Disguising the National as International: The Design Strategy of the Argentine Furniture Firm Buró

Researcher: Eliana Kim (Seoul National University)

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報告人：D011430001 李淨慈
報告時間：114年11月5日10:00-10:30

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Author Biography

Eliana Kim (Seoul National University)

Confluencias del «buen diseño» en centros disímiles de diseño: un análisis comparativo del KDPC de Corea y el CIDI de Argentina

Reinaldo Leiro (1930-2016)

烏爾姆造型學院 **(Hochschule für Gestaltung Ulm)**，曾於**1953**年至**1968**年間存在。就讀於第三任校長 **Tomás Maldonado**期間。

2010年布宜諾斯艾利斯大學 **(UBA)** 授予他榮譽教授。

1. Introduction

In a Market that Devalued the Local, How Did a National Brand Thrive for 50 Years?

Founded in 1963, Buró was a national Argentine design firm facing a monumental challenge. It had to compete in a landscape dominated by prestigious international brands like Herman Miller and Knoll, whose licensed products were seen as the gold standard. The core obstacle was overcoming a deep-seated cultural preference for foreign goods and the stigma of the 'Made in Argentina' label—a bias so strong that clients would ask founder Reinaldo Leiro to remove the stickers from the furniture.

2. A Nation Pulled in Two Directions

Economic Volatility

1930s-1974

Protectionist policies (Import Substitution Industrialization) foster national SMEs like Buró.

Post-1976

A military coup ushers in neoliberalism, opening the market to foreign imports and creating intense competition and instability.

Cultural Bias

The deep-rooted “Civilization vs. Barbarism” concept equated European influence with quality and progress.

> “...Argentine identity has juxtaposed ‘civilization,’ associated with European influence, against ‘barbarism,’ tied to indigenous Creole culture...”

3.

If You Can’t Beat Them, Look Like Them.

Instead of fighting the market’s preference for foreign goods, Buró brilliantly adapted. Their core strategy was to **disguise the national as international**. They meticulously crafted a brand identity that appeared European, allowing them to compete on a level playing field with global giants.

Büro → Buró

German for “office”

A localized adaptation; a quiet nod to its Argentine roots.

4. Pillar 1: Crafting a European Persona.

1. **The Name:** Choosing “Buró,” derived from the German word for office, immediately gave the brand an international, functionalist feel.
2. **The Look:** The logo and advertisements were heavily influenced by the minimalist Swiss design movement (*Die Neue Typographie*), projecting sobriety, elegance, and durability.
3. **The Message:** Advertisements intentionally omitted the phrase “Industria Argentina” and mirrored the clean, grid-based visual style of their main rivals, Knoll and Herman Miller.

Buró

Interieur Forma (Knoll)

Colección (Herman Miller)

Our clients believed that we imported our designs.

Most of them bought our designs for more than ten years with that belief.

— Eduardo Simonetti, Buró Designer

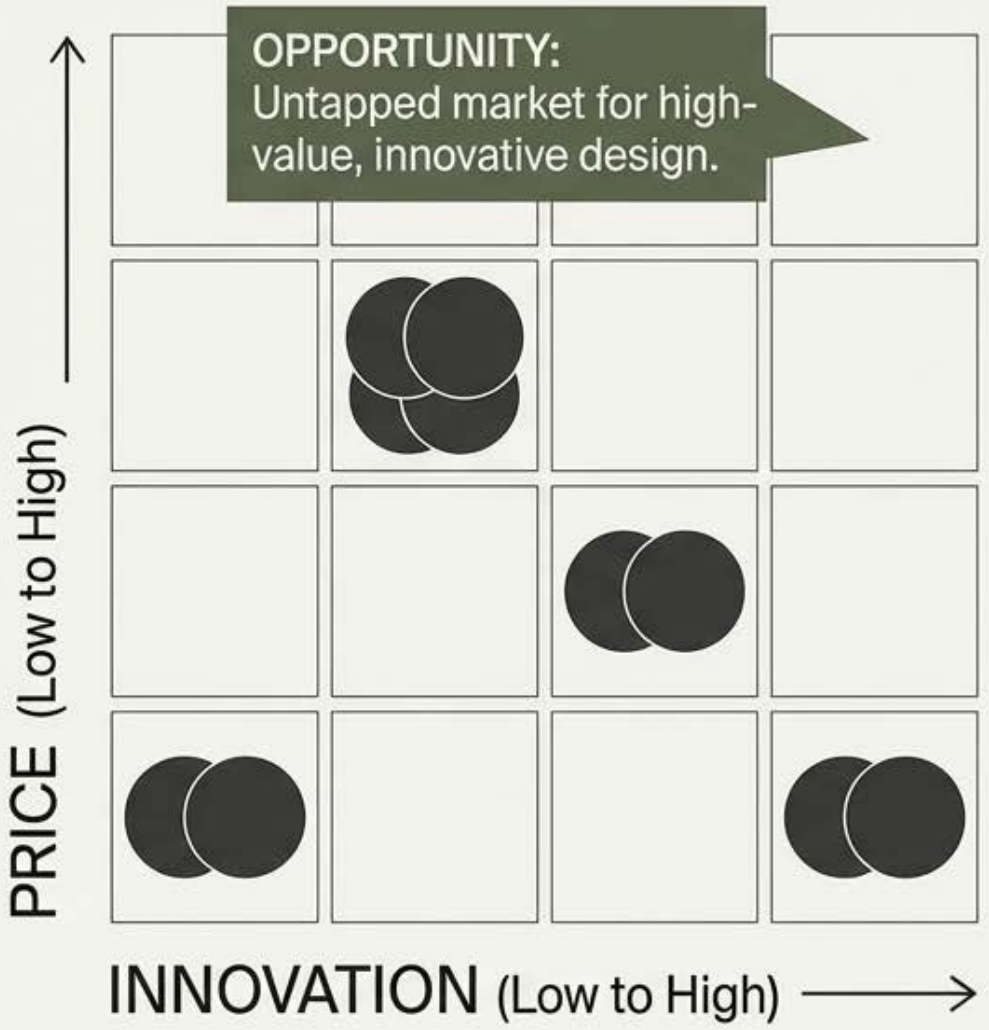
Founder Reinaldo Leiro noted that his clients would often ask him to **‘take “made in Argentina” stickers off’** the furniture.

5. Pillar 2: Mapping the Market to Outsmart the Competition.

Buró employed a proprietary strategy developed by founder Reinaldo Leiro: "Counter-Design" (Contra-diseño). This was a systematic market analysis, not just a design philosophy.

The process involved creating a value-pair map to graphically position competitor products based on variables like price and innovation.

This tool allowed Buró's designers to instantly identify weaknesses and underserved gaps in the market.



6. The Result: Designing for the Opportunity.

The Rolo armchair (1968) is a prime example of Counter-Design in action. Its novel form, featuring curved chrome steel tubes and upholstered cylindrical modules, was an innovative solution that filled a gap competitors had missed. It became a huge commercial success, popular in both modern offices and domestic settings.

7.

Pillar 3: Turning Limitations into Strengths

Buró's national status gave it a key advantage over international licensees: flexibility. While competitors were locked into rigidly reproducing foreign models, Buró could:

- Adapt designs to local materials and manufacturing realities.
- Create highly modular and customizable systems for clients.
- Navigate economic chaos by designing "hybrid" products (part local, part imported) that didn't look like a hybrid.

"...ten years of thinking about the limits of the factual possibilities of an almost non-existent but imaginative furniture industry."

— Arnoldo Gaite, Buró Designer

A System, Not Just a Product.

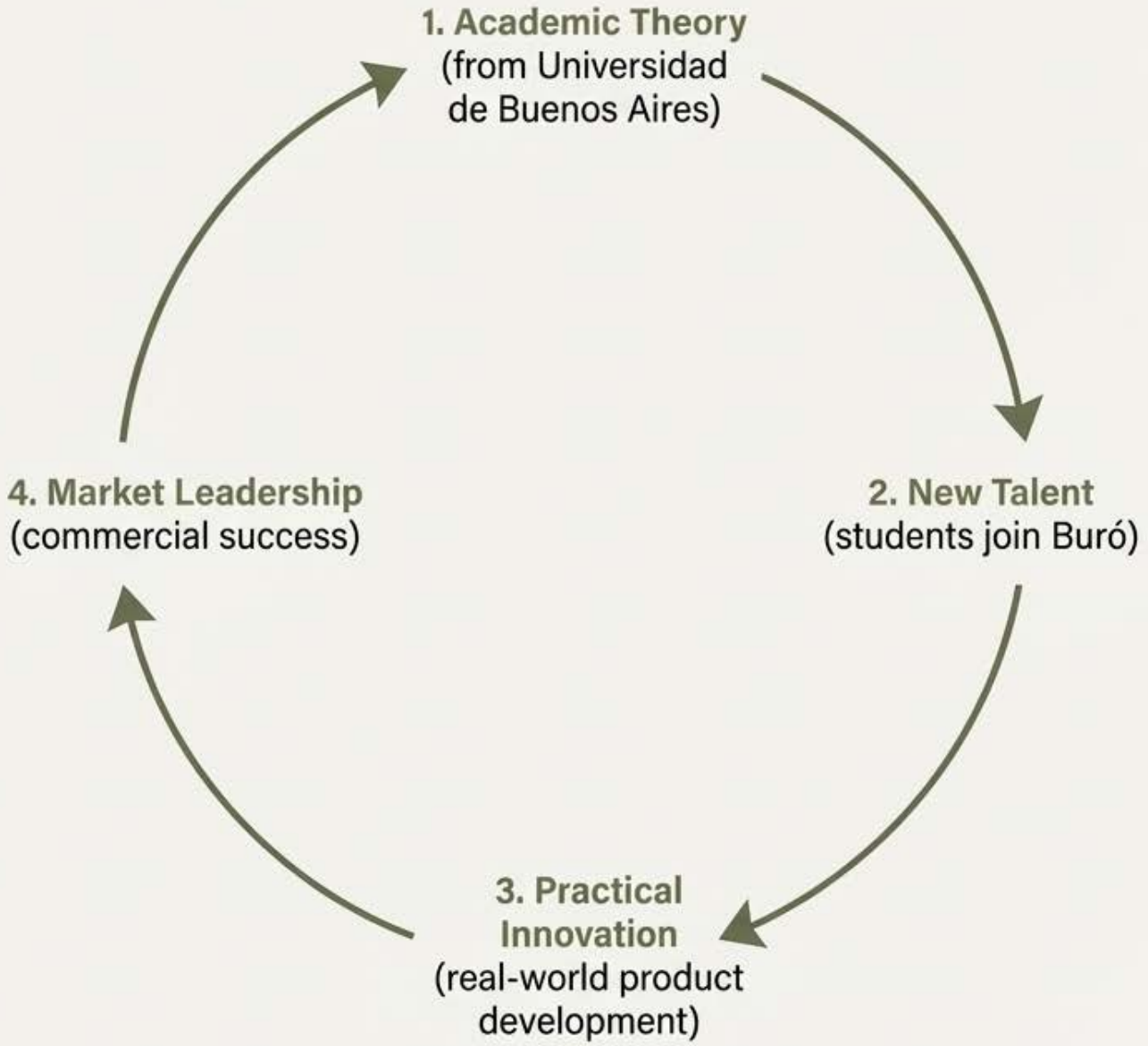
Buró's modular approach, showcased here with the NQ desk line, offered unparalleled adaptability for the modern office. The same core components could be configured in different ways to suit various functions, creating a cohesive furnishing solution across an entire space.

⟶ Standalone Configuration: A simple, individual workspace for reception.

⟶ System Configuration: Core components are joined to create larger, collaborative L-shaped workstations.

A Factory, A Classroom, An Incubator.

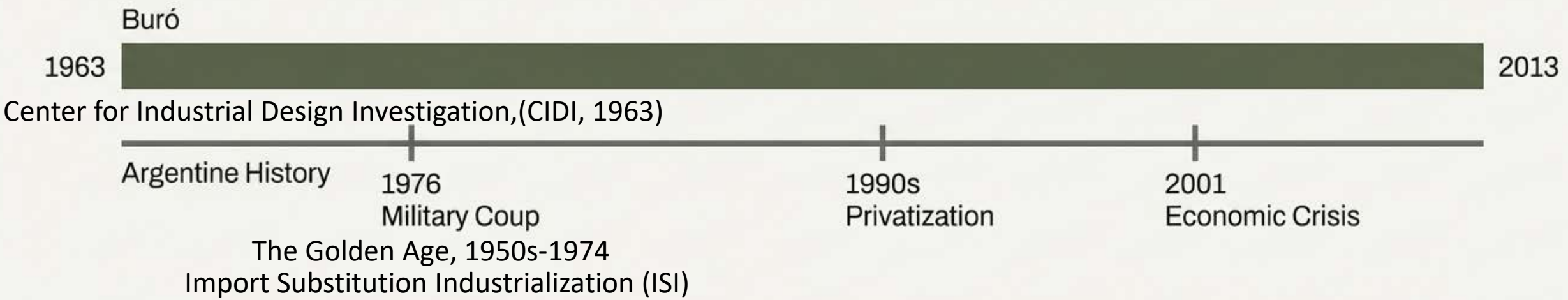
Driven by founder Reinaldo Leiro, a longtime educator, Buró created a unique synergy with Argentina's design schools. This virtuous cycle fed the company with top talent and cutting-edge theory, while Buró provided a real-world laboratory for students to become professionals, applying theory to solve market-driven problems.



Weathering Decades of Storms.

After a remarkable 50-year run, Buró ceased operations in 2013.
Its closure was the result of multiple pressures:

* The devastating 2001 economic crisis.
* Widespread illegal copying of its designs.
* Internal leadership and family business challenges.



From Disguise to Definition

Buró's strategy was so **successful** that it ultimately transformed the very perception it was designed to overcome. The firm proved that "Made in Argentina" could be synonymous with world-class quality, innovative thinking, and a universal, modern aesthetic, helping to redefine and elevate the nation's entire design identity.

8. Lessons from Buró.

Strategic Identity

A brand is a powerful tool. Buró masterfully wielded its identity not just to sell products, but to overcome deep-seated market bias.

Constraint Breeds Creativity

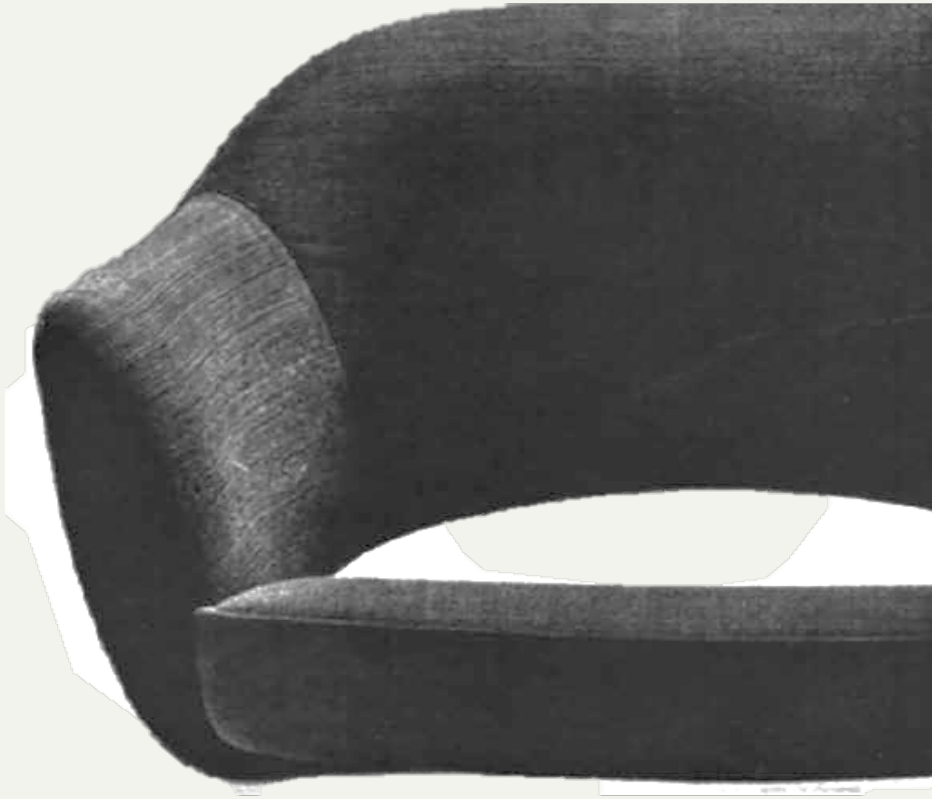
Economic and technological limitations were not obstacles but catalysts. They forced Buró to develop innovative, flexible, and ultimately more resilient design solutions.

Know Your Context

Lasting success requires a profound understanding of the social, cultural, and economic environment. Buró thrived because it adapted to its reality rather than fighting it.

9. Conclusions and Areas for Further Research

Future research should focus on Transnational Design and Methodological Nationalism to provide an in-depth understanding of **Taiwan** design identity.



My presentation is now complete.
Thank you for your attention.

I'd be happy to answer any questions you may have.

Questions & Discussion

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DESIGN STUDIES VOLUMES 97

114-1專題研討

AI as a co-creator and a design material: Transforming the design process

人工智慧作為共同創作者與設計材料：轉變設計流程

Keywords: artificial intelligence, design process, creativity, human-AI collaboration, design education
關鍵字：人工智慧、設計流程、創造力、人機協作、設計教育

報告者：D11430002 李佳蓉
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2025-11-05

Author Introduction

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Researchers focusing on the collaboration between design and artificial intelligence

Research Background and Core Question

- Recent advancements in **Artificial Intelligence (AI)** have created new opportunities for incorporating AI into **creative activities**.
- AI has become an increasingly significant tool in the **design process**, changing **traditional workflows.**
- This study explores AI’s role as both a **co-creator** and a **design material**.
- The **core research question** examines AI's transformation of the **creation stage** (**ideation/evaluation**) from a **psychological, neural-based, and educational** perspective.

