CHI'26

HANYANG UNIVERSITY

CHUNGBUK NATIONAL UNIVERSITY

QuerySwitch: Supporting the Design Process by Balancing Vagueness through Large Language Models

Myungjin Kim

Bogoan Kim

Kyungsik Han

Honorable Mention Award

HANYANG HUMAN CENTERED COMPUTING LAB

Vagueness

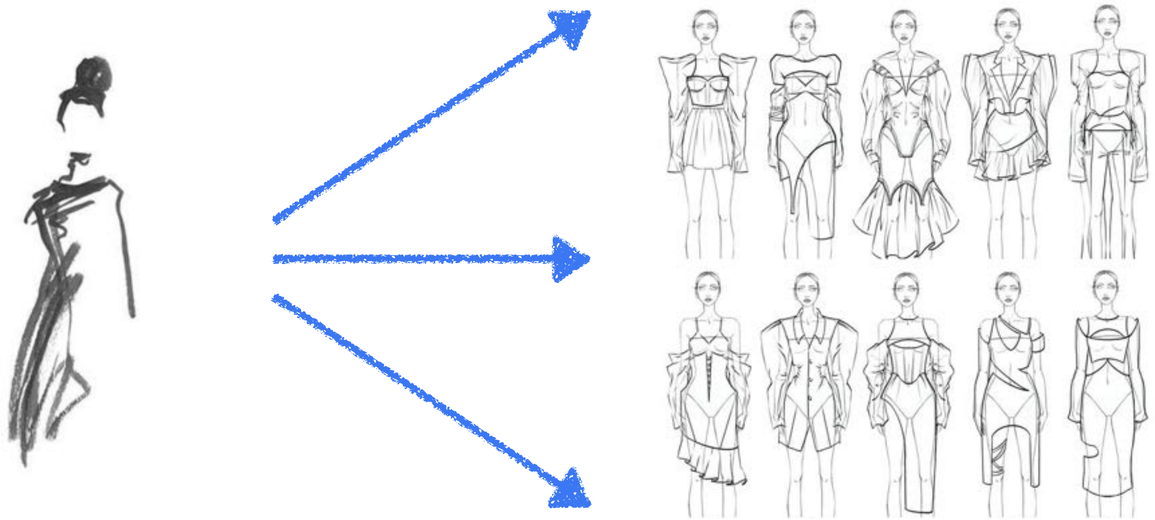
The Role of Vagueness

Designers strategically leverage vagueness
throughout divergent-convergent cycles

The Role of Vagueness

Divergence

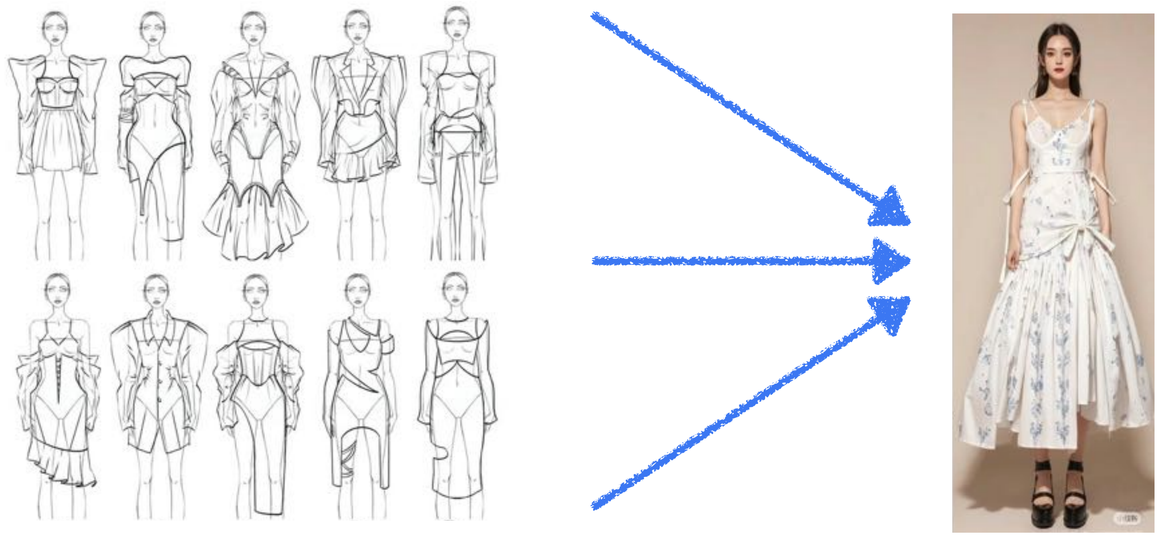
Vagueness catalyzes the expansion of the design space for multiple interpretations and transformations



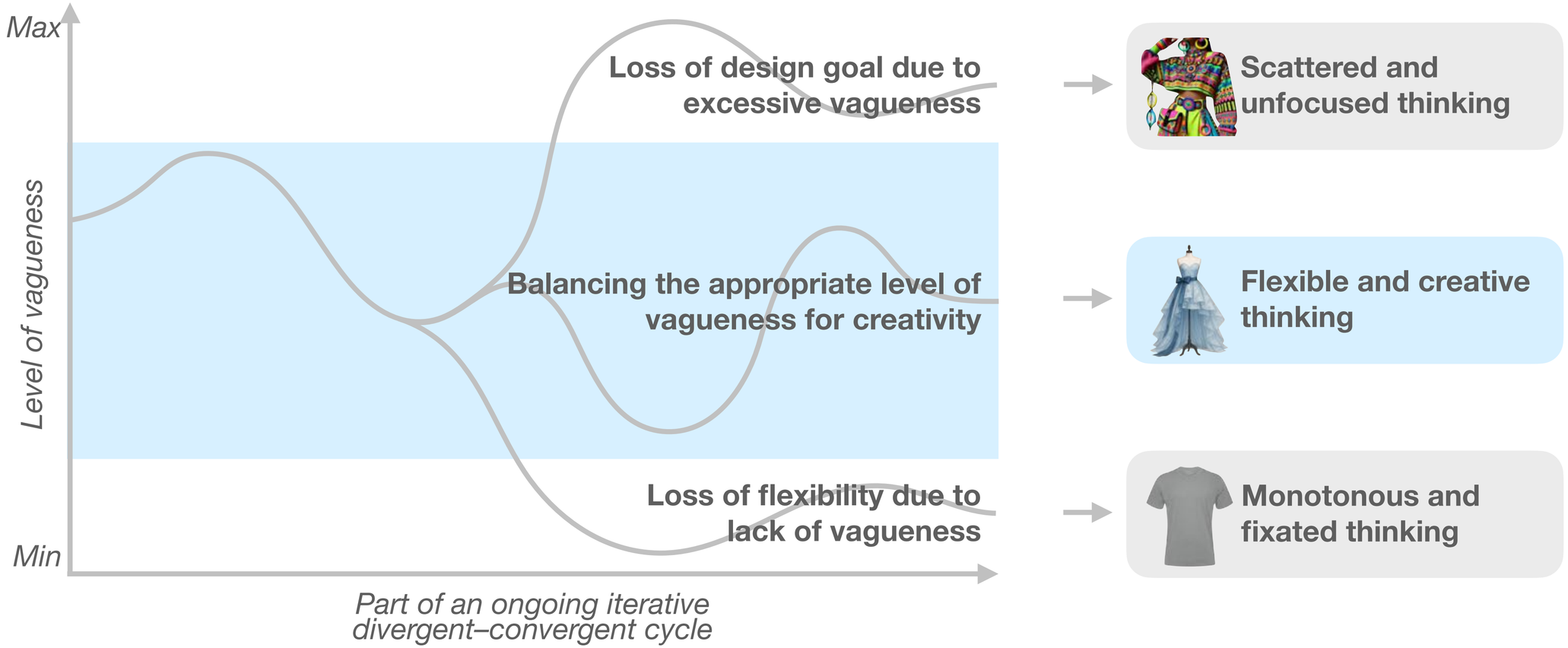
The Role of Vagueness

Convergence

Vagueness persists to avoid premature closure on uncreative solutions and keep multiple perspectives in play



