is in

' 20-25 weeks per
, not Jewish day
/-First Century Skills" of
ta], constructing
extbooks],
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explore, debate, process and re-process ideas – why are we not jumping onto that bandwagon with glee?

Jewish educational attainment around the world | Pew Research ...
http://www.pewforum.org/2016/12/13/jewish-educational-attainment/

Eight facts about Orthodox Jews from the Pew Research survey | Pew ...
www.pewresearch.org/.../eight-facts-about-orthodox-jews-from-the-pew-research-sur...

More Search on Jewish × Education × Part-time ×

Yang, Qian, et al. "Sketching nlp: A case study of exploring the right things to design with language intelligence." *CHI*. 2019.

Reframing

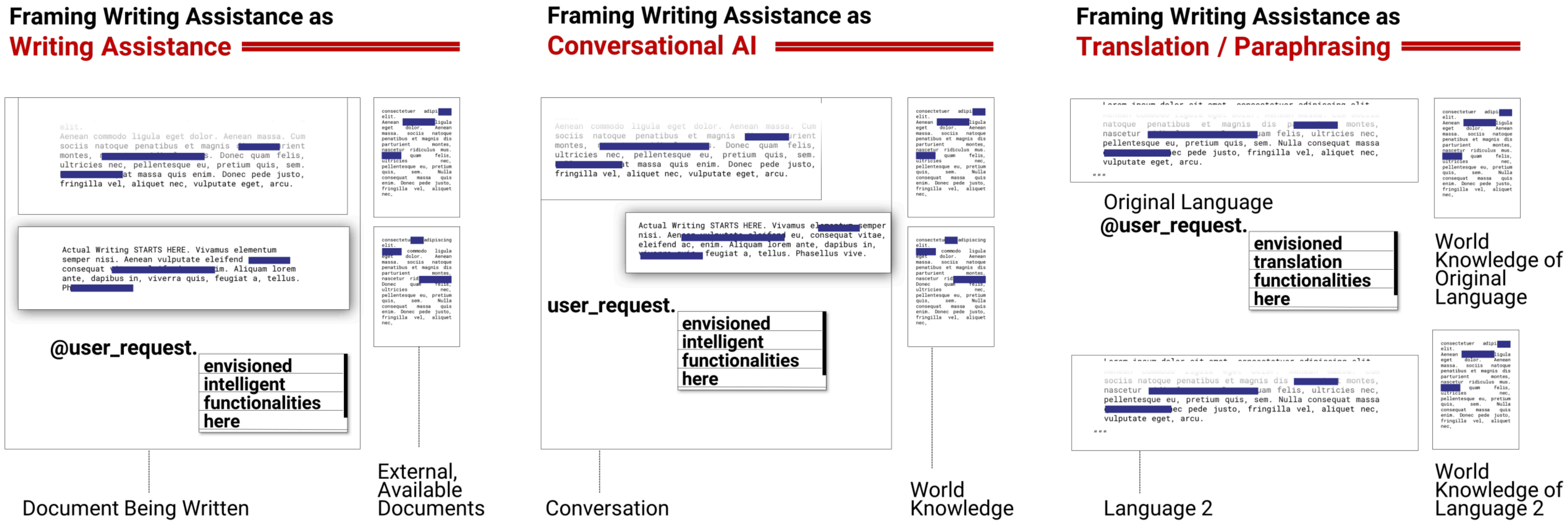
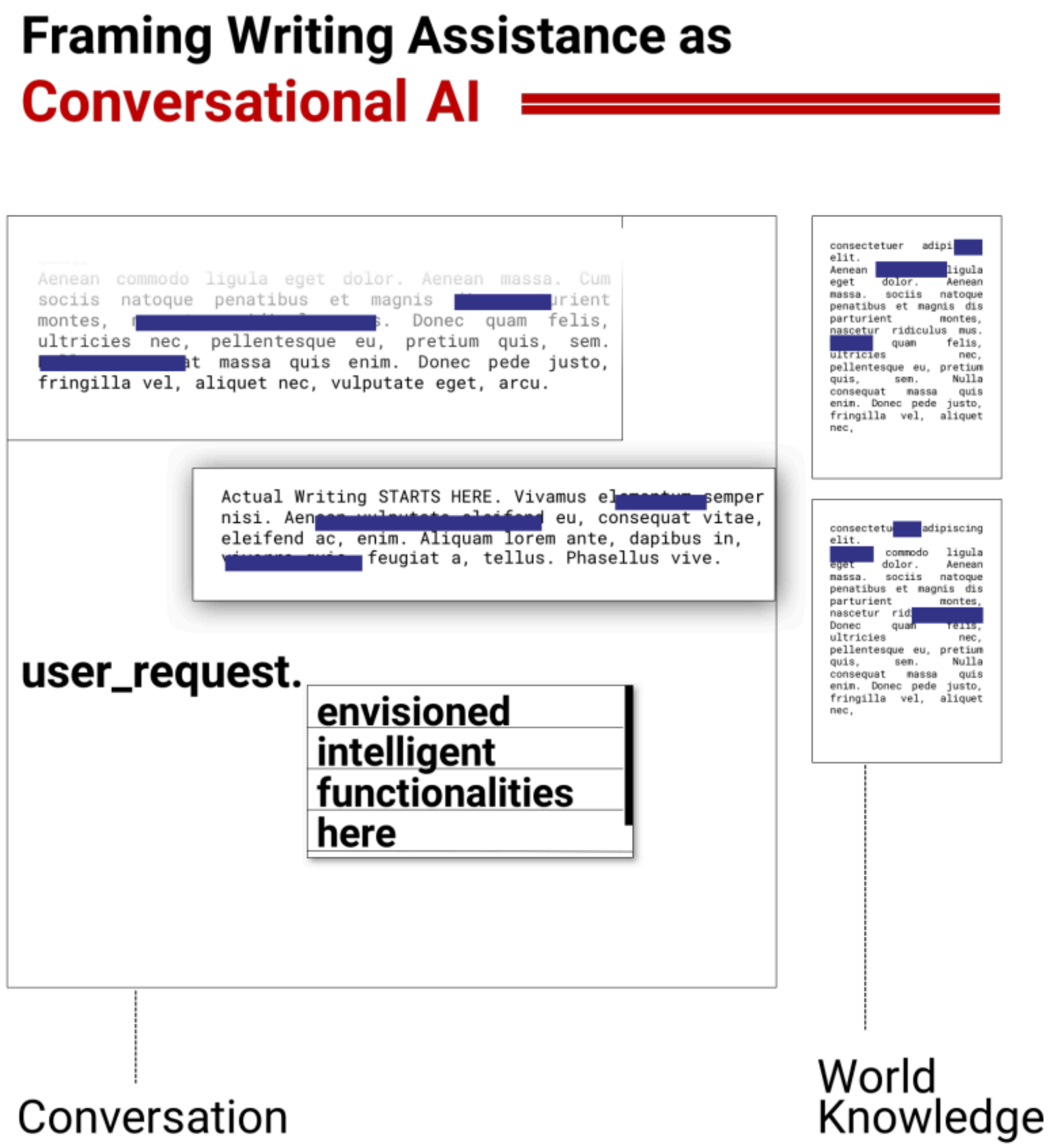


Figure 2: Left: A developed version of the Notebook (Figure1), used as boundary object between HCI and NLP researchers. “Contexts" that can help inform intelligent function outputs are marked blue. Middle and Right: Reframing the problem of designing writing assistance as other canonical NLP technical problems. This expands our design space to the intersection between what authors want and what existing NLP capabilities can do.

Use reframing to drive interviews (1/2)



Reframing purpose – to find new design questions:
Whom would authors like to talk to and for what purpose?
What information can conversational assistance offer?

Findings: Participants…

Pick those who are close to their target readers as their "**beta-readers**".

Write to meet the expectations and needs of their target readers.

Read documents from their target venue to infer the expected length, lexical complexity, or level of detail.

Transfer to function: "ask your reader"

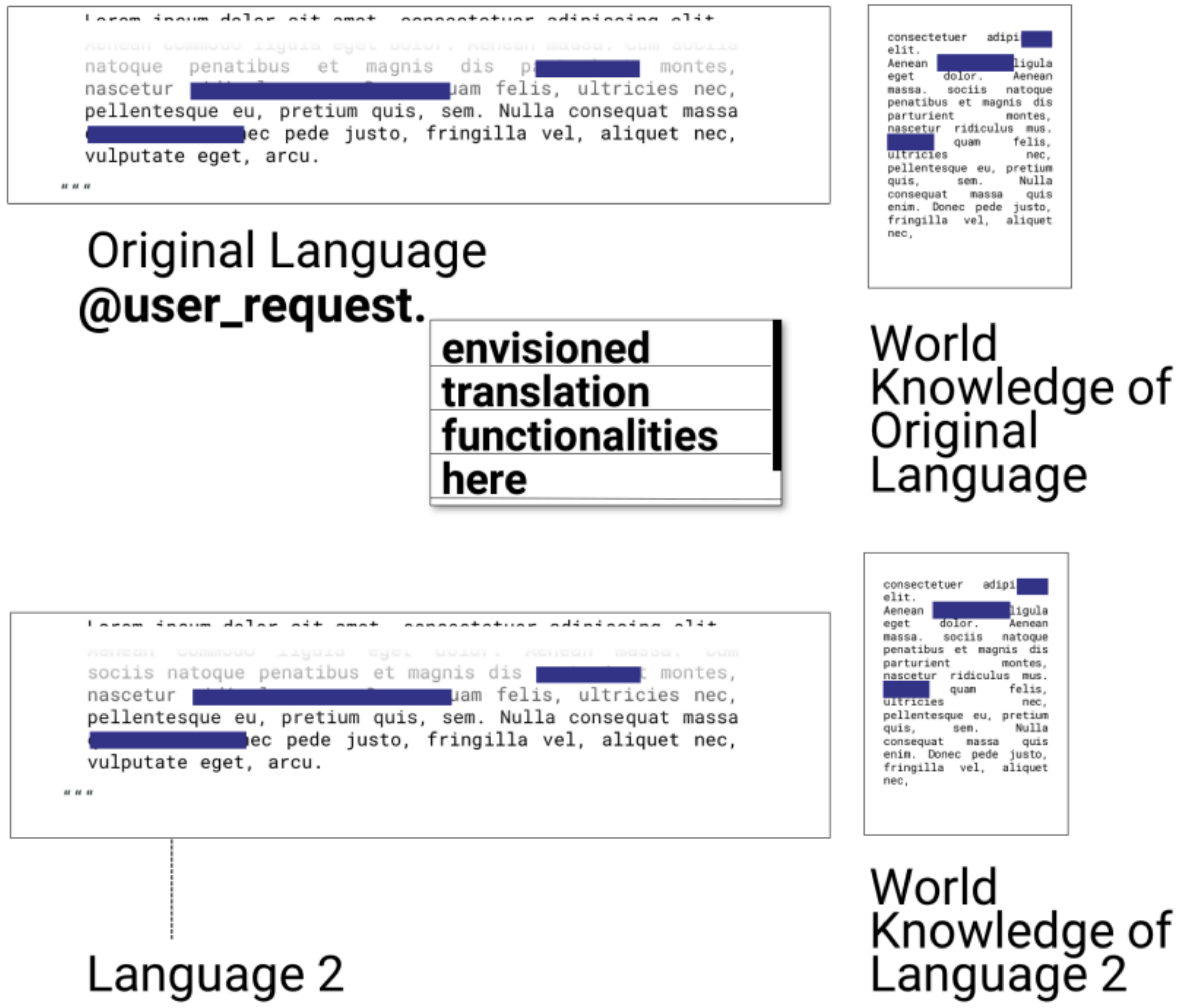
Mines documents from an author-identified venue. The author can request insights about these documents or make comparisons between their own writing against it.

"Am I writing too formally?"

"How long is a typical introduction section in [venue]?"

Use reframing to drive interviews (2/2)

Framing Writing Assistance as
Search functions.



Reframing purpose – for near-future technical possibility:

Search is a relatively matured NLP sub-domain.

how do authors sought information during writing?

Findings: Participants…

Search for sample rhetorical structures for reference, e.g. "[quotation mark][comma] in comparison to [quotation mark]"

Does not work: Current search focus on content, not structure.

Read documents from their target venue to infer the expected length, lexical complexity, or level of detail.

Transfer to function: "rhetorical search function"

Find texts similar in language structure and composition to the query.

Design Process: “Double Diamond”

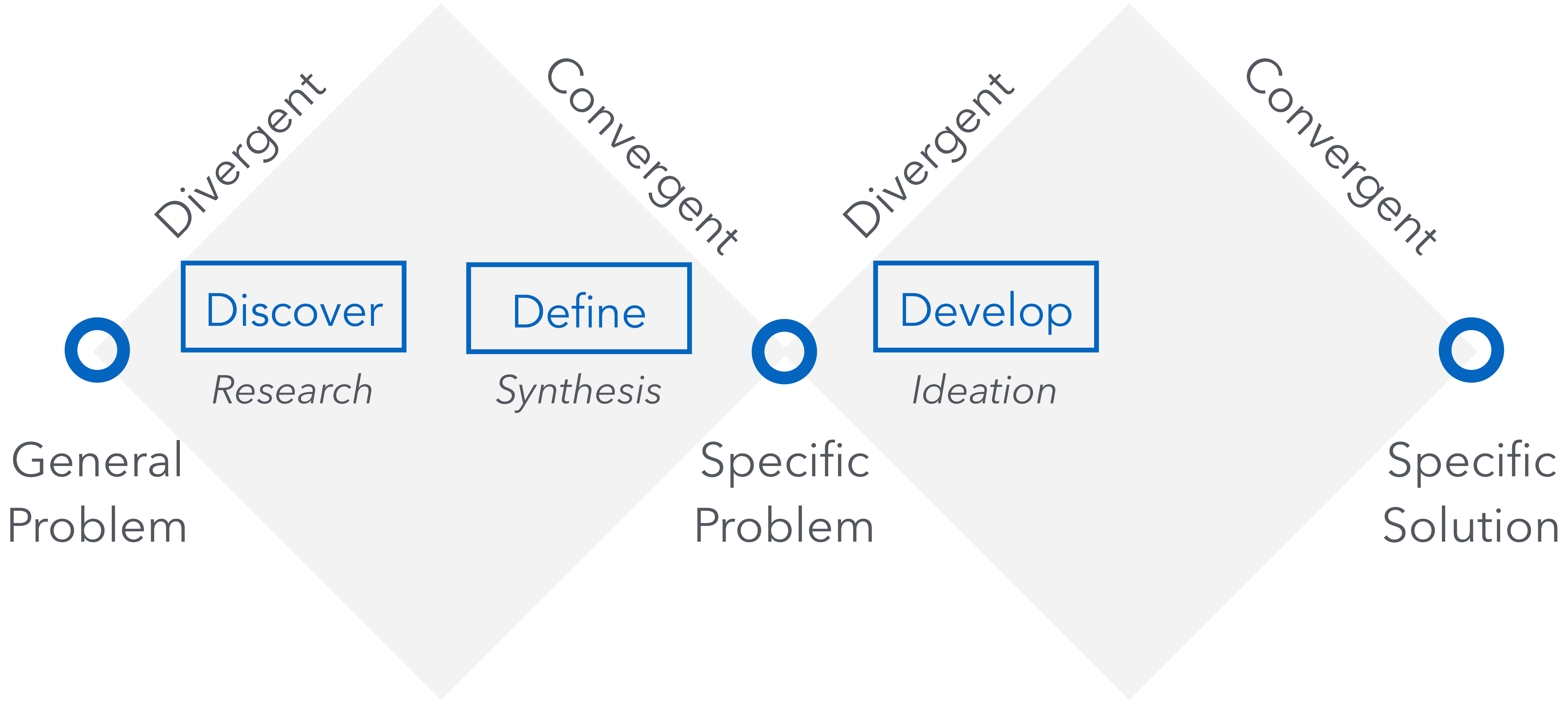
Develop: Give different answers to the clearly defined problem, seeking inspiration from elsewhere and co-designing with a range of different people.

