

# EK- PHR- ASIS<sup>①</sup>



# Demystify Abstract Terminologies in Graphic Design Through Human-AI Co-Practice

EK-  
PHR-  
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EKPHRASIS

SHAYNE SHEN & BOB TIANQI WEI

I. Roots and Resonance

II. Building the Bridge of Babel

III. Echoes in the Studio

III. Symphony of Tomorrow

# WHY CAN'T DESIGNERS JUST SAY WHAT THEY MEAN?



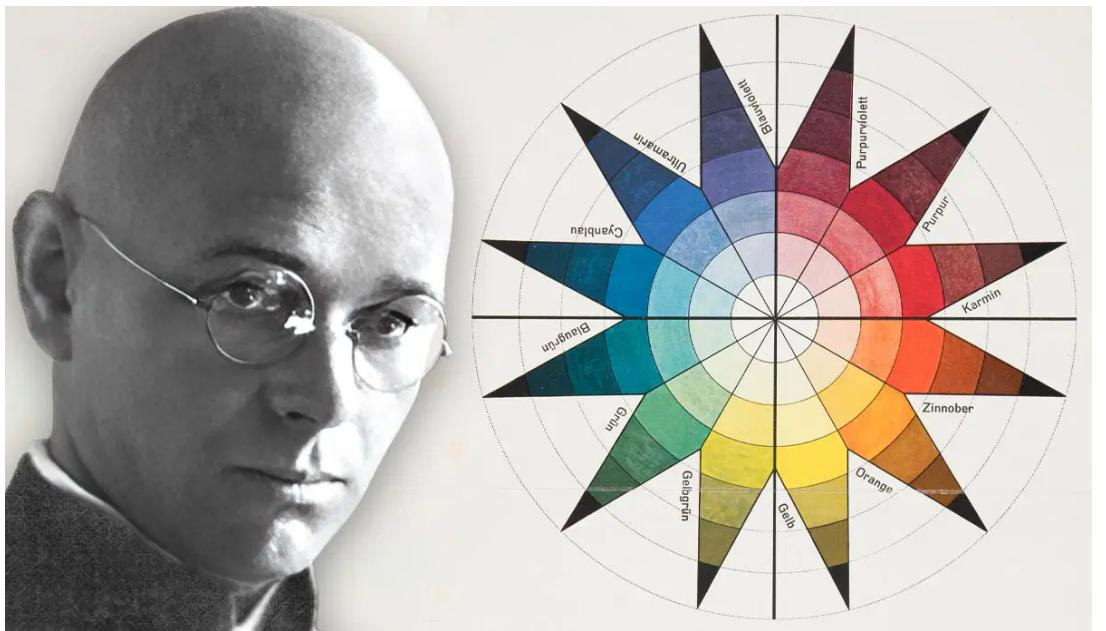
# THE LITERAL ERA OF VISUAL COMMUNICATION



# TRANSLATING SEMANTICS TO VISUALS

## Objectivity VS Subjectivity

Johannes Itten



## Abstraction of emotions

Wassily Kandinsky



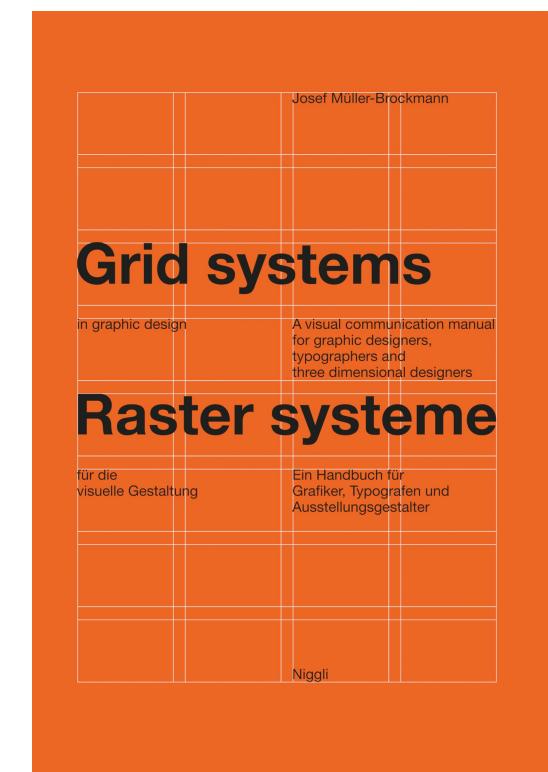
## Iconography

Otto Neurath



## Grid System

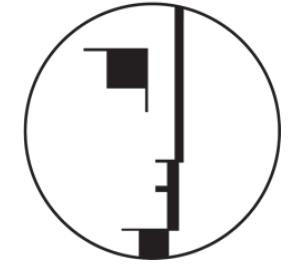
The Swiss International Style



# DESIGN EDUCATION TRANSFORMATION



bauhaus



\*Remains  
Unknown



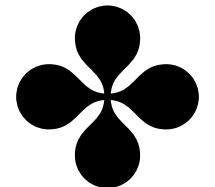
Traditional  
Apprenticeship

1920s–1930s

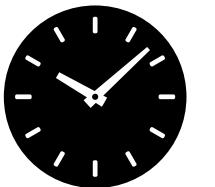
Studio-based Culture

Future

# FROM MIMETIC TO LINGUISTIC



**Design Education  
Transformed From  
Apprenticeship Model to  
Studio-Based Pedagogy**



## Post-1920s Changes

- Decentralization of mentorship authority
- Rise of designer autonomy and subjective expression
- Translation from subjective semantics to abstract designs



## Shift in Knowledge Transfer Methods

- Decreased reliance on direct mentor guidance
- Studio critique emerged as primary learning vehicle
- Increased emphasis on peer evaluation and discussion