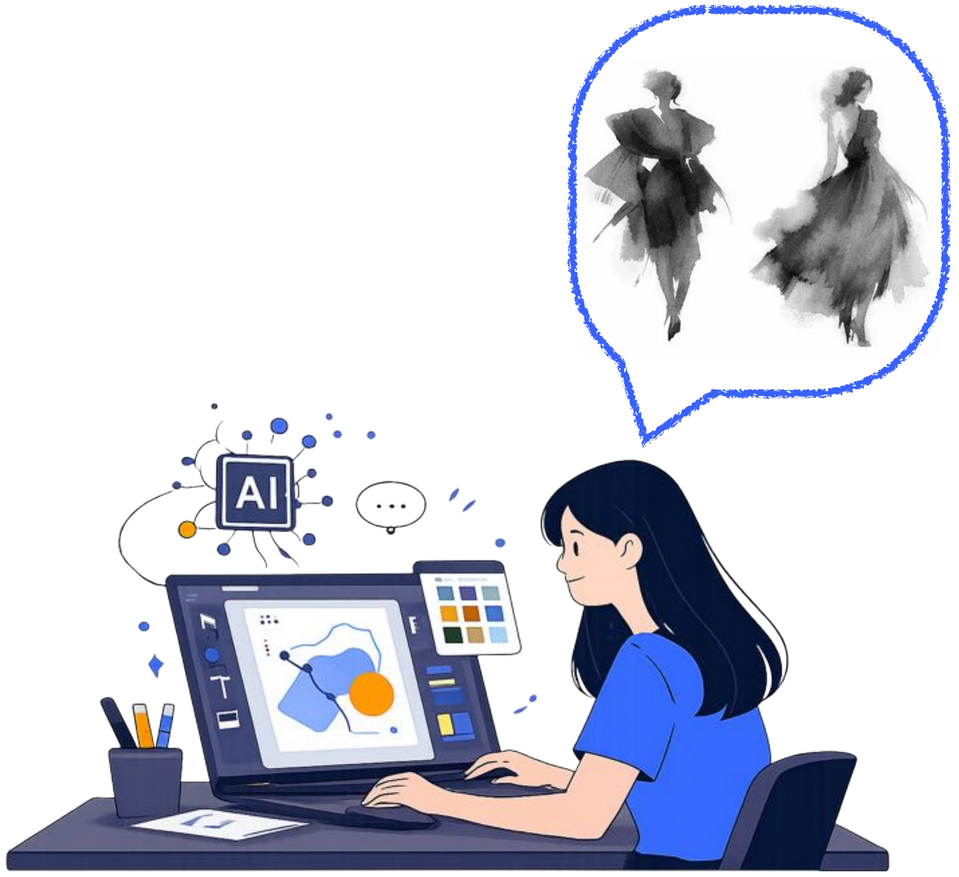
Balancing Vagueness



Large Language Models (LLMs) in Creativity

LLMs have gained attention in design for generating tailored, novel outputs

However, prior studies treat vagueness only as a starting point, refining it into concrete prompts for fully specified images



Large Language Models (LLMs) in Creativity

LLMs have gained attention in design for generating tailored, novel outputs

However, prior studies treat vagueness only as a starting point, refining it into concrete prompts for fully specified images

Research Goal

Understand how balanced vagueness can be maintained during collaboration with LLMs

Study Design

Fashion Domain: Managing vagueness across divergent and convergent phases is a key design strategy

30-minute design task simulating real-world use of LLM-tools (i.e., ChatGPT and DALL-E)

Challenges

Challenge 1

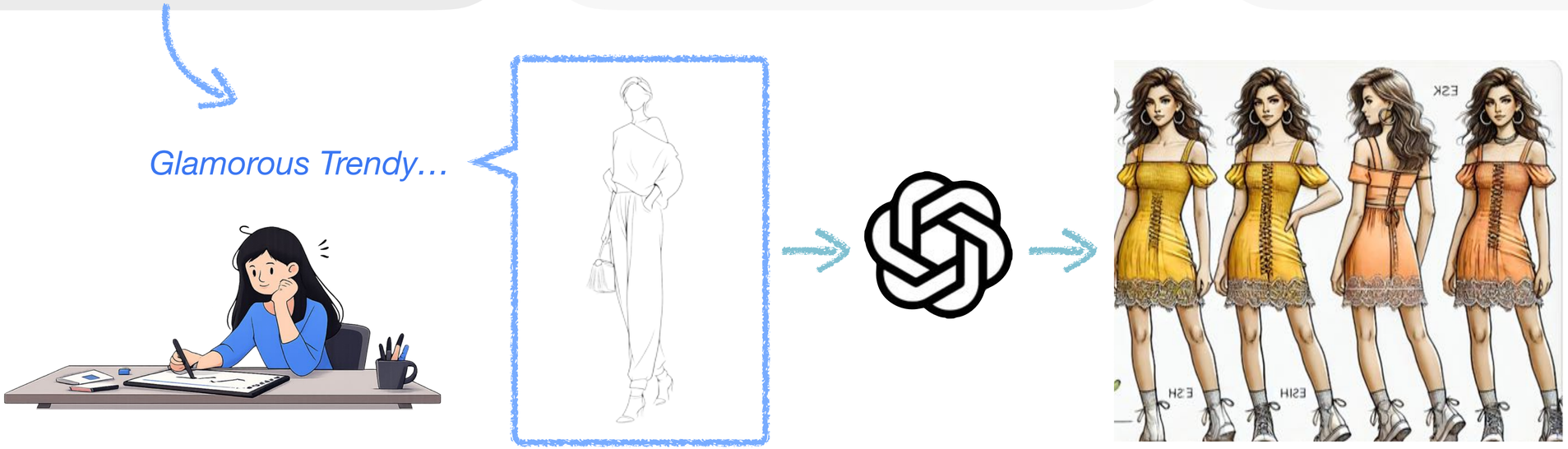
Excessive vagueness during divergence, as LLMs generate information that deviates from the main concept due to inevitable abstract inputs

Challenge 2

Minimal vagueness during convergence, as LLMs generate monotonous and overly literal images due to inevitable concrete idea inputs

Challenge 3

Misalignment between the level of detailed input required by LLMs and the levels of vague input inherent in the divergent-convergent process