Methods:

Storytelling;

Minimum Viable Product;

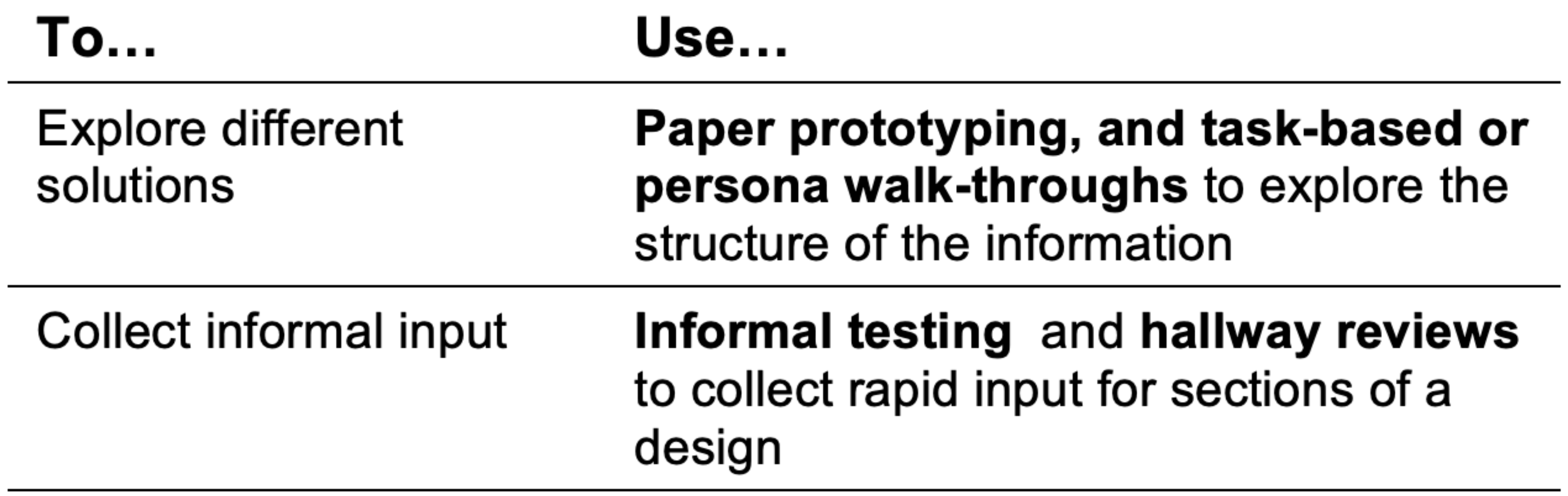
Rapid prototyping….



Develop: Evaluate designs-in-progress, Via formative usability testing

Formative usability testing: test with representative *users* and representative *tasks* on a representative *product*.

To not only **evaluate a product or prototype**, but to **provide recommendations to improve** it.



To...	Use...
Explore different solutions	**Paper prototyping, and task-based or persona walk-throughs** to explore the structure of the information
Collect informal input	**Informal testing** and **hallway reviews** to collect rapid input for sections of a design

Quesenbery, Whitney, and W. Whitney. "Choosing the right usability technique: Getting the answers you need." *User Friendly 2008-Innovation for Asia* (2008).

What’s a prototype?

Physical realizations of the research and design process in a tangible form.

Can be used to get a sense of what it would be like to experience the product/service.

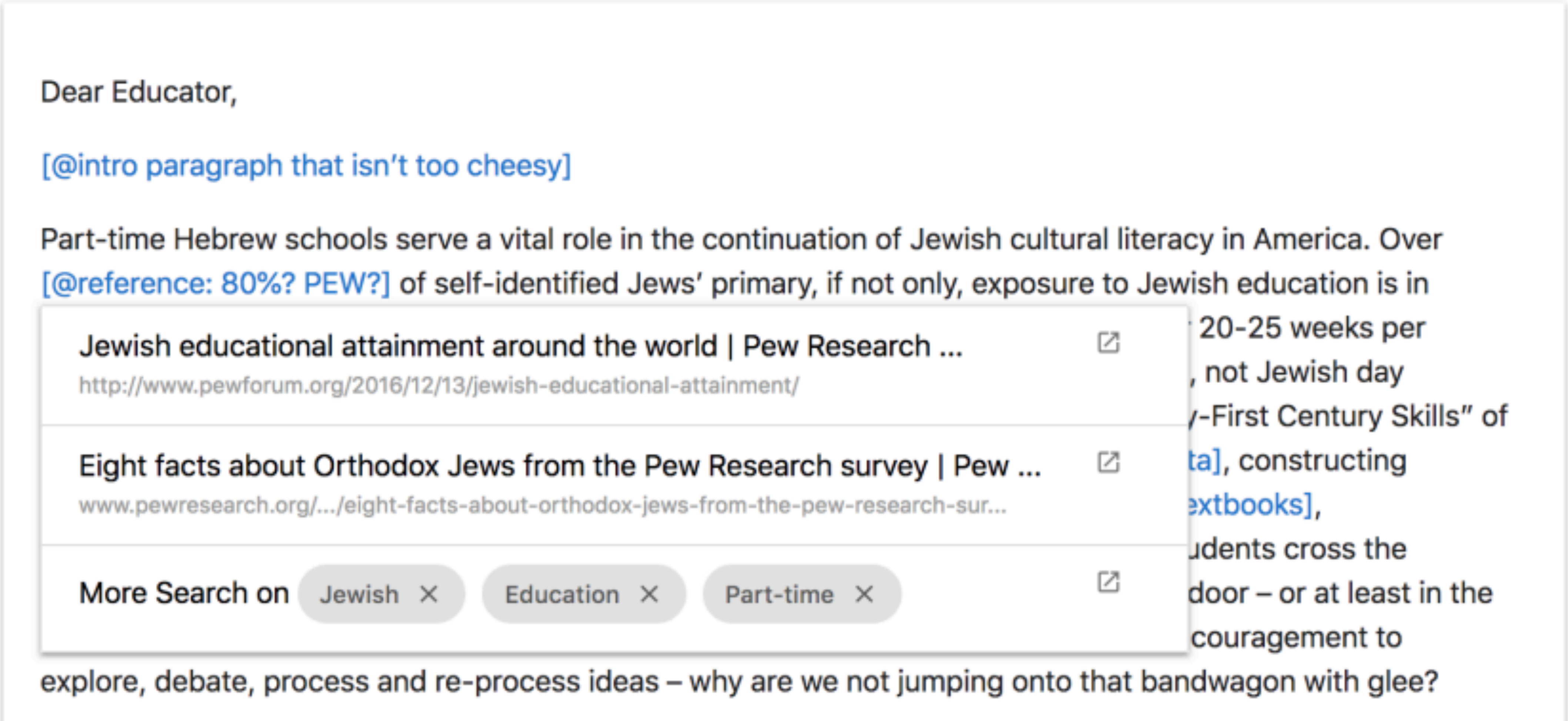
Can appear at varying levels of fidelity

- Paper, low-fidelity prototypes usually show up at earlier stages in the process
- Higher-fidelity prototypes show up later

Common prototyping methods

Wizard-of-Oz
Fake features so that the user thinks that the responses are computer-driven when they are actually human-controlled.
Challenge for NLP: AI errors are hard to simulate.

Mimic simple functionality
Challenge for NLP: cannot simulate SOTA model capabilities
Ensemble multiple simple models and expectations.
(More recent) **use large language models**.



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Eight facts about Orthodox Jews from the Pew Research survey | Pew ...
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More Search on Jewish × Education × Part-time ×

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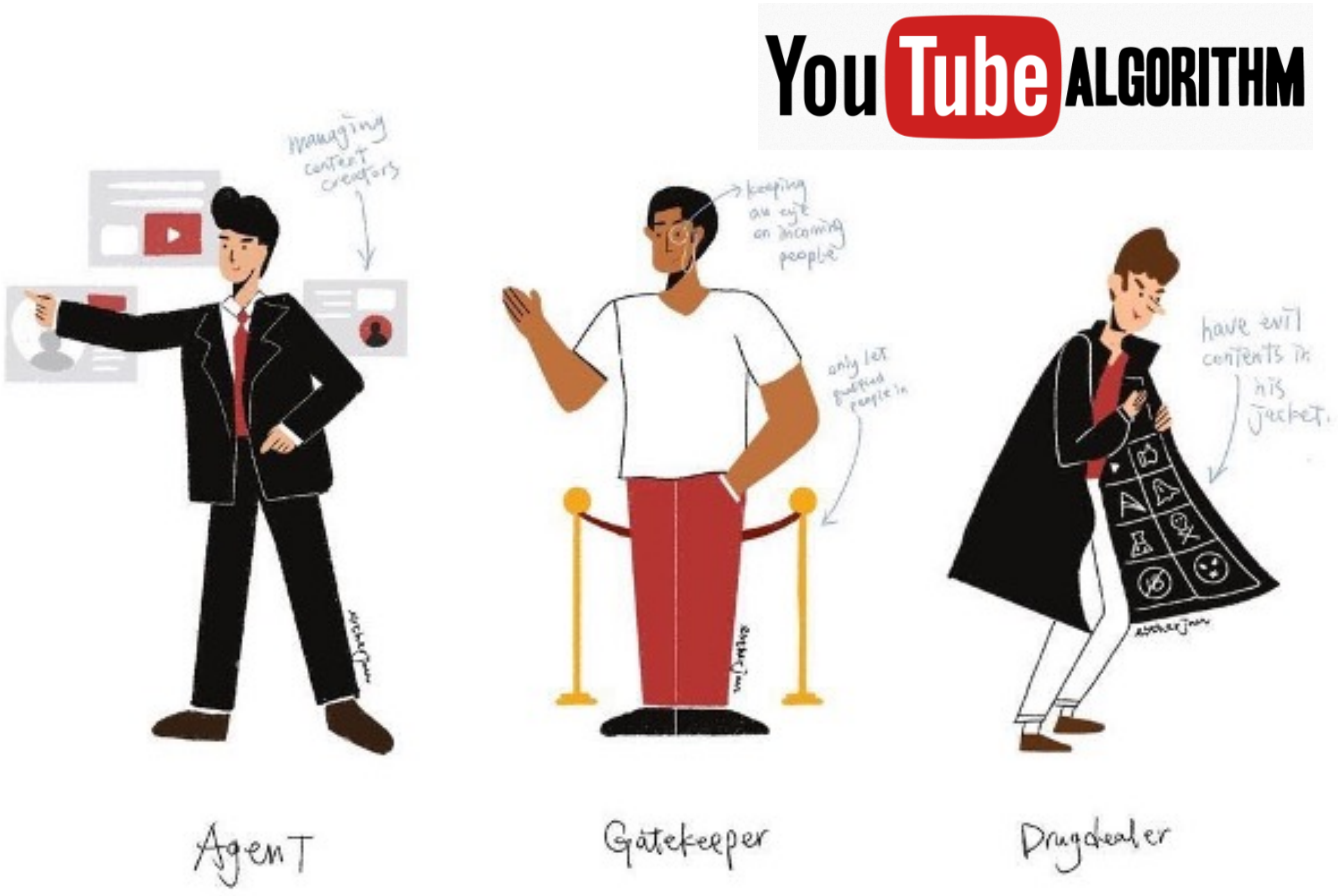
explore, debate, process and re-process ideas – why are we not jumping onto that bandwagon with glee?

Figure 3: This prototype interface is a simple text editor. At any time of their writing, users type @ to signal the start of an intelligent function request and Enter to end. When they click on a request, intelligent assistance pops out. This prototype probes users' needs and wants for writing assistance, and their reactions to the simulated intelligent responses.

Prototyping with AI/NLP: Persona

Algorithmic persona: human roles that users assign to the algorithm to explain the algorithm's goals, behaviors, and characteristics.

Example: YouTube recommendation algorithm
65 years of video are uploaded every day…
The way YouTube content creators perceive these algorithms affect their attitudes and


YouTube ALGORITHM
managing content creators
keeping an eye on incoming people
only let qualified people in
have evil contents in his jacket.
AgenT
Gatekeeper
Drugdealer

Wu, Eva Yiwei, Emily Pedersen, and Niloufar Salehi. "Agent, gatekeeper, drug dealer: How content creators craft algorithmic personas." *CSCW 2019*

Recommendation Algorithm as Agent

Agent: manages and helps creators in their work by finding an audience for them and promoting them.

> *"YouTube will favor you in the algorithm, which would then lead to more views and more subscribers."*

Blessed by, Build a relationship with, To please, Work with

> *"You wanna be friends with the YouTube algorithm which decides to push your video or not."*

Recommendation Algorithm as Gatekeeper

Gatekeeper: stands between content creators and the viewers and determines whether YouTubers' content gets viewed.

> *"...there is [an] algorithm between you and the viewers. You need to try to understand the algorithm and play to its strengths, or kinda get really lucky."*

Bribe, Circumvent, Fit in

> *"I ended up getting a lot of views because I actually piggybacked a very popular trend at the time."*

keeping an eye on incoming people
only let qualified people in

Gatekeeper

Recommendation Algorithm as Drug Dealer

Drug dealer: keeps viewers **addicted** to the platform.

"The algorithm is really good at keeping us here."

Rebel, Complicit, Addictive

"My model is slow disperse growth. I'm trying to go the other way against the click-bait, viral algorithm. My goal is to not to follow that model. It is a dangerous path -- it's luck."

have evil contents in his jacket.
Drugdealer

Prototyping with AI/NLP: Persona to behavior

managing content creators

AgenT

keeping an eye on incoming people
only let qualified people in

Gatekeeper

have evil contents in his jacket.

Drugdealer

The use of persona: Describe roles that are familiar, use them to guide design.
What would be your expectations on a model if it's introduced as agent, gatekeeper, etc.?