Defining the Design Process and Study Scope

- AI refers to **computer systems that reproduce human cognition** by learning from **data** and **statistical models** to recognize patterns and make decisions.
- **Generative AI** is a new category capable of generating seemingly new, meaningful content such as **text, images,** or **audio** from training data.
- The **conventional design process** can be divided into four stages: **Problem-Defining, Ideation, Evaluation, and Final Outcome**

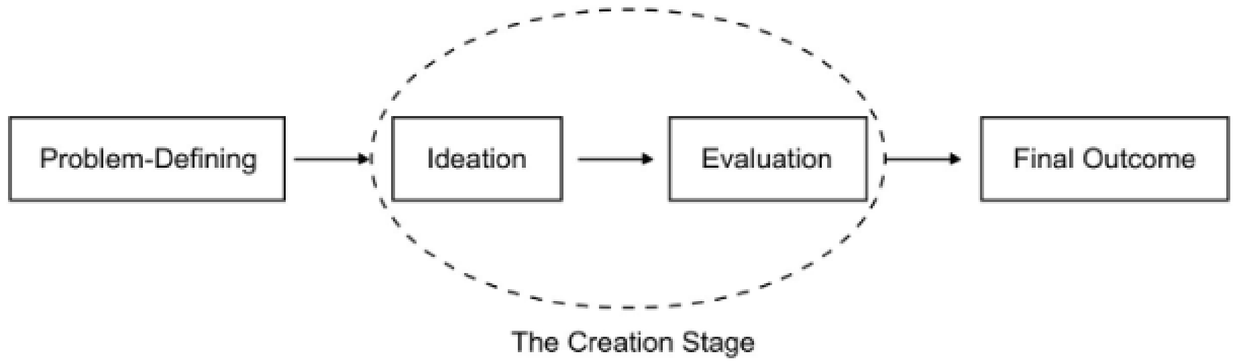


Figure 1 The design process

Note. This figure was created by the author, based on Lazar (2018)

Psychological Foundations (I): Thinking Processes

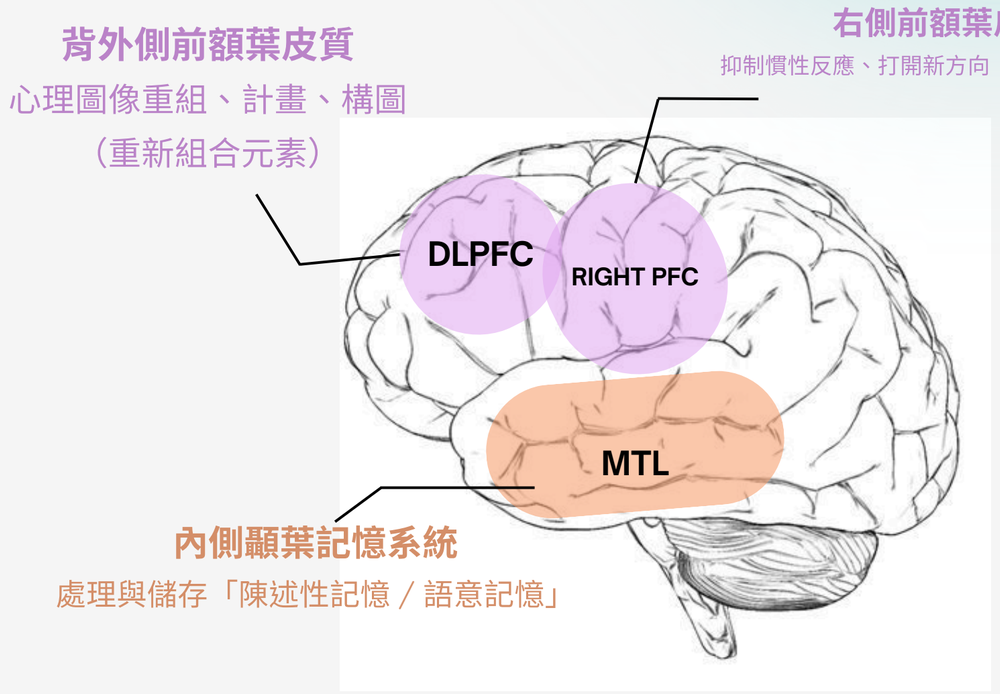
- The main cognitive strategy during the **prototype generation (ideation)** stage is **Divergent Thinking**.
- **Divergent thinking** uses **Analogical Reasoning** to connect present problems with similar past problems, enhancing creativity by **mapping deeper structural connections**.
- The **evaluating outcome** stage involves **Convergent Thinking**, which focuses on **analytical thinking** and **refining ideas into final solutions.**

Psychological Foundations (II): Fixation and Inspiration

- **Design Fixation** is a state where designers **restrict exploration of the design space** due to an **unconscious bias** resulting from **prior experiences or assumptions**.
- Design tools could be developed to provide **diverse stimuli** to encourage **broader exploration** of the design space, supporting designers in **recognizing and overcoming fixation**.
- **Inspirational stimuli** provided to designers facilitate the **retrieval of useful concepts from memory.**
- **Near-field stimuli** (analogy from related domains) have been shown to sustain **a more productive level of ideation** and promote **abstract thought.**

Neural-Based Perspective: Brain Activity

- The **Prefrontal Cortex (PFC)** plays a critical role during the **generative phase of design.** The **right PFC** is particularly important in **creative tasks**.
- The **Dorsolateral Prefrontal Cortex (DLPFC)** is heavily involved in **planning** and **mental imagery**.
- The **Medial Temporal Lobe (MTL)** is activated during **idea generation**, supporting **analogical processing** and **novel idea creation**.
- The **Evaluation stage** activates **prefrontal areas** and the **Default Network,** supporting **analytical assessment** and **emotional evaluation** (the "gut feeling").



AI as Co-creator: Creativity Enhancement

- Integrating **AI** aims to **overcome human limitations** and **enhance capabilities**, optimizing **resource allocation and boosting creativity**.
- AI utilizes the "**random stimulus principle of lateral thinking**" to **disrupt designers' preconceived notions** and **reasoning patterns**.
- This approach effectively counters the **risk of designers becoming fixated** on a **single paradigm.**
- **Generative AI** can produce **novel** and often **unorthodox** design solutions, providing **unexpected visual cues** crucial for **triggering lateral thinking**.

AI as Co-creator: Roles in Idea Development

- AI's potential roles include **Representation Creation**, where AI suggests **texts or images** to **widen design scope** or **trigger design actions**.
- AI acts as an **Empathy Trigger**, supporting **descriptive thinking**, valuable for **building scenarios** and **expanding the scope** of possible design ideas.
- AI serves as **Engagement**, helping designers **learn new insights** and providing **instructions or questions** to help **overcome barriers** and **prevent fixation.**
- **Empirical observations** suggest that **AI-based inspirations** can lead to a **burst of new ideas**, even when **initial stimuli** seem **irrelevant**.

AI as Co-creator: Cognitive Load Management

- **Cognitive load** is the **relative demand** imposed by a particular task in terms of **mental resources required.**
- The use of **AI tools** has resulted in the **AI-assisted group** benefiting from **cognitive off-loading**.
- **AI handles repetitive elements**, thereby **reducing the mental burden** on designers.
- This enables a **more efficient allocation** of designers' **cognitive resources**, which potentially **enhances the overall creativity** and **productivity** in the design process.

AI as Co-Creator: Evaluation and Decision-Making

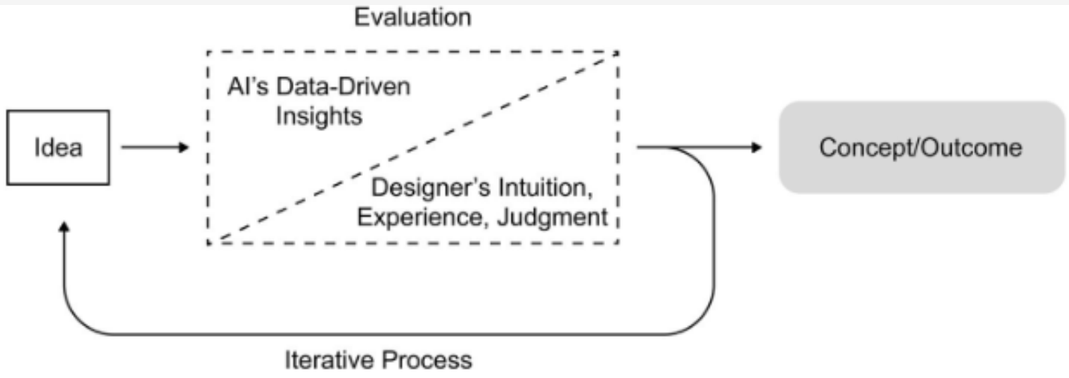


Figure 4 How AI transforms the evaluation and decision-making process.

Note. This figure was created by the author

- **AI enhances evaluation** by processing and combining extensive data sets for rapid assessment and balancing complex design variables.
- AI facilitates heuristic evaluations, providing holistic feedback on usability and user experience.
- **Human-AI symbiosis**: AI handles complexity with analytical methods, allowing humans to address uncertainty using intuition, experience, and creative strategies.

Co-creator Challenges (I): Cognitive Load Paradox

- **AI poses risks of cognitive overload** because it can introduce an **overwhelming amount of information and options, making integration difficult.**
- Designers risk becoming **overly dependent on AI**, leading to a potential loss of **creativity** and **critical thinking skills**.
- **Generative AI,** while **enhancing individual creativity**, was found to reduce the **collective diversity** of novel content (in a writing study), making **stories more similar** to each other.
- Further research is needed to determine whether **AI-generated image inspirations** also lead to a **homogenizing effect**.

Co-creator Challenges (II): Agency and Control

- **AI-generated images** have been observed to **suppress the design team's engagement**, leading to **dissatisfaction** with the AI results.
- Designers often find it **difficult to share control** with AI tools, sometimes feeling that the **AI dominated the design process.**
- In the "**AI without augmented design**" mode, designers may experience a **loss of agency** and feel **less in control**, potentially **lowering innovative thinking**.
- **Mixed-Initiative Co-Creativity (MI-CC)** systems enable **iterative**, **bidirectional exchanges** and use features like **scrutability** and **explainability** to **preserve user agency**.

AI as Design Material: Capability Uncertainty

- Despite **AI's potential**, there is a **notable lack of innovation** in its use as a **design material**.
- A fundamental challenge is that many designers **struggle to comprehend Machine Learning (ML),** often perceiving it as "**black magic**".
- This results in "c**apability uncertainty**," referring to the **ambiguities surrounding the functionalities** of AI systems.
- **Capability uncertainty impedes early ideation**, as designers **cannot easily assess the feasibility** of potential AI applications.

AI as Design Material: Prototyping Difficulties

- "**Output Uncertainty**" complicates how designers **conceptualize the AI system's complex behaviors.**
- **Prototyping AI-infused products** is **cognitively demanding** because prototypes must **reflect the inherent complexity and uncertainty** of AI models.
- Designers frequently use the "**Wizard of Oz" method (human simulation) for prototyping and testing.**
- However, this method risks producing "**fictitious design possibilities**" because it may **fail to capture the technical constraints** of real AI systems.

AI as Design Material: Integration Models

- **A Priori:** The AI model is developed before the design, requiring designers to conform to its requirements.
- **Post-Hoc:** The design is completed first, and the AI model is subsequently built to fit the design requirements.
- **Model-Centric:** The AI model is at the core of the project, requiring close collaboration between designers and AI specialists.
- **Competence-Centric:** Emphasizes the diverse expertise of team members working in parallel and synchronizing their technical and design efforts.

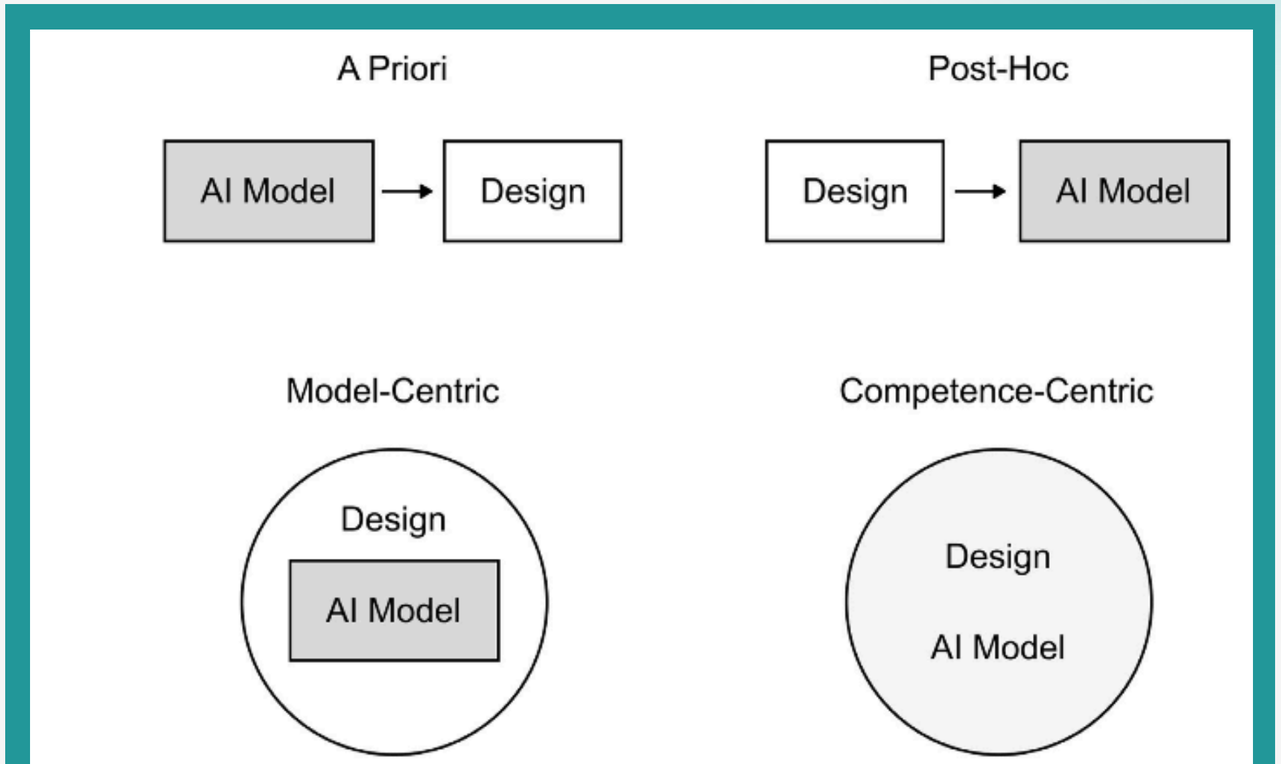


Figure 3 Four approaches to integrating AI in the design process.

Note. This diagram is based on Windl, Feger, Zijlstra, Schmidt and Wozniak (2022)

Educational Reform and Future Research Needs

- **Design education must reform** to equip students with the **skills to effectively use AI** and **recognize its capabilities and limitations.**
- When **AI is a co-creator,** students should be trained as "**Designer Arbiters**," using **advanced critical analysis expertise** to **evaluate and integrate AI outputs**.
- When **AI is a design material**, students should be trained as "**Integrators**," developing **technical knowledge to incorporate AI while managing technical constraints.**
- A **major gap** is the scarcity of neural-based studies (e.g., using brain imaging scans) to fully understand AI's **impact on the brain.**

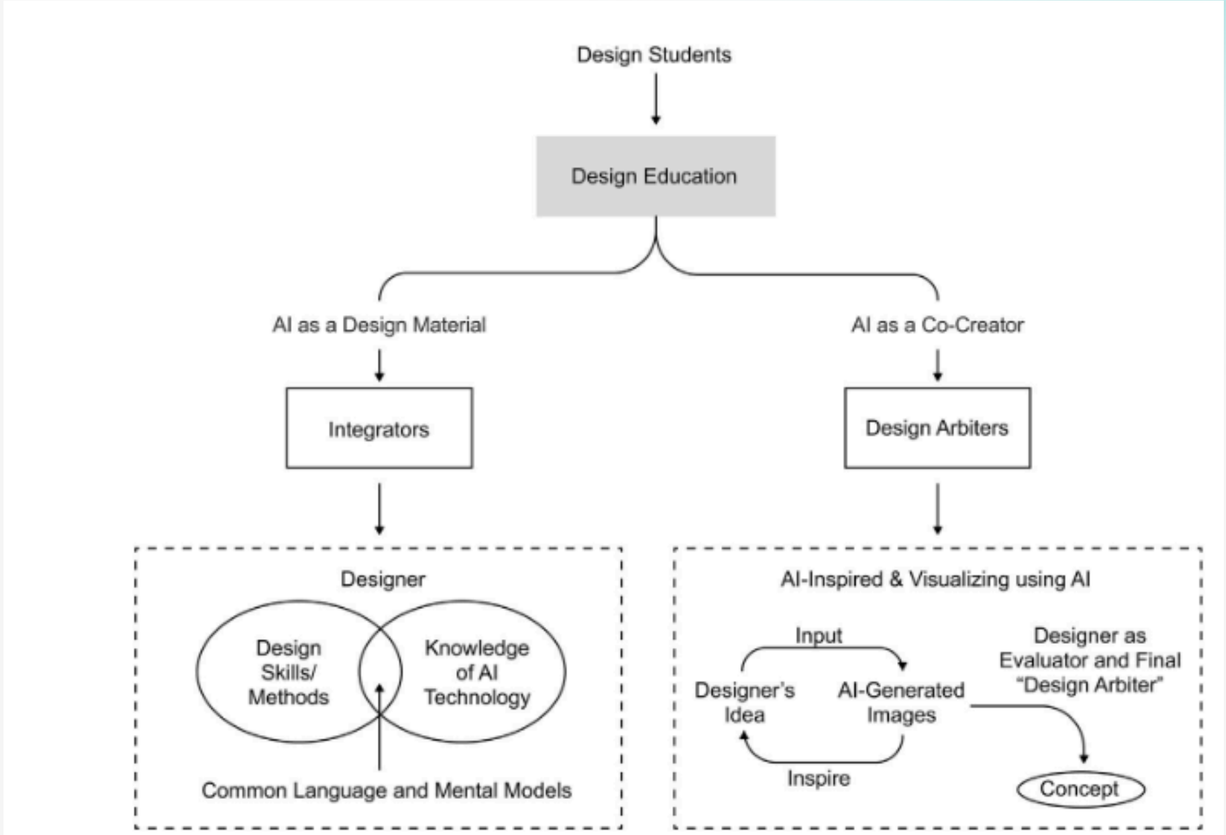


Figure 5 How design education should prepare students for AI integration.

Note. This figure was created by the author

Thank You!

國立雲林科技大學 設計學研究所博士班 |
114-1 專題研討（一）

Design Issues，Vol. 41, No. 2, Spring 2025

Methodology Approach to Digital Imagery Conception: The Designer Against the Homogeneity of Digital Media

設計師對抗數位媒體同質化的影像設計方法論

Marcos García-Ergüín Maza、Jorge Fragua Valdivieso

INSTRUCTOR:
李傳房 教授

DOCTORAL ADVISOR：
杜瑞澤 教授

PRESENTED BY:
D11430007 陳鈺淋

危機：結構性同質化 (Structural Homogeneity)

- 即時性 (Immediacy) 與 持續流動 (Continuous Flow)
- 所有設計 (平面/工業/時尚) -> 最終都被編碼為「圖像」
- 結果：結構性同質化（大家都長得越來越像）

- 在同質化世界中，設計師的「個體性」(Individuality) 如何倖存?