Challenges

Challenge 1

Excessive vagueness during divergence, as LLMs generate information that deviates from the main concept due to inevitable abstract inputs

Challenge 2

Minimal vagueness during convergence, as LLMs generate monotonous and overly literal images due to inevitable concrete idea inputs

Challenge 3

Misalignment between the level of detailed input required by LLMs and the levels of vague input inherent in the divergent-convergent process

Hoodie and short pleated denim skirt designs …

Challenges

Challenge 1

Excessive vagueness during divergence, as LLMs generate information that deviates from the main concept due to inevitable abstract inputs

Challenge 2

Minimal vagueness during convergence, as LLMs generate monotonous and overly literal images due to inevitable concrete idea inputs

Challenge 3

Misalignment between the level of detailed input required by LLMs and the levels of vague input inherent in the divergent-convergent process

[Divergence]
Glamorous Trendy…

[Convergence]
Hoodie and short pleated denim skirt designs…

Design Goals

Challenge 1

Excessive vagueness during divergence, as LLMs generate information that deviates from the main concept due to inevitable abstract inputs

Design Goal 1

Prevent excessive vagueness by generating fashion design ideas based on the main concept

Challenge 2

Minimal vagueness during convergence, as LLMs generate monotonous and overly literal images due to inevitable concrete idea inputs

Design Goal 2

Prevent minimization of vagueness by generating diverse design outcomes based on concrete inputs

Challenge 3

Misalignment between the level of detailed input required by LLMs and the levels of vague input inherent in the divergent-convergent process

Design Goal 3

Support different levels of vagueness across divergent-convergent process by enabling two types of loosely defined queries

Implementations

Design Goal 1	Design Goal 2	Design Goal 3
Prevent excessive vagueness by generating fashion design ideas based on the main concept	Prevent minimization of vagueness by generating diverse design outcomes based on concrete inputs	Support different levels of vagueness across divergent-convergent process by enabling two types of loosely defined queries
Implementation 1	**Implementation 2**	**Implementation 3**
Hierarchical keywords that contain sub-styles and categories derived from the main concept	**Combinational images** that contain diverse syntheses of user inputs and fashion components	Input **abstract concepts** as queries during divergence, and list **fashion elements in parallel** as queries during convergence

Implementations

Implementation 1

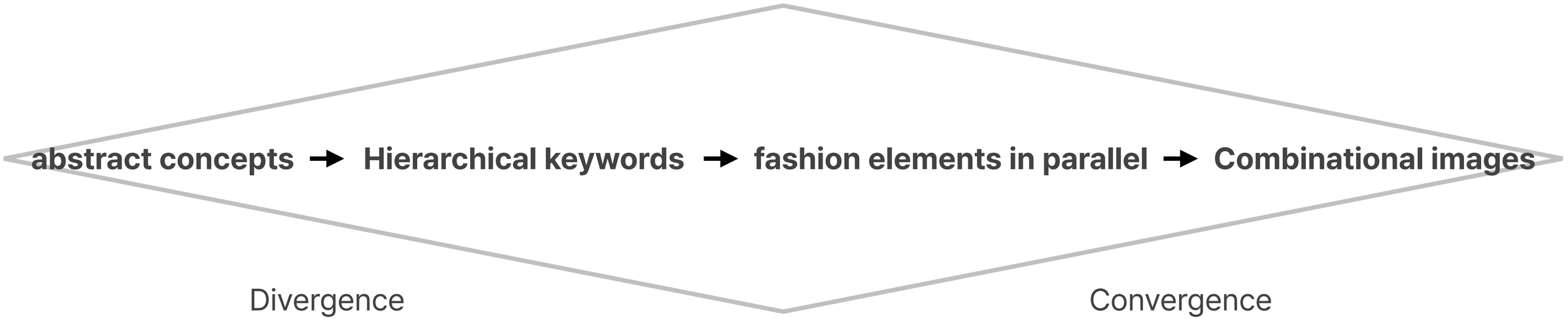
Hierarchical keywords that contain sub-styles and categories derived from the main concept

Implementation 2

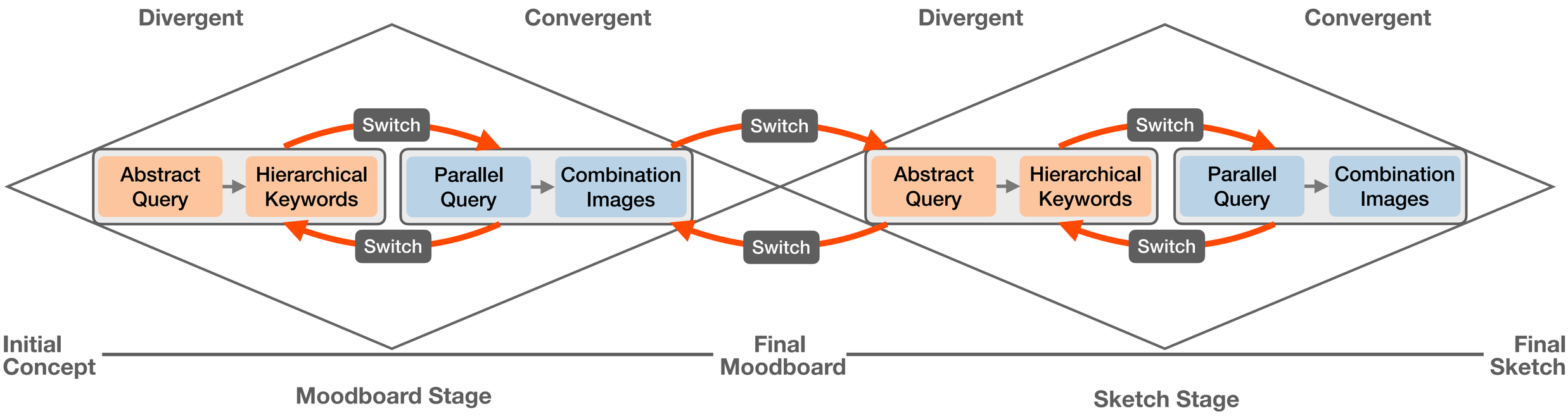
Combinational images that contain diverse syntheses of user inputs and fashion components

Implementation 3

Input **abstract concepts** as queries during divergence, and list **fashion elements in parallel** as queries during convergence



Framework


Divergent
Convergent
Divergent
Convergent
Switch
Switch
Switch
Switch
Switch
Switch
Abstract Query
Hierarchical Keywords
Parallel Query
Combination Images
Abstract Query
Hierarchical Keywords
Parallel Query
Combination Images
Initial Concept
Final Moodboard
Final Sketch
Moodboard Stage
Sketch Stage

MOODBOARD

SKETCH

Upload image

balanced, modern look. This style plays with classic menswear silhouettes, fabrics, and detailing, subtly adjusted to suit a more feminine aesthetic. Here are five substyles derived from the feminine manish style, each with its unique characteristics:

1. **Soft Tailored**
   - **Tops**: Blazers with a nipped waist, silk blouses with bow ties or high collars.
   - **Bottoms**: High-waisted trousers with a tapered or slightly relaxed fit.
   - **Dresses**: Shirt dresses with belts to emphasize the waist; wrap dresses with tailored collars.
   - **Color Schemes**: Neutral tones like beige, soft grays, and pastels.
   - **Textures**: Blended wools, cashmere, silk, and fine cotton.
   - **Silhouettes**: Tailored but with a soft edge, emphasizing a gentle flow rather than stark lines.
   - **Accessories**: Leather satchels, subtle jewelry, brogues or loafers with a slight heel.
   - **Materials**: Soft wool, cashmere blends, silk, fine cotton.
   - **Details**: Subtle ruching, light shoulder pads, fabric-covered buttons.