Prototyping with AI/NLP: Persona to behavior

managing content creators

Agent: Contracts between YouTubers and the algorithms?

keeping an eye on incoming people
only let qualified people in

Gatekeeper: Creators ask the algorithm to explain /appeal why their video got demonetized?

have evil contents in his jacket.
18

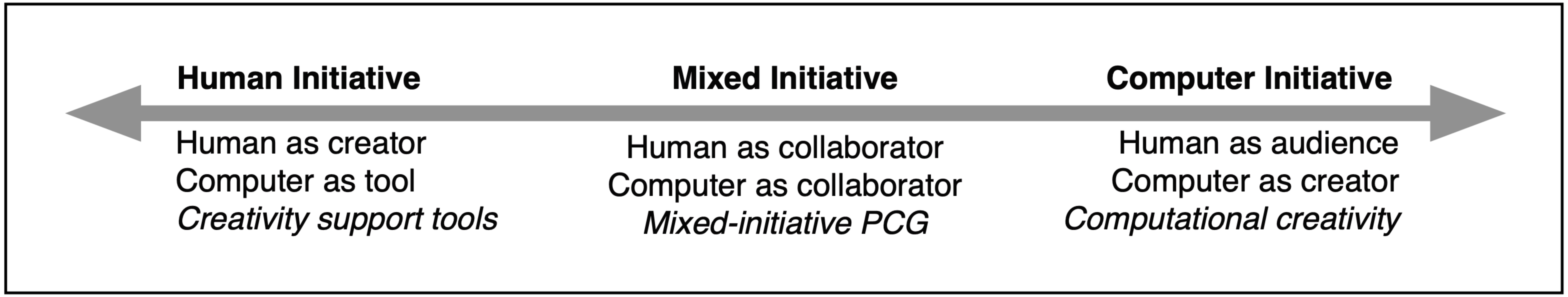
Drug dealer: address the public health concerns of algorithm as a drug dealer?

Prototype interfaces: Mixed-initiative interactions

Mixed initiative systems allow users to interact with them in a collaborative way, where the user and the system both take an active role in carrying out tasks or making decisions.

Advocates elegant coupling of **automated services** with **direct manipulation**.

> *"Autonomous actions should be taken only when an agent believes that they will have greater expected value than inaction for the user."*



Human Initiative

Human as creator
Computer as tool
Creativity support tools

Mixed Initiative

Human as collaborator
Computer as collaborator
Mixed-initiative PCG

Computer Initiative

Human as audience
Computer as creator
Computational creativity

Horvitz, Eric. "Principles of mixed-initiative user interfaces." CHI 1999.

Principles for Mixed-initiative user interfaces

Developing significant value-added automation (v.s. direct manipulation)

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Scoping precision of service to match uncertainty, variation in goals – do less if uncertain!

Providing mechanisms for efficient agent-user collaboration to refine results

Employing socially appropriate behaviors for agent-user interaction

Maintaining working memory of recent interactions

Continuing to learn by observing (e.g., about user's goals, etc.)

Horvitz, Eric. "Principles of mixed-initiative user interfaces." CHI 1999.

Project Tips

Pick a question that you're excited about

Broadly relevant to HCI + NLP

- ✦ Could you formulate a research question to deeply explore it?
- ✦ What type of data might be available for you to use?
- ✦ Which softwares or tools could you use to work on it?
- ✦ How do you evaluate the outcome of your project?

Form Research Group

Posted as an **assignment on Canvas**, **dues on 4/18**

You will fill in a short Google Form that documents your group members, and a general description of your project. Your group should contain 1-3 **people**.

In the form, you will answer these questions:

1. **The problem:** what are you trying to do
2. **Why bother:** Summarize why the problem is important, or why we care about solving it.
3. **Status-quo**: Current solutions and why they may fail
4. *[Optional]* ***Your proposed method***: *If I had a solution, what would it look like?*
5. *[Optional]* ***Evaluation / metrics of success:*** *How do I know if I solved the problem?*

If you are looking for project partners, please post to **Ed Discussion**!

What’s a good project?

It should generally be relevant to HCI+NLP.

Just pick projects that interest you!

TA and I will reach out if a project seems too far off

But, make sure to do a small scoped project that’s *suitable for a quarter*

And, if you want the course to count as your technical requirement, you might want to choose a project that require more coding practice.

Resources to check out

Top course projects sometimes end up into actual paper submissions to either full conferences or workshop venues.

Checking out workshop papers published in (*some of them focus on general AI):

HCI+NLP @ NAACL 2022

HCI+NLP @ EACL 2021

Human Evaluation of Generative Models @ NeurIPS 2022

In2Writing @ CHI 2023

InterNLP @ NeurIPS 2022

What could be a final project?

Some sample topics could be:

System / interface: Designing and evaluating a natural language interface for a mobile or web application, with a focus on usability and user experience.

Analysis: Examining the biases present in a specific NLP model or dataset, and designing solutions to mitigate those biases.

Design: Analyzing and visualizing model decisions (e.g. interpretability) to accommodate the needs of specific domain experts.

…

Key Considerations

Availability of data

Be careful in deciding whether to collect and annotate your own data

ML framework

Huggingface, sklearn, keras, pytorch, Tensorflow

Statistical models

R, Stata, etc.

Availability of computation

Literature Review

Conduct a thorough literature survey

A few places to check out:

Google Scholar

ACL Anthology (https://aclanthology.org/)

Types of Projects

Visualization or interpretability analyses of neural networks

Apply/extend a computational NLP method to real world problem

Develop new methodologies to leverage human feedback/preferences

Fairness, bias, or ethical issues around existing NLP tools

Improve existing NLP pipelines

Building interactive NLP systems to allow humans to interact with LLMs

Simulating personas via LLMs

NLP for social good (e.g., accessibility, climate change, etc)

Position papers or a critic (talk to us first)

Recommendations for *Successful* Projects

Start early and work on it every week rather than rushing at the end

Get your data first!

Have a clear, well-defined research question (novel/creative ones ++)

Results should teach us something

Visualize results well

Divide the work between team members clearly

Common Issues

Data not available or hard to get access to

No code written for model/data processing

Team starts late

Results/Conclusion don’t say much besides that it didn’t work

Even if results are negative or unexpected, analyze them

Resources

Computation

Google Cloud/Google Colab

Discussion

Come to TA and Diyi's Office hours

Come up with your own idea and talk to us!

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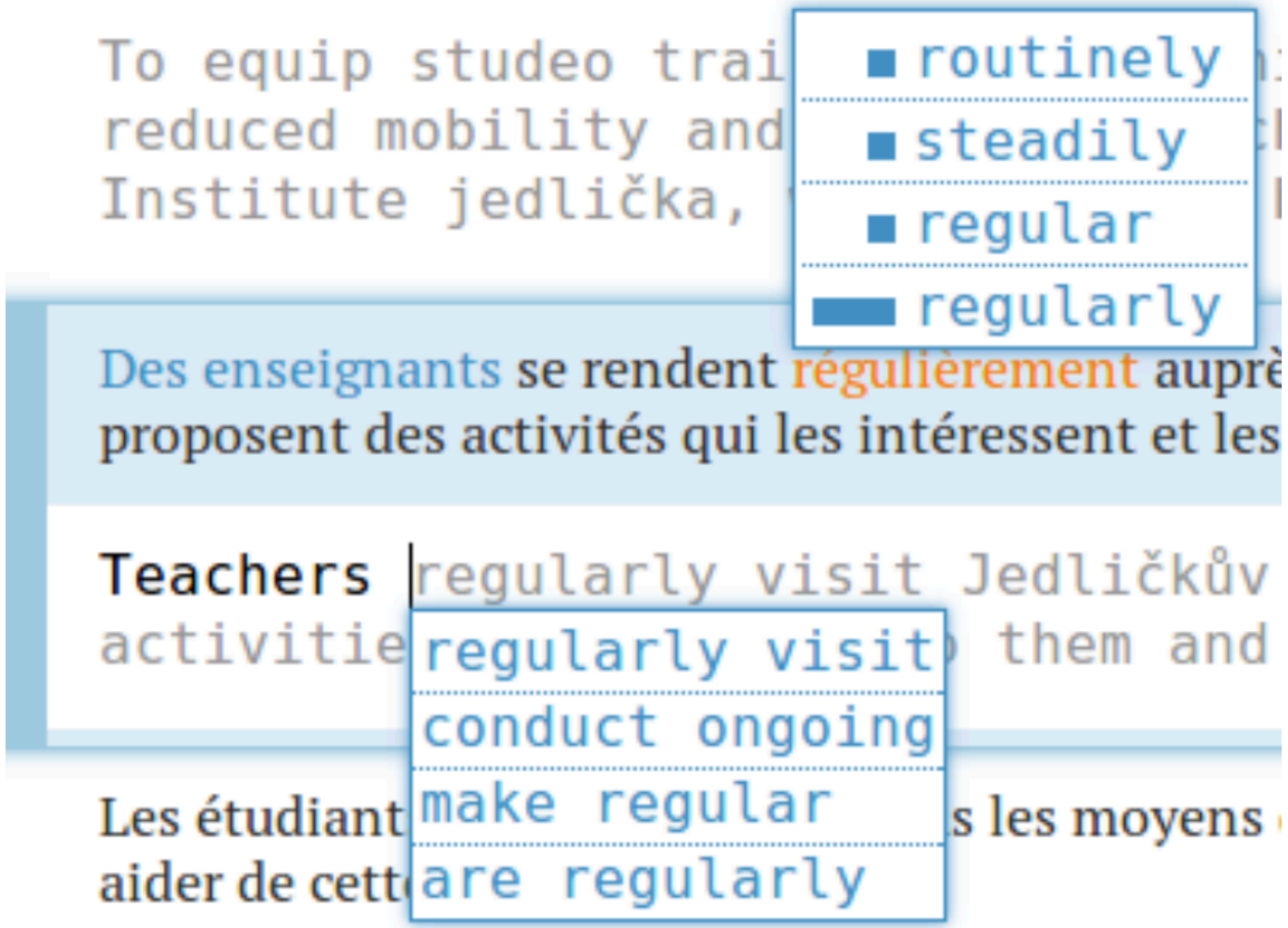
Case Study: Interactive Machine Translation

Predictive Translation Memory

Green, Spence, Jason Chuang, Jeffrey Heer, and Christopher D. Manning. "Predictive translation memory: A mixed-initiative system for human language translation." In Proceedings of the 27th annual ACM symposium on User interface software and technology, pp. 177-187. 2014.



To equip studeo trai
reduced mobility and
Institute jedlička,

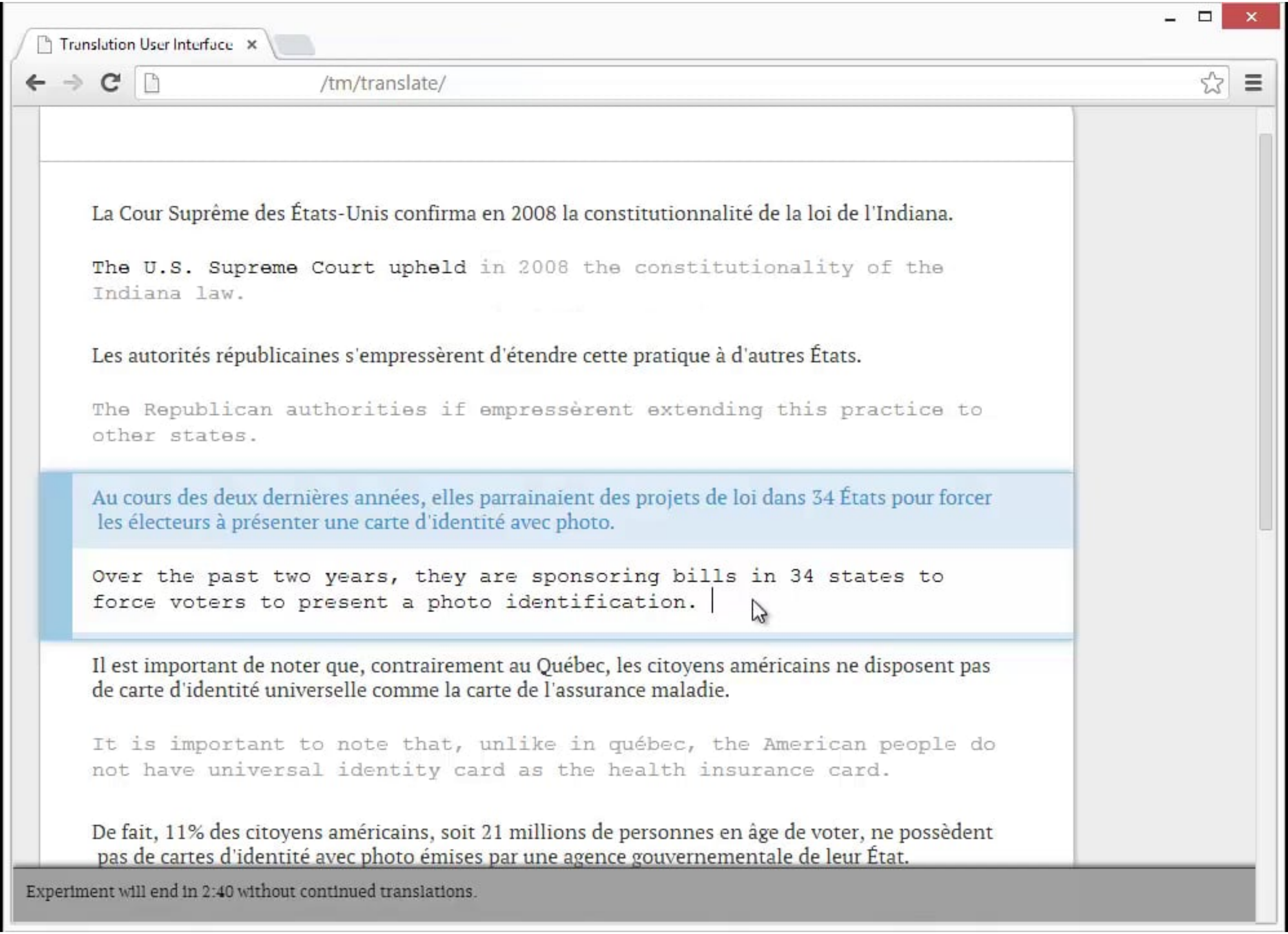
- routinely
- steadily
- regular
- regularly

Des enseignants se rendent régulièrement auprè
proposent des activités qui les intéressent et les

Teachers regularly visit Jedličkův
activitie them and

- regularly visit
- conduct ongoing
- make regular
- are regularly

Les étudiant s les moyens
aider de cett



La Cour Suprême des États-Unis confirma en 2008 la constitutionnalité de la loi de l'Indiana.

```
The U.S. Supreme Court upheld in 2008 the constitutionality of the
Indiana law.
```

Les autorités républicaines s'empressèrent d'étendre cette pratique à d'autres États.

```
The Republican authorities if empressèrent extending this practice to
other states.
```

Au cours des deux dernières années, elles parrainaient des projets de loi dans 34 États pour forcer les électeurs à présenter une carte d'identité avec photo.

```
Over the past two years, they are sponsoring bills in 34 states to
force voters to present a photo identification.
```

Il est important de noter que, contrairement au Québec, les citoyens américains ne disposent pas de carte d'identité universelle comme la carte de l'assurance maladie.

```
It is important to note that, unlike in québec, the American people do
not have universal identity card as the health insurance card.
```

De fait, 11% des citoyens américains, soit 21 millions de personnes en âge de voter, ne possèdent pas de cartes d'identité avec photo émises par une agence gouvernementale de leur État.