Agenda

01	問題（The Problem）
02	理論（The Theory）
03	方法（The Methodology）
04	結論（The Resistance）

本文不是做實證，也不是提出新的方法；它的主要貢獻是把哲學理論轉譯為可用的影像分析框架，並提供評論及閱讀數位影像個體性的操作語彙。

The Problem

#1

非歷史性設計師
Ahistorical Designer

- 數位時代的「去物質化」(Dematerialization)
- 設計師與「歷史過程」(Historical Process) 決裂

➞ 不再關心過去的脈絡，只關心「即時」的流動

The Problem

1

非歷史性設計師

Ahistorical Designer

- 定義：「我們感知和概括美學判斷的管道」

Adobe

Figma

2

同質性媒介

Homogeneous Medium

盧卡奇 · 捷爾吉 Georg Lukács

匈牙利馬克思主義哲學家和文藝批評家

The Problem

華特·班雅明 Walter Benjamin
出身德國的阿什肯納茲猶太裔哲學家

2

同質性媒介
Homogeneous Medium

3

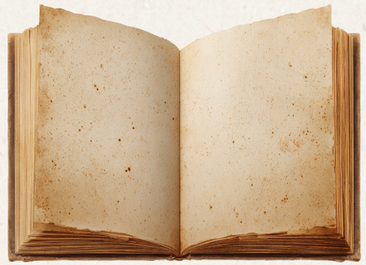
從「碎片」到「圖層」
From fragmented to Layers

- 在「同質性媒介」中，個體性消失，設計師被「碎片化」(Fragmented)
- 「碎片」(Fragments) = 「圖層」(Layers)

The Theory

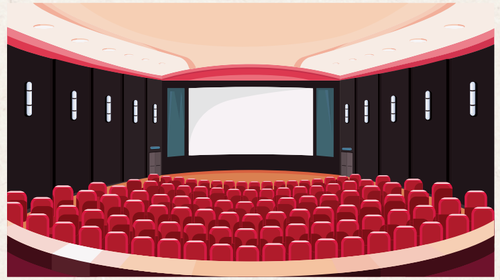
問題 → 同質性

物件 → Layers



數位「再媒介化」(Re-mediation)

數位媒介（新）「吞噬」並「重塑」傳統媒介（舊）



The Theory

- Y 軸 (垂直)：傳統創作
  歷史知識、先例、敘事性

- X 軸 (水平)：數位創作
  沒有歷史意義、即時、同質性

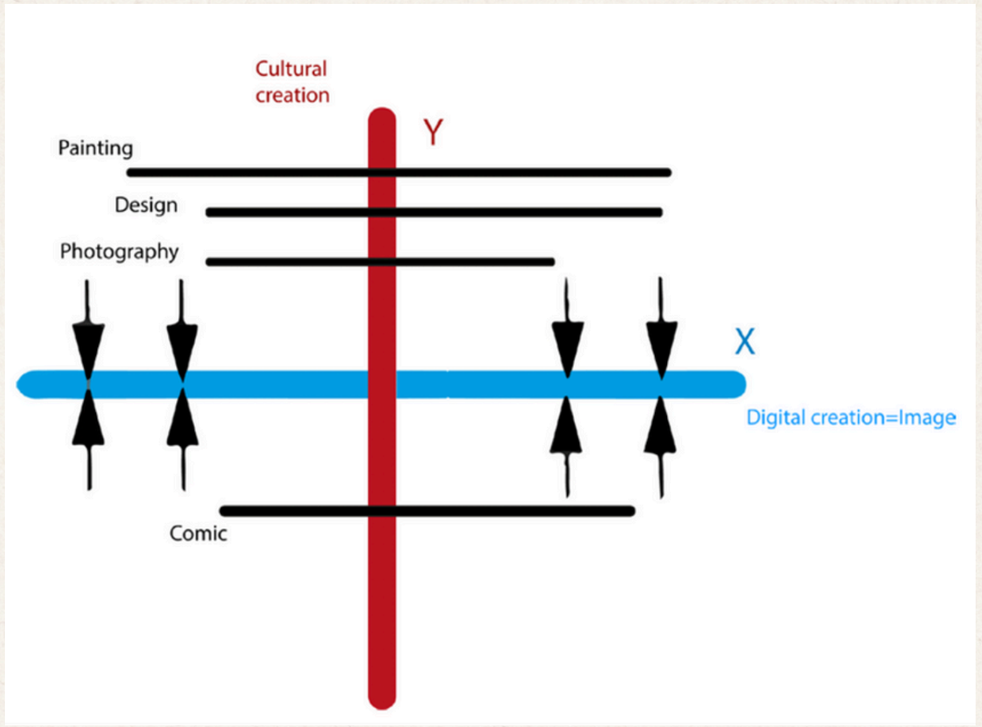


圖 1　X、Y軸並存

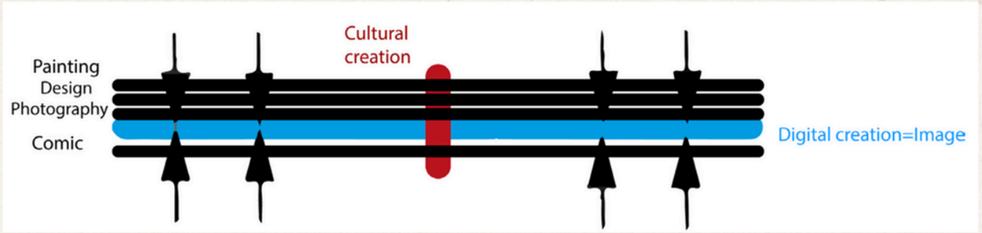


圖 2　Y軸收縮

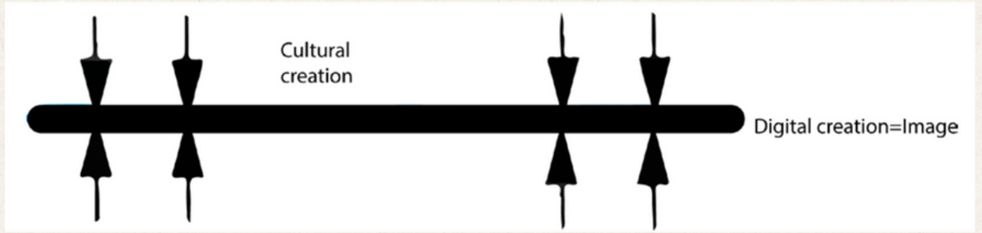


圖 3　Y軸完全塌陷

The Theory

組裝理論 (Assemblage Theory)

- 又稱「裝配理論」或「集結理論」
- 解釋了「演算法、機器學習、AI、Adobe 軟體」的非線性運作方式
- 完美描述 X 軸的「根莖狀」(Rhizomatic) 結構

曼紐爾 · 德蘭達 Manuel DeLanda
墨西哥裔美國哲學家、實驗電影導演

The Theory

- Y 軸 (歷史) → 塌陷至X軸
  數位再媒介化

- X 軸的作業系統
  德蘭達的組裝理論

- 組裝的零件　=　圖層
  班雅明論點中，碎片的概念

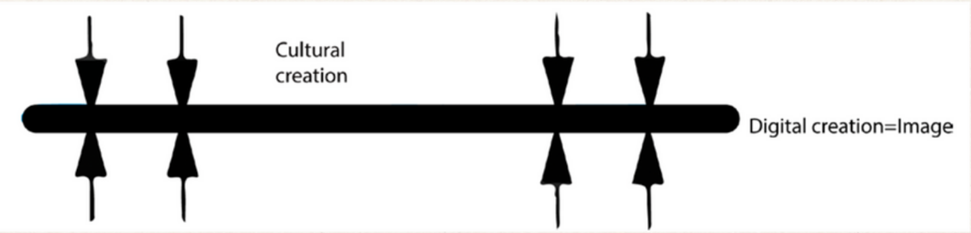


圖 3　Y軸完全塌陷

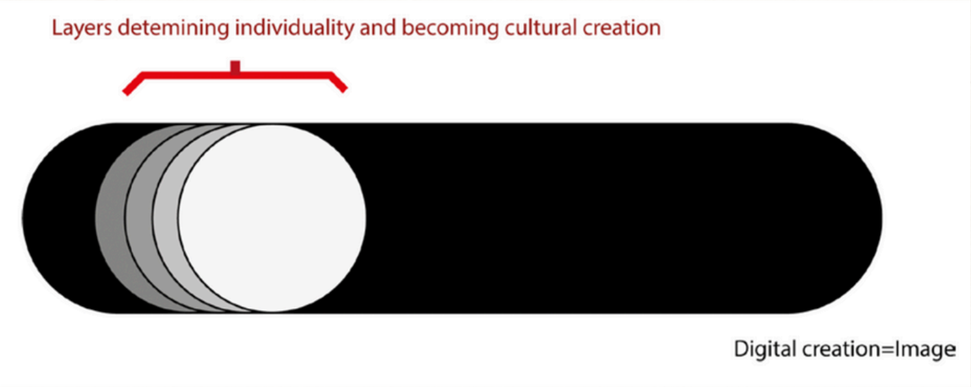


圖 4　X軸放大圖

The Methodology

分析框架 (一)：透明 vs. 不透明

透明度 (Transparency / T)

- 定義：忠實再現
- 目的：隱藏人為痕跡
- 範例：完美的 CGI 背景

不透明度 (Opacity / O)

- 定義：再現的框架與行為本身
- 目的：突顯人為痕跡/過程
- 範例：看得到拼貼痕跡

The Methodology

分析框架 (二)：強度 vs. 廣度

強度 (Intensity / I)

- 定義：圖層「沒有空間」、完美「融合」
- 來源：單一來源 (如：同一台相機)

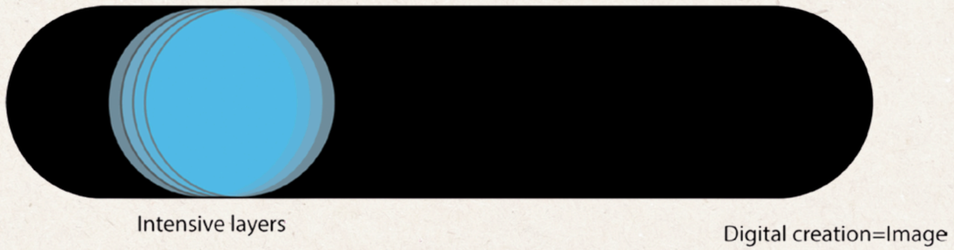


圖 6　強度

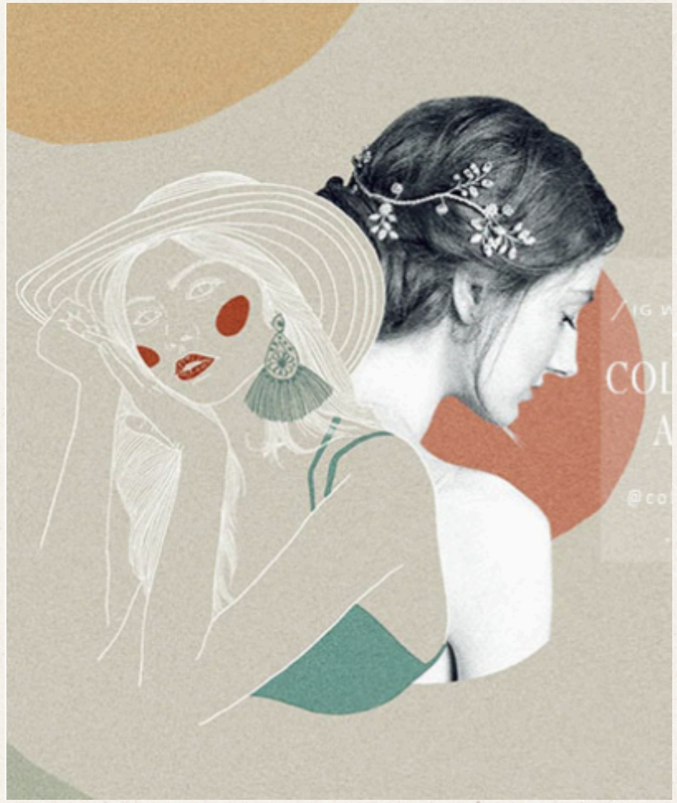
廣度 (Extensiveness / E)

- 定義：圖層「個體化」、彼此「疏遠」
- 來源：不同來源 (如：照片 + 3D)

圖 5　廣度


Intensive layers
Digital creation=Image

圖 6　強度




Extensive layers
Digital creation=Image

圖 5　廣度

The Methodology

案例A：HDR 照片-同質性範例

- 構成：T+T+T (來自「同一台相機」)
- 來源：單一來源 ➡ 強度 (I)
- 結果(左)：效果自然 ➡ I/T (強度/透明)
- 結果(右)：效果誇張 ➡ I/O(強度/不透明)

I/T (強度/透明)
是數位同質性的「預設狀態」

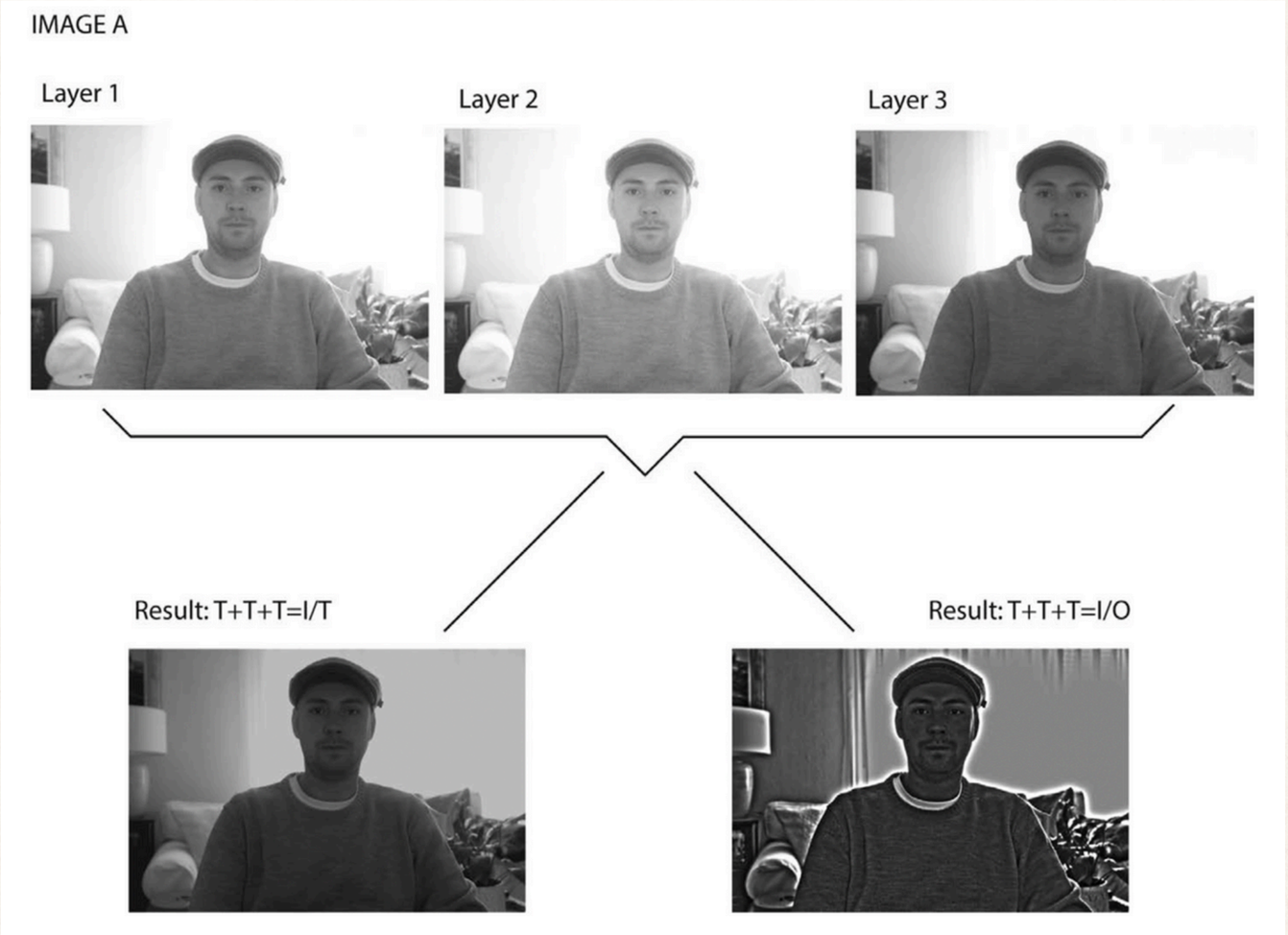


圖 7　HDR 照片-同質性範例

The Methodology

案例B：混合媒介肖像-抵抗性範例

- 構成：O+O+O

  (來自「不同媒介」：相機 + 3D + 2D)

- 來源：不同來源 ➡ 廣度 (E)
- 接縫：人為感強烈 ➡ 不透明 (O)
- 結果：I/O(廣度/不透明)

E/O (廣度/不透明)
是「設計師意圖」的展現

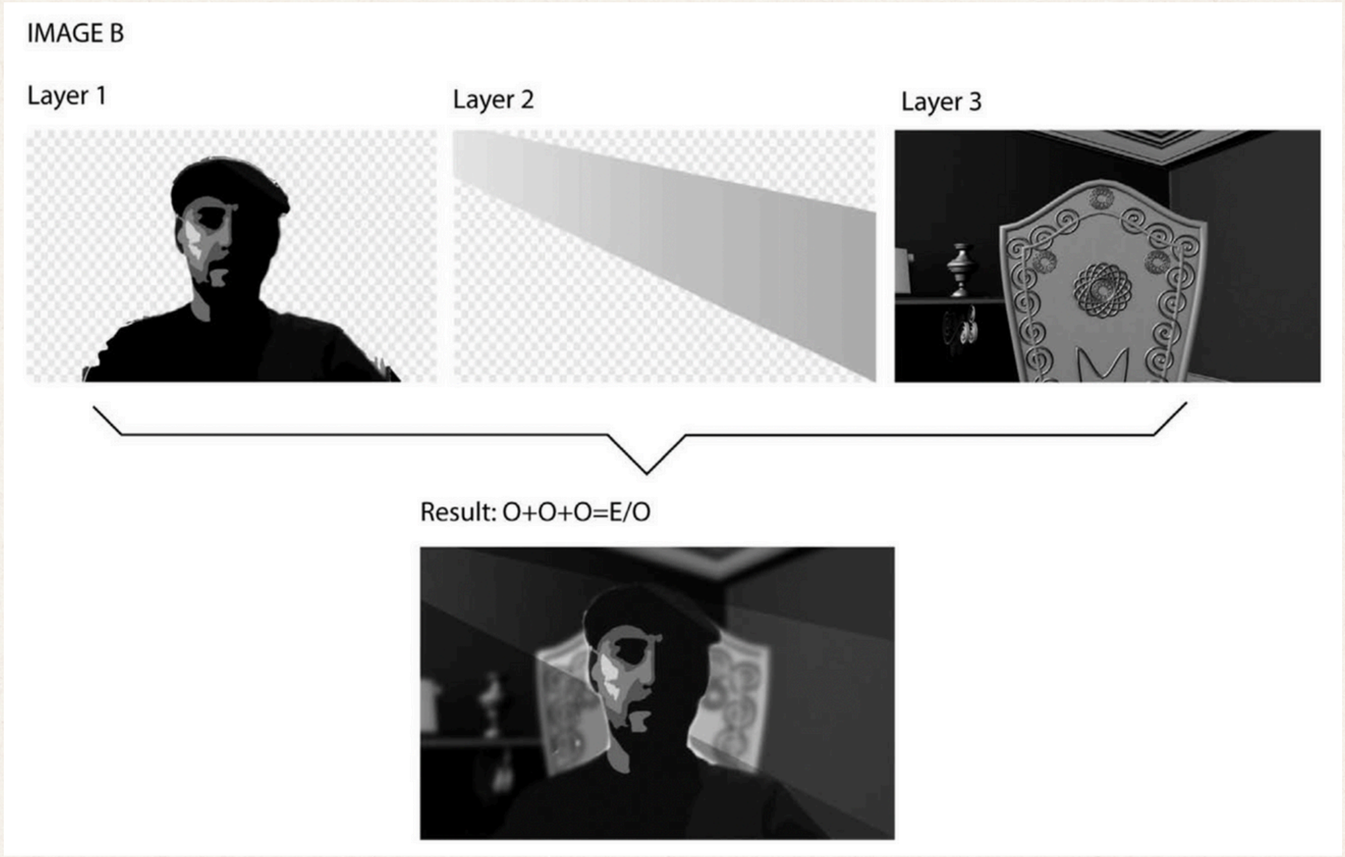


圖 8　混合媒介肖像-抵抗性範例

The Resistance

E/O (廣度/不透明) 作為抵抗策略

敵人：I/T（強度/透明）

- AI / 數位工具的目標
- 同質化、無個人色彩

我們：E/O（廣度/不透明）

- 設計師的價值不再是「技術技能」
- 而是「維持不透明度 (Opacity) 的能力」
- AI 追求 T，我們擁抱 O；AI 追求 I，我們擁抱 E

The Conclusion

在 X 軸內部，恢復 Y 軸

數位時代的「靈光」(Aura)

- 從傳統創作中「獨一無二的物件」
- 變成「圖層之間的平衡與對話」

「對話」與「對抗」= 「敘事」(Narrative)

- 1950年代的『不透明』(O) 圖層　與
  2030年代的 3D 模型的『不透明』(O) 圖層　融合

設計師使用 E/O 策略，在 X 軸上創造「位移」

➞ 恢復原本屬於 Y 軸的歷史、社會和文化成分

Design Issues，Vol. 41, No. 2, Spring 2025

Thank You For Your Kind Attention.