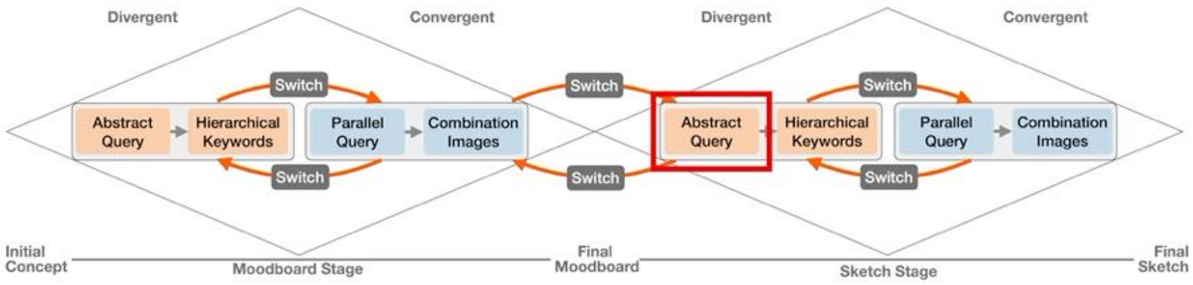
2. **Urban Minimalist**
   - **Tops**: Crisp white button-down shirts, sleek wool sweaters.
   - **Bottoms**: Straight-leg trousers, culottes.
   - **Dresses**: Minimalist sheath dresses with a high neckline.
   - **Color Schemes**: Monochrome palettes, primarily black, white, and grey.
   - **Textures**: Smooth, finely woven fabrics, structured denim.
   - **Silhouettes**: Clean lines, uncluttered shapes, boxy fits.
   - **Accessories**: Slim leather belts, minimalist watches, angular glasses.
   - **Materials**: Merino wool, gabardine, leather.
   - **Details**: Hidden buttons, seamless pockets, well-defined edges.

3. **Preppy Chic**

Type fashion elements...

Category

Blazers with a nipped waist, silk blouses with bow ties, High-waisted trousers, Monochrome palettes, primarily black, white, and grey



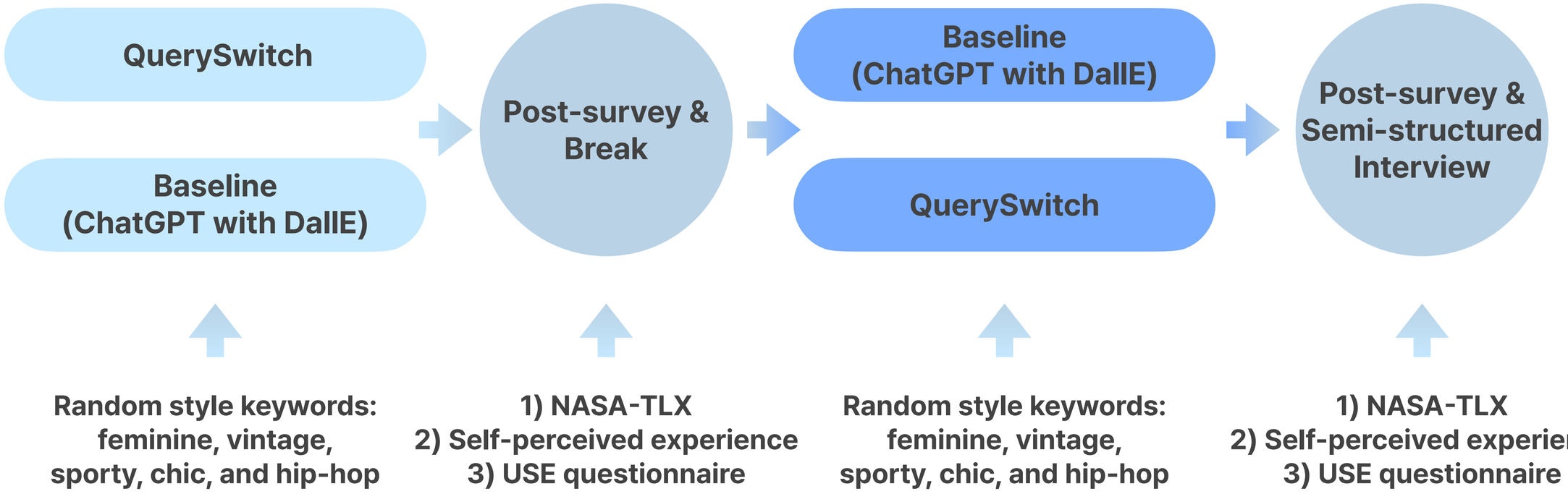
Research Questions

RQ1. How do hierarchical keywords and combinational images support fashion designers in balancing vagueness during the creative process?

RQ2. How does LLM-driven context integration facilitate diverse design exploration and workflow efficiency across the moodboard-to-sketch stages?

Study Procedure

Create a Moodboard and Final Sketch in Each Session



Participants

ID	Job Description	Gender	Experience	Given Style (Q)	Given Style (B)
P1	Freelancer Designer	Male	2 years	Chic	Vintage
P2	Brand Designer	Female	3 years	Sporty	Feminine
P3	Brand Designer	Male	3 years	Sporty	Vintage
P4	Brand Designer	Female	2 years	Vintage	Feminine
P5	Freelancer Designer	Female	1 years	Vintage	Chic
P6	Brand Designer	Female	1 years	Chic	Hiphop
P7	Brand Designer	Male	4 years	Hiphop	Chic
P8	Freelancer Designer	Female	1 years	Feminine	Hiphop
P9	Freelancer Designer	Male	2 years	Hiphop	Sporty
P10	Brand Designer	Female	5 years	Feminine	Sporty

Measures for Evaluating Vagueness Balance

Balanced vagueness promotes **conceptual coherence** and **idea diversity**

	Concept Coherence	Idea Diversity
Text Query (Divergence)	BERT Embeddings + Pairwise Distance	Shannon Entropy
Generated Images (Convergence)	CLIP embeddings + Pairwise Distance	Edge Map Entropy

- Lower consistency values indicating higher semantic consistency
- Higher diversity indicating greater idea diversity