Experiment will end in 2:40 without continued translations.

PTM recap: Rationals for seemingly simple decisions

Design: Re-use familiar hotkeys e.g., CTRL+Enter Typing activates interactions

Translators are fast typists: want to avoid the mouse

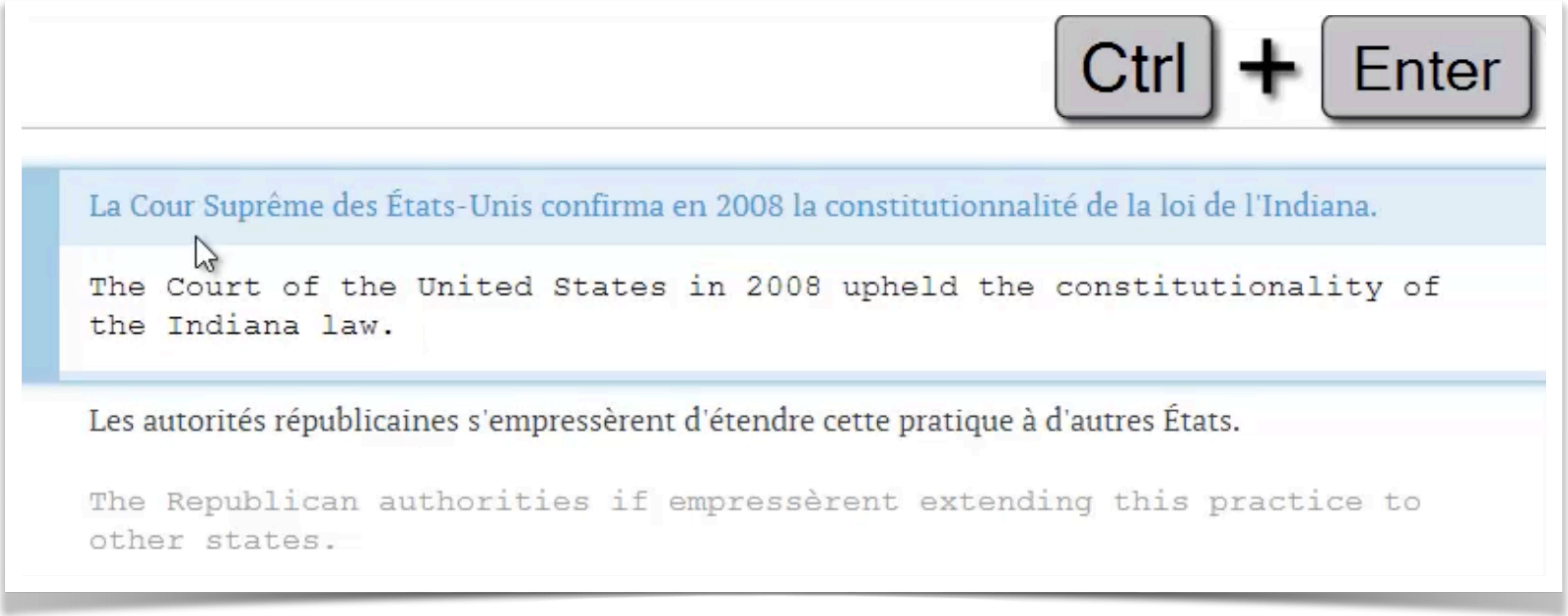
Design: One column, interleaved layout

Translators read (20-25% of translation session), 2-column will be cumbersome

Design: Text color encoding

Ownership: AI can't modify human text, human can accept but not modify AI text

Principle: Horvitz #6 – Employing socially appropriate behaviors for agent–user interaction.



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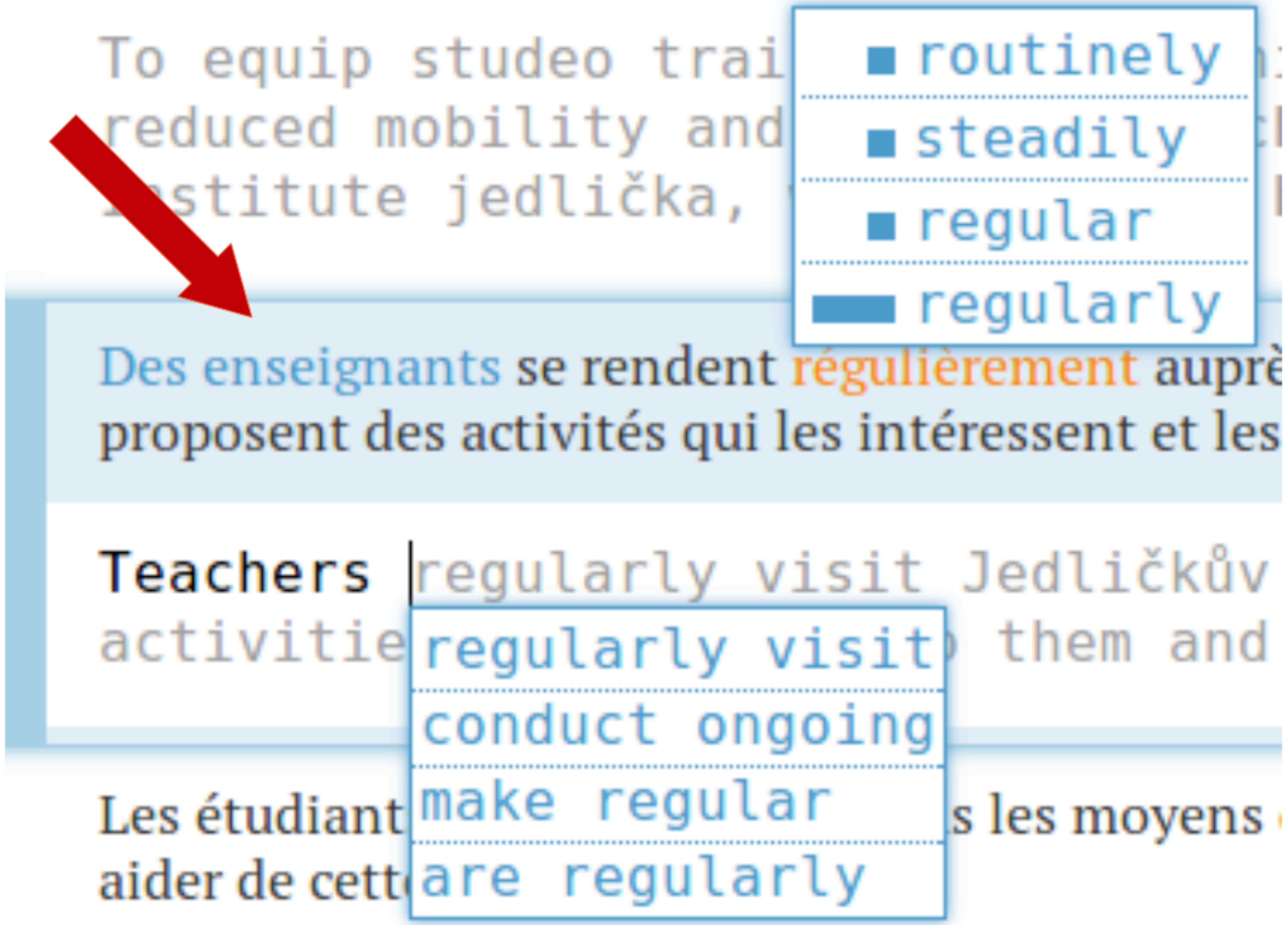
The Republican authorities if empressèrent extending this practice to other states.

PTM recap: Source comprehension

Design: highlight translated words
Principle: Horvitz #11 – maintaining working memory of recent interactions



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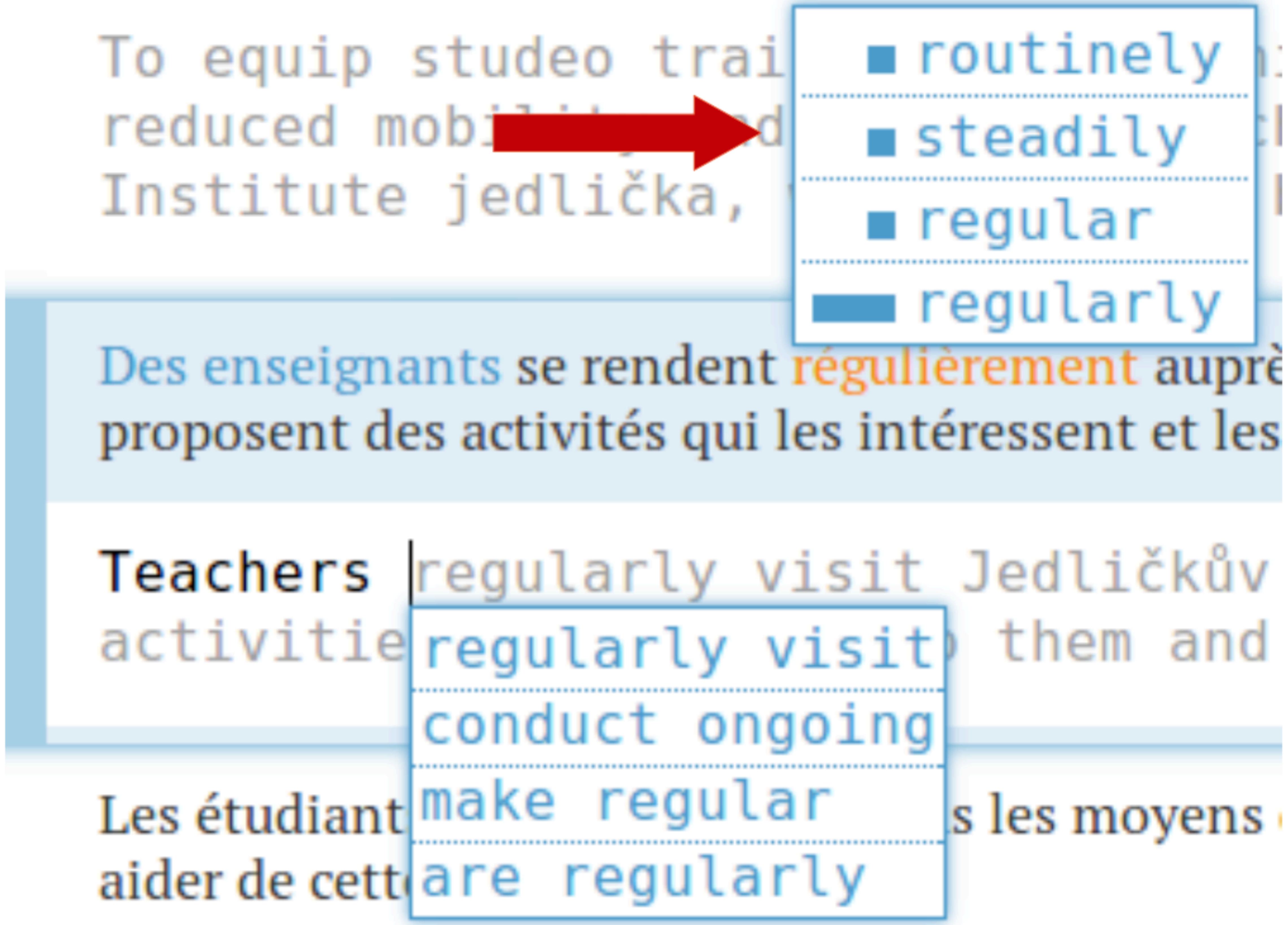
Les étudiant s les moyens
aider de cett

PTM recap: Source comprehension

Design: highlight translated words
Principle: Horvitz #11 – maintaining working memory of recent interactions

Design: allow for word-to-word query
Principle: Horvitz #6 – allowing efficient direct invocation and termination



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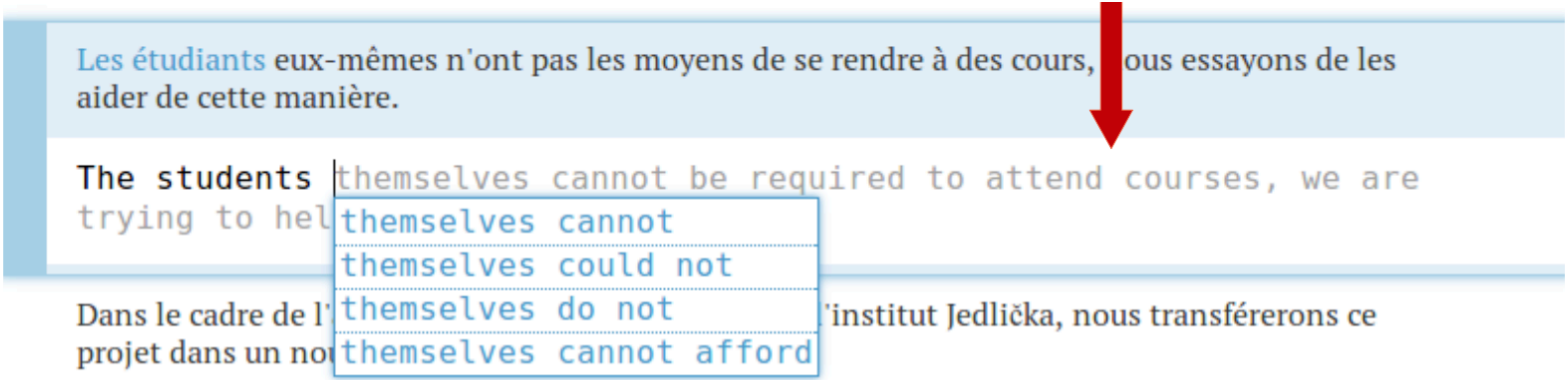
PTM recap: Target gisting

Design: Full best translation

Principle: Horvitz #10 – Employing socially appropriate behaviors for agent-user interaction

Design: Real-time updating

Principle: Horvitz #9 – providing mechanisms for efficient agent-user collaboration to refine results termination



Les étudiants eux-mêmes n'ont pas les moyens de se rendre à des cours, nous essayons de les aider de cette manière.