INSTRUCTOR:
李傳房 教授

DOCTORAL ADVISOR：
杜瑞澤 教授

PRESENTED BY:
D11430007 陳鈺淋

114-1專題討論

Design education is too important to be left to designers

設計教育太重要了，不能只交給設計師

報告者:D11430010馬惠君

授課教授:李傳房 教授

2025-11-26

CONTENTS

Author Introduction

Dan Formosa is a member of ThinkActHuman, LLC, serving as a design consultant collaborating with design teams across companies and organizations. With a background in industrial design, ergonomics, and biomechanics, he is an early advocate of inclusive design and design research, and a strong proponent of leveraging design to enhance quality of life. He has been invited as a guest lecturer and speaker at international design events, focusing on usability issues related to physical interaction, perception, and research methods. He also co-founded programs at the School of Visual Arts in New York City.

Dan Formosa

Product Design • Design Research • Ergonomics • User Experience (UX) • User Interface Design

Selected Design and Innovation Projects

1. DialPak III
2. OXO Good Grips
3. Ford SmartGauge
4. XM Satellite Radio
5. Baseball Stadium Guide
6. Johnson Reach Wonder Grip
7. Cimzia Arthritis Injector
8. Cimzia Package
9. Apple iPad, 1989

Career development should be people-oriented, not product- and technology-oriented.

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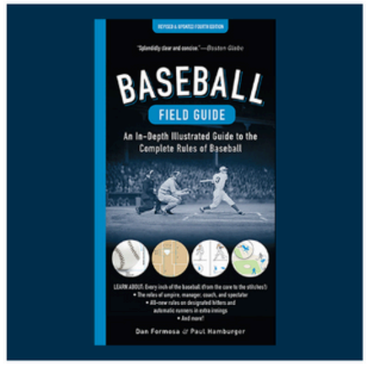
2

3

4



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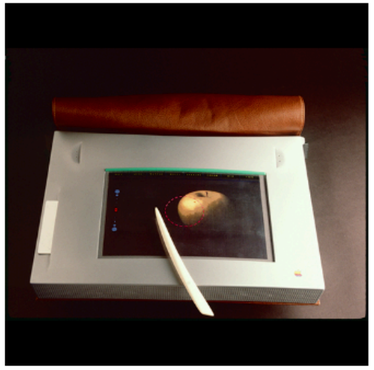

9

Selected Design and Innovation Projects

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職業發展應該以人為本，而不是以產品和技術為本。

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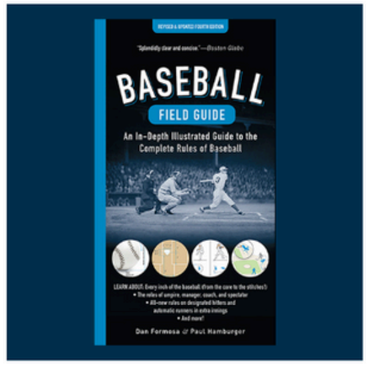

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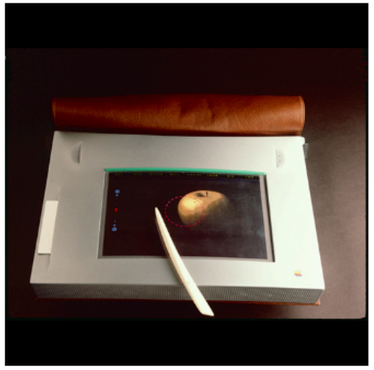

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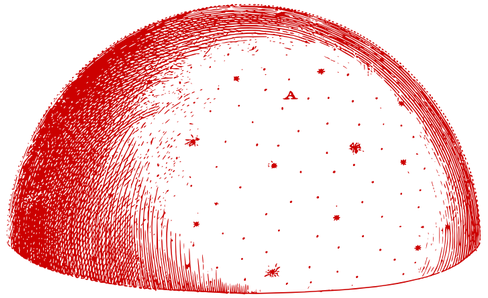
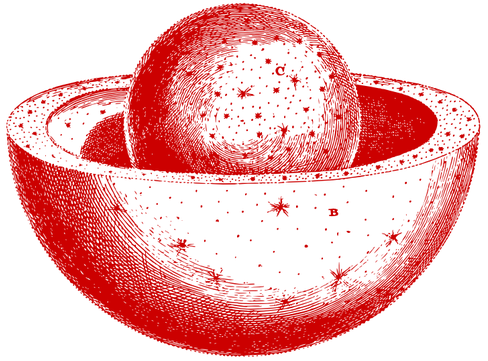
Author's Perspective

1. Observes global design education and practice from an outsider view
2. Design won't be inclusive anytime soon

The Core Problem





1. Design Stagnancy

- Focus too much on things, not people
- Curriculum too similar to 50+ years ago

2. Limitations of Methodology

- Design reduced to scripted processes, celebrating process over knowledge
- Suppresses creativity and prevents innovation

3. Solution

- Center design education on people: psychology, physiology, research methods, statistics
- Create an entirely new people-centered design discipline

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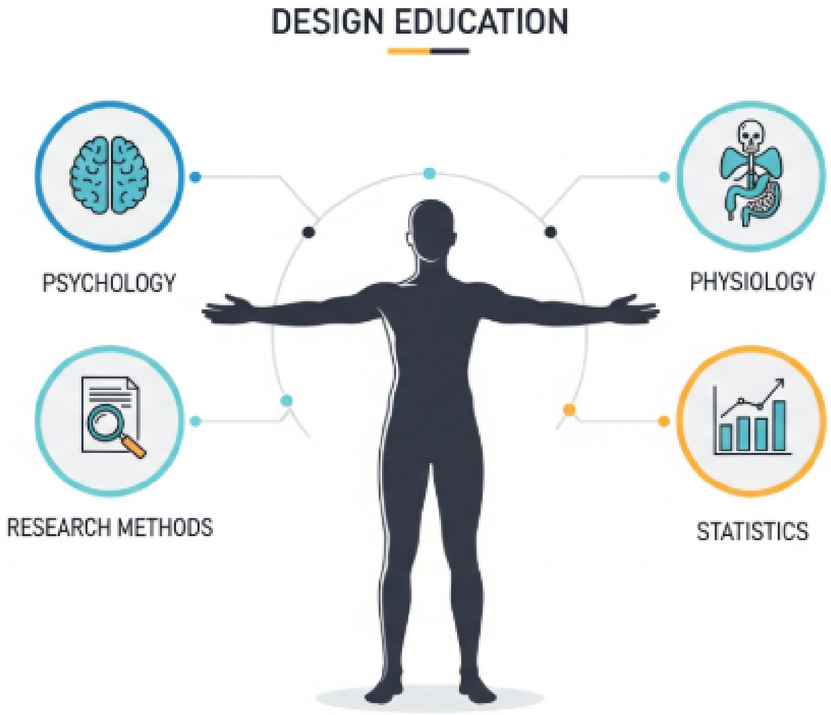
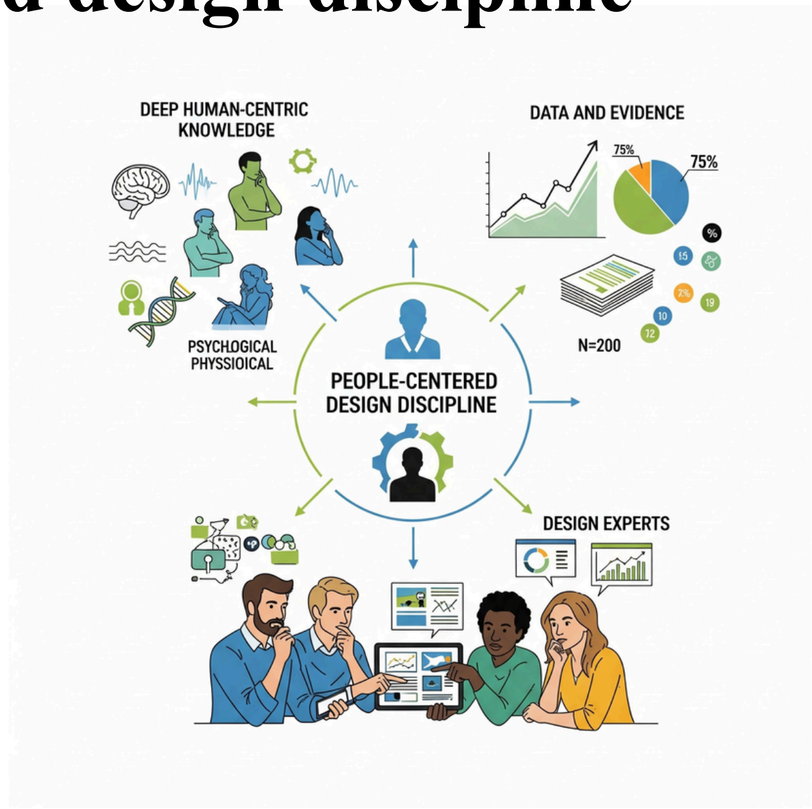




Stagnation: The “Things” Focus

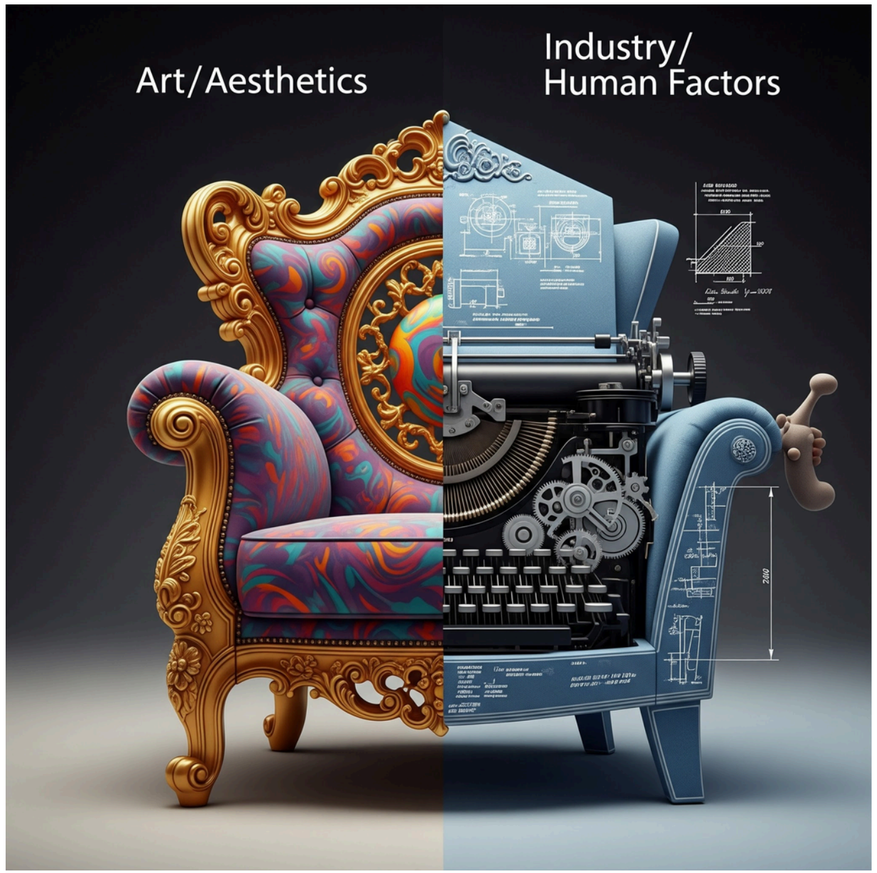
1. Historical Legacy

- Design rooted in art & industry; early designs seen as commercial art
- Papanek’s 1972 critique remains relevant

2. Education & Practice

- Focusing on "things" early creates a locked mindset
- Google “industrial design” shows objects, not people
- Instructors still explain basics like gravity, balance, leverage

Historical Legacy



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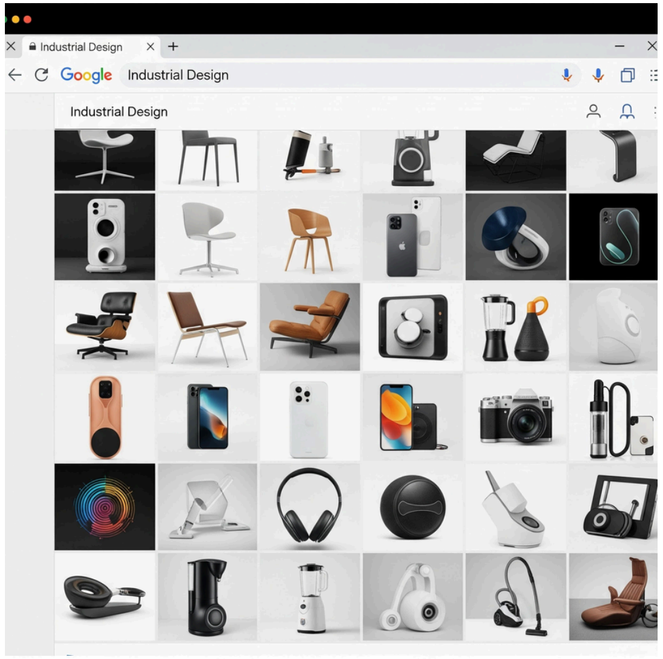

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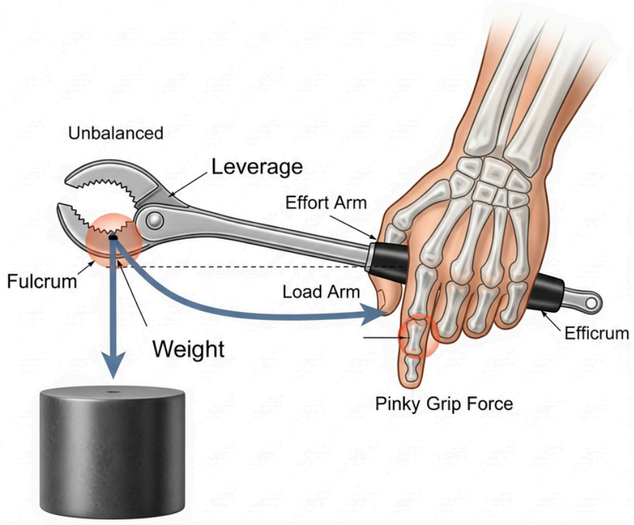

Stagnation: Process Over Knowledge

1. Innovation vs Fear

- Education favors answers, punishes failure; students avoid risk
- Portfolios show final outcomes without justification

2. Design Thinking Blind Spot

- Design Thinking became a restrictive "how-to"
- Ignores implementation and long-term consequences
- Without knowledge, designers just create offerings

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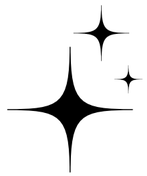

Design Thinking Blind Spot

- Design Thinking became a restrictive "how-to"
- Ignores implementation and long-term consequences
- Without knowledge, designers just create offerings

Excluding People: Curriculum Gaps

1. Human-Centered Topics Marginalized

- Psychology, physiology, ergonomics treated as electives
- Schools need psychologists, ergonomists, statisticians

2. Ignoring Inclusivity & Diversity

- Lack understanding of physical differences (hand/hip differences)
- Profession developed in male-dominated culture
- Every designer is a social-impact designer

Human-Centered Topics Marginalized

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Call to Action

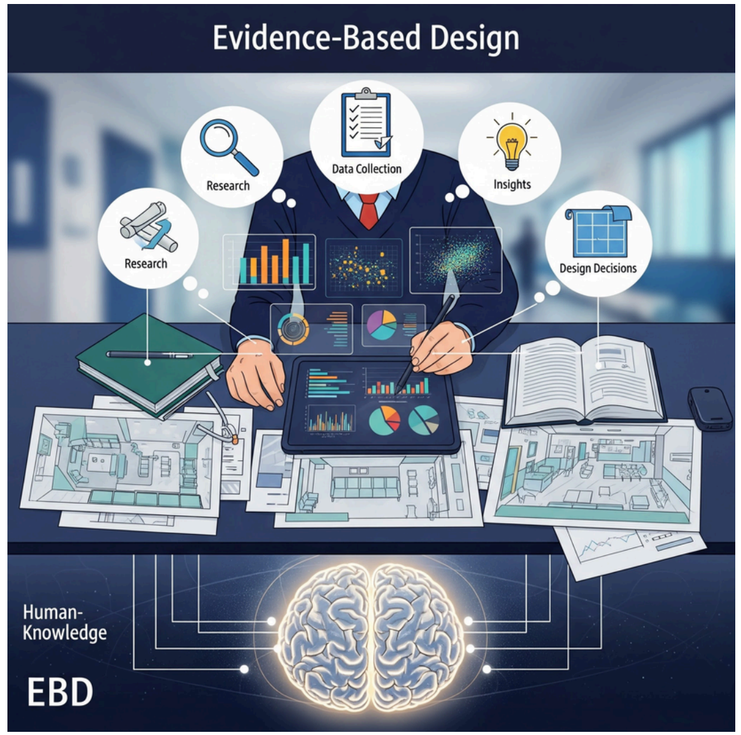
1. Human Knowledge as Foundation

- Must learn research methods & statistics; adopt evidence-based design

2. Critical Disciplines

- Physiology: sensory systems
- Acoustics: product sound as communication
- Sustainability: energy, renewal, end-of-lif