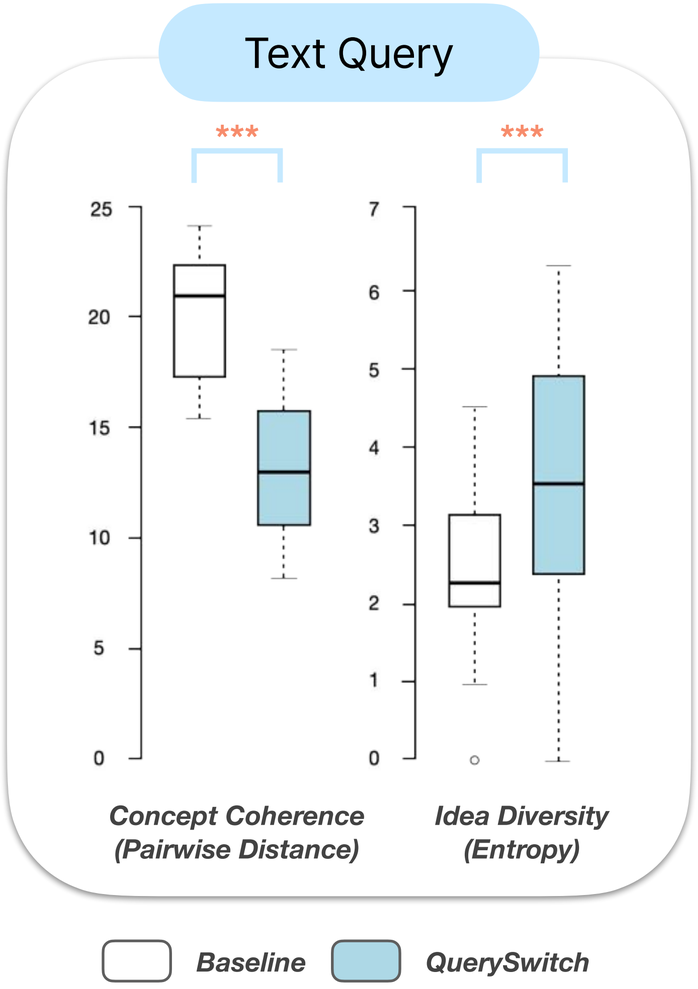
Examples of Generated Images

QuerySwitch

Baseline

Hierarchical Keywords

Supporting Exploration and Concept Coherence during Divergence



Realign ideas with the main concept when thinking became overly broad

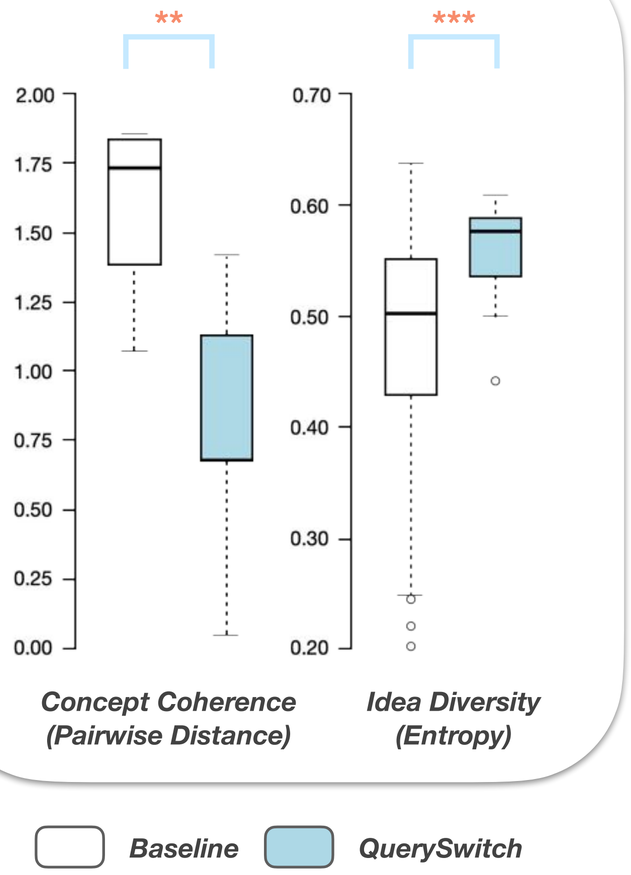
"I wanted to create a new chic-mannish concept, so I kept combining different elements [...] Later, when I entered the moodboard and reviewed the derived keywords, I realized it leaned too heavily toward suit style. So I adjusted my thinking by emphasizing chic elements" P8

Prevent deviation from the concept in collaborative contexts

"Because everyone thinks differently, it always ends up all over the place. So we paste the ideas we each found into a Word document and spend a long time together removing the ones that don't fit the concept. [...] At that point, these keywords could help us quickly filter out ideas that deviate too much" P2

Combinational Images
Supporting Direction and Openness during Convergence

Generated Image



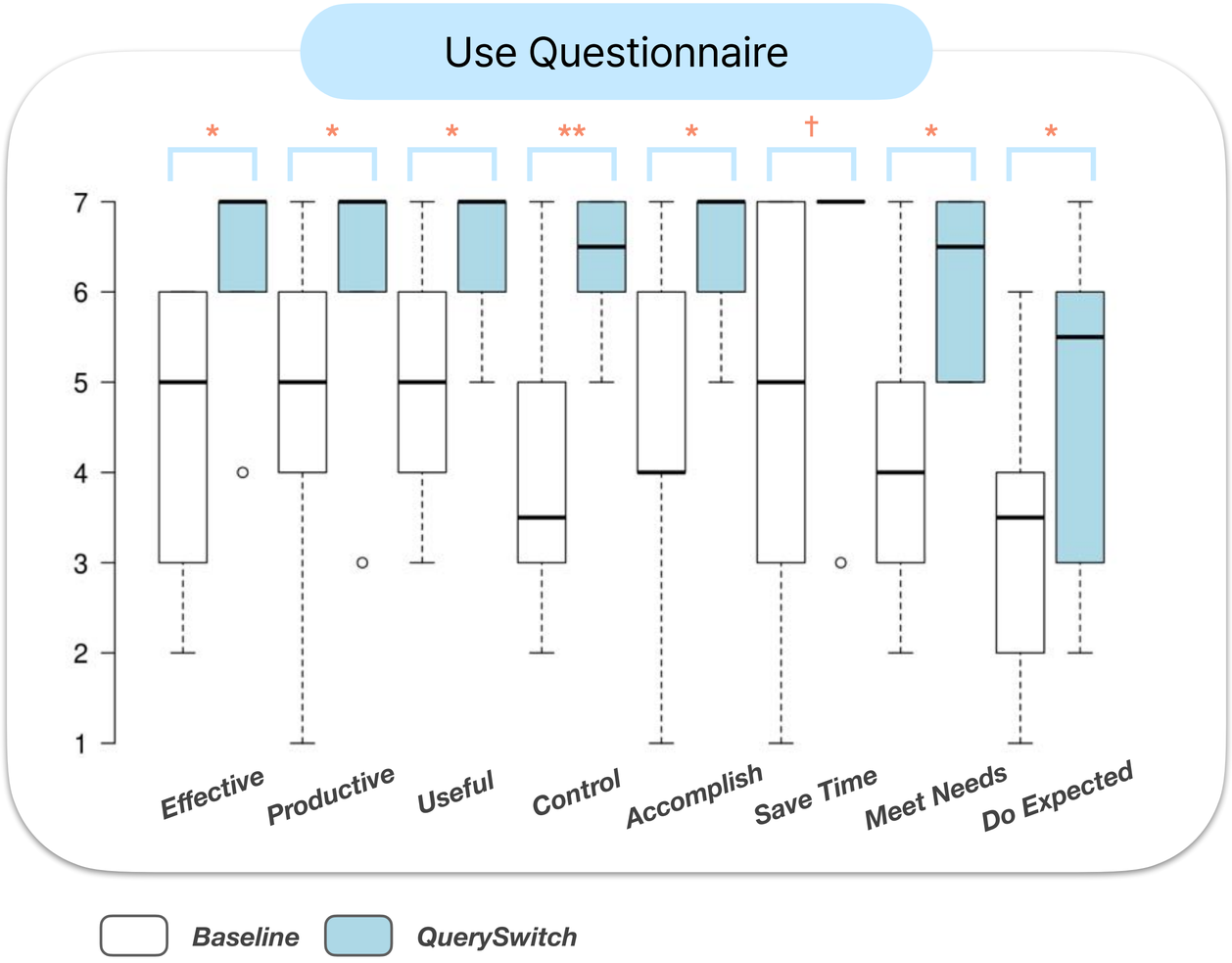
Support fluid thinking in highly constrained real-world practices