The students themselves cannot be required to attend courses, we are trying to hel

themselves cannot

themselves could not

themselves do not

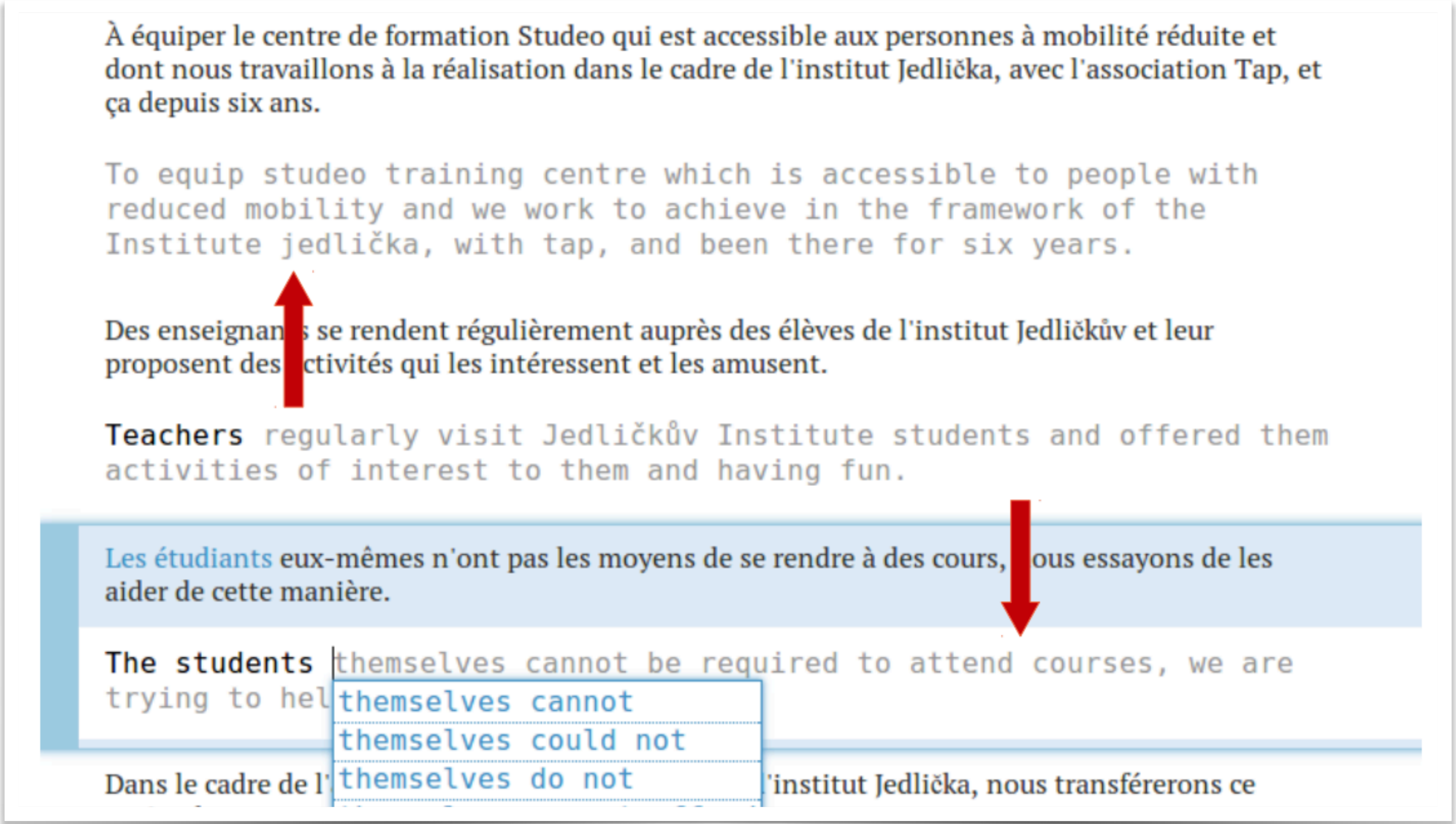
themselves cannot afford

Dans le cadre de l'… l'institut Jedlička, nous transférerons ce projet dans un no…

PTM recap: Target generation

Design: Insert complete translation

Principle: Horvitz #6 – allowing efficient direct invocation and termination



À équiper le centre de formation Studeo qui est accessible aux personnes à mobilité réduite et dont nous travaillons à la réalisation dans le cadre de l'institut Jedlička, avec l'association Tap, et ça depuis six ans.

To equip studeo training centre which is accessible to people with reduced mobility and we work to achieve in the framework of the Institute jedlička, with tap, and been there for six years.

Des enseignants se rendent régulièrement auprès des élèves de l'institut Jedličkův et leur proposent des activités qui les intéressent et les amusent.

Teachers regularly visit Jedličkův Institute students and offered them activities of interest to them and having fun.

Les étudiants eux-mêmes n'ont pas les moyens de se rendre à des cours, nous essayons de les aider de cette manière.

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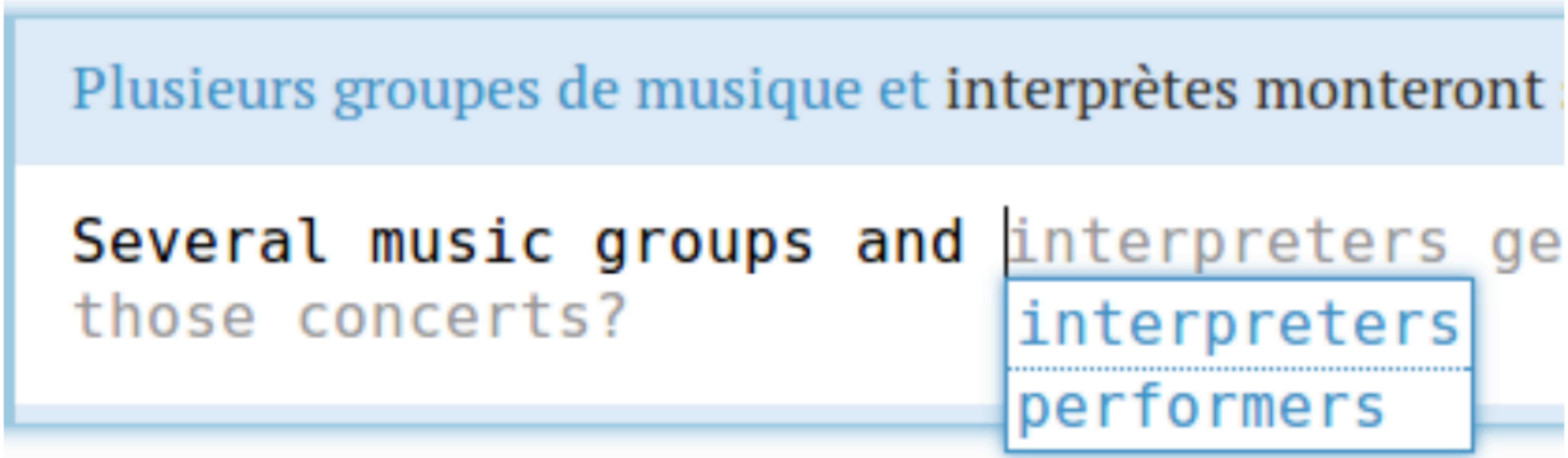
Dans le cadre de l' 'institut Jedlička, nous transférerons ce

PTM recap: Target generation

Design: Insert complete translation
Principle: Horvitz #6 – allowing efficient direct invocation and termination

Design: Real-time autocomplete dropdown
Principle: Horvitz #5 – employing dialog to resolve key uncertainties



Plusieurs groupes de musique et interprètes monteront

Several music groups and interpreters ge
those concerts?

PTM recap: Other principles?

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RLHF :)

Design Process: “Double Diamond”

Deliver: Involves testing out different solutions at small-scale, rejecting those that will not work and improving the ones that will.

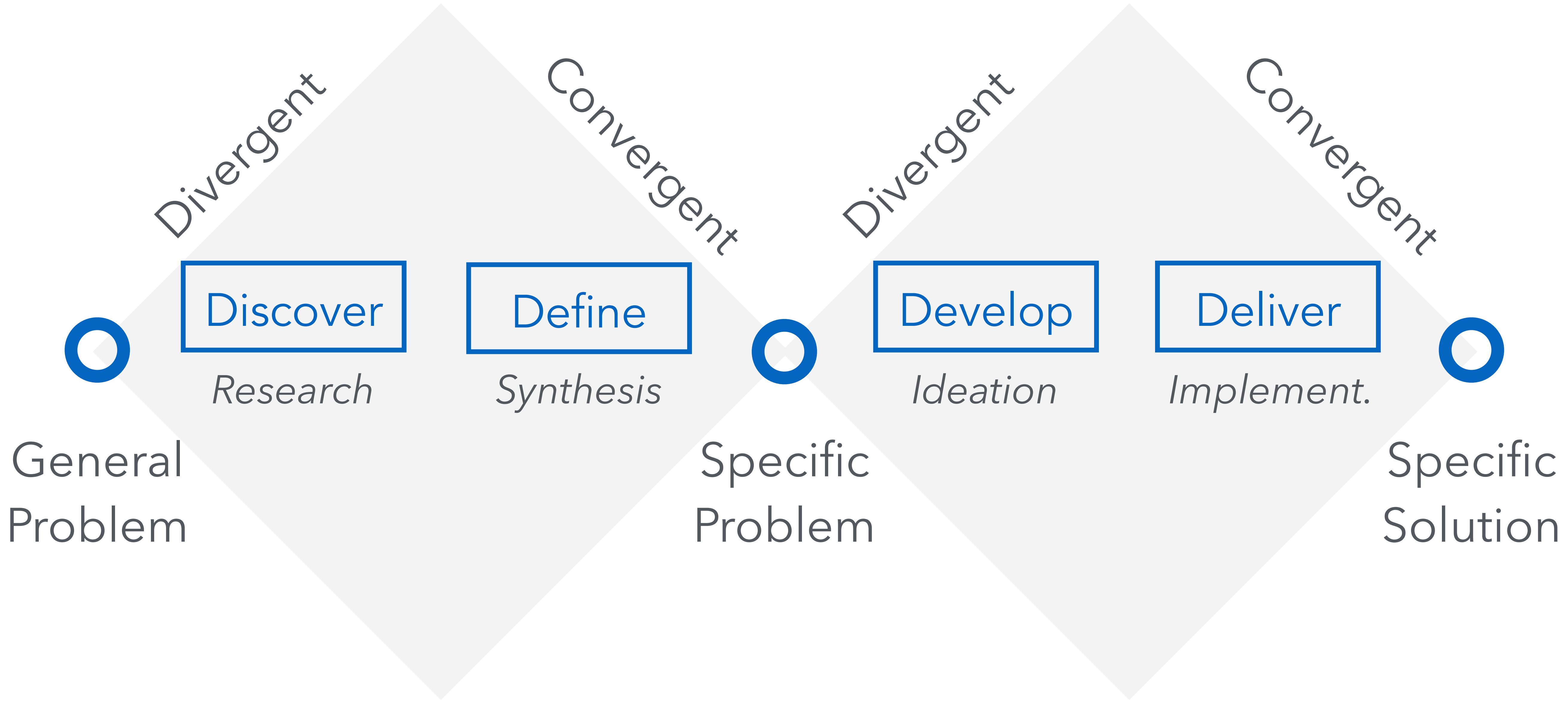
Methods:

Survey;

Think Aloud;

Usability testing

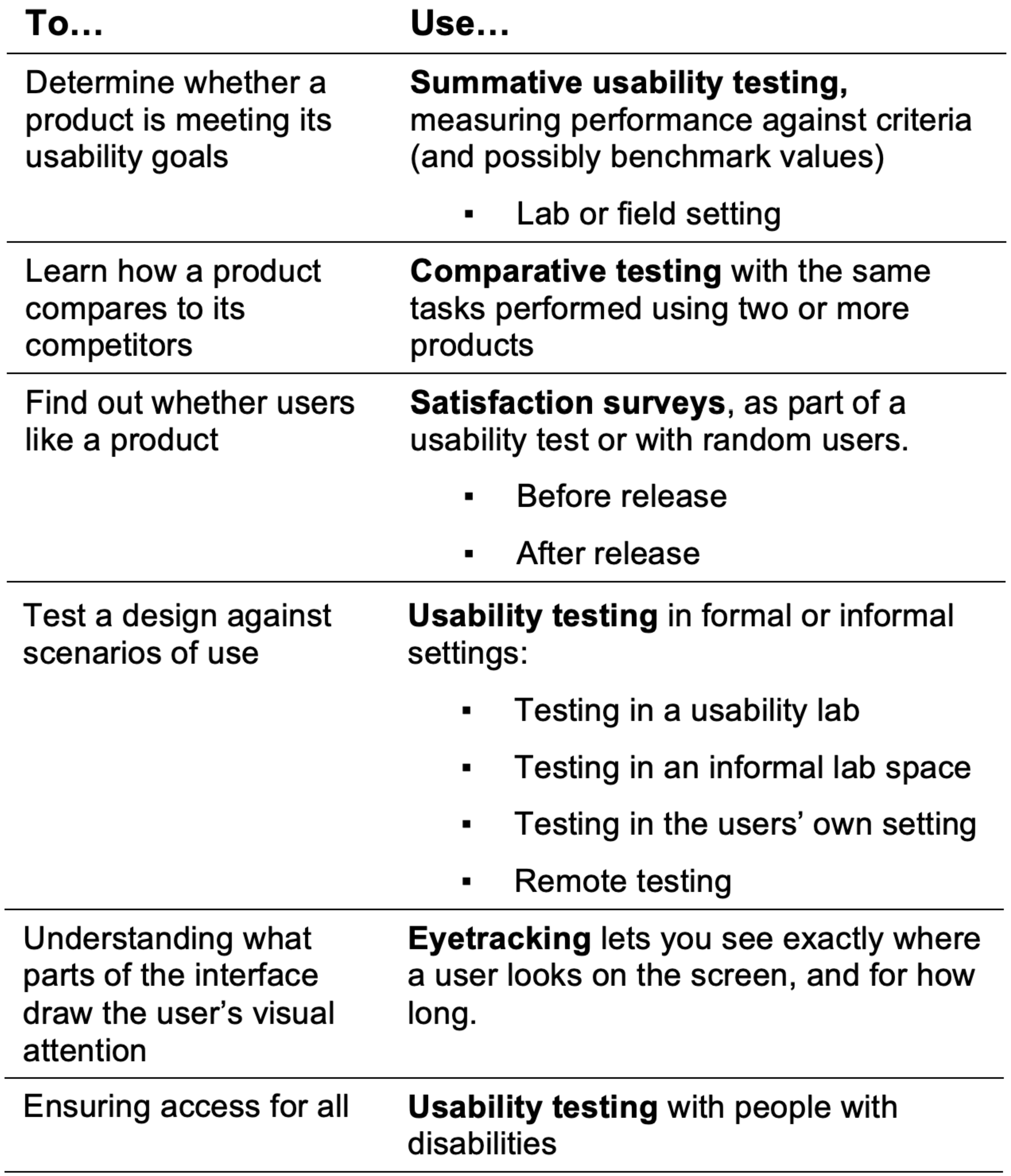
…



Develop & Deliver: Evaluate usability results

These techniques include both measuring the success of a design (*against usability performance and satisfaction criteria*) and establishing benchmarks metrics. They require a more formal test protocol, and realistic tasks.