Human Knowledge as Foundation



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Critical Disciplines

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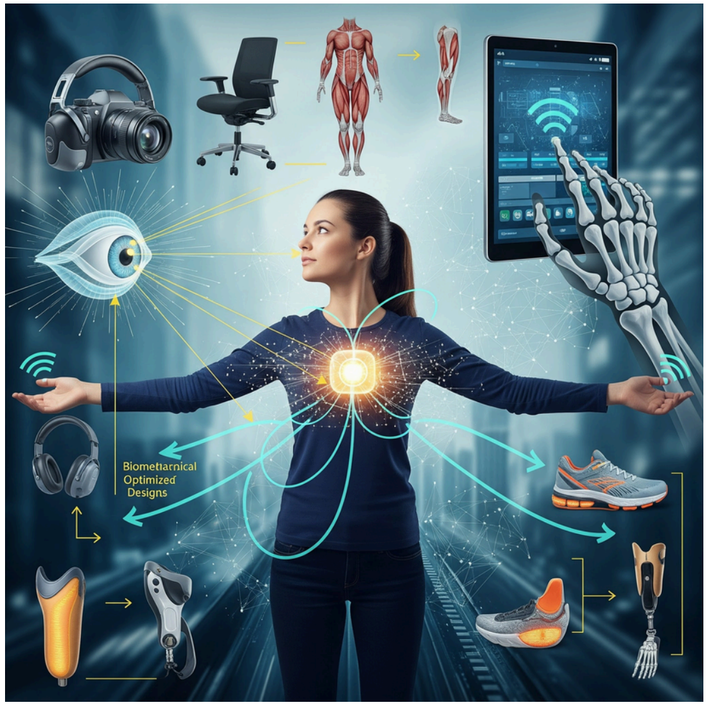
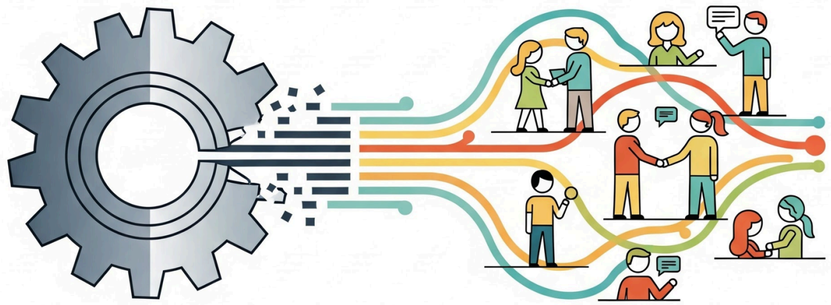


Conclusion: A Reimagined Discipline



1. Hard to Change
   - Too much legacy to change quickly
   - Loewy reinterpreted: Design education is too important
2. Final Solution
   - Create a new design discipline
   - Shift focus from objects to people
   - Train experts who can guide traditional designers

Hard to Change

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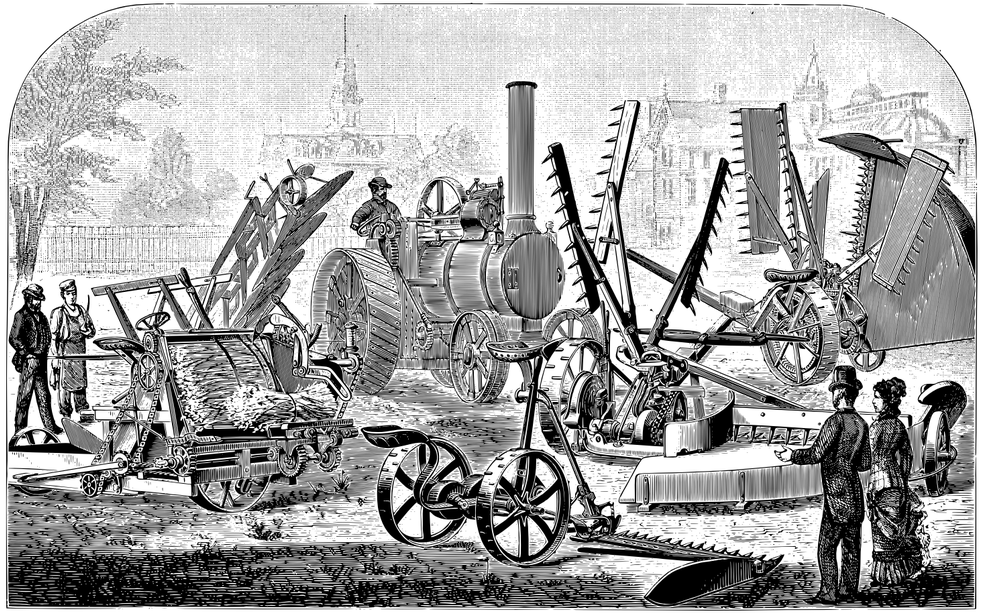
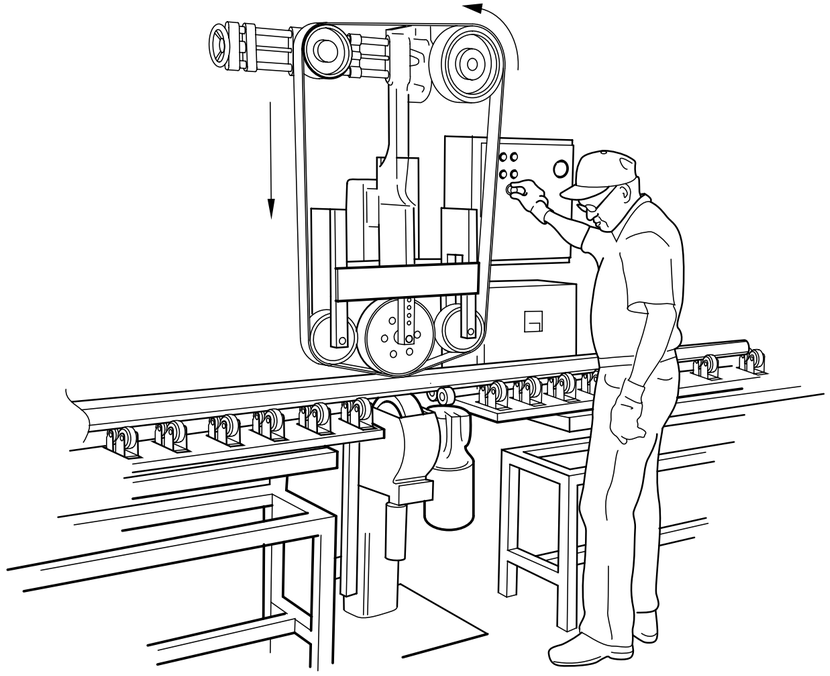




Final Solution

- Create a new design discipline
- Shift focus from objects to people
- Train experts who can guide traditional designers

THE END

THANKS

McDesign :

McDonald’s Video Games and Digital Play Areas

McDesign：麥當勞的電玩遊戲與數位遊戲區

指導老師 / 李傳房 教授

報告者 / D11430008 蕭仔廷

2025 / 12 / 03

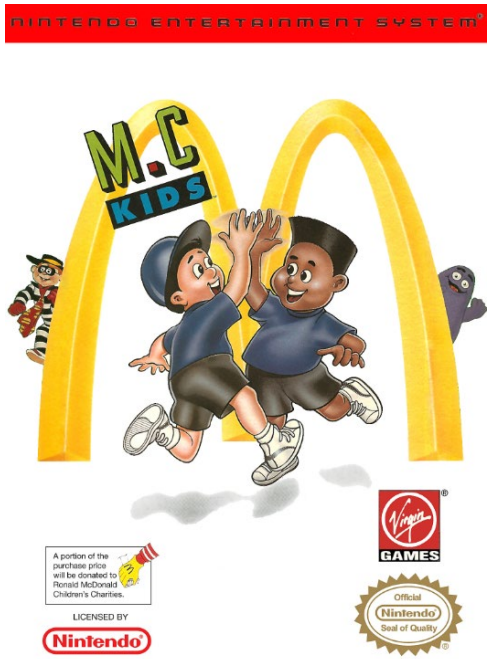
報告大綱

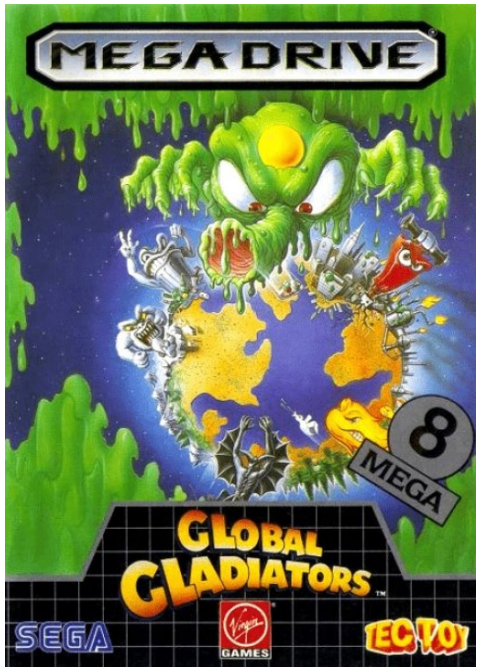
1. 研究背景
2. 問題
3. 方法
4. 結果
5. 設計演變
6. 討論與啟示
7. 結論

- 研究背景 : **McDonald’s as a Play Space**

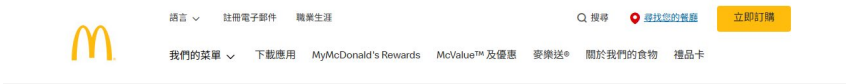
- # 研究背景 : McDonald’s & Video Game History

1980年 - 1990年





2010年後



家庭娛樂中心

- **Research Problems**

本研究提出三大核心問題：

1) 麥當勞是否利用遊戲來行銷高熱量食物給兒童，造成倫理與健康問題？

2) 早期授權電玩的遊戲設計是否過度「廣告化」？(例如收集的物品是麥當勞圖片卡或金色拱門)

3) 店內出現自助點餐機與遊戲機台，是否讓兒童在無形中被訓練成熟悉消費流程？

- 這三個問題都指向同一個核心：設計是否被用來引導兒童形成消費習慣？

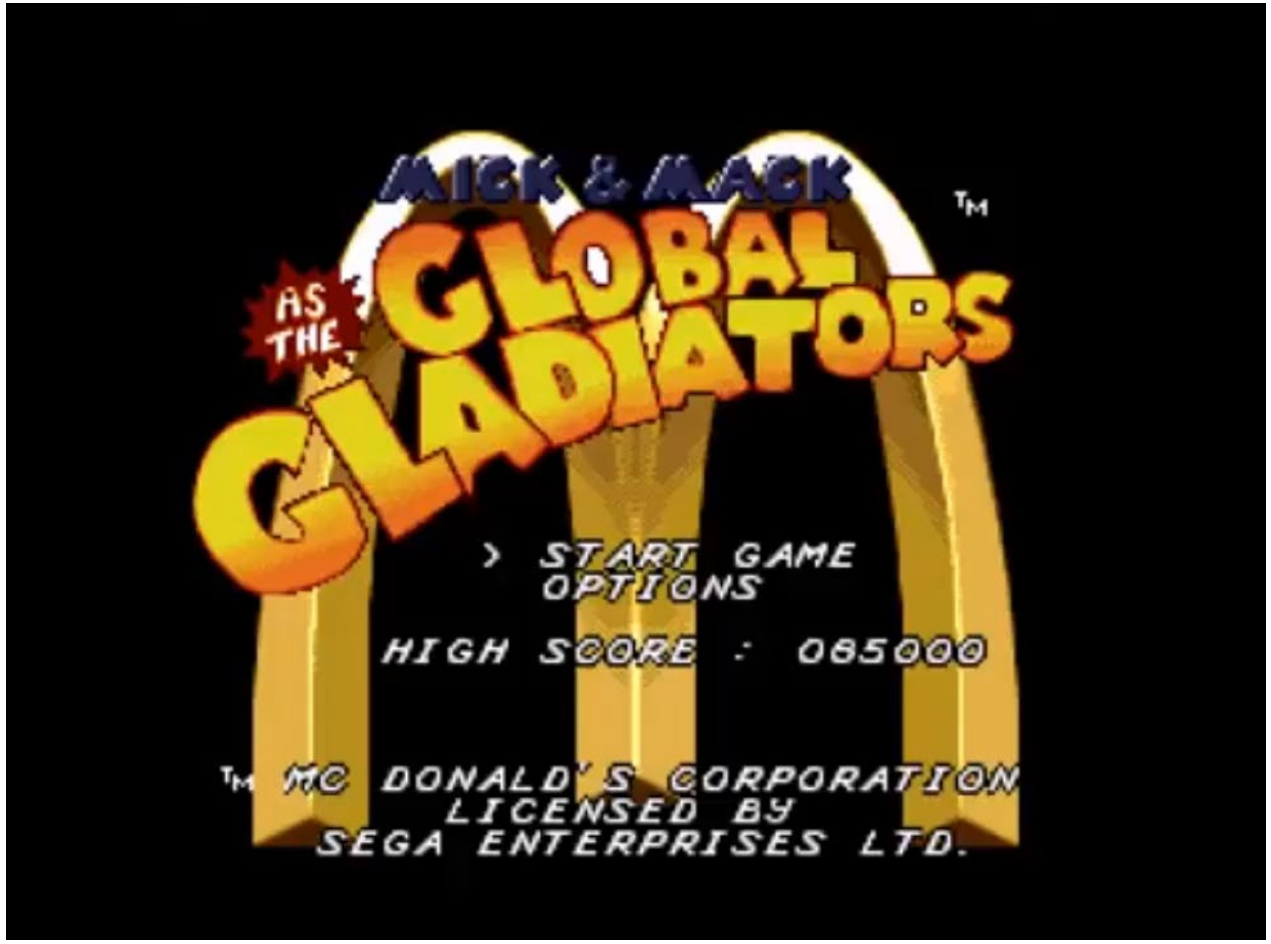
- **Research Methods**

1. 歷史分析 : 回顧 Happy Meal、電玩合作、PlayPlace 演變
2. 遊戲設計分析 :分析遊戲機制與品牌置入方式
3. 訪談 : 包含開發者與營養專家等觀點
4. 設計比較 : 比較店內遊戲站、點餐機、線上平台