"To maintain the target customer group, we can never deviate from the brand concept, and sometimes we even have to refer to designs that sold well just before. So I often get stuck with a single idea. In those moments, I believe this system could provide insights" P8

Prevent homogenized sketches in collaborative contexts

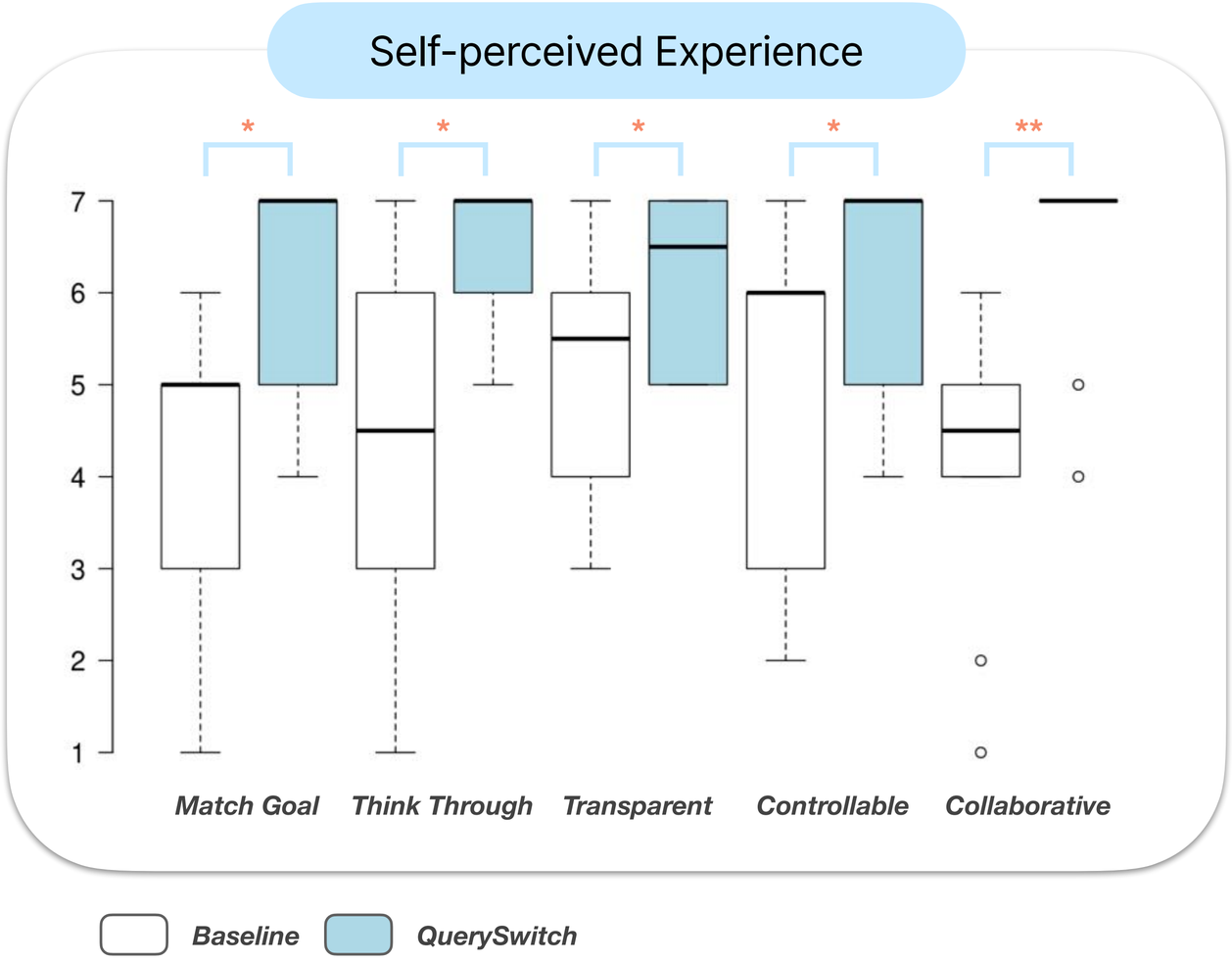
"We work in the same brand, so inevitably we're exposed to the same images, and our designs often turn out similar. But if we input the overlapping parts here, it gives slightly different suggestions for the same elements […] That would be really helpful" P10

Minimizing Query Adjustment Effort through Abstract and Parallel Input



"When my thoughts were abstract, I could simply enter the concept and the system suggested a wide range of ideas. When my thoughts became somewhat more concrete, I just pasted fashion elements into the query, and it provided information that helped me refine my ideas. Without the need to fine-tune the query, I could spend more time sketching" P10