Quesenbery, Whitney, and W. Whitney. "Choosing the right usability technique: Getting the answers you need." *User Friendly 2008-Innovation for Asia* (2008).



To…	Use…
Determine whether a product is meeting its usability goals	**Summative usability testing,** measuring performance against criteria (and possibly benchmark values) ▪ Lab or field setting
Learn how a product compares to its competitors	**Comparative testing** with the same tasks performed using two or more products
Find out whether users like a product	**Satisfaction surveys**, as part of a usability test or with random users. ▪ Before release ▪ After release
Test a design against scenarios of use	**Usability testing** in formal or informal settings: ▪ Testing in a usability lab ▪ Testing in an informal lab space ▪ Testing in the users' own setting ▪ Remote testing
Understanding what parts of the interface draw the user's visual attention	**Eyetracking** lets you see exactly where a user looks on the screen, and for how long.
Ensuring access for all	**Usability testing** with people with disabilities

What is a “Think Aloud?”

A research method used to gain insight into a person's thought processes as they perform a task or solve a problem. The participant is asked to verbalize their thoughts as they perform the task, which allows the researcher to understand how the participant approaches the task.

"Thinking aloud may be the single most valuable usability engineering method.“

“I’m going to ask you to ____ and while you are doing that, can you tell me whatever you are thinking. Whatever comes into your mind while you are working on that. Okay?”

Protocol

Give participants specific tasks to accomplish (but not HOW to do it)
Have them speak aloud as they complete the tasks
Keep interruptions to a minimum
Ask for open-ended questions & clarification after the task is complete
Learning effect - if you make tasks, watch for biasing test due to order
Typically used to test the usability of a website, app or object

Holtzblatt, Karen, and Hugh Beyer Contextual Design : Defining Customer-Centered Systems, Elsevier Science & Technology, 2016.

What is a “Think Aloud?”

Think-aloud user studies are a mixer of **quantitative** and **qualitative** studies.

	Quantitative	**Qualitative**
Definition	Gather numerical data to be analyzed using statistical methods	Gathering descriptive, non-numerical data to be analyzed through interpretation and contextualization
Data source	surveys, questionnaires, experiments	interviews, observations, and document analysis
Presentation	tables, graphs, and statistics	quotes and narratives that reflect the participants' experiences and perspectives
Goal	establish cause-and-effect relationships between variables	gain a deeper understanding of social phenomena, meanings, and processes

Advantages of think aloud studies

Rapid, high-quality, qualitative user feedback

Data available from **range of sources**:

- Direct observation of what the subject is doing.
- Hearing what the subject wants, or is trying, to do.

If participant gets into difficulties, observer has the chance to **clarify situation**

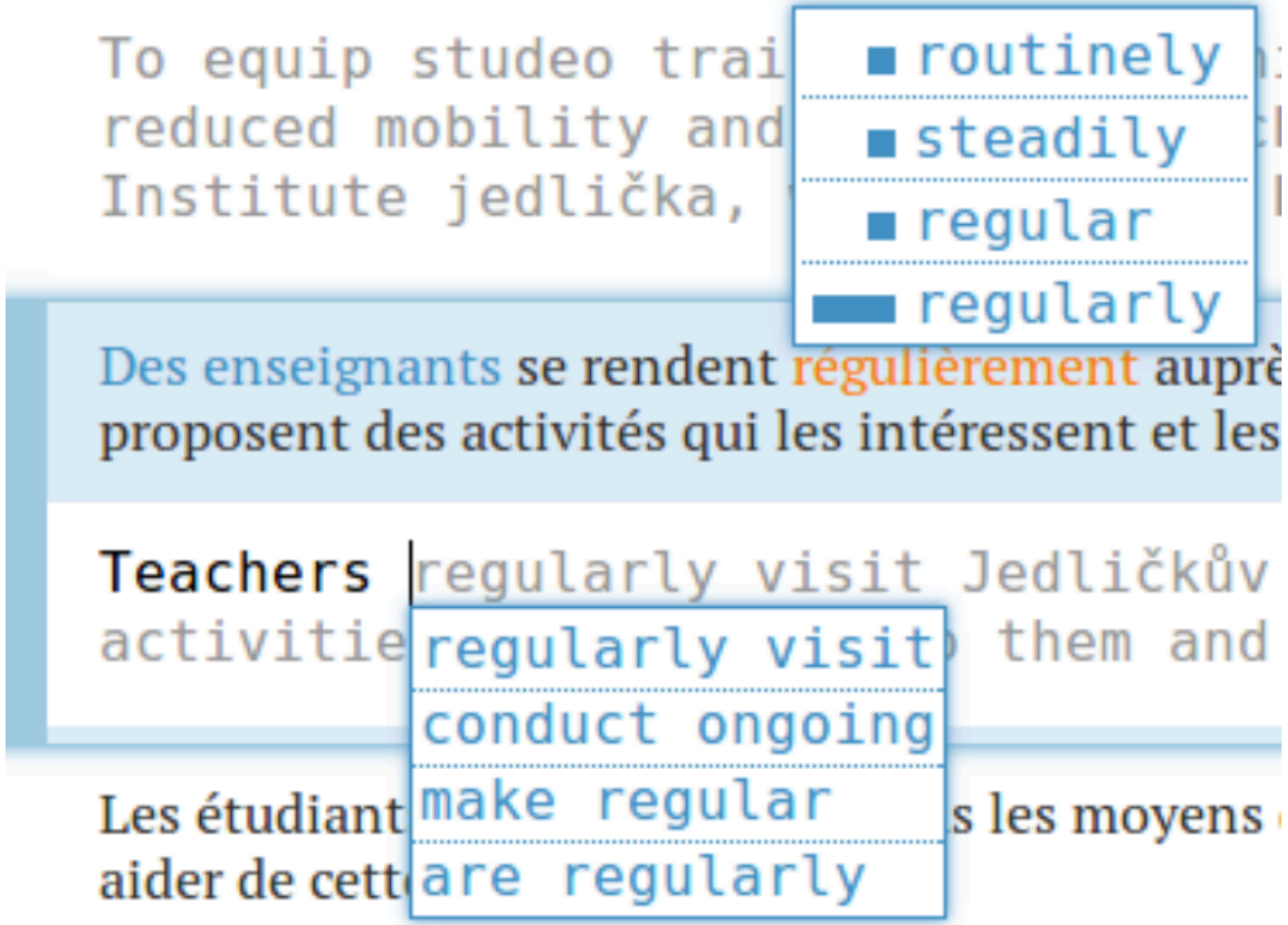
High flexibility; experiment may easily be steered by the observer

In person allows meaningful, direct dialogue

Case Study: Interactive Machine Translation

We present Predictive Translation Memory, an interactive, mixed-initiative system for human language translation. Translators build translations incrementally by considering machine suggestions that update according to the user's current partial translation.

Green, Spence, et al. "Predictive translation memory: A mixed-initiative system for human language translation." *UIST 2014*



To equip studeo trai
reduced mobility and
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■ routinely
■ steadily
■ regular
▬ regularly

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regularly visit
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make regular
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PTM: Experimental Design

Comparative analysis

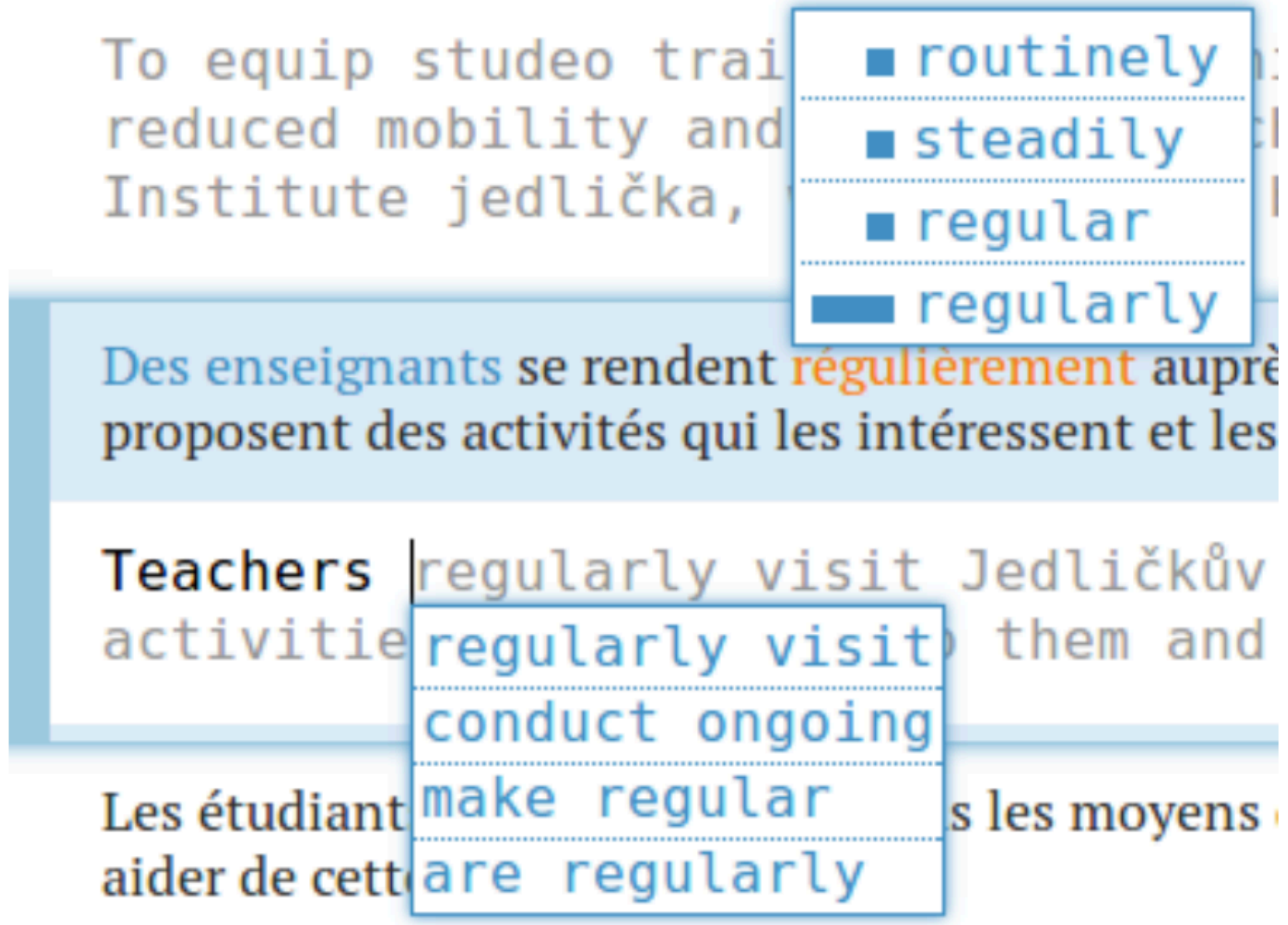
"We compared our system to post-editing, which is a strong baseline [29, 21], and is also the most common commercial use of MT. "

Clear research questions

Time *– PTM faster than post-edit?*

Quality *– PTM == better translation?*

Task	translate French→English or English→German
Source Text	≈3,000 tokens of News/Medical/Software
Conditions	post-edit (pe) and PTM
Expert Subjects	16 per language pair



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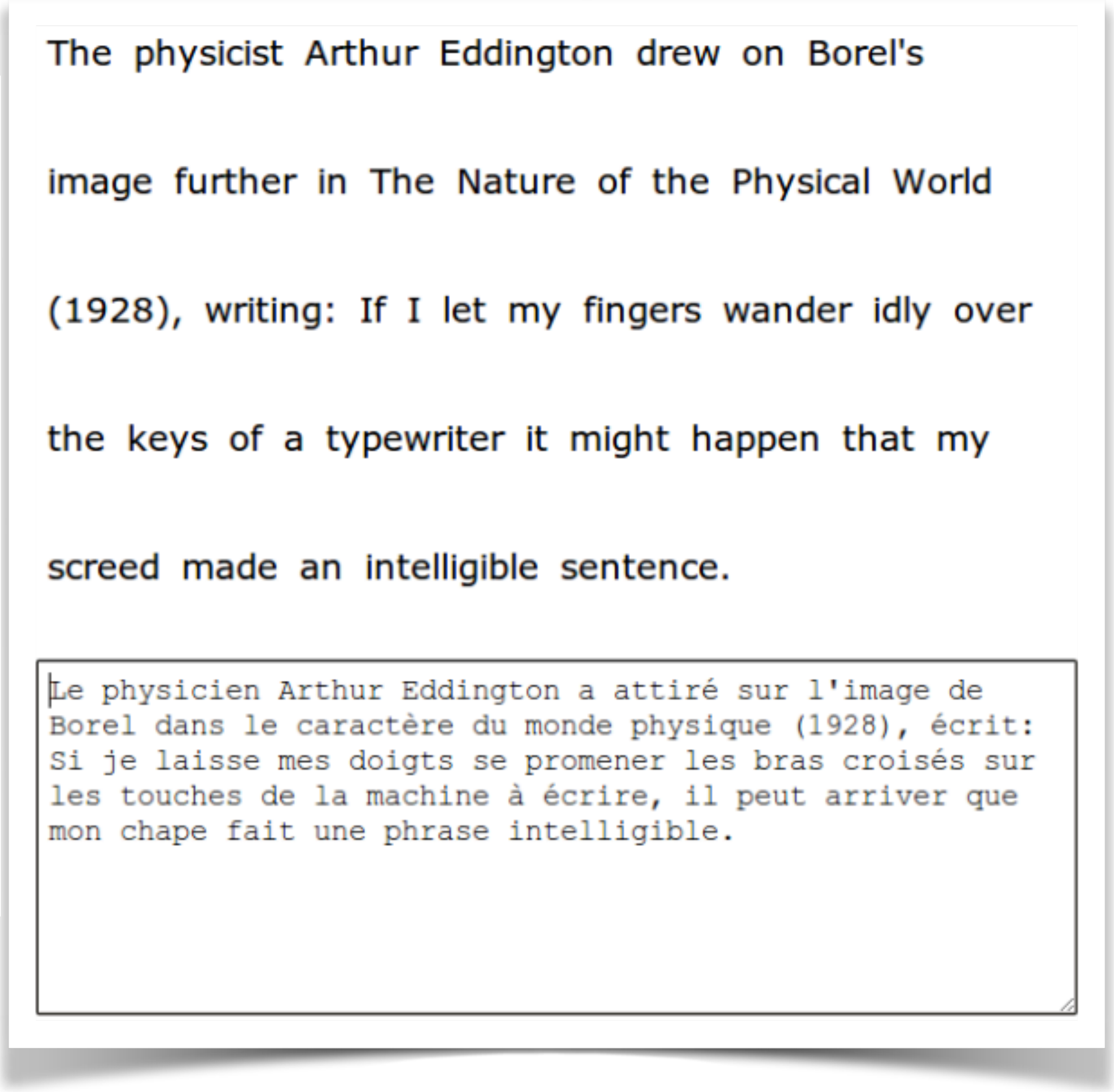


The physicist Arthur Eddington drew on Borel's

image further in The Nature of the Physical World

(1928), writing: If I let my fingers wander idly over

the keys of a typewriter it might happen that my

screed made an intelligible sentence.