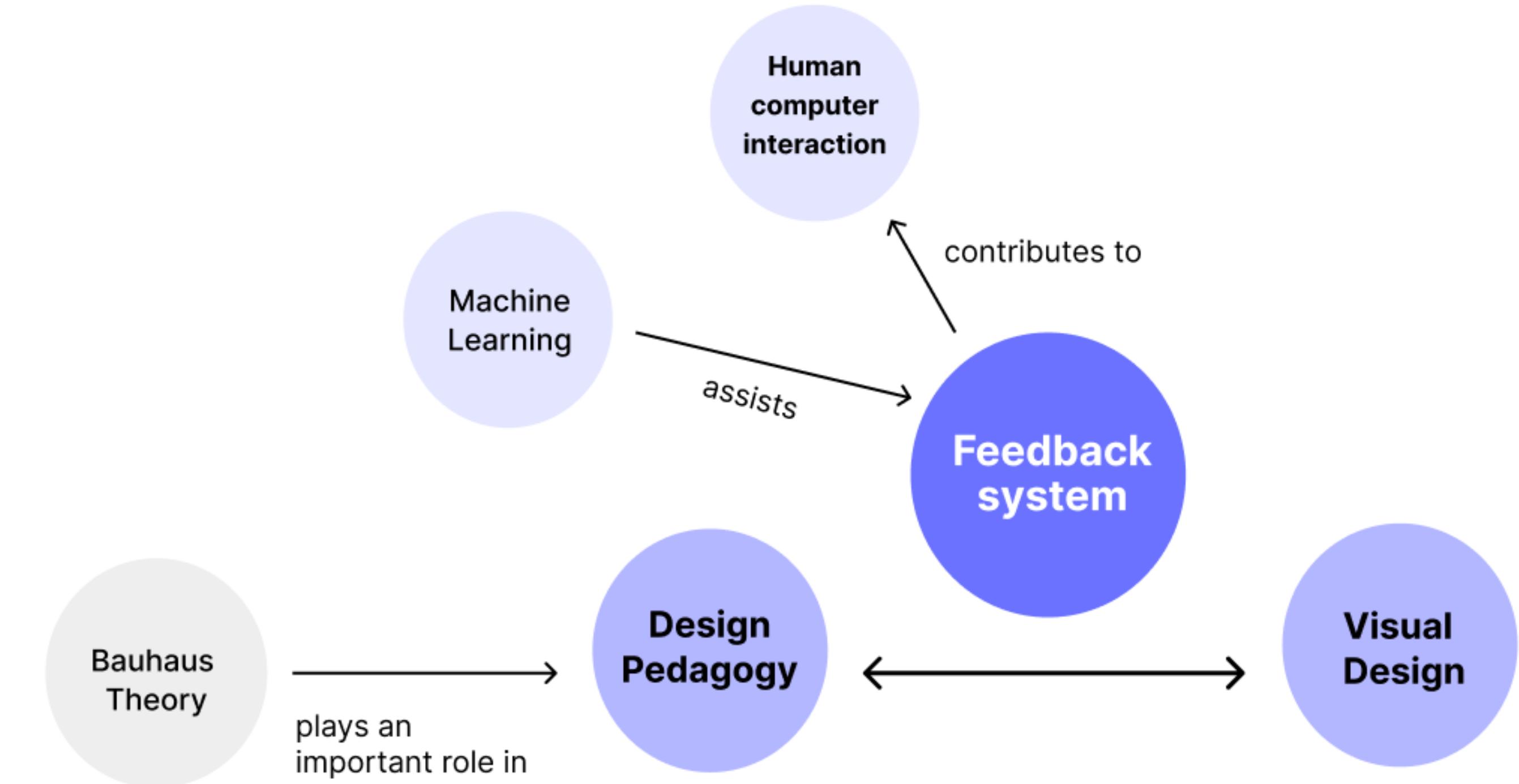
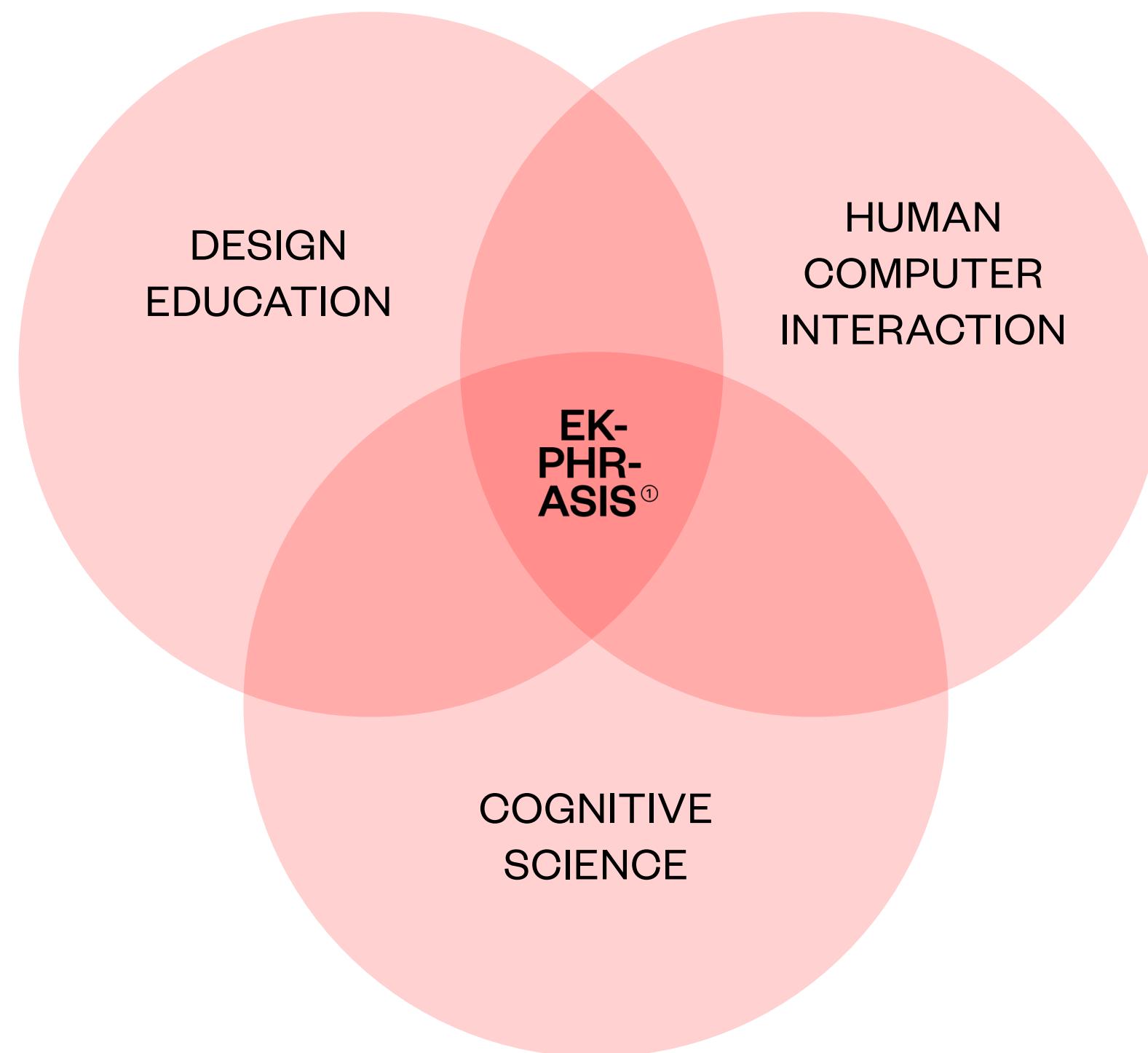
## New Requirements in Design Education

- Enhanced linguistic proficiency
- Sophisticated verbal-visual translation abilities
- Abstract language comprehension and interpretation
- Conversion of conceptual feedback into design solutions

## PROBLEM STATEMENT

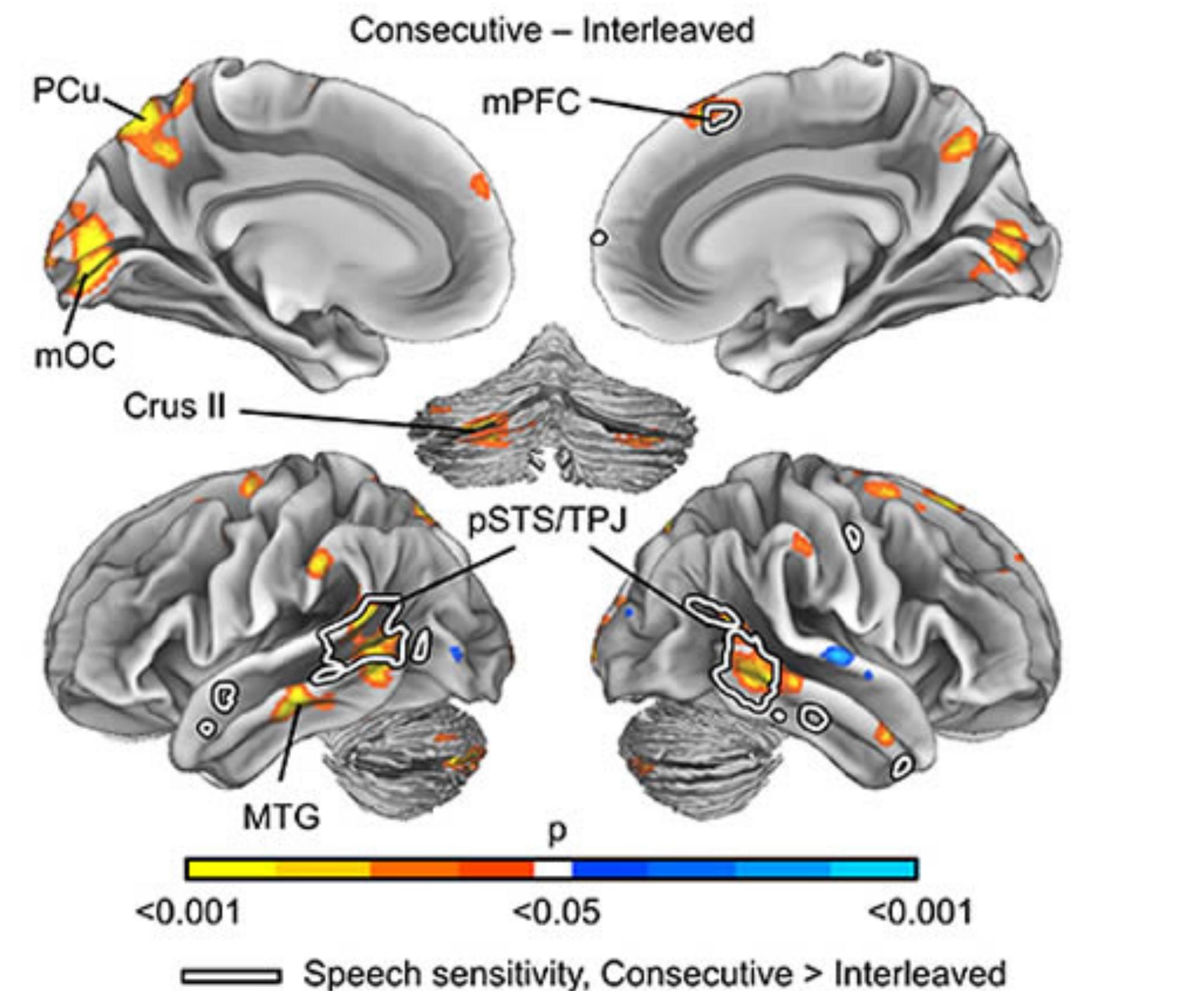
The reliance on **abstract language** in graphic design critiques creates barriers for novice and professional designers, making it difficult to translate feedback into actionable visuals.