- 結果1) : **Early Games & Brand Reinforcement**

M.C. Kids (麥當勞小子)遊戲畫面

Global Gladiators (全球角鬥士)遊戲畫面



- **結果2) : Nintendo Partnerships (遊戲區將餐飲和遊戲合而為一)**

Nintendo 64 機台

GameCube 機台

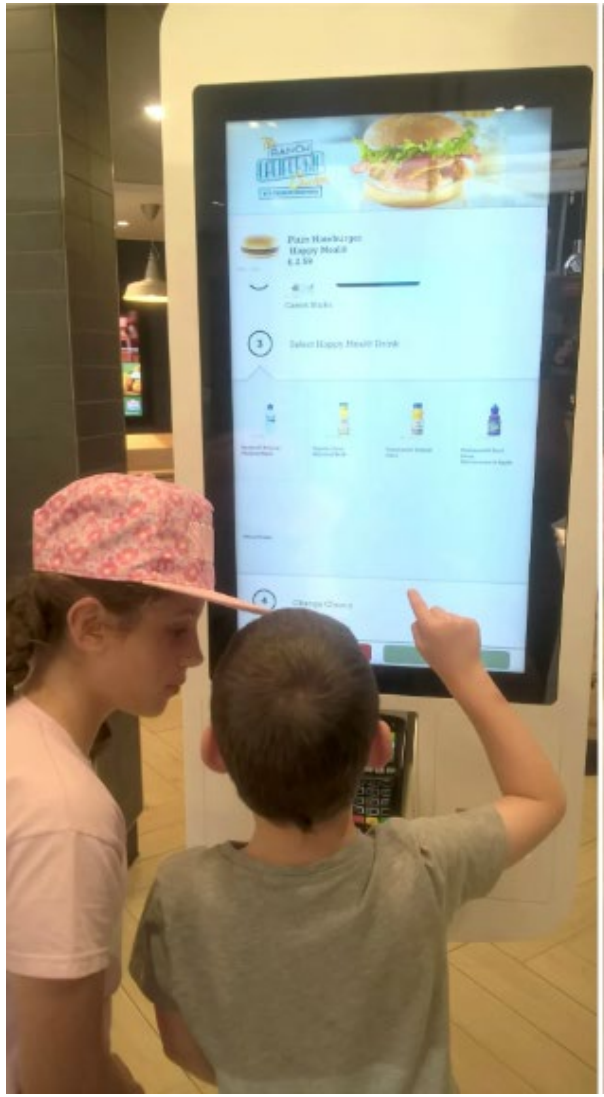
- 結果2) : 麥當勞店內的 **Nintendo** 遊戲展示台

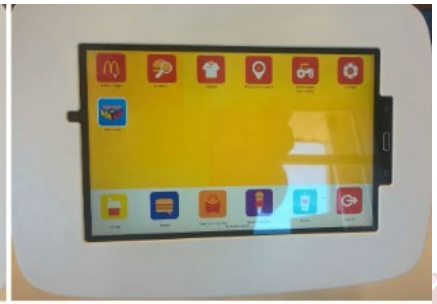
Nintendo 64

GameCube

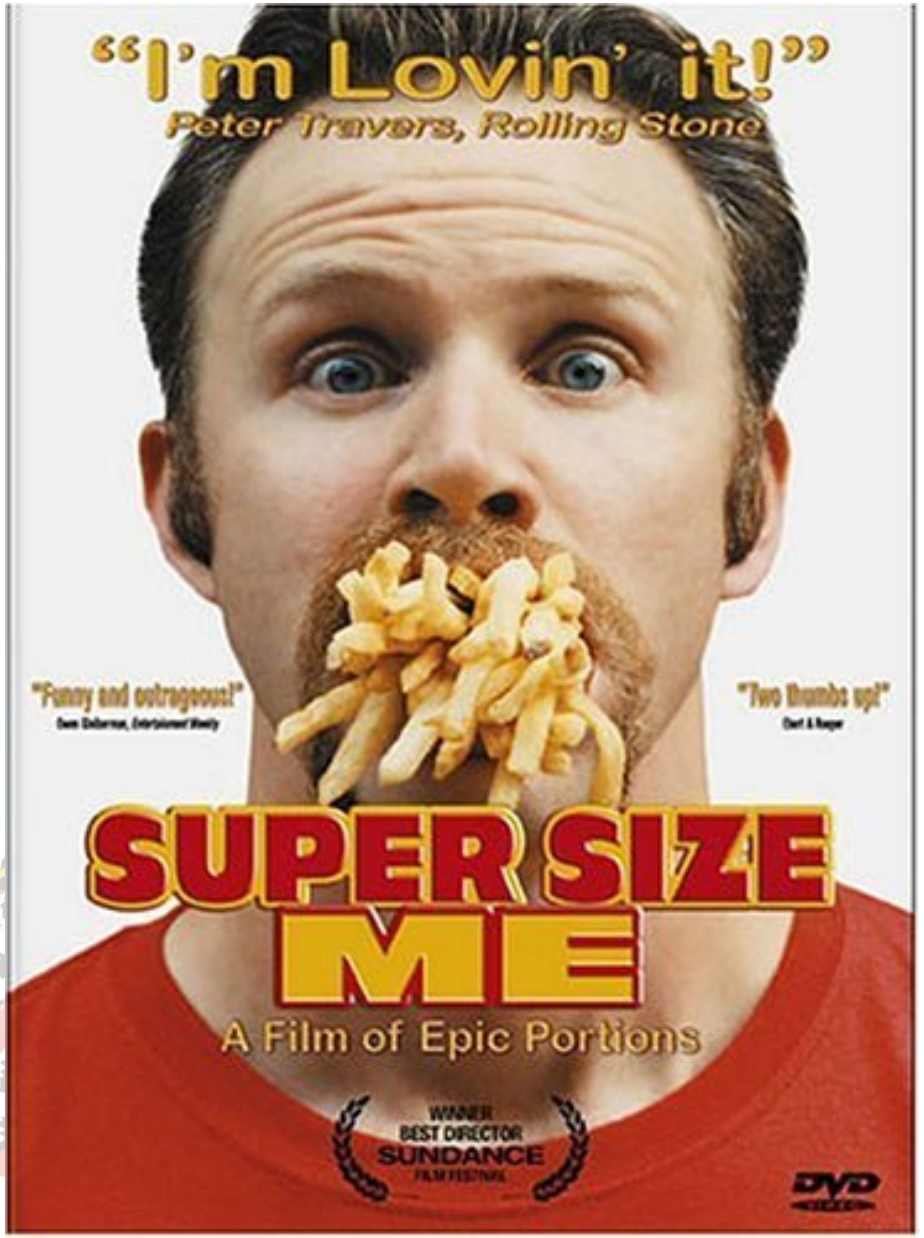
麥當勞店內遊戲主機展示台

- 結果3): Touchscreens & Consumer Training





- 結果4) : **Impact of Super Size Me**



- 結果5)：R Gym 的健康導向設計
  (轉向體育活動)

- 結果6)：Touch2Play Pro 教育遊戲的導入(更注重教育意義，減少品牌宣傳)

- **結果7) : Pandemic Shift: Family Fun Hub** (遊戲方式從實體遊戲轉向數位遊戲)

歡迎來到我們的家庭娛樂中心！在這裡，您可以找到數小時的創意活動，讓您的孩子在下一個生日留下難忘的回憶！

數位書籍和遊戲

在我們的兒童應用程式「開心樂園餐®應用程式」中，您可以與家人一起享受精彩的互動電子書、麥當勞遊戲和擴增實境帶來的樂趣。

探索系列

祝你生日快樂！

在家舉辦麥當勞生日派對，準備派對帽和各種活動，讓您的孩子在生日當天綻放燦爛的笑容。

了解更多

塗色和創作！

盡情發揮創意，用我們充滿冒險、自然和趣味的著色頁來著色吧！

了解更多

自創開心樂園餐®盒

你家孩子心儀的開心樂園餐會是什麼呢？列印我們的方格，鼓勵他們盡情暢想吧！

下載（PDF 451 KB）

頑皮的海豚

下載開心樂園餐®應用程序，開讓克蕾西達·科威爾的《樹頂雙胞胎的荒野探險》。

下載開心樂園餐®應用程式

擺姿勢的渡渡鳥

下載開心樂園餐®應用程序，開讓克蕾西達·科威爾的《樹頂雙胞胎的荒野探險》。

下載開心樂園餐®應用程式

飢餓的北極熊

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失落的斑驢

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下載開心樂園餐®應用程式

列印 - 彩色 - 掃描！

為開心樂園餐的笑臉上色，然後用開心樂園餐應用程式掃描它，探索擴增實境的魔力！

下載（PDF 1.8 MB）

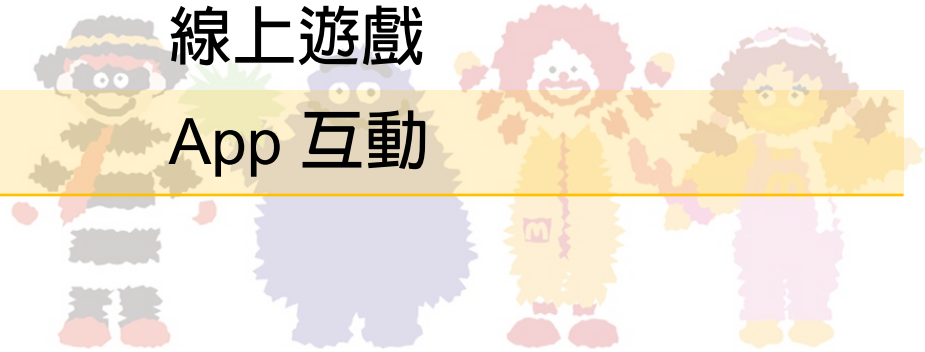
一起畫遊戲

叫上你的朋友和家人，一起來玩「畫畫遊戲」吧！這個遊戲超級好玩，而且很快就會變得超級瘋狂！

了解更多

- 麥當勞遊戲設計演變時間軸 **Timeline**

時期	設計策略	範例
1979	Happy Meal 玩具	玩具收藏
1990s	授權電玩	M.C. Kids
1996–2005	店內 Nintendo 遊戲站	N64、GameCube
2006	R Gym	活動遊戲設備
2010s	Touch2Play Pro	教育遊戲
2020	Family Fun Hub	線上遊戲
2020s	AR＋虛擬派對	App 互動



- # 設計討論（1）：Branding & Game Design

1. 紅色跟黃色是最容易吸引孩童的顏色。
2. 紅色：增進食慾，並讓人感到一種迫切感，因此讓客人想要快速購買、食用 (速食的宗旨)。
3. 黃色：黃色的麥當勞標誌M就是想帶給消費者一種樂觀、熱情、積極感。
4. 大量的紅色＋黃色，其實也帶給入內消費的客人一種「躁動感」，讓客人想趕快吃完就離開，速食餐廳就可以有較好的翻桌率。

- **設計討論（2）：Productive Play vs Ad Games**

項目	Good Game Design	Ad Games
目的	提供挑戰、學習、探索	推廣品牌、產品置入
玩家角色	主動解決問題、探索世界	被動接收品牌訊息
遊戲機制	多樣、有意義的選擇、策略、回饋	重複、簡單，主題圍繞品牌符號
學習價值	促進認知、創造力、道德推理	限於品牌記憶、收集品牌物件
敘事	促進投入感、角色動機明確	以品牌人物或吉祥物為中心
玩家動機	追求掌握感、樂趣、成就感	因為免費、品牌吸引力
舉例	Minecraft、Portal、Zelda、Touch2Play Pro games	M.C. Kids、Global Gladiators、Treasure Land

- 社會討論：**PlayPlace** 作為弱勢家庭資源 (遊樂場為低收入家庭提供便利的場所)

- # Design Implications：商業、設計與倫理

麥當勞的案例提醒我們：商業設計不只是造型或介面，更是價值觀與行為的塑造者。

遊戲、玩具、自助點餐機——它們共同構成一套完整的「使用者經驗」。

而當主要使用者是兒童時，設計者與企業需要面對更高的倫理責任。

- **Conclusion**

總結來說，麥當勞利用遊戲和娛樂來建立強大的品牌接觸點(Brand Touchpoints)，並成功吸引跨世代的家庭。

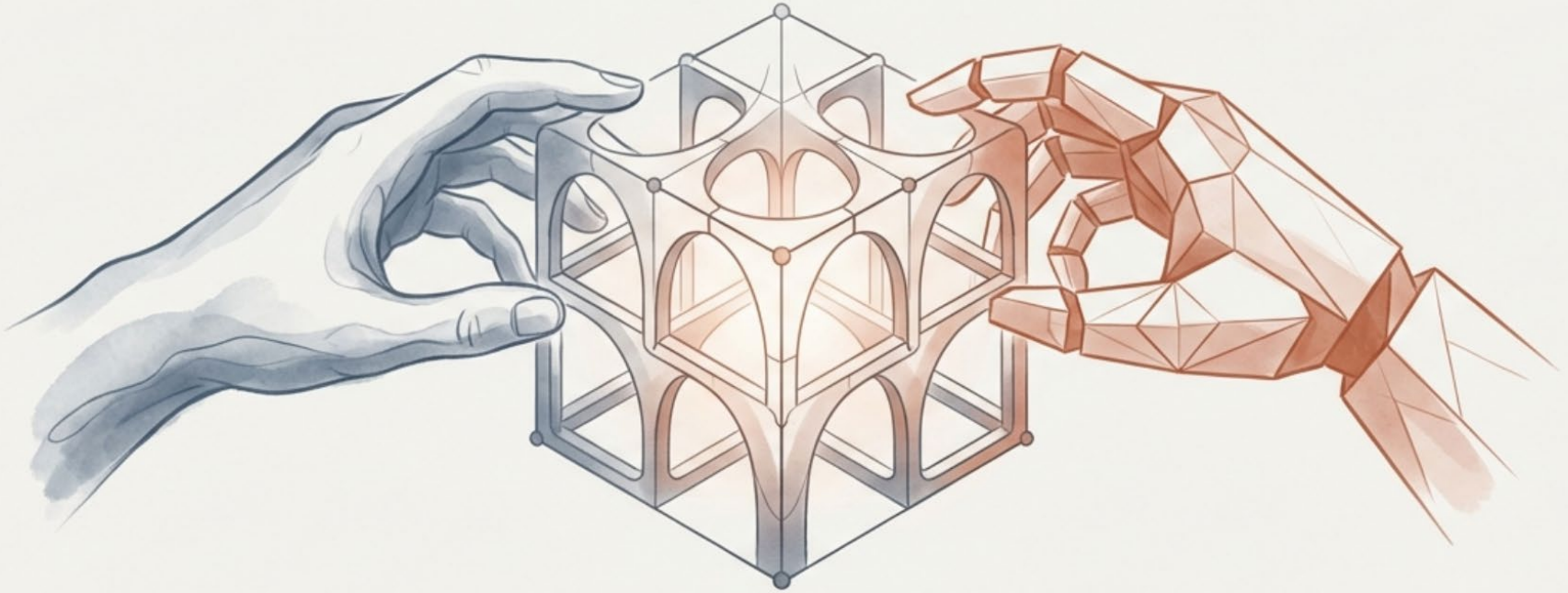
然而，從設計角度來看，它的策略長期在「商業性」與「教育性／健康性」之間調整。這使得麥當勞成為一個非常值得研究的案例，不論是對設計學、遊戲研究、兒童發展或公共政策，皆具有啟發性。

報告結束

Thank you

Generative AI-enhanced human-AI collaborative conceptual design: A systematic literature review

生成式人工智慧強化的人機協同概念設計：系統性文獻回顧



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2025 / 12 / 10

Introduction & Problem Statement

The Power of GenAI: Generative AI (GenAI) enhances design productivity and creativity by generating new content (text, images, models) from patterns in training data.

The Problem: Despite technological advances, the influence of GenAI on the conceptual design process and collaboration methods remains ambiguous.

Current Gap: Research often focuses on technology rather than user experience and interaction, hindering effective Human-AI collaboration.

Study Goal: To explore GenAI's role in conceptual design and propose a collaboration framework.

Based on these insights, this study aims to address the following three research questions:

RQ1: In Human-AI Collaboration research, what stages of conceptual design can GenAI contribute to?

RQ2: What would be the effective approach for GenAI to facilitate the collaborative process between humans and GenAI in conceptual design?

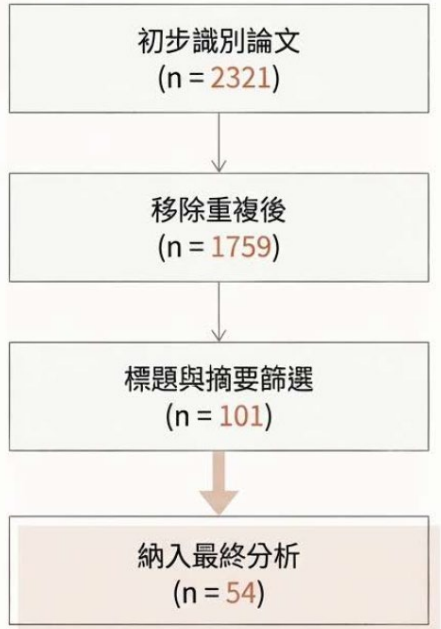
RQ3: How do users and GenAI collaborate in conceptual design tasks through GenAI-human collaboration?

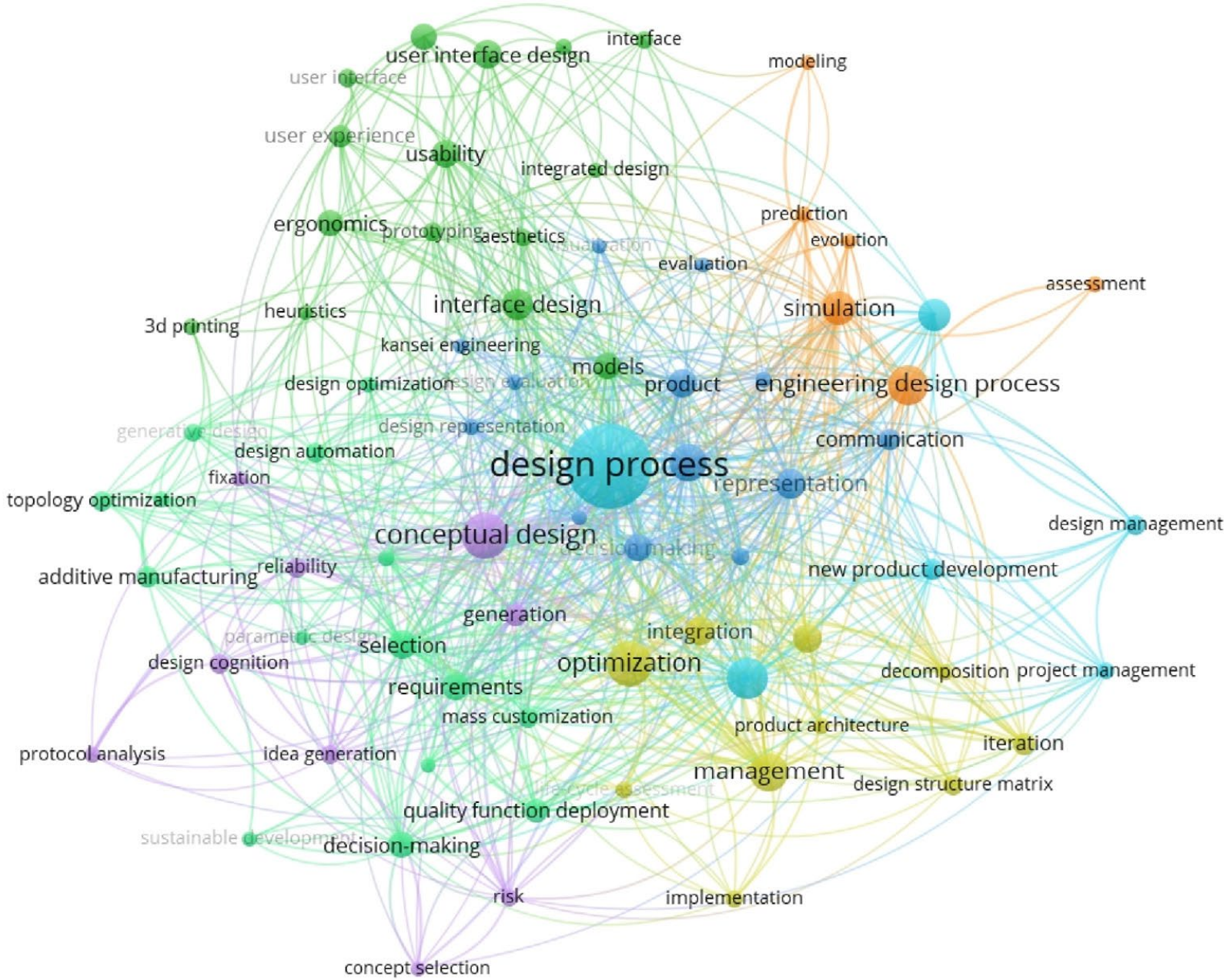
Methodology

- **Approach:** Systematic Literature Review following PRISMA guidelines.
- **Scope:** 54 peer-reviewed papers selected from 2016 to 2023.
- **Search Strategy:** Focused on "Generative AI," "Human-AI Collaboration," and "Conceptual Design".
- **Analysis:** Categorized design tasks based on a review of 5,000 related papers to identify key collaborative activities

Database	*Links*	*Past 7 Years Studies*
ACM digital library	dl.acm.org	115
Scopus	Scopus.com	1474
IEEE xplore	Ieeexplore.ieee.org	354
Web of science	webofscience.com	378

Search Type	*Search Term*
Technology used	"Artificial intelligence (AI)" OR "machine learning (ML)" OR "generat∗" OR "generative adversarial network∗ (GAN∗)" OR "variational autoencoder∗ (VAE∗)" OR "large language model (LLM)" OR "diffusion"
Role of AI	"Creativity support tool" OR "CST" OR "design tool" OR "partner" OR "assistant" OR "collaborat∗"
Conceptual design and related activities	"Conceptual design" OR "conceptual" OR "ideation" OR "exploration" OR "inspiration"