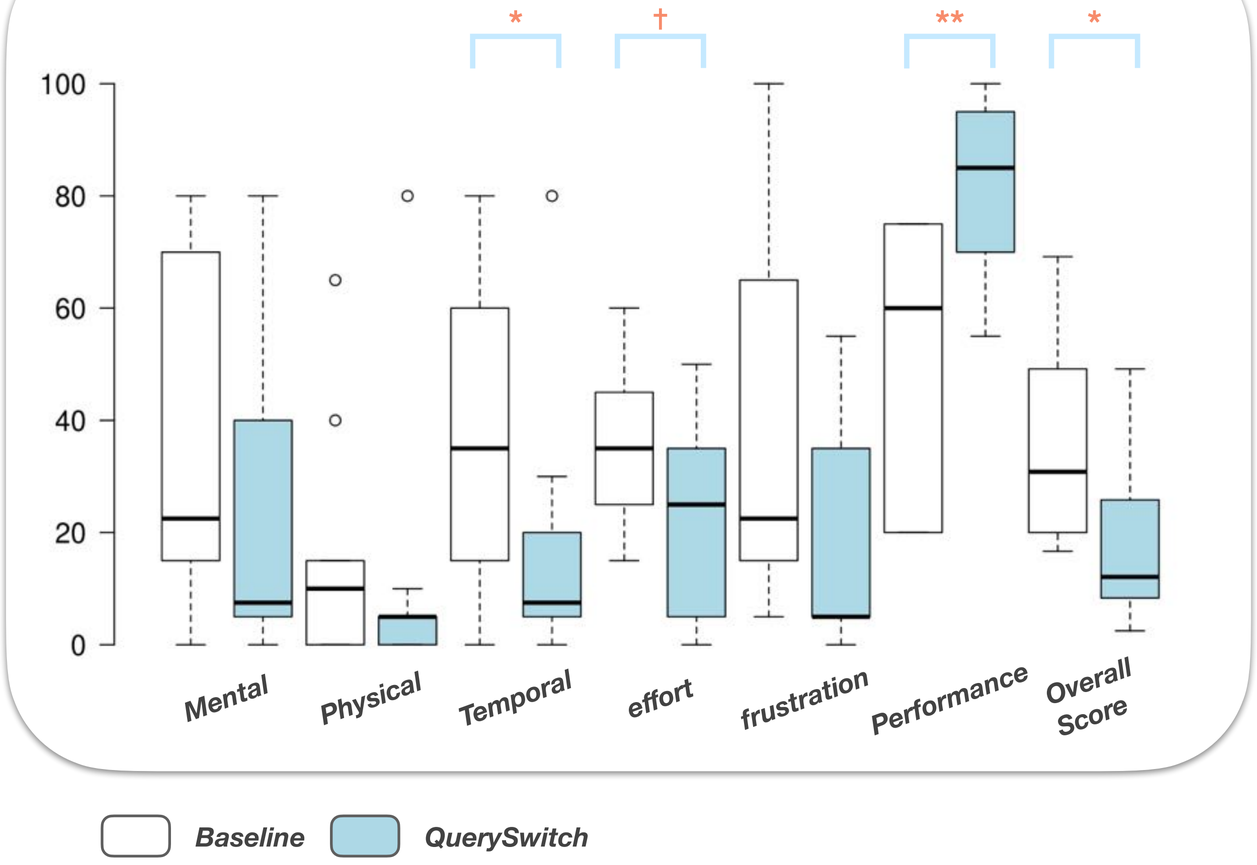
User Agency through Shifting Input-Output Modes



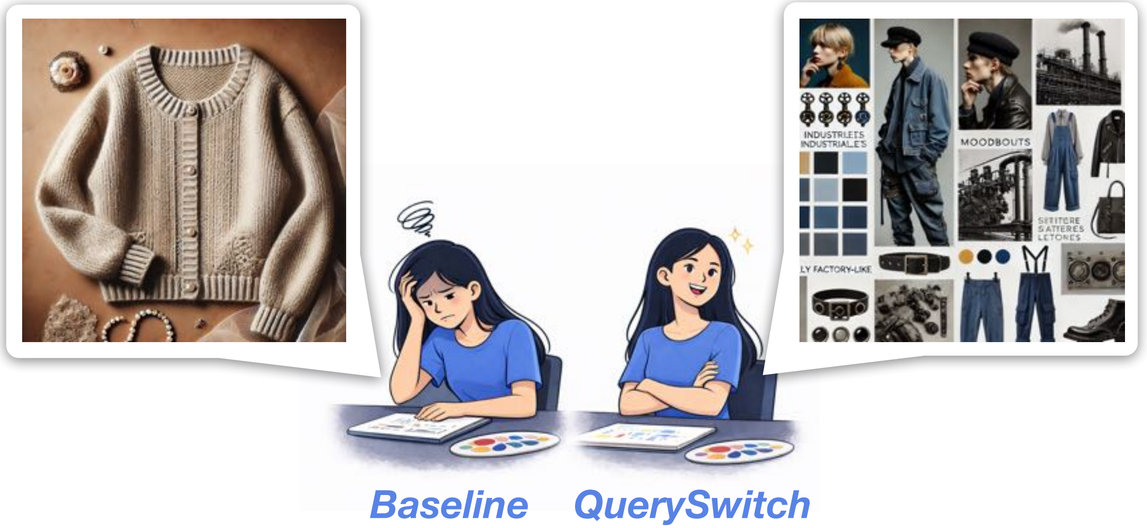
"If I wanted to specify a styling direction, I could simply click the moodboard interface, and if I wanted to work on more detailed design tasks, I could click the sketch interface. Because I only had to choose the appropriate screen depending on the situation, it was much more convenient to adjust" P9

Higher Design Achievement without Increasing Effort

NASA-TLX



"DALL-E allows freer input than this [QuerySwitch], which is an advantage. But often the results weren't appropriate, so I had to make several adjustments. [...] On the other hand, this [QuerySwitch] had a few steps compared to DALL-E, but it gave me much more useful information, so I could create designs I was more satisfied with" P1