# DISPLINARY LINEAGE



# COGNITIVE OVERLOAD DURING CRITIQUE

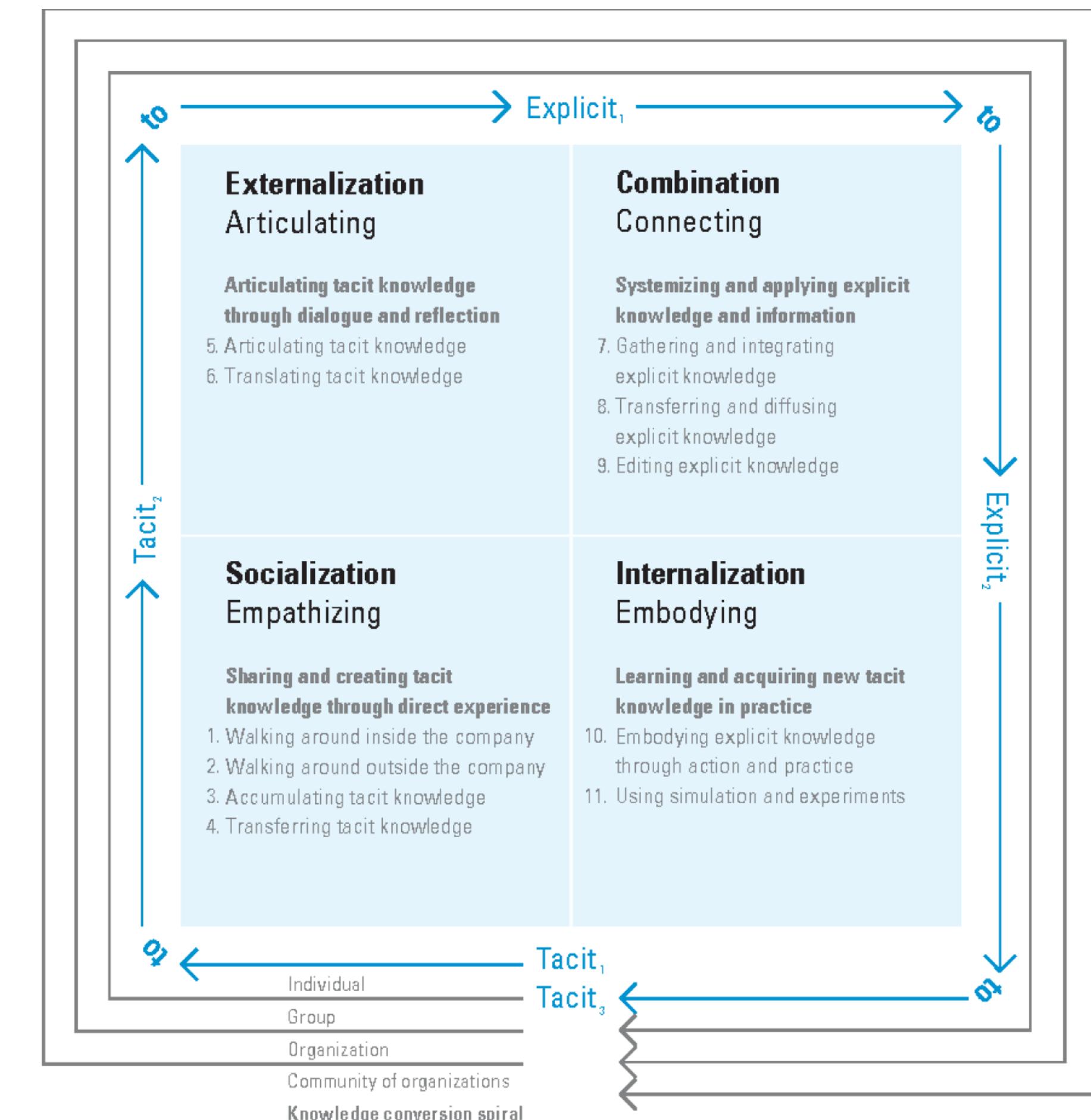
- Processing abstract terms requires extensive contextual analysis
- Multiple thought processes occur simultaneously during critiques
- Design vocabulary is only part of professional discourse complexity
- Both giving and receiving critique involve multiple intricate steps



Credit: Juha Lahnakoski.

# TACIT KNOWLEDGE

- Semantics as a form of tacit knowledge
- Abstract terms embedded in professional practice
- Three key dimensions:
  - Rapid and simultaneous information processing
  - Difficulty in explicitly expressing required skills
  - Complex interconnections between skill sets
- Risk of misinterpretation or obfuscation



Credit: Hugh Dubberly

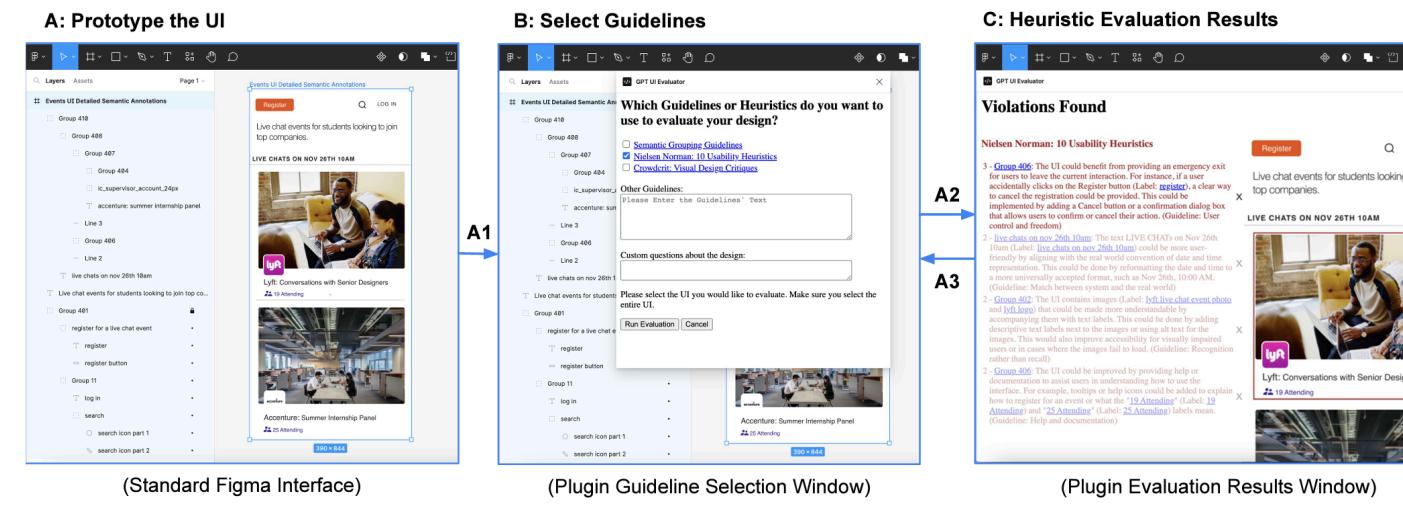
# LEARNING PROCESS CHARACTERISTICS

- Emphasis on "learning by doing"
- Designer requirements:
  - Internalize abstract feedback
  - Extract underlying meanings
  - Incorporate understanding into creative processes
- Gradual learning through immersive, iterative practice
- Absence of universal design terminology "dictionary"