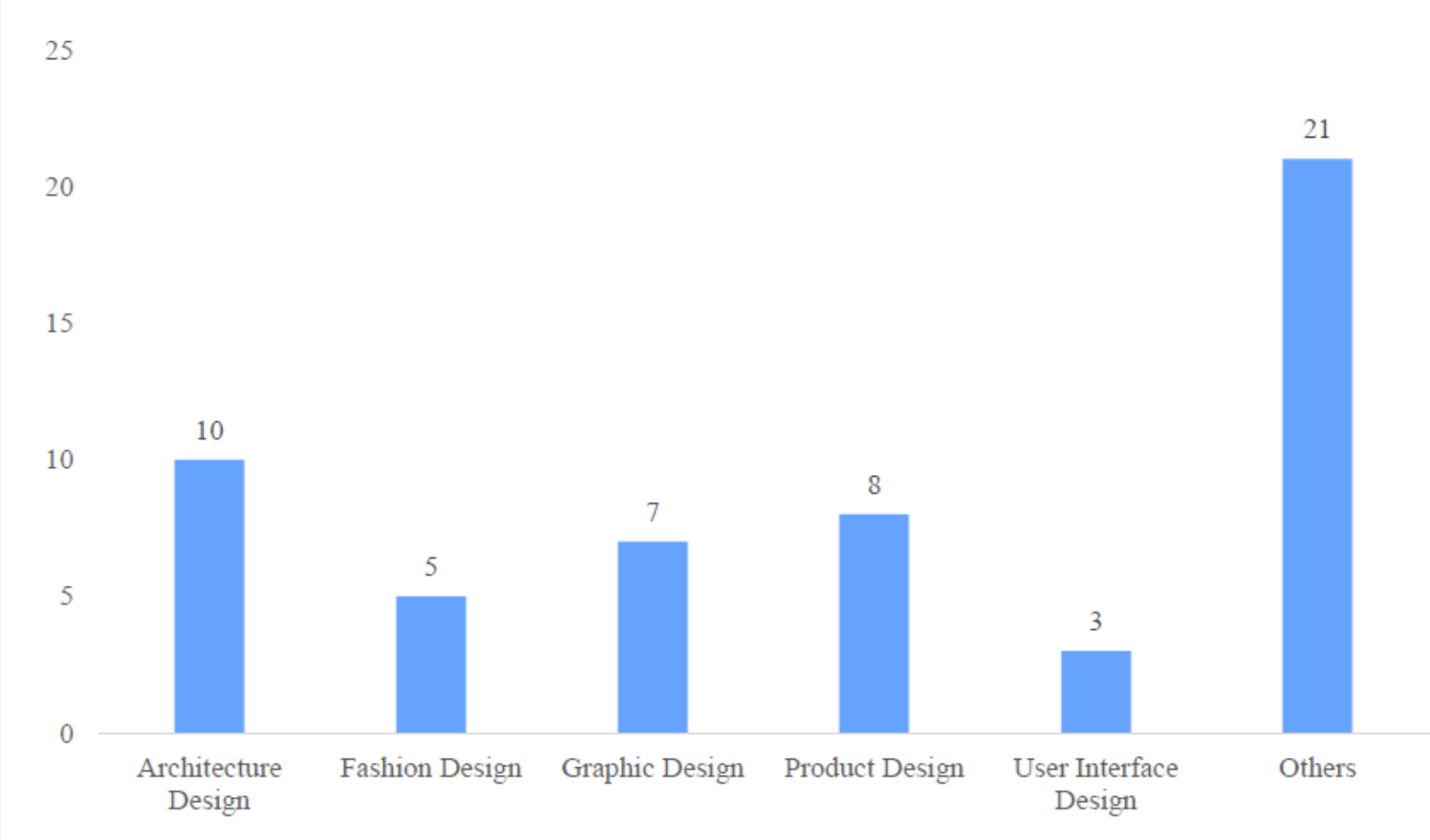


Co-occurrence graph and key design tasks

Results

Conceptual design stage using GenAI: fostering creative expression and stimulating divergent thinking (RQ1)

概念設計階段：促進創意表達與激發發散性思考 (研究問題1)

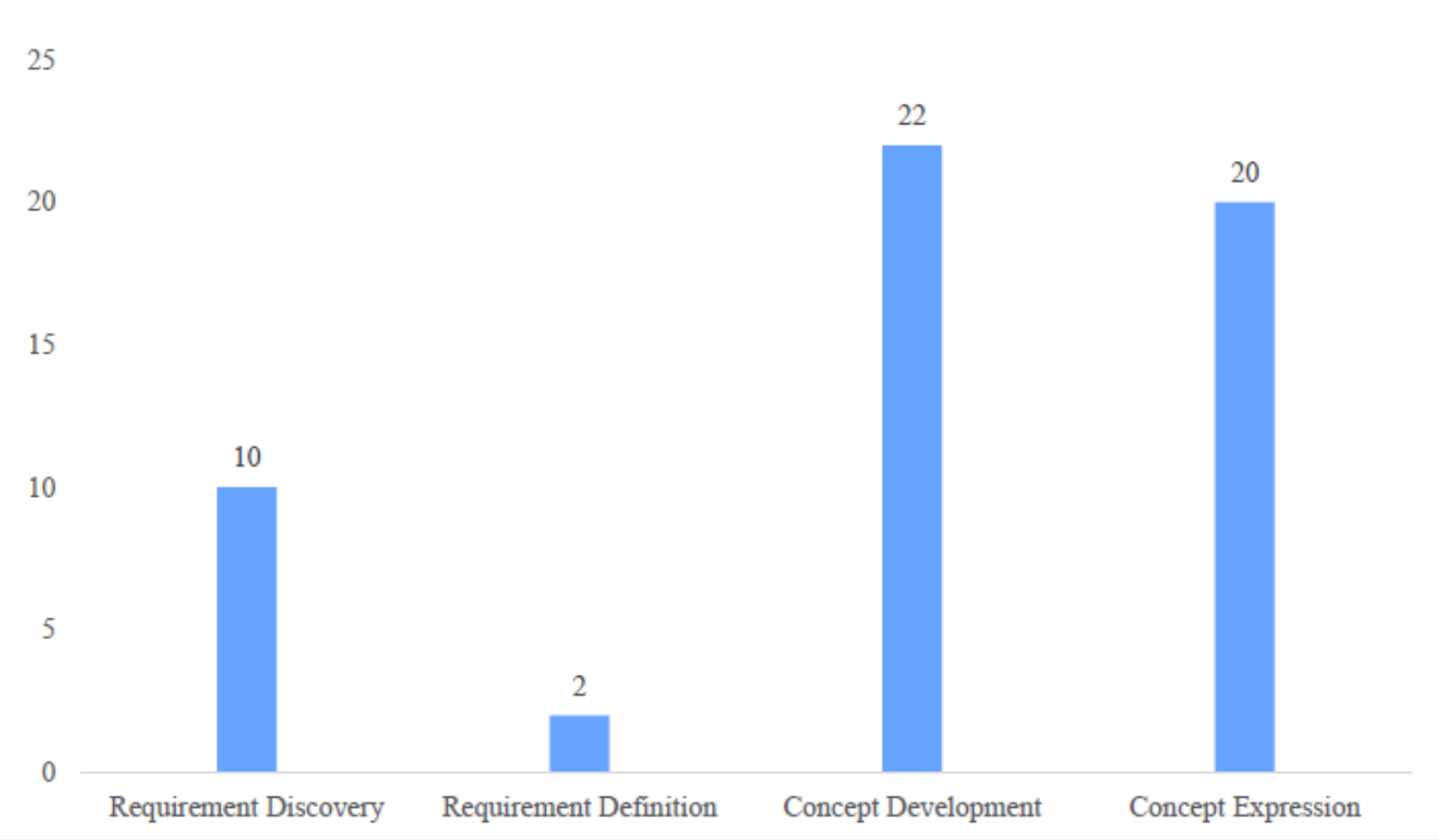


Design field of application

Results

Conceptual design stage using GenAI: fostering creative expression and stimulating divergent thinking (RQ1)

概念設計階段：促進創意表達與激發發散性思考 (研究問題1)

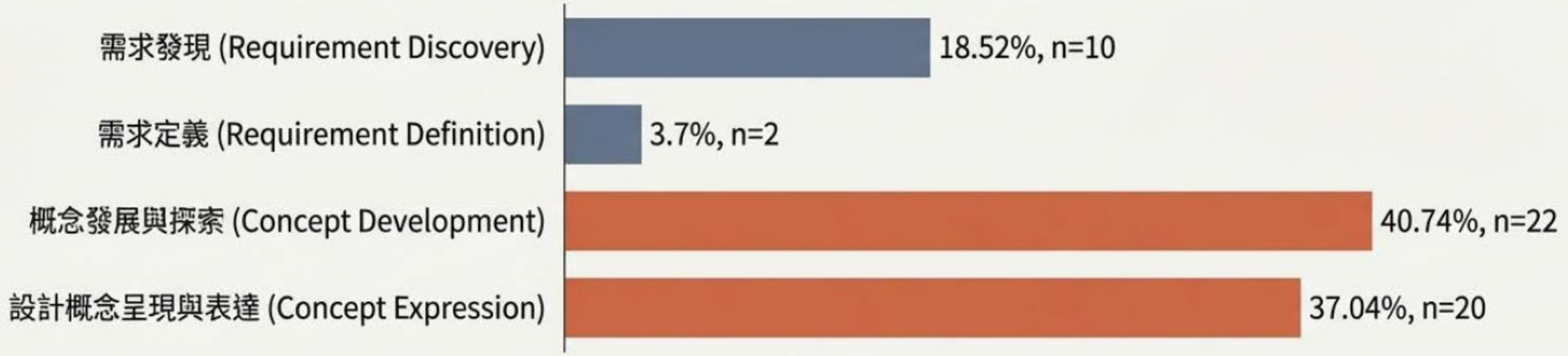


Application phase in design process

Results

Conceptual design stage using GenAI: fostering creative expression and stimulating divergent thinking (RQ1)

概念設計階段：促進創意表達與激發發散性思考 (研究問題1)



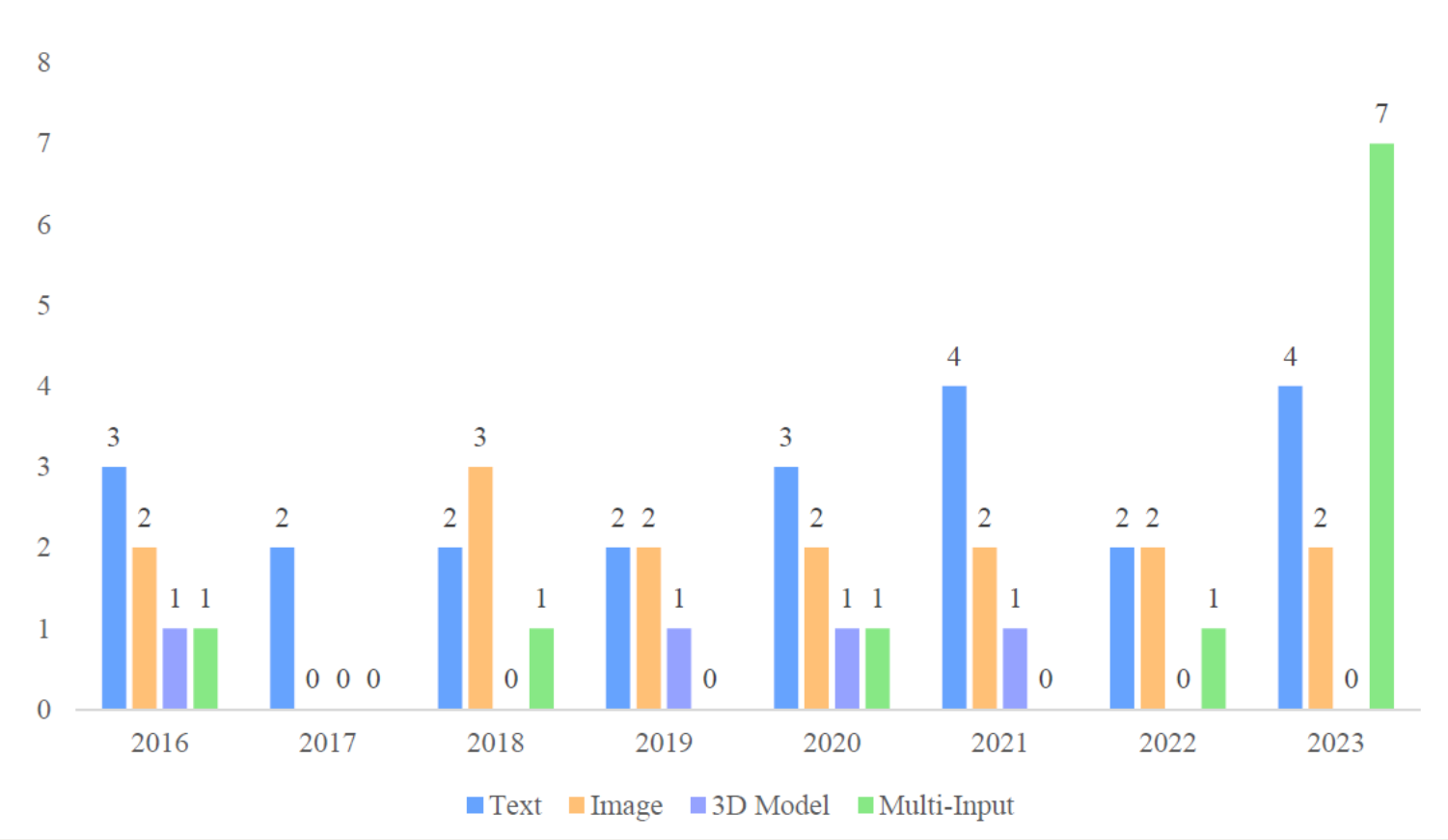
- **概念發展與探索 (40.74%, n=22)**：包含共同繪製草圖、概念構思、設計迭代等。
- **設計概念呈現與表達 (37.04%, n=20)**：包含設計方案的自動生成與優化、創意視覺化等。

洞察：目前 GenAI 較少應用於前端的「需求發現」 (18.52%) 和「需求定義」 (3.7%)。這顯示 AI 主要被定位為增強創意的工具，而定義問題的核心任務仍由設計師主導。

Results

Predominant interaction modalities: exploring multimodal and visual expressions in design (RQ2)

主要互動方式：探索設計中的多模態與視覺表達（研究問題2）

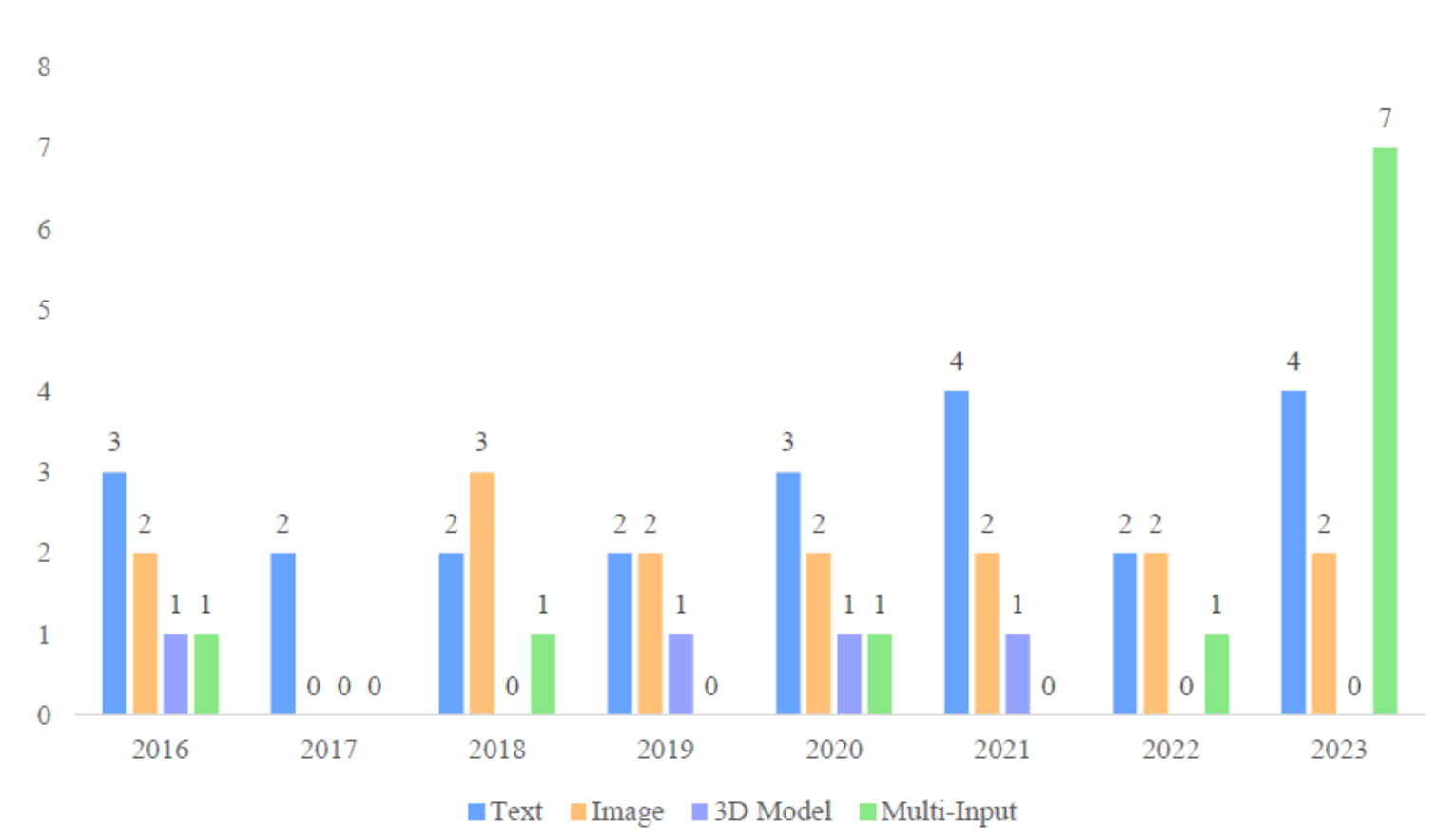


Input types by year

Results

Predominant interaction modalities: exploring multimodal and visual expressions in design (RQ2)