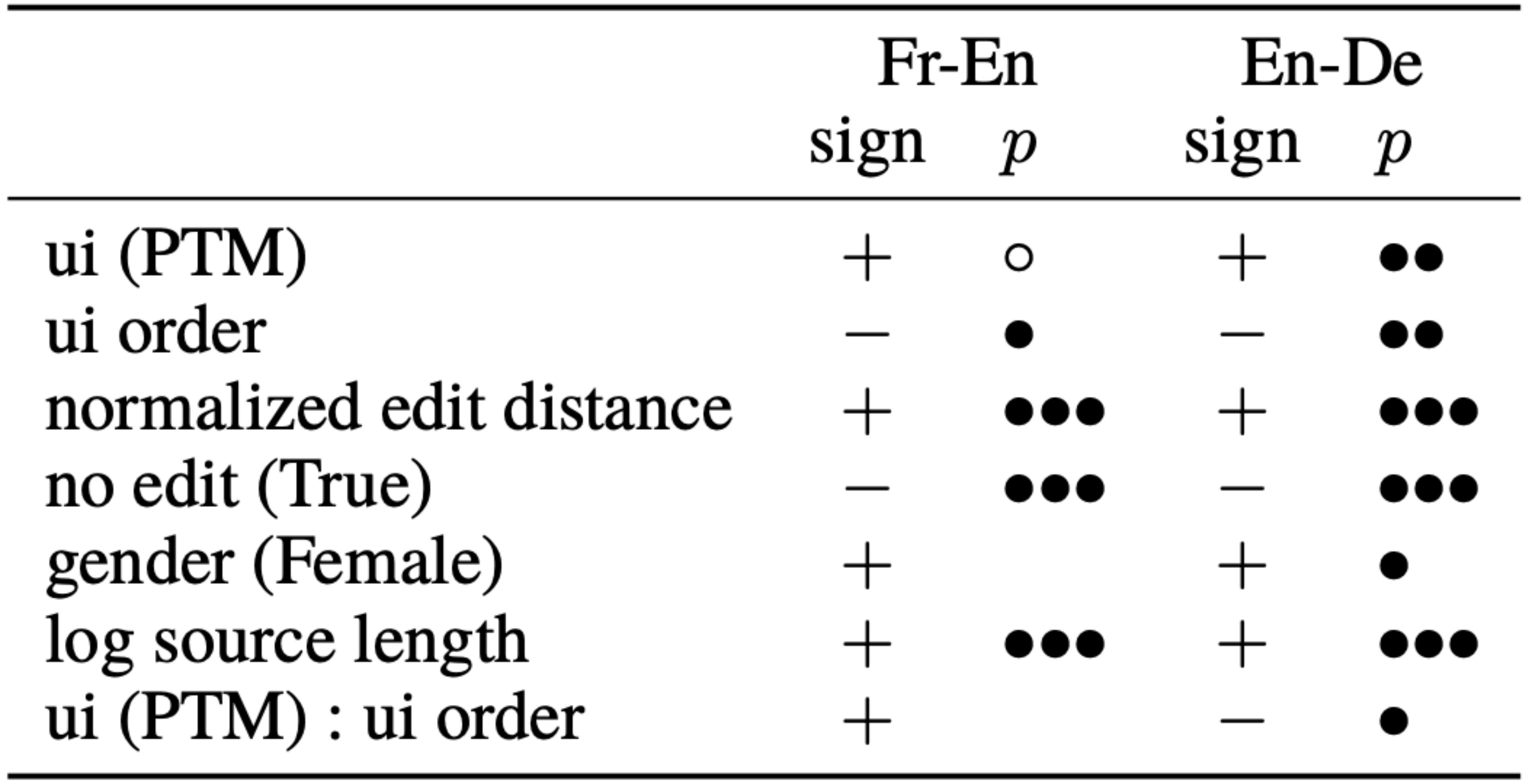
Le physicien Arthur Eddington a attiré sur l'image de Borel dans le caractère du monde physique (1928), écrit: Si je laisse mes doigts se promener les bras croisés sur les touches de la machine à écrire, il peut arriver que mon chape fait une phrase intelligible.

RQ1: Time – PTM faster than post-edit?

Metric: log of time (**more tolerant of outliers**)

Quantitative analysis (**find robust evidence)**

- Compare mean (**for general understanding**)
- Linear mixed effects models (**for understanding significance, important factors**)



	Fr-En		En-De	
	sign	*p*	sign	*p*
ui (PTM)	+	○	+	●●
ui order	−	●	−	●●
normalized edit distance	+	●●●	+	●●●
no edit (True)	−	●●●	−	●●●
gender (Female)	+		+	●
log source length	+	●●●	+	●●●
ui (PTM) : ui order	+		−	●

The key independent variable: translation condition

Learning effect – People get quicker as the task proceed

More edits means longer time

Initial translation quality – how much edit is necessary

They had unbalanced participation pool

Longer source sentence takes longer to edit

Potential interaction between independent variables

+random intercepts/slopes for subject, source, text genre.

RQ1: Time – PTM faster than post-edit?

Likert Scale survey (**can still quantitatively compare users' subjective judgements**):

"In which interface did you feel most productive?"

"I would use interactive translation features if they were integrated into "

"I got better at using the interactive interface with practice/experience"

Think aloud (**record users' comments**) – Interactive mode takes more time because…

There are more aids to operate and more information to read and analyze:

"Because you spend more time on each word, you have opportunity to see alternative translations."

MT quality quality greatly affected the usefulness of the interactive aids:

"If drop-down suggestions are not of a good quality, reading (without selecting them) may consume extra time."

The post-edit mode was easier at first, but in the end the interactive mode was better once I got used to it.

"I am used to this [post-edit], this is how Trados [the preeminent CAT tool] works."

RQ2: Quality – PTM == better translation?

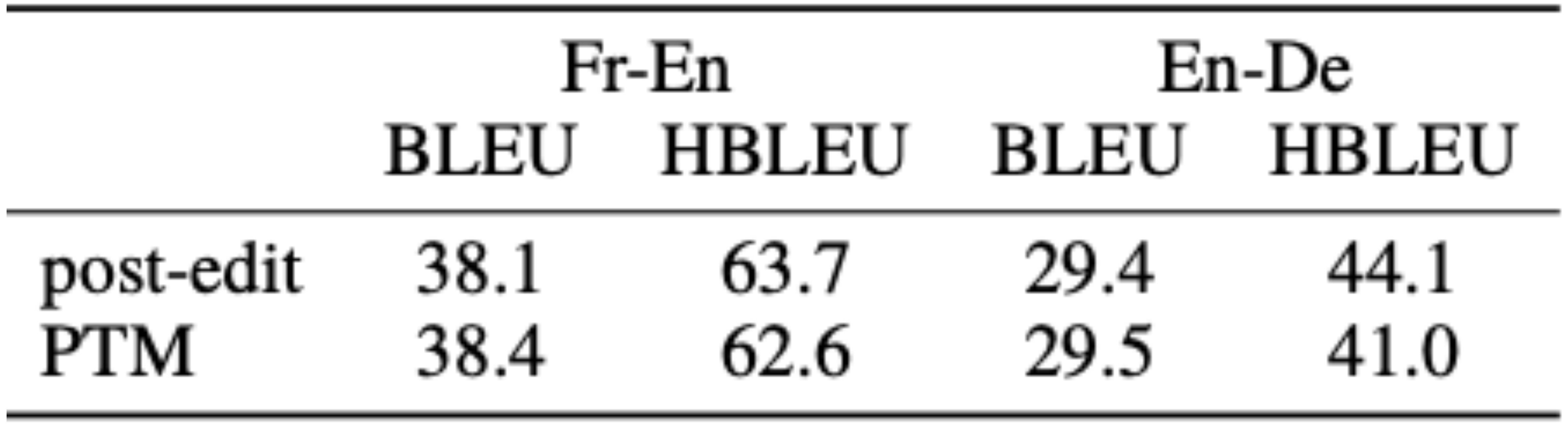
Metric: BLEU (**automatic eval, has issues, but easier to run**)

BLEU: a measure of similarity with the gold reference.

HBLEU: measure of similarity with the initial MT suggestions.

Compare mean

(**Also vs. original generated text**)



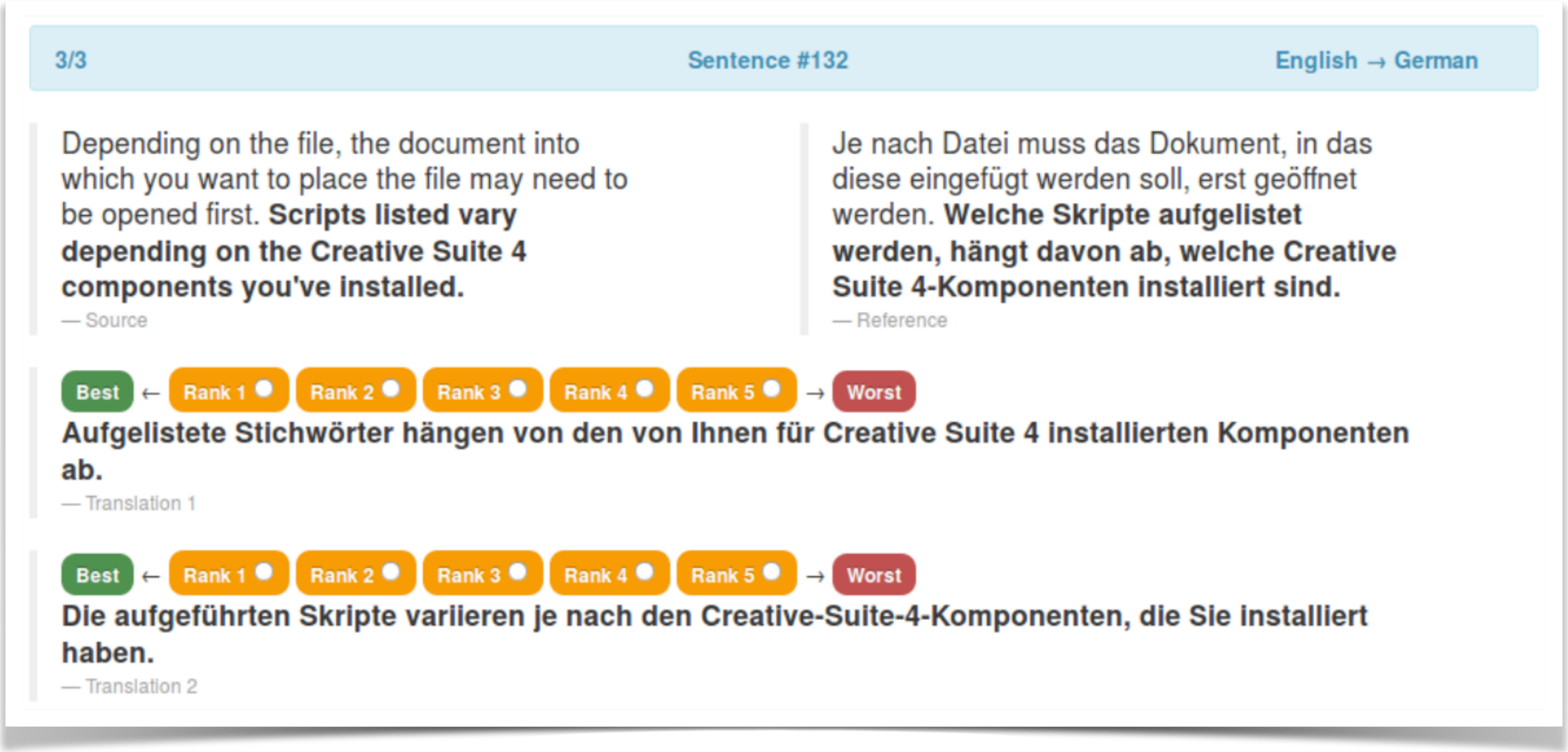
	Fr-En		En-De	
	BLEU	HBLEU	BLEU	HBLEU
post-edit	38.1	63.7	29.4	44.1
PTM	38.4	62.6	29.5	41.0

“PTM exposes translators to many more alternatives, encouraging them to deviate further from the initial MT suggestion (lower HBLEU).”

RQ2: Quality – PTM == better translation?

Metric: Human subject rating

Auto methods are sensitive and noisy, so usually **paired with human judgements** as well



3/3 Sentence #132 English → German

Depending on the file, the document into which you want to place the file may need to be opened first. **Scripts listed vary depending on the Creative Suite 4 components you've installed.**
— Source

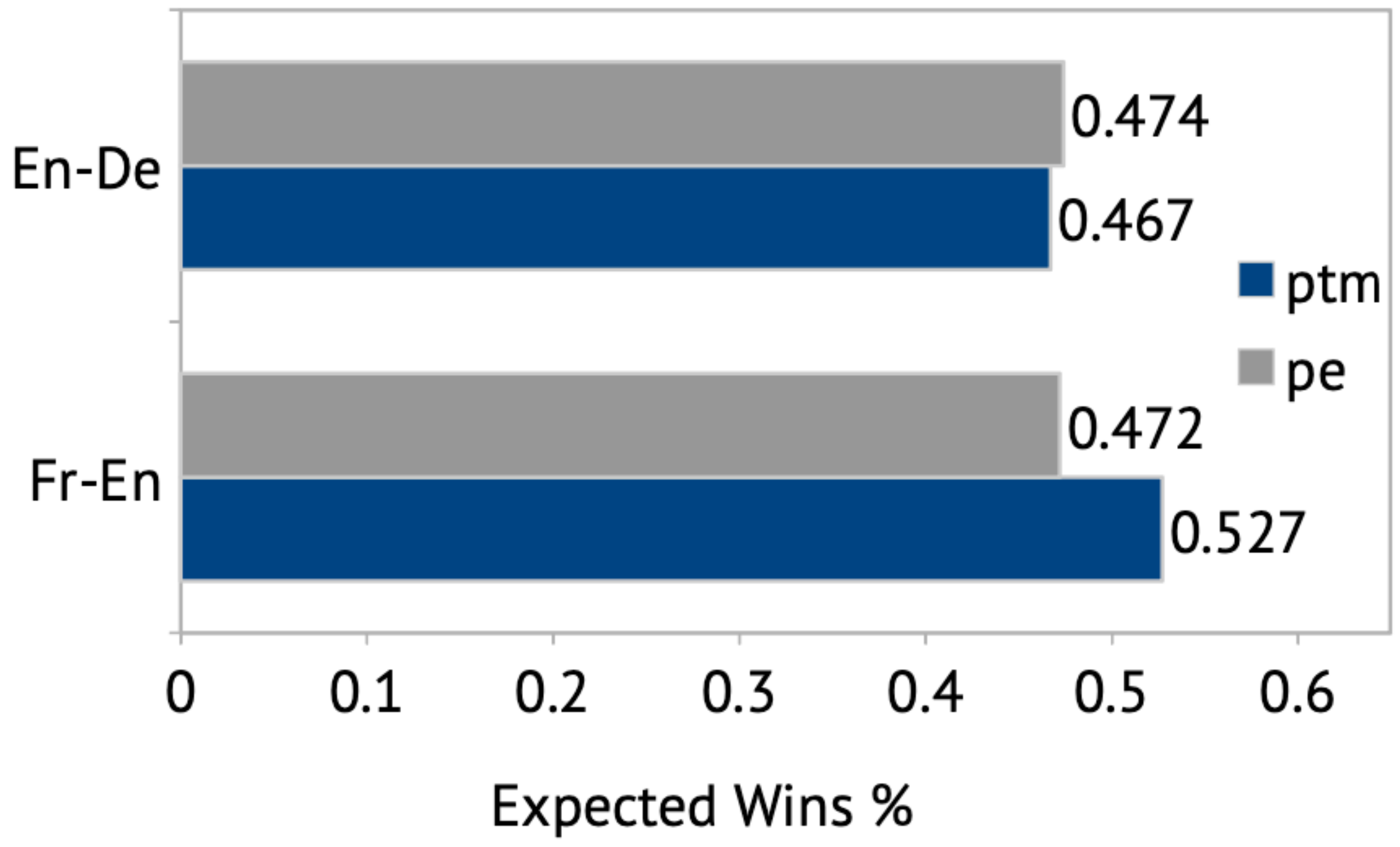
Je nach Datei muss das Dokument, in das diese eingefügt werden soll, erst geöffnet werden. **Welche Skripte aufgelistet werden, hängt davon ab, welche Creative Suite 4-Komponenten installiert sind.**
— Reference