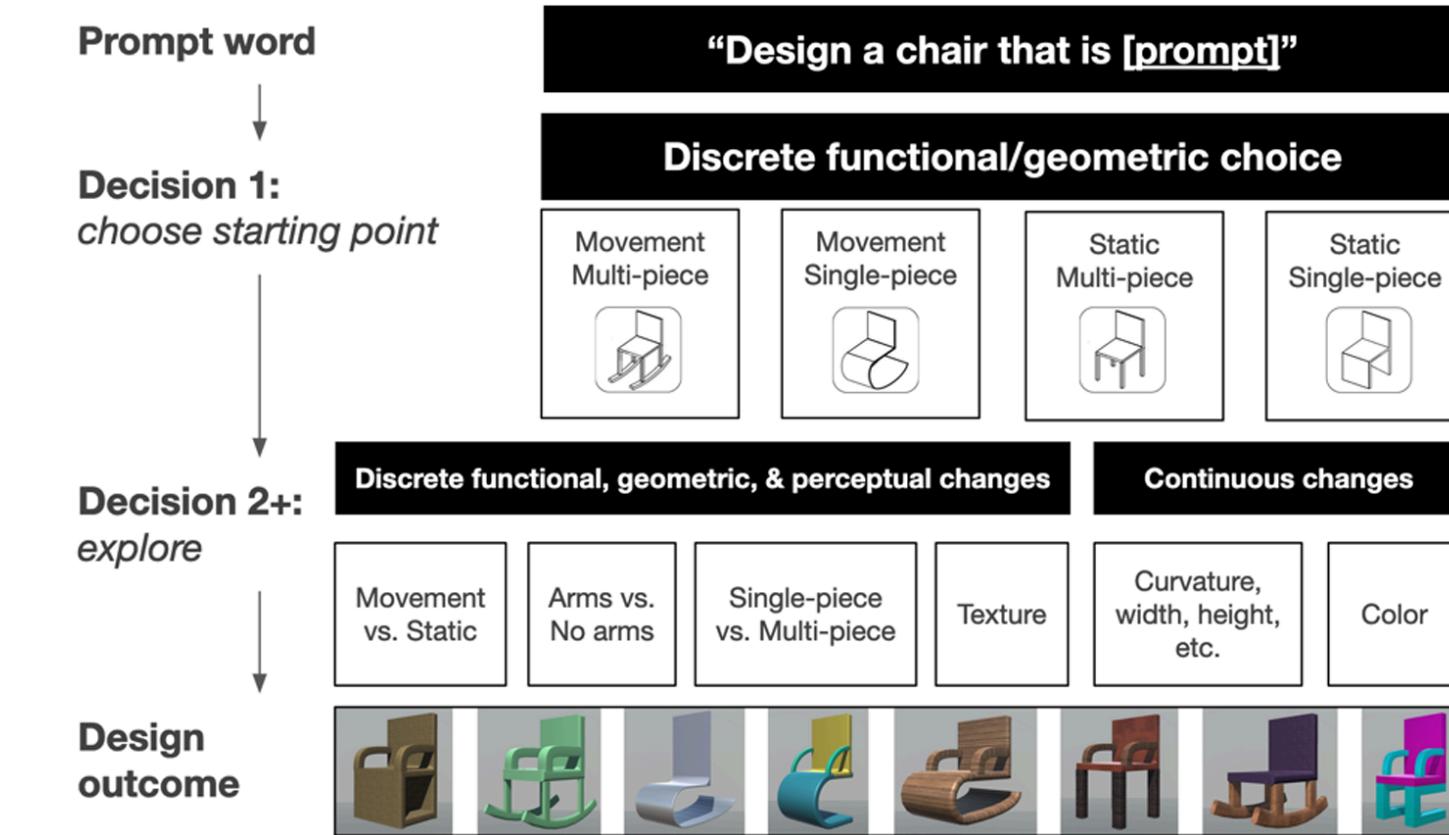


# APPLICATION OF EMERGING TECHNOLOGY

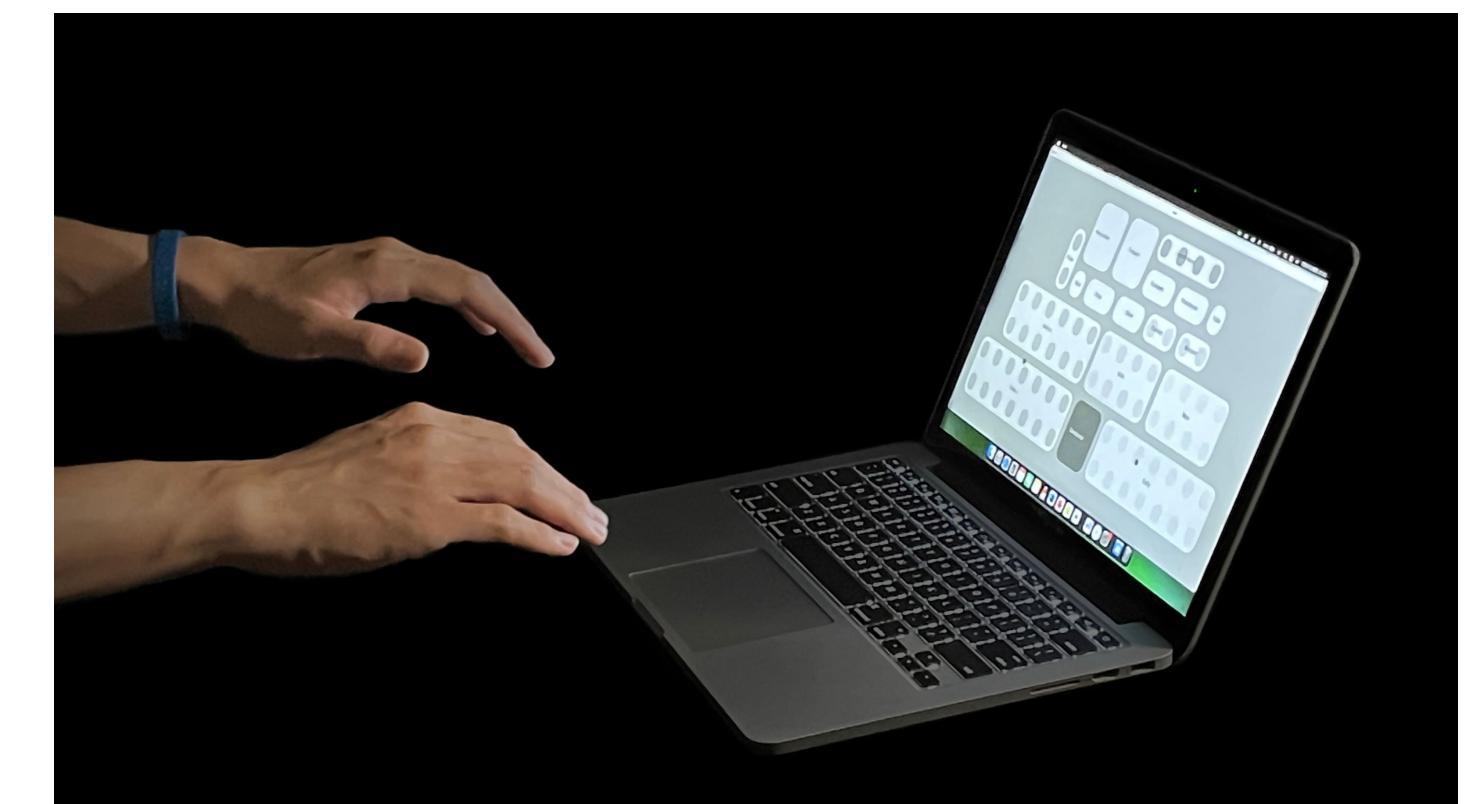
The integration of emerging technologies into design and education, aimed at enhancing feedback mechanisms.



Duan et al. Generating Automatic Feedback on UI Mockups with Large Language Models



Nandy et al. Semantic properties of word prompts shape design outcomes: understanding the influence of semantic richness and similarity



Wei et al. Investigating the Impact of Responsive Feedback on the Experience of Learning to Conduct with *Sympathetic Orchestra*

## UI Design

## Industrial Design

## Music

## EMERGING OPPORTUNITY: A DIGITAL SOLUTION MATTERS

Machine learning offers context-aware feedback that can bridge the gap between tacit and formal knowledge. By harnessing the capabilities of ML, designers can receive precise and nuanced responses tailored to their unique needs, enhancing comprehension and minimizing potential misunderstandings.

## FORMATIVE STUDY

### 11 Professors, Faculty Members, and Researchers

From architecture design, graphic design, cognitive science, computer science, education and mechanical engineering.



Berkeley  
UNIVERSITY OF CALIFORNIA

ArtCenter

EK-  
PHR-  
ASIS®

ROOTS AND RESONANCE

BUILDING THE BRIDGE OF BABEL

ECHOES IN THE STUDIO

SYMPHONY OF TOMORROW

### Prompt Choice Visual Harmony (Harmonious)

1.a. Marked by harmony, agreement, or concord; agreeing, accordant, concordant, congruous; having the parts or elements in accord so as to form a consistent or agreeable whole. 1638-

1638 If contraries shall bee adhivated to a harmonious temper, 'tis the cause of discord.  
T. Whitaker, *Blood of Grape* 6 [...](#)

1643 The..statutes of God..are most constant and most harmonious each to other.  
J. Milton, *Doctrine Divorce* 33 [...](#)