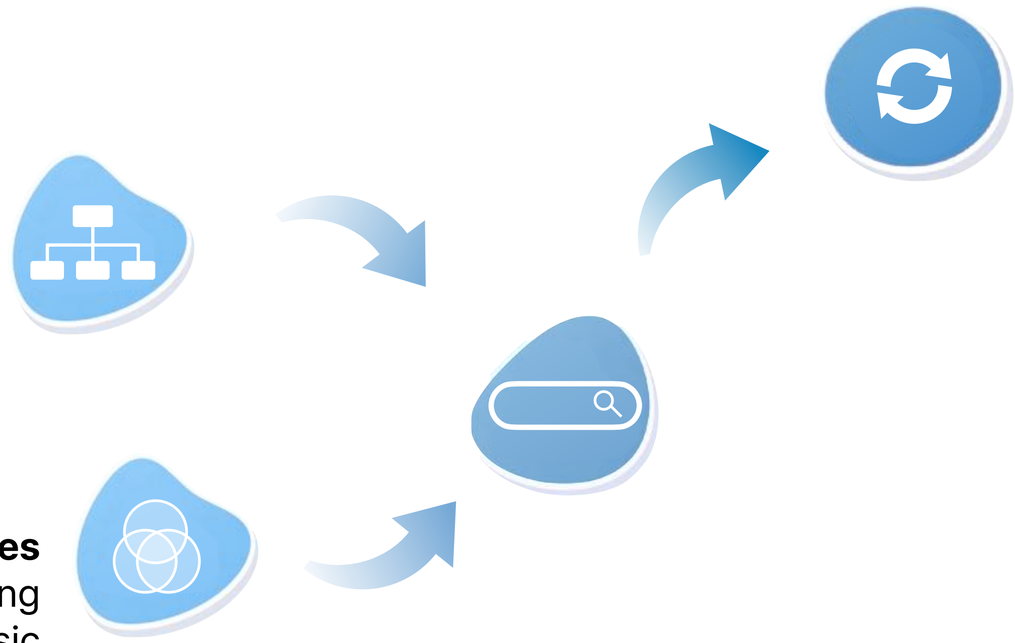


Identify Idea Structures and Support Them with Open-Ended Queries

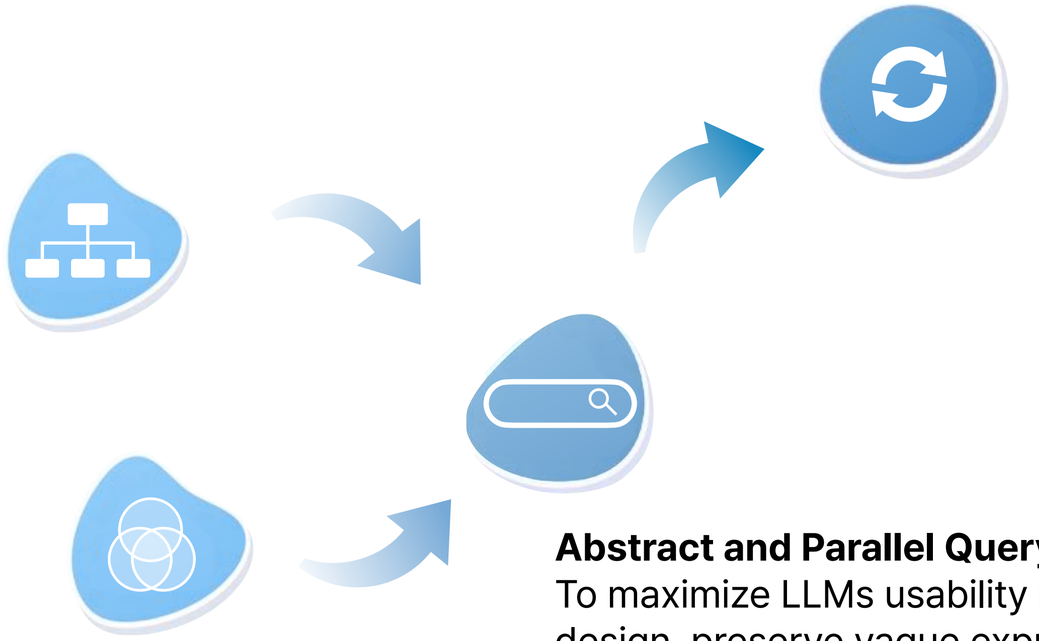
Identify Idea Structures and Support Them with Open-Ended Queries

Hierarchical Keywords
To balance vagueness during divergence, identify the idea expansion structure and ensure that the expansion remains anchored to the core concept

Combination Images
To balance vagueness during convergence, identify the basic components that constitute an outcome and enable diverse ways of combining them with user input

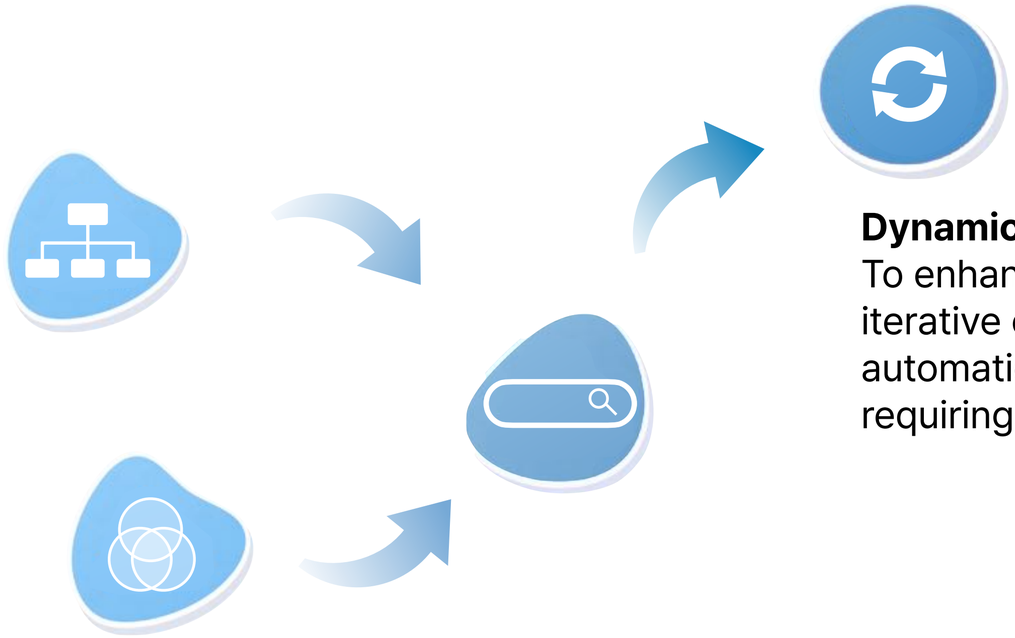


Identify Idea Structures and Support Them with Open-Ended Queries



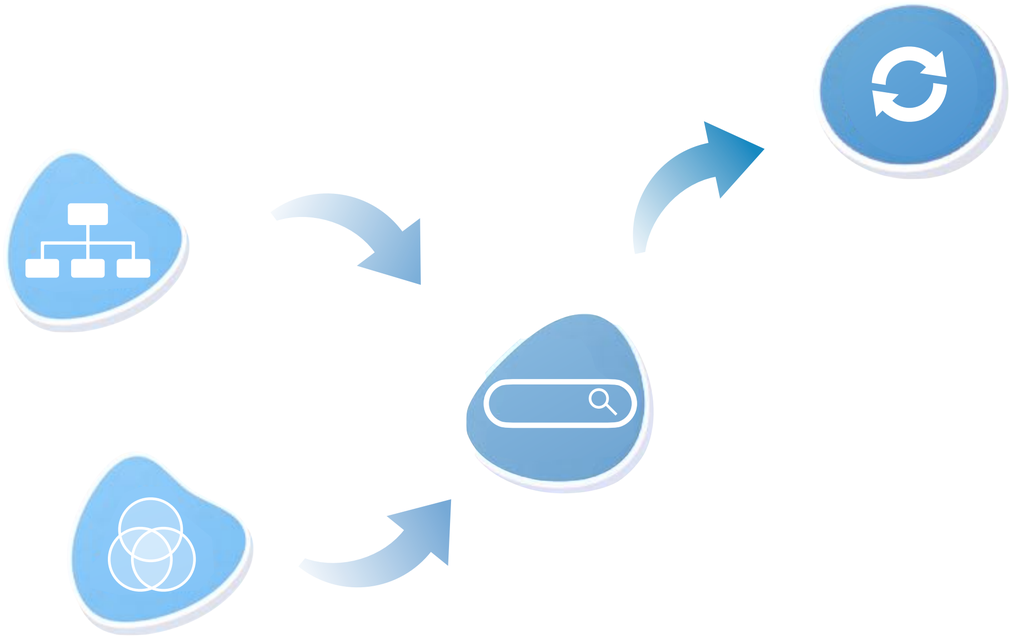
Abstract and Parallel Query
To maximize LLMs usability in vagueness-driven design, preserve vague expressions in user queries during the divergence–convergence process and apply structured generation methods

Identify Idea Structures and Support Them with Open-Ended Queries



Dynamic Query Shifting
To enhance communication with LLMs during iterative cycles, integrate open-ended queries that automatically interpret user intentions without requiring explicit mode switching

Identify Idea Structures and Support Them with Open-Ended Queries



Domains with Fluid Design Elements
Position such tools as one option among a broader ecosystem of creative resources, rather than as the sole alternative

CHI26

HANYANG UNIVERSITY

CHUNGBUK NATIONAL UNIVERSITY

QuerySwitch: Supporting the Design Process by Balancing Vagueness through Large Language Models

Thank You

HANYANG HUMAN CENTERED COMPUTING LAB

Myungjin Kim

Bogoan Kim

Kyungsik Han

Contact: myungkim331@hanyang.ac.kr