Best ← Rank 1 ○ Rank 2 ○ Rank 3 ○ Rank 4 ○ Rank 5 ○ → Worst

Aufgelistete Stichwörter hängen von den von Ihnen für Creative Suite 4 installierten Komponenten ab.
— Translation 1

Best ← Rank 1 ○ Rank 2 ○ Rank 3 ○ Rank 4 ○ Rank 5 ○ → Worst

Die aufgeführten Skripte variieren je nach den Creative-Suite-4-Komponenten, die Sie installiert haben.
— Translation 2



RQ2: Quality – PTM == better translation?

Metric: BLEU & rating (**automatic eval, has issues, but easier to run**)

Qualitative analysis (**find reasons behind quantitative analysis**)

Why do many participants prefer post-edit?

“I found the machine translations (texts in gray) were of a much better quality than texts generated by Google Translate”

"The translations generally did not need too much editing, which is not always the case with machine translations.”

When users wanted to render more stylistic translations, PTM was less useful:

“...choosing a very different translation approach (choice of words, idioms with no equivalent in English...) would be like going against the current—but may have provided a better quality.”

“the translator is less susceptible to be creative.”

Conduct the Think Aloud: Test / Pilot the study

Discover problems with study or concept being tested

Estimate time needed for test

Refine test script and tasks

Verify typical tasks (something users actually do?)

Practice before going live

New ideas for follow-on questions or things to observe

Takeaways

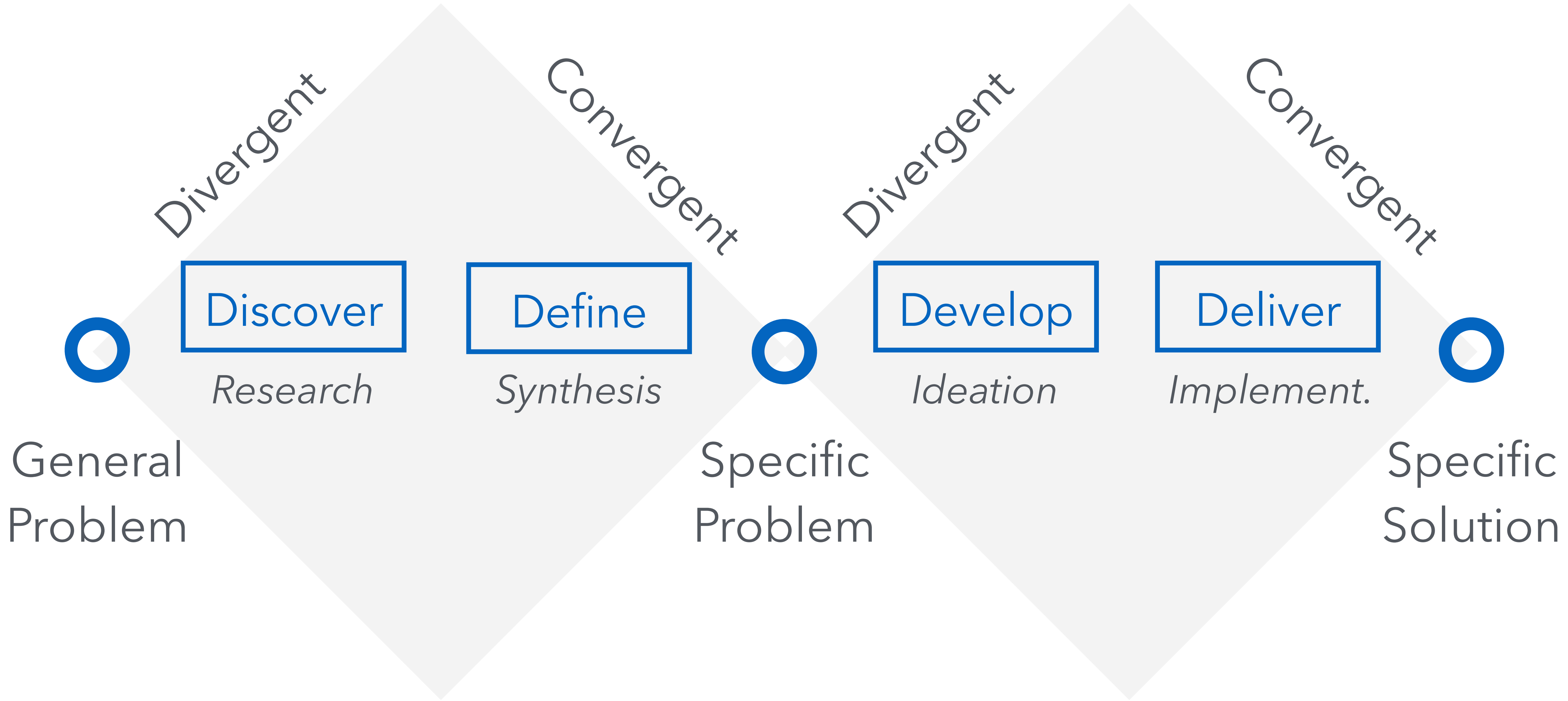
User-centered design is **important**.

Double Dimond is a typical process.

Reframing the problem and the persona changes human behaviors.

Interviews & think-aloud are important HCI methods for building NLP-infused applications.

Quantitative & qualitative studies are both important.



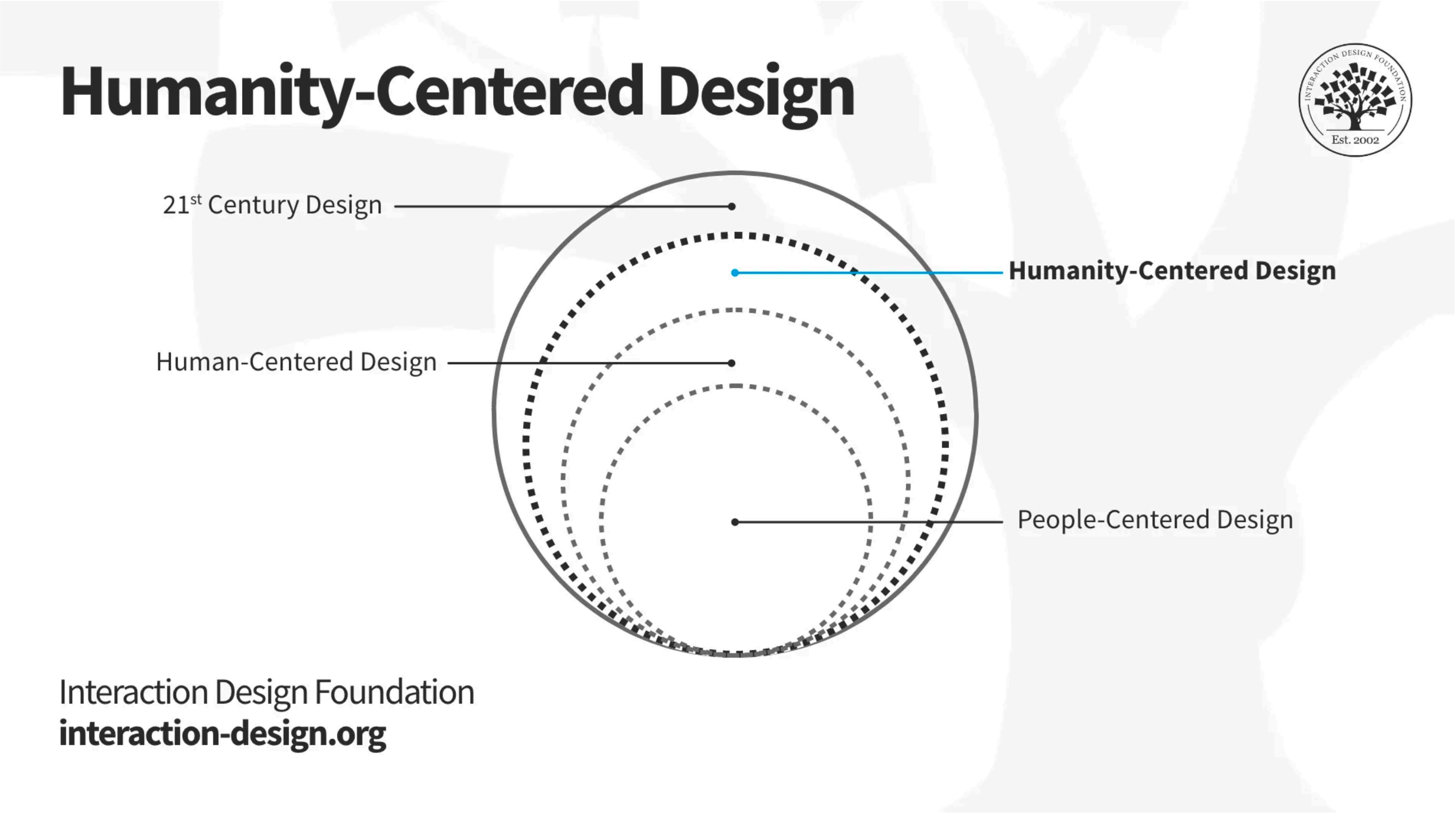
Terminologies

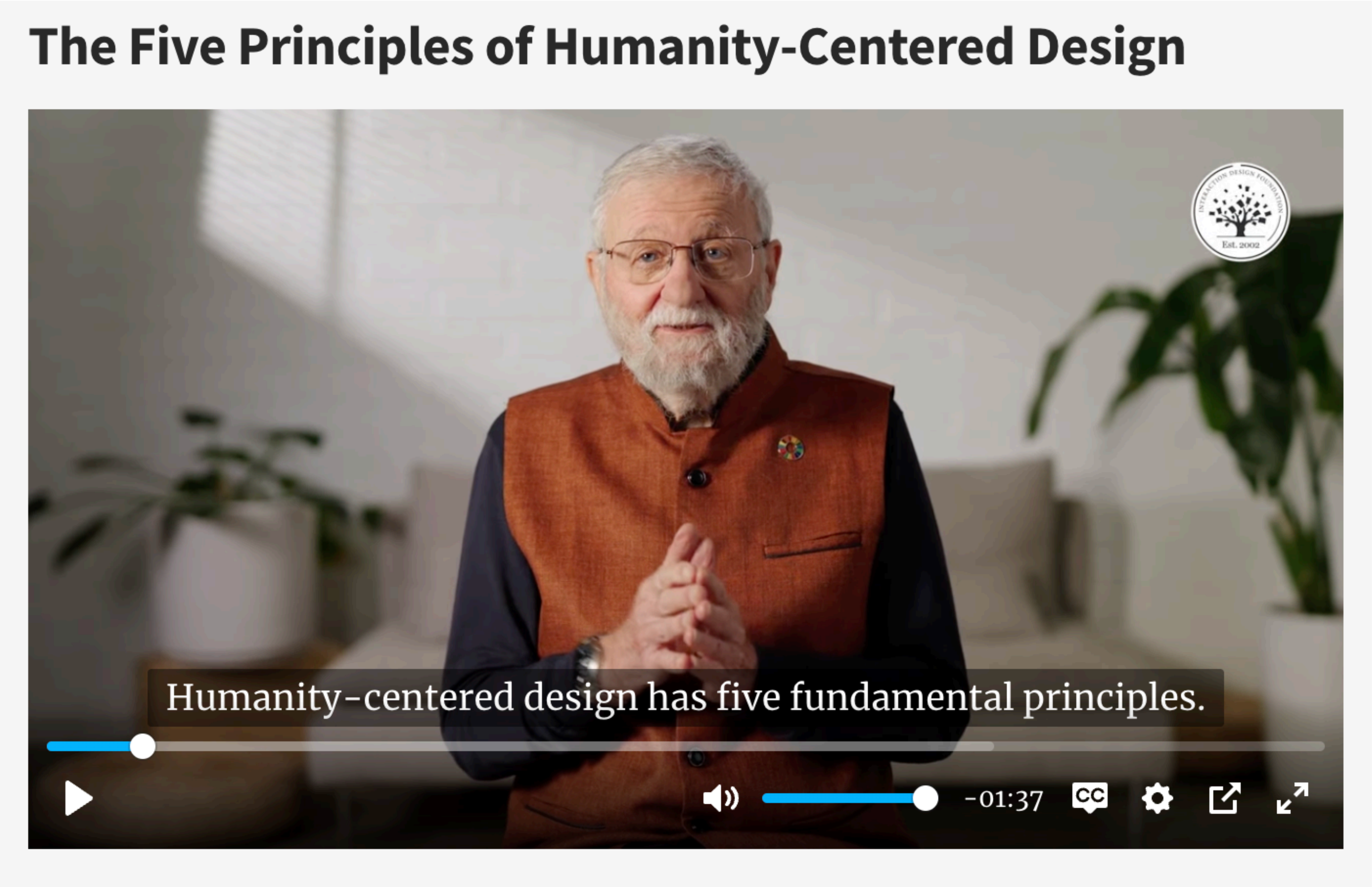
Human Centered Design

User Centered Design

Value Centered Design

Humanity Centered Design





The Five Principles of Humanity-Centered Design

Humanity-centered design has five fundamental principles.

https://www.interaction-design.org/literature/topics/humanity-centered-design