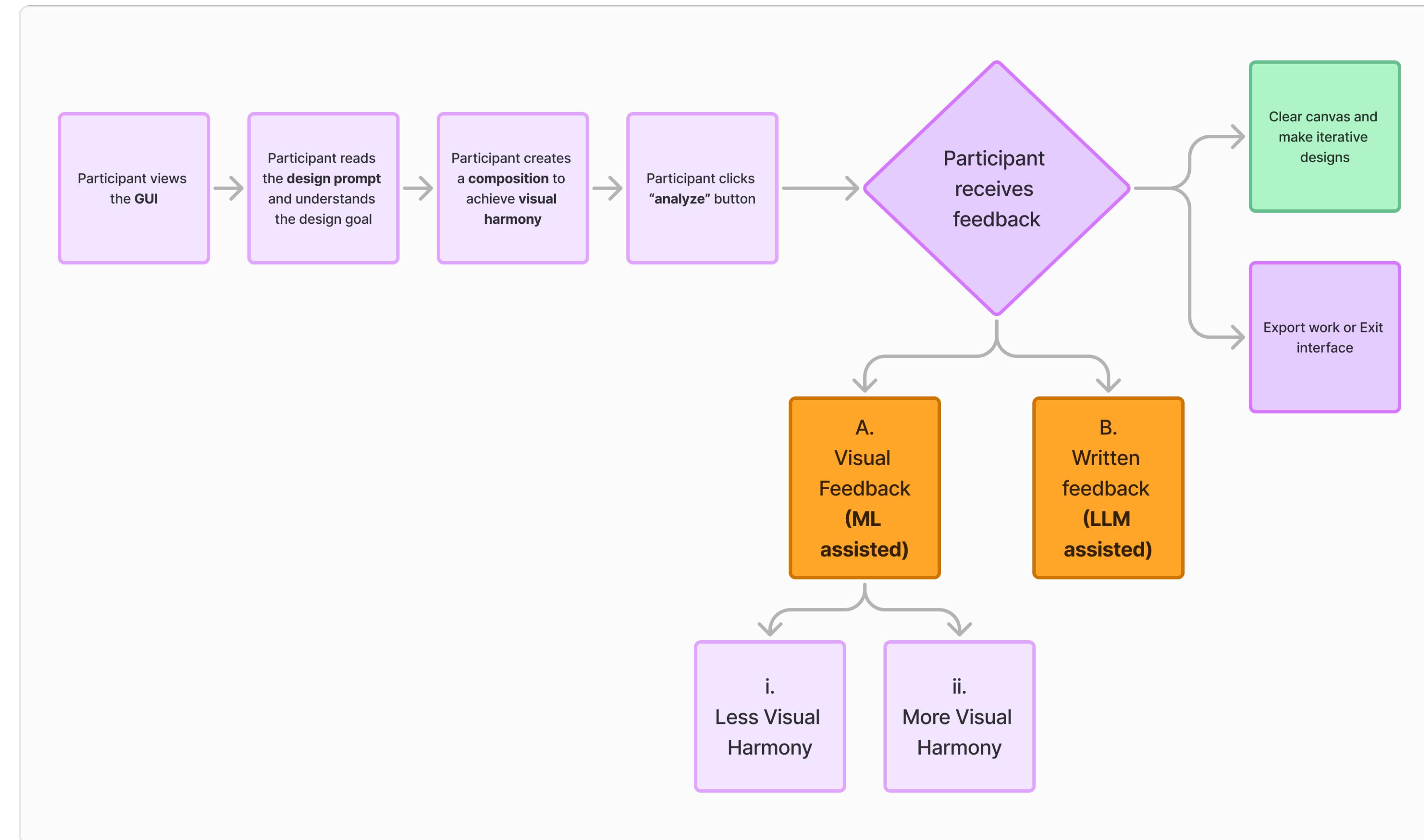
1753 A..harmonious order of architecture in all its parts.  
W. Hogarth, *Analysis of Beauty* viii. 40 [...](#)

1804 Th' ethereal curve of seven harmonious dyes.  
J. Grahame, *Sabbath* 816 [...](#)

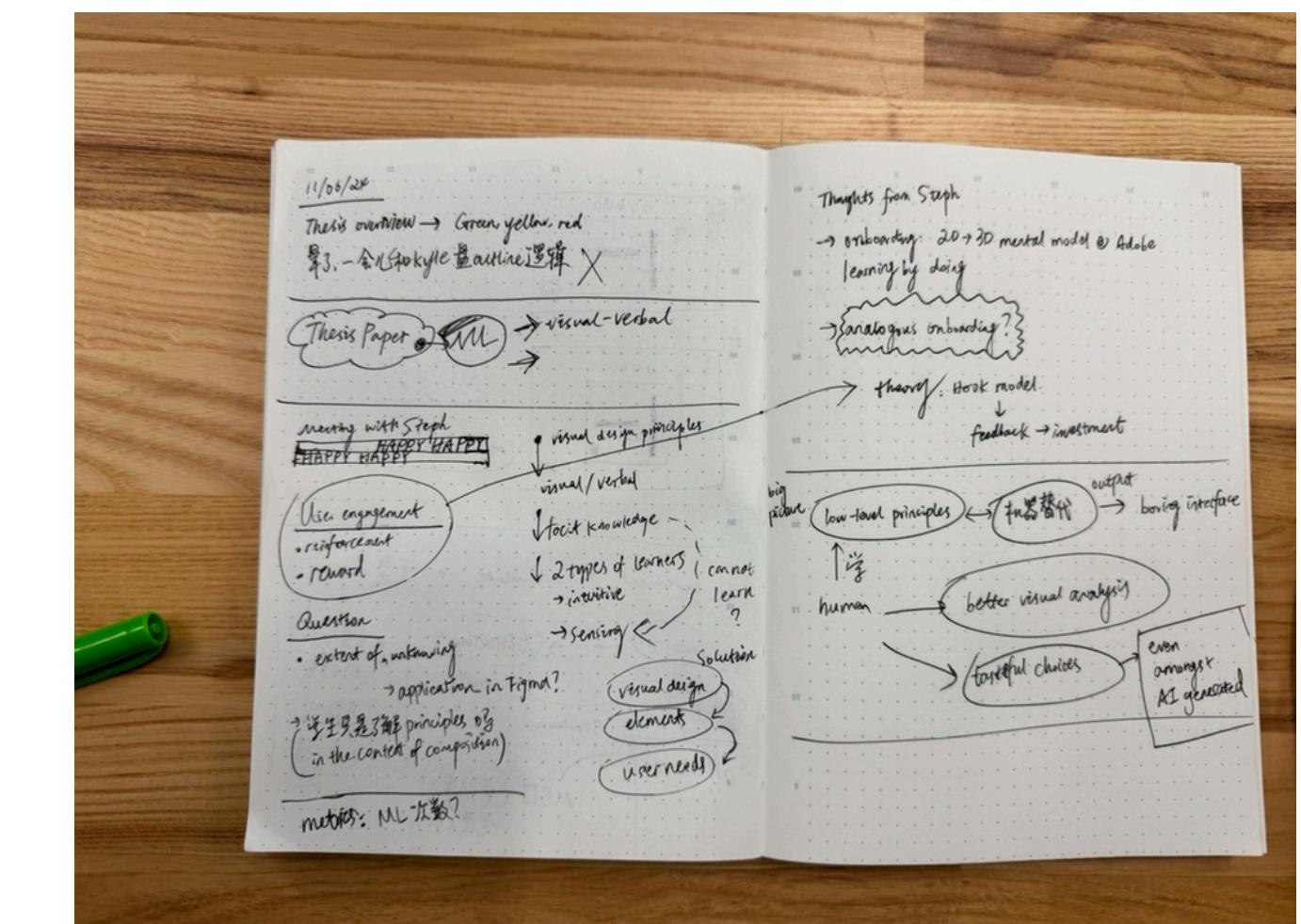
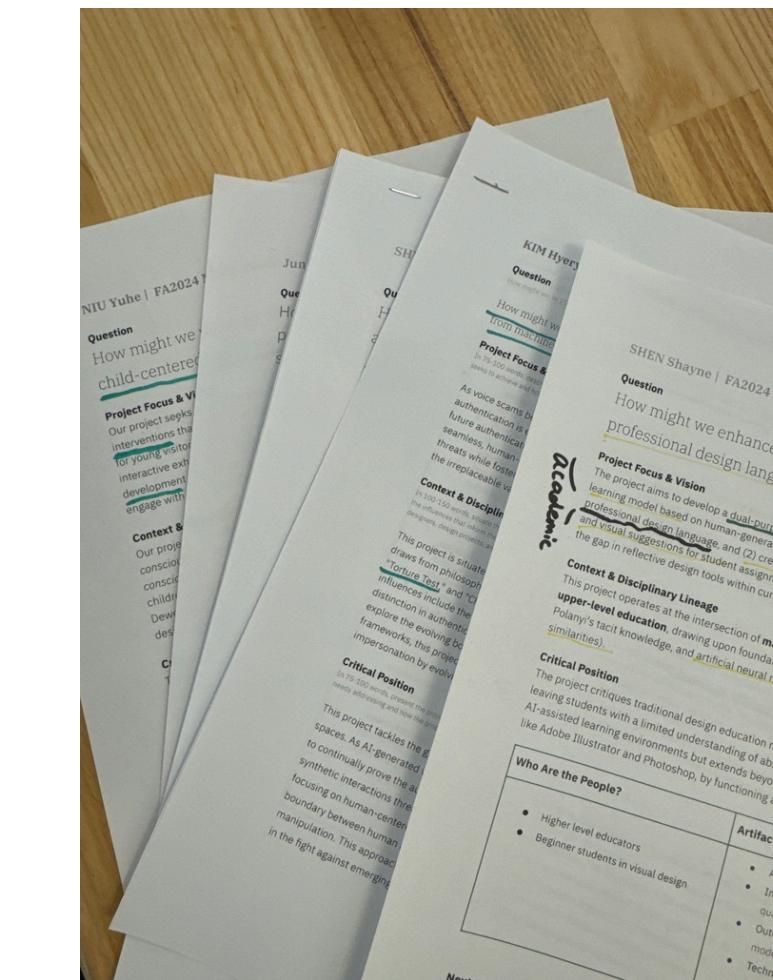
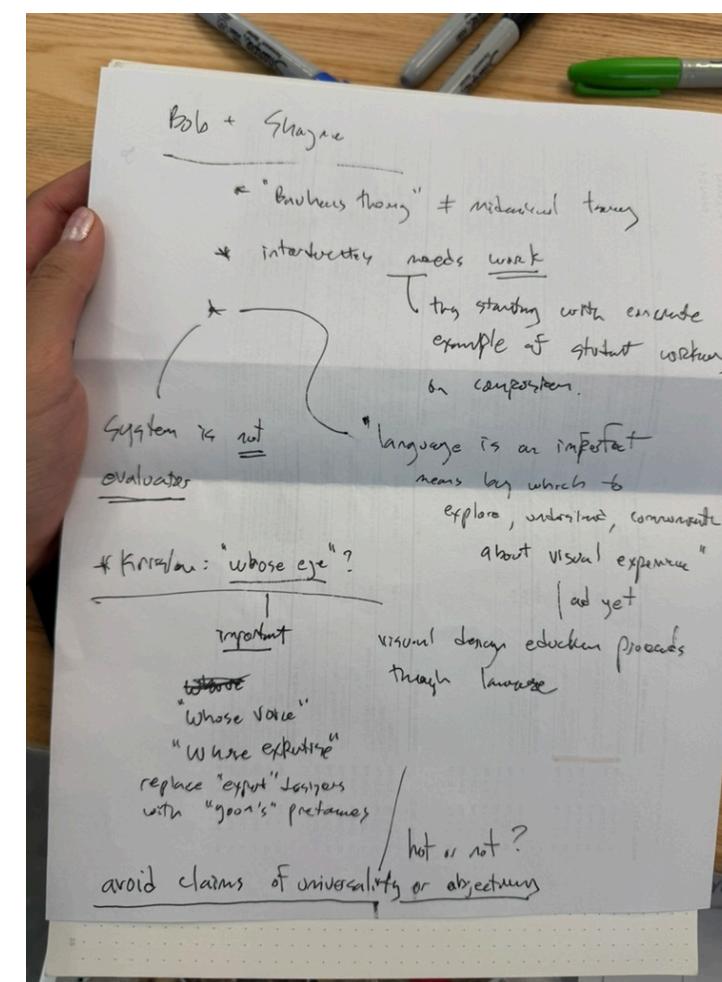
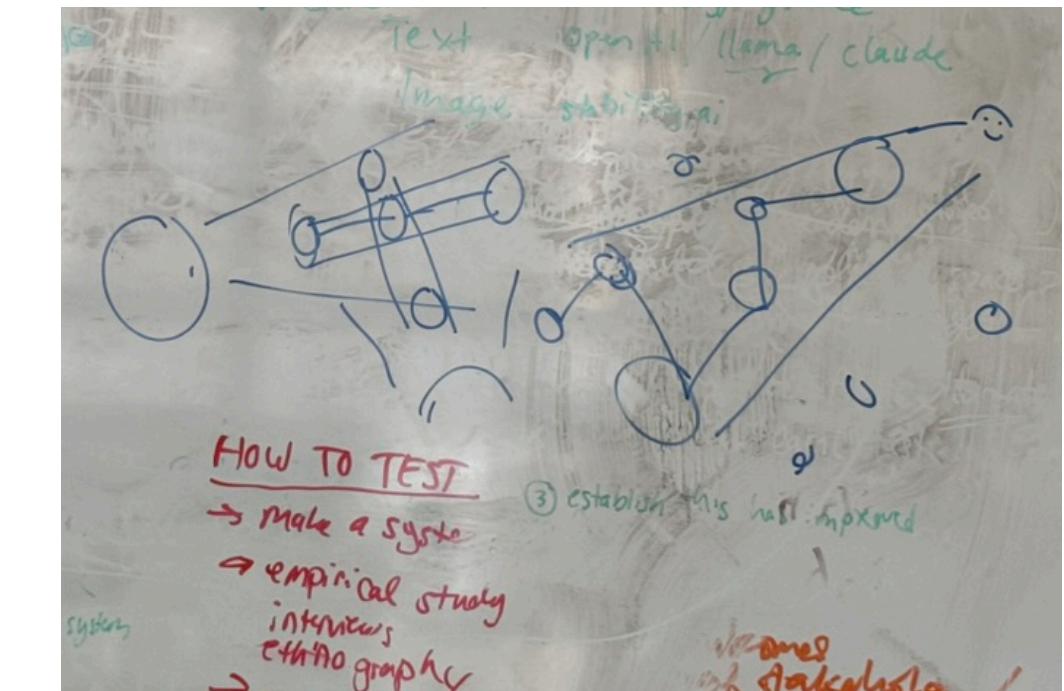
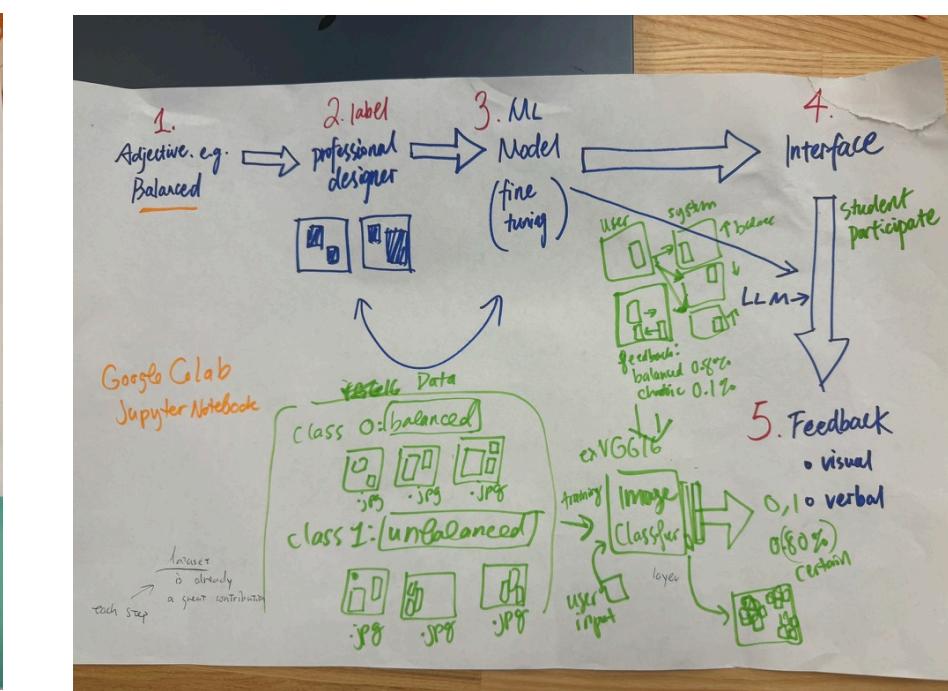
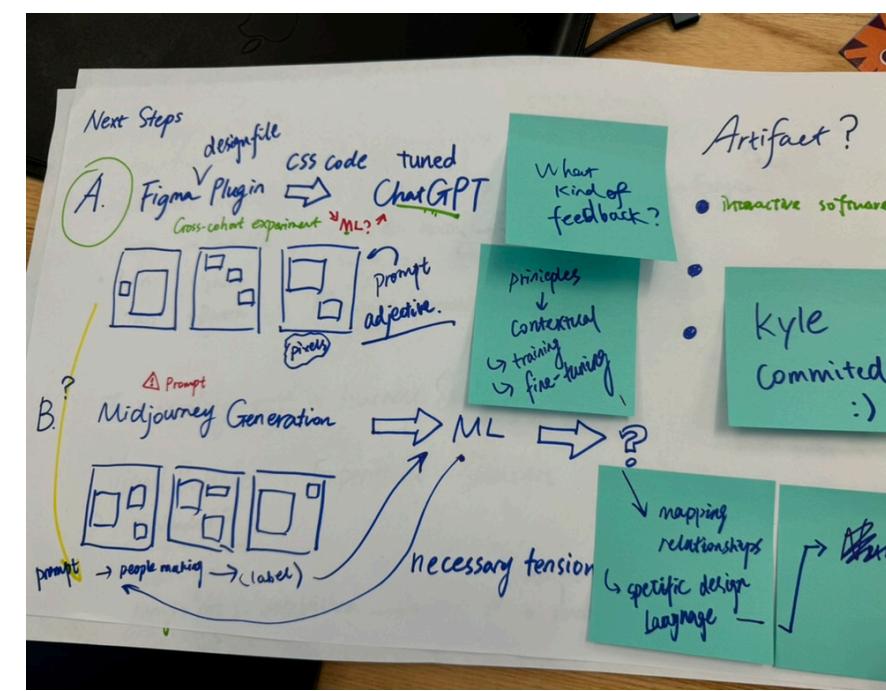
1819 The very difference in their characters produced an harmonious combination.  
W. Irving, *Sketch Book* i. 42 [...](#)

[“ Cite](#) [Historical thesaurus ▾](#)

# SYSTEM DESIGN AND DEVELOPMENT

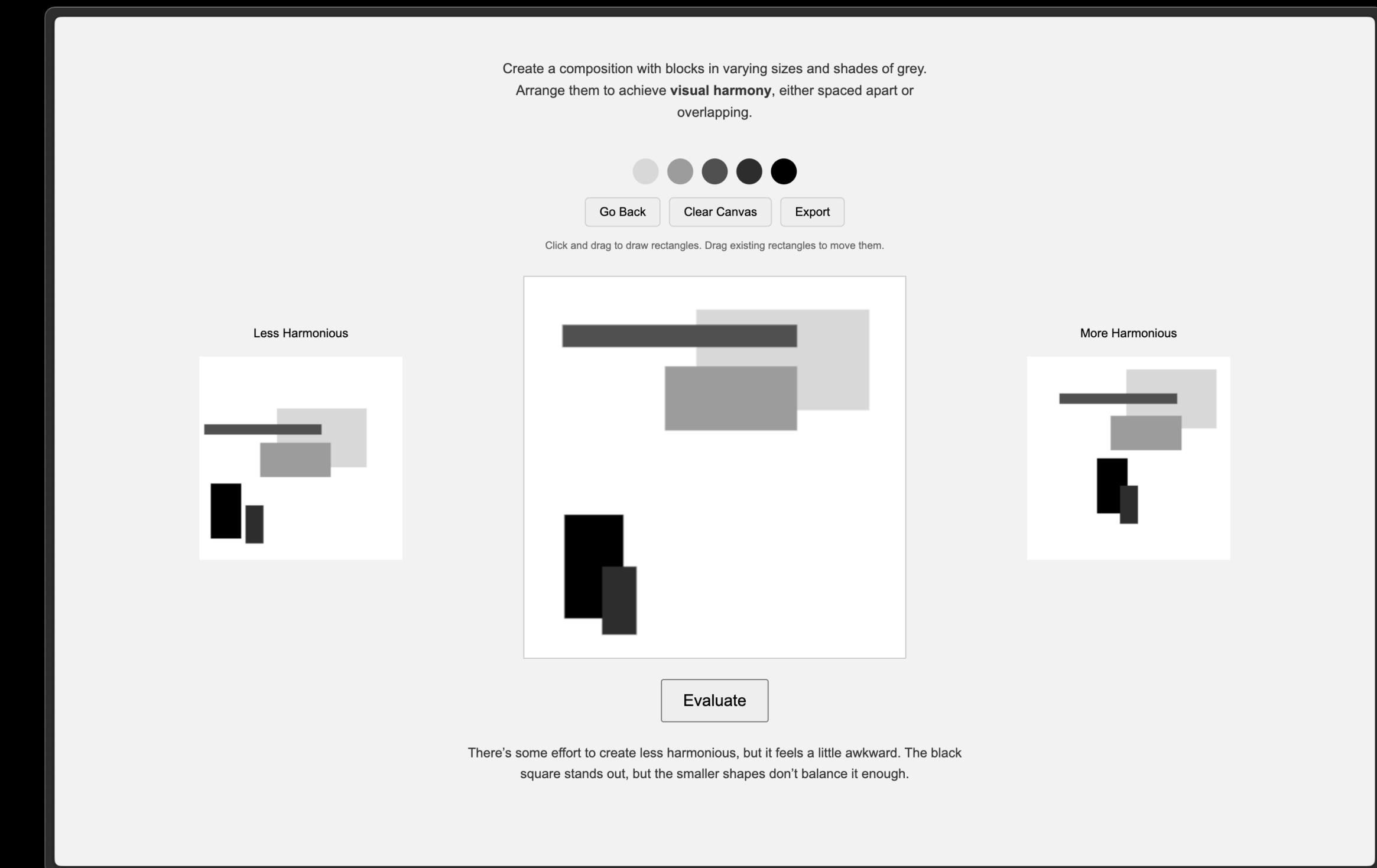


# DESK STUDY & WEEKLY ADVISORY SESSION



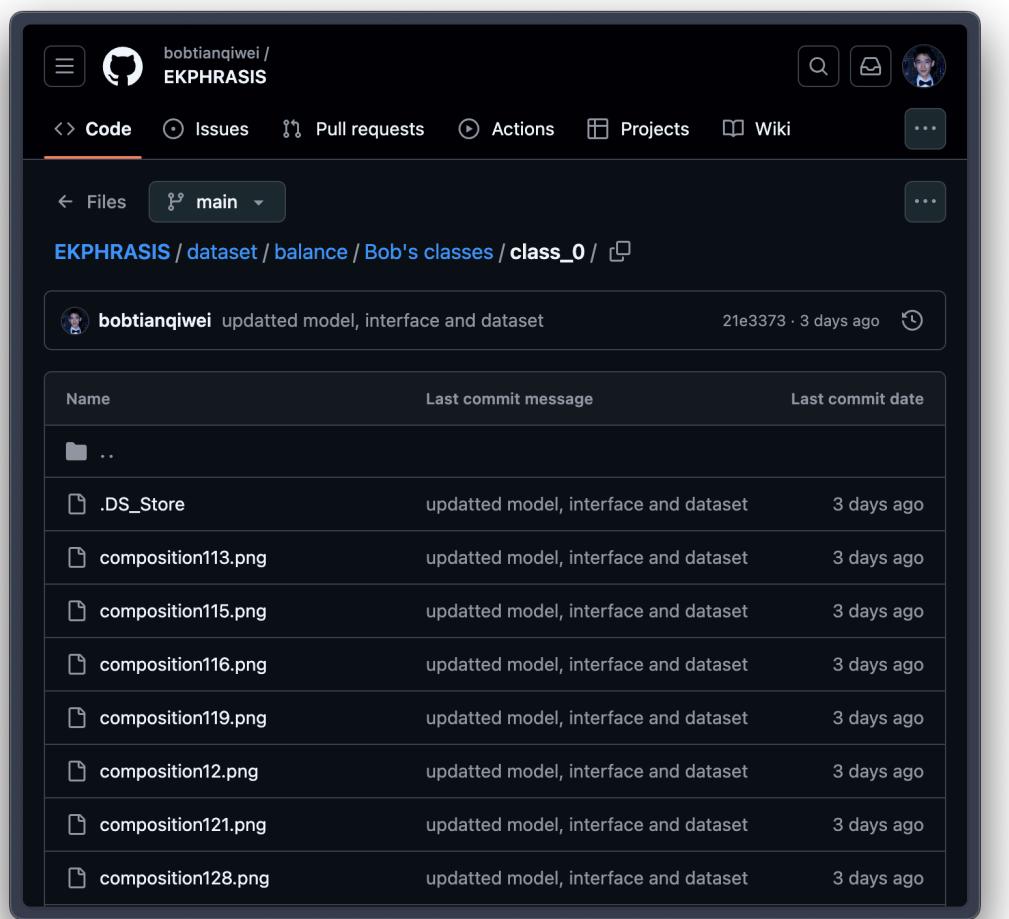
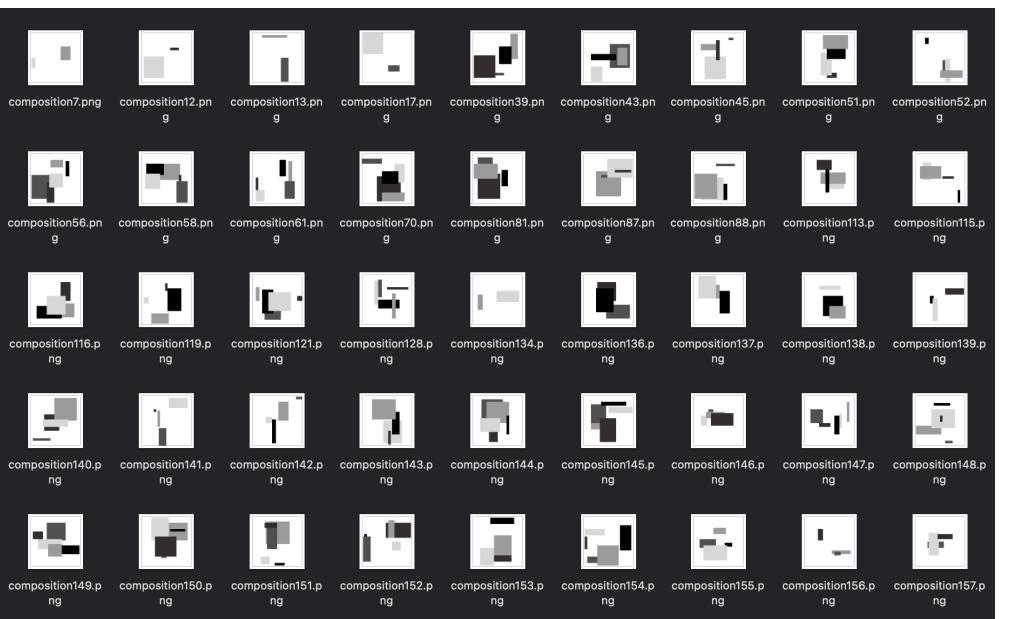
# EKPHRASIS SOLUTION

- AI-powered interactive digital interface
- Provides visual references and written feedback
- Uses blocks in compositional studies
- Features minimalistic interface to reduce cognitive load



# MACHINE LEARNING MODEL & DATASET

- Load the VGG16 model without the top classification layers, keeping only the feature extraction part.
- Freeze these layers to retain their pre-trained knowledge.
- Add new layers: a flatten layer, a dense layer with 128 neurons, and an output layer with 1 neuron using a sigmoid function for binary classification.
- Split the dataset randomly into 80% for training and 20% for validation to evaluate the model's performance.
- Train the model for ten epochs and monitor validation performance to find the best-performing model.
- After training, the model outputs the probability that a new image belongs to class\_1 (if  $>0.5$ ) or class\_0 (if  $<0.5$ ).



Dataset

```
# Load the pre-trained VGG16 model without the top classification layer
base_model = VGG16(weights='imagenet', include_top=False, input_shape=(224, 224, 3))

# Freeze the convolutional layers of VGG16 to prevent them from being updated during training
for layer in base_model.layers:
    layer.trainable = False

# Add custom classification layers
x = base_model.output
x = Flatten()(x) # Flatten the feature maps
x = Dense(128, activation='relu')(x) # Fully connected layer
predictions = Dense(1, activation='sigmoid')(x) # Output layer with sigmoid activation for binary classification

# Define the new model
model = Model(inputs=base_model.input, outputs=predictions)

# Compile the model
model.compile(optimizer=Adam(), loss='binary_crossentropy', metrics=['accuracy'])

# Display the model architecture
model.summary()

Model: "functional"
Layer (type)          Output Shape         Param #
input_layer (InputLayer)   (None, 224, 224, 3)       0
block1_conv1 (Conv2D)      (None, 224, 224, 64)     1,792
block1_conv2 (Conv2D)      (None, 224, 224, 64)     36,928
block1_pool (MaxPooling2D) (None, 112, 112, 64)      0
block2_conv1 (Conv2D)      (None, 112, 112, 128)    73,856
block2_conv2 (Conv2D)      (None, 112, 112, 128)    147,584
block2_pool (MaxPooling2D) (None, 56, 56, 128)      0
block3_conv1 (Conv2D)      (None, 56, 56, 256)     295,168
block3_conv2 (Conv2D)      (None, 56, 56, 256)     590,080
block3_pool (MaxPooling2D) (None, 28, 28, 256)      0
block4_conv1 (Conv2D)      (None, 28, 28, 512)     1,188,160
block4_conv2 (Conv2D)      (None, 28, 28, 512)     2,359,080
block4_pool (MaxPooling2D) (None, 14, 14, 512)      0
block5_conv1 (Conv2D)      (None, 14, 14, 512)     2,359,080
block5_pool (MaxPooling2D) (None, 7, 7, 512)       0
```

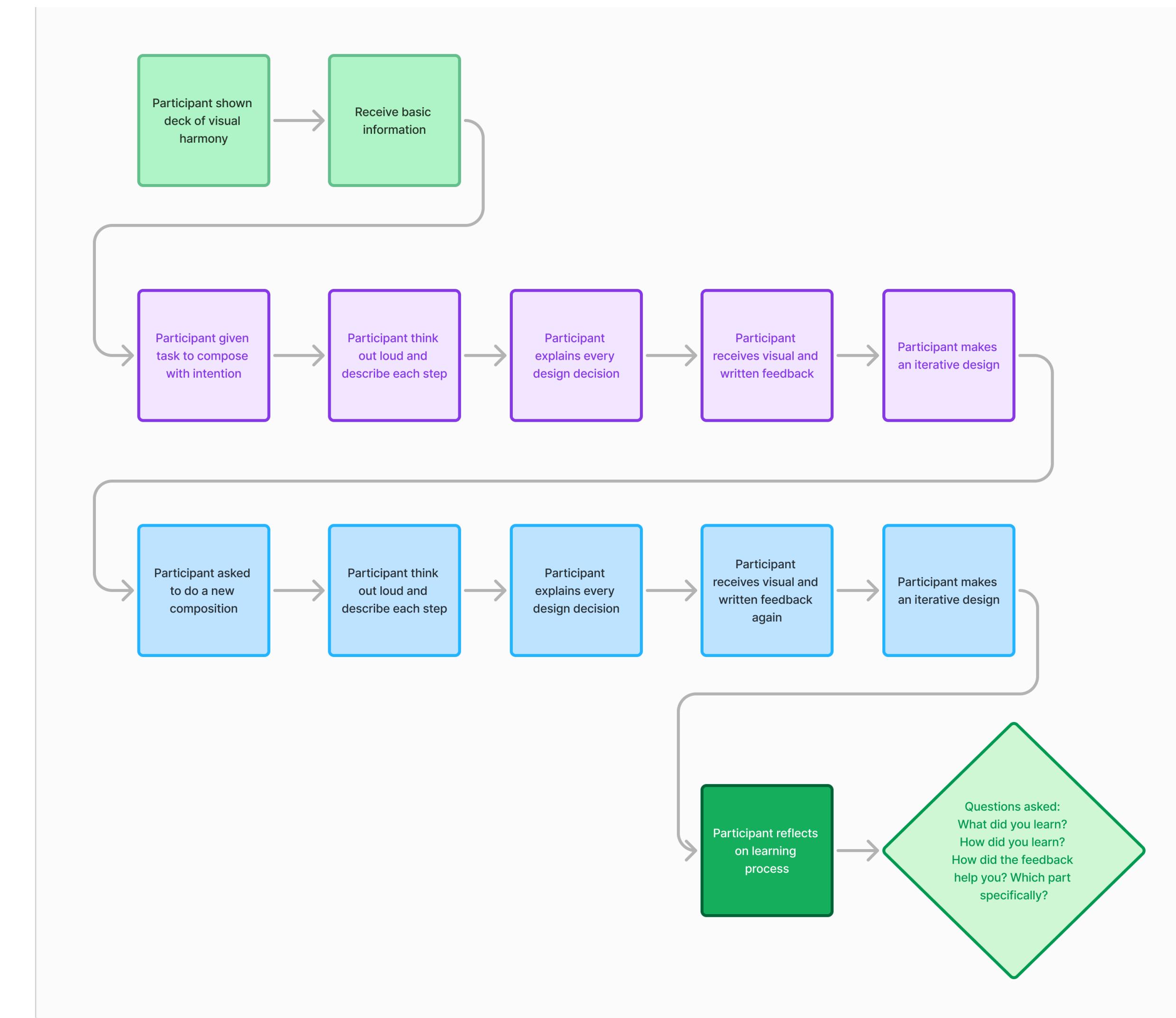
ML model

[github.com/bobtianqiwei/EKPHRASIS](https://github.com/bobtianqiwei/EKPHRASIS)

# EMPIRICAL STUDIES

## RESEARCH QUESTIONS

- What are the impacts of structured visual and written feedback on novice designers' comprehension of abstract terms like "visual harmony"?
- How does iterative reflection and articulation influence skill acquisition and professional discourse in design education?



## KEY FINDINGS

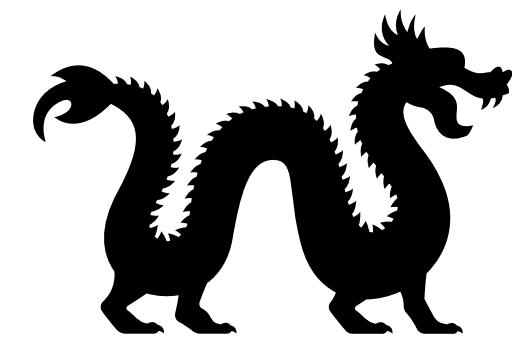
- Improved performance in second-round compositions (from expert evaluation)
- Enhanced understanding of abstract concepts through reflection
- Numerical scoring system found counterproductive
- Participants showed deeper engagement with terminology

## NEXT STEPS



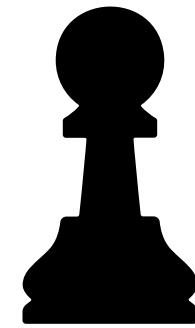
- Broader user interaction possibilities
- Chess-like interaction model for strategic engagement
- Potential for interactive critique sessions
- Need for expanded dataset and professional designer input
- Adjustment of prompt

## FUTURE APPLICATIONS



- Design education/ remote education / democratize critique
- Professional training /Industry collaboration
- Customizable feedback/Multilingual support
- Cognitive science research
- Cultural adaptation

## LIMITATIONS AND CHALLENGES

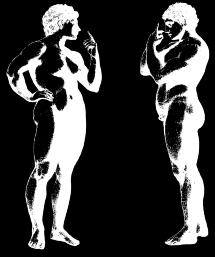


- Dataset size and diversity constraints
- Machine learning models' struggle with context
- Cultural and subjective design elements difficult to quantify
- Need for more diverse data and context-aware algorithms

## RETHINKING AI'S ROLE IN DESIGN



- Balances technical standards with creative needs
- Highlights importance of human judgment and creativity
- Questions AI's capability to develop "taste"
- Emphasizes need for human-centered design approach



# THANK YOU



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