主要互動方式：探索設計中的多模態與視覺表達（研究問題2）

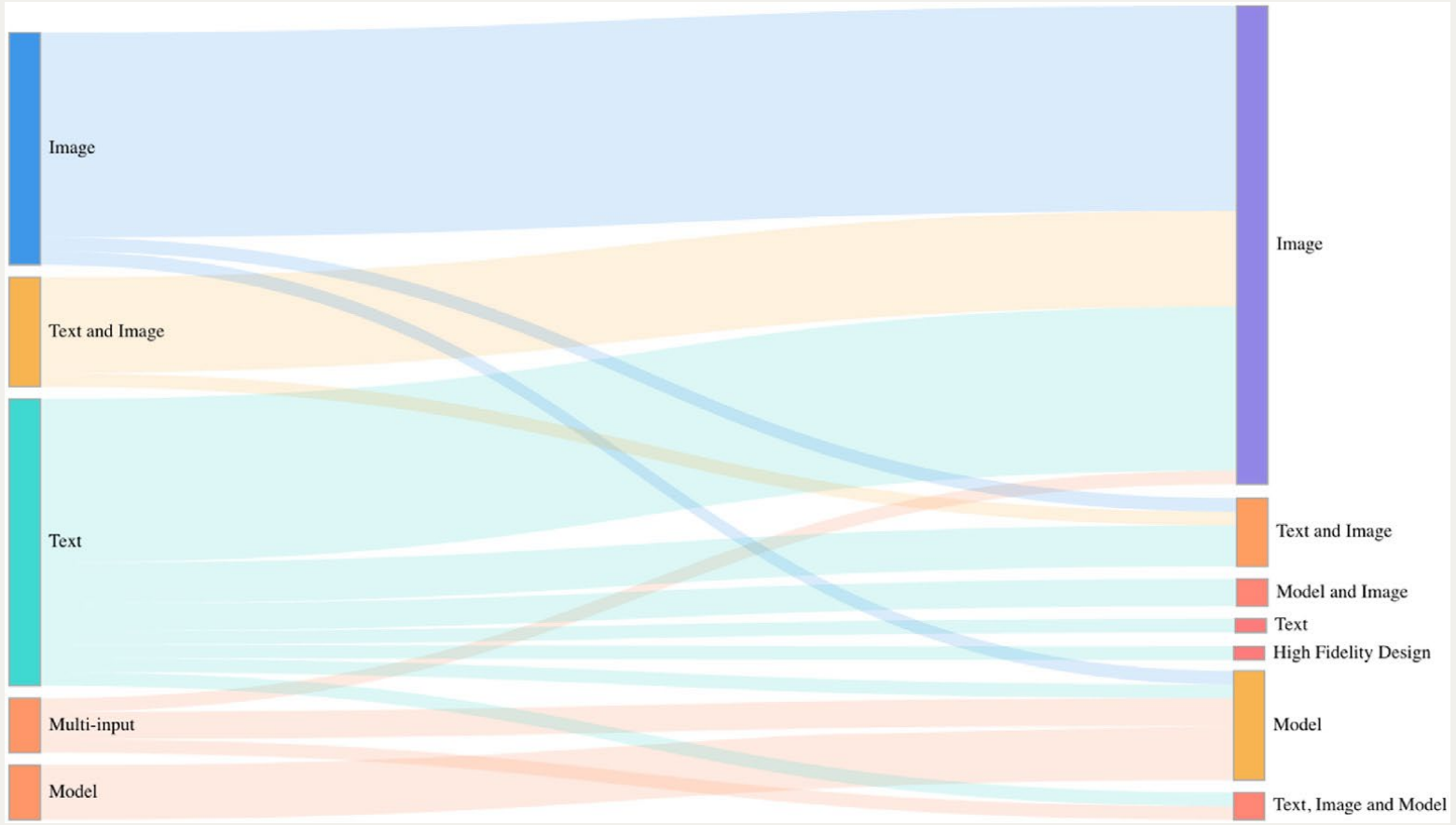


Output types by year

Results

Predominant interaction modalities: exploring multimodal and visual expressions in design (RQ2)

主要互動方式：探索設計中的多模態與視覺表達（研究問題2）

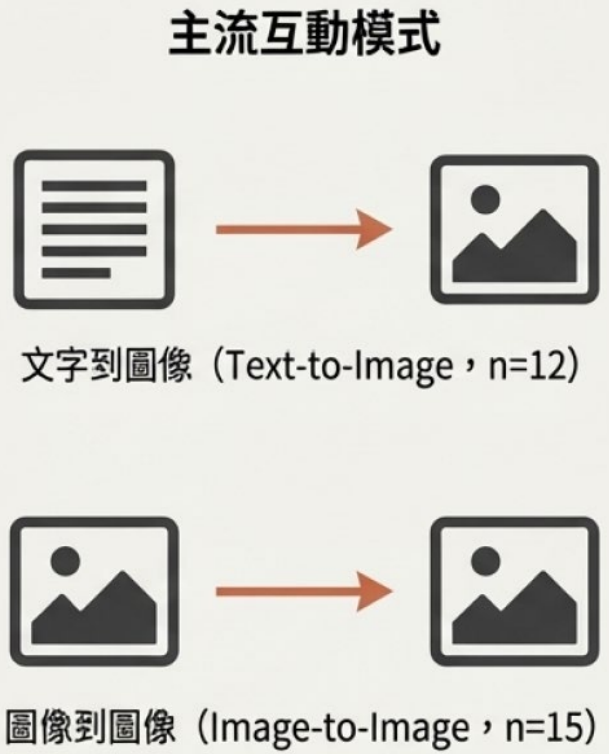


Interaction methods

Results

Predominant interaction modalities: exploring multimodal and visual expressions in design (RQ2)

主要互動方式：探索設計中的多模態與視覺表達（研究問題2）

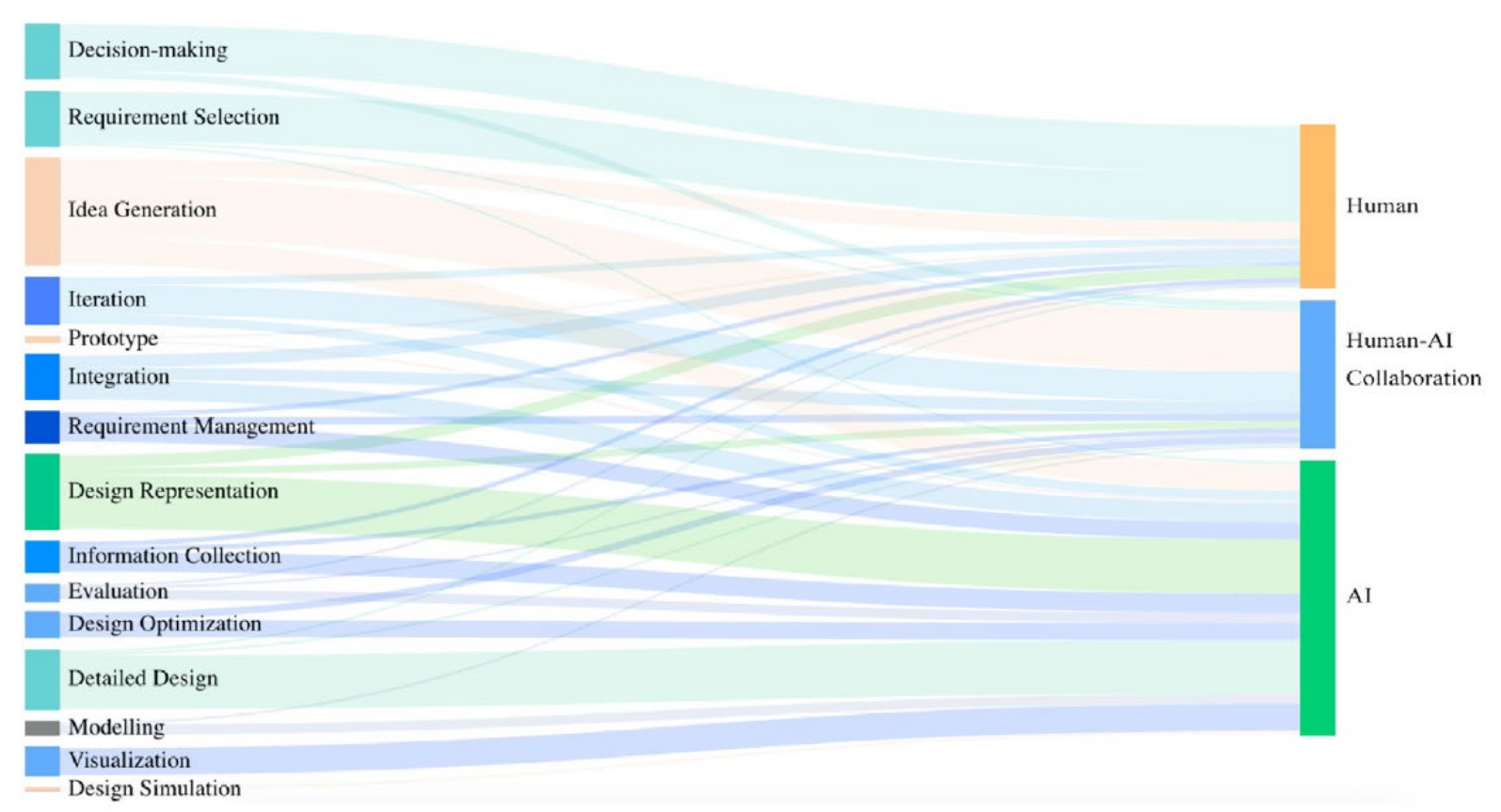


主要模態： 文字(n=22) 與圖像(n=IS) 仍是主要輸入方式。新興趨勢：2023年， 採用多模態輸入(Multi-Input)的研究顯著增加， 佔比達53.8% 。這反映了大型語言模型(LLM) 和擴散模型的影響， 使互動更靈活， 更貼近設計師的認知習慣。

Results

AI-enhanced design collaboration: optimizing divergent and convergent thinking in design processes (RQ3)

人工智慧增強的設計協作：優化設計過程中的發散性思考與收斂性思考（研究問題3）

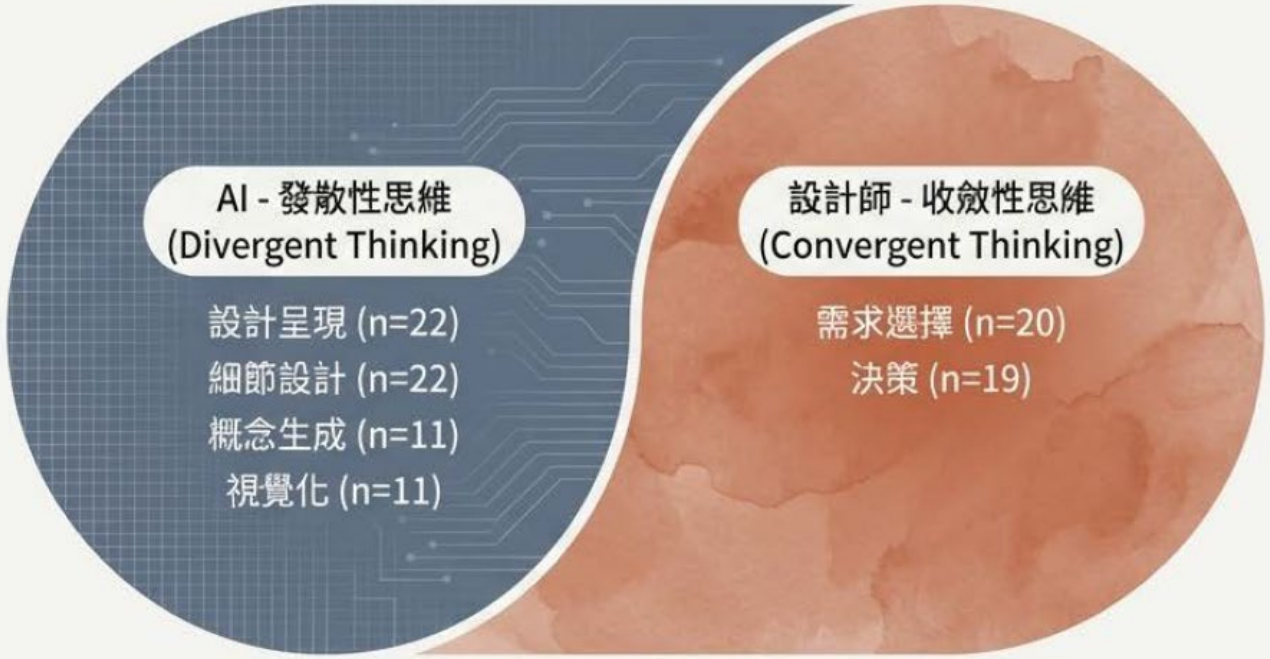


Specific design tasks involving designers and AI

Results

AI-enhanced design collaboration: optimizing divergent and convergent thinking in design processes (RQ3)

人工智慧增強的設計協作：優化設計過程中的發散性思考與收斂性思考（研究問題3）



AI 顯著降低了設計師在概念優化與表達上的負擔。

協作熱點

概念生成（n=25）與設計迭代（n=12）是人機協作最密集的任務，需要雙方不斷互動以達成最佳方案。

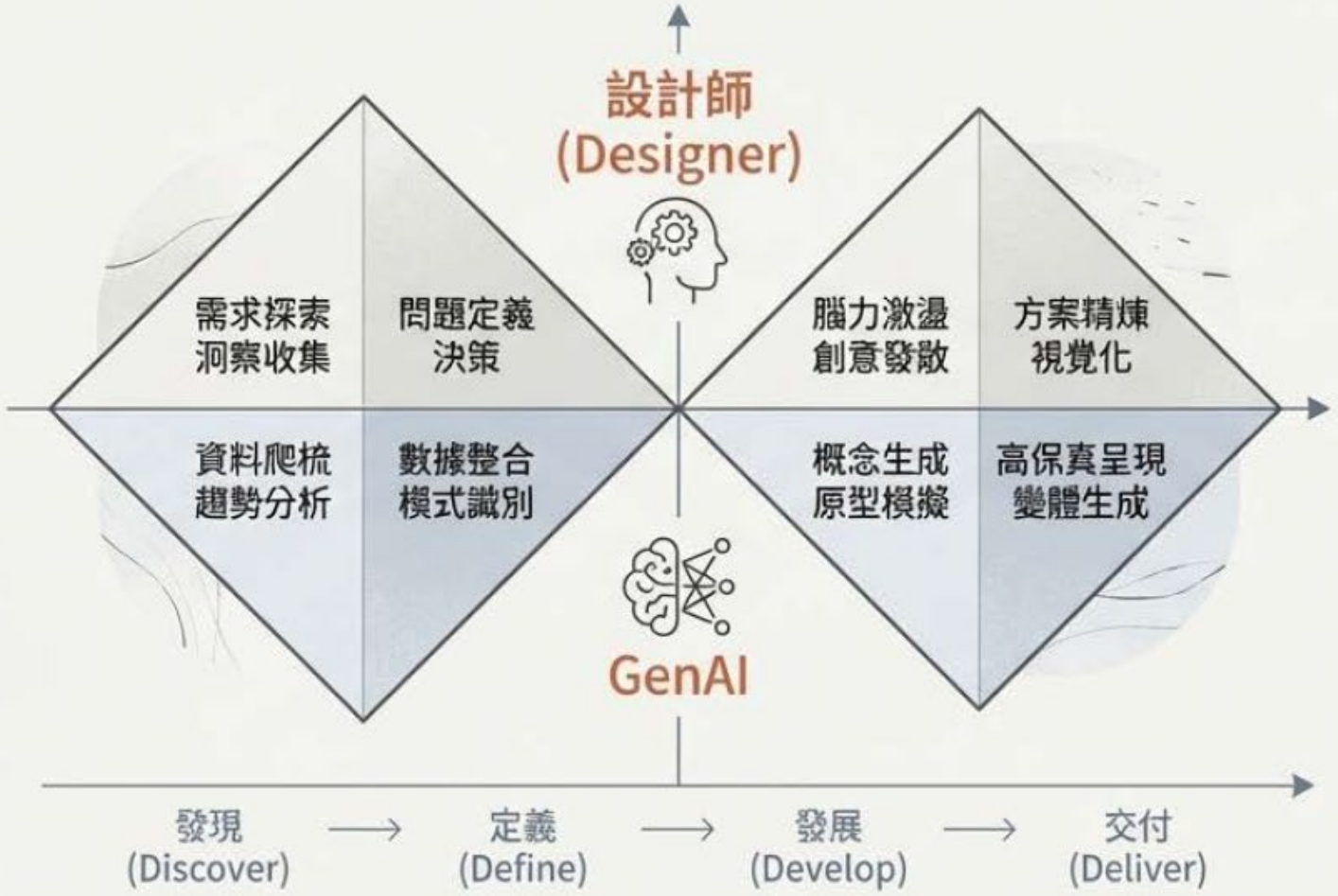
研究問題二 (RQ2) / 三 (RQ3) ：GenAI 在概念設計中協作過程與角色分工的綜合指南

框架基礎

該框架建立在設計思考的經典「雙鑽石模型（Double Diamond Model）」之上，將其擴展至人機協作的脈絡。

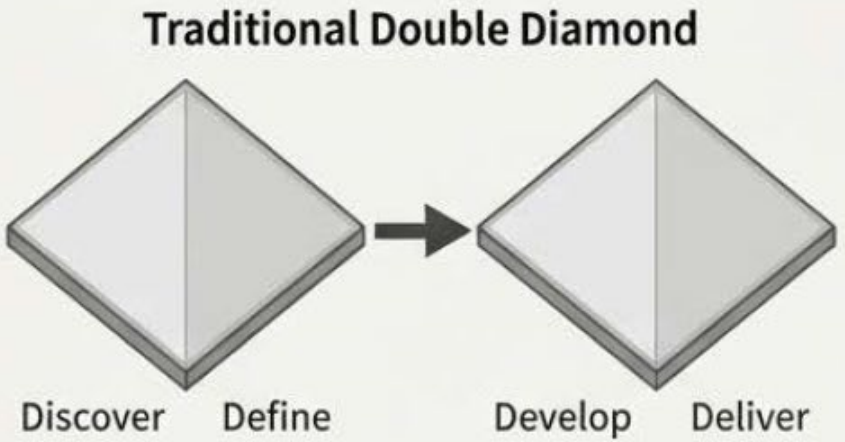
核心目標

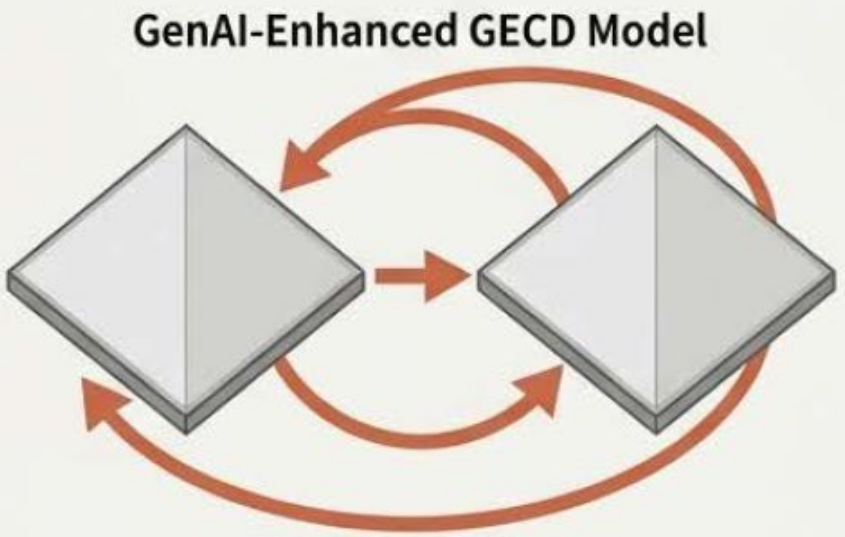
提供一個清晰的指南，說明設計師與 AI 如何有效協作，優化從模糊需求到具體設計方案的完整過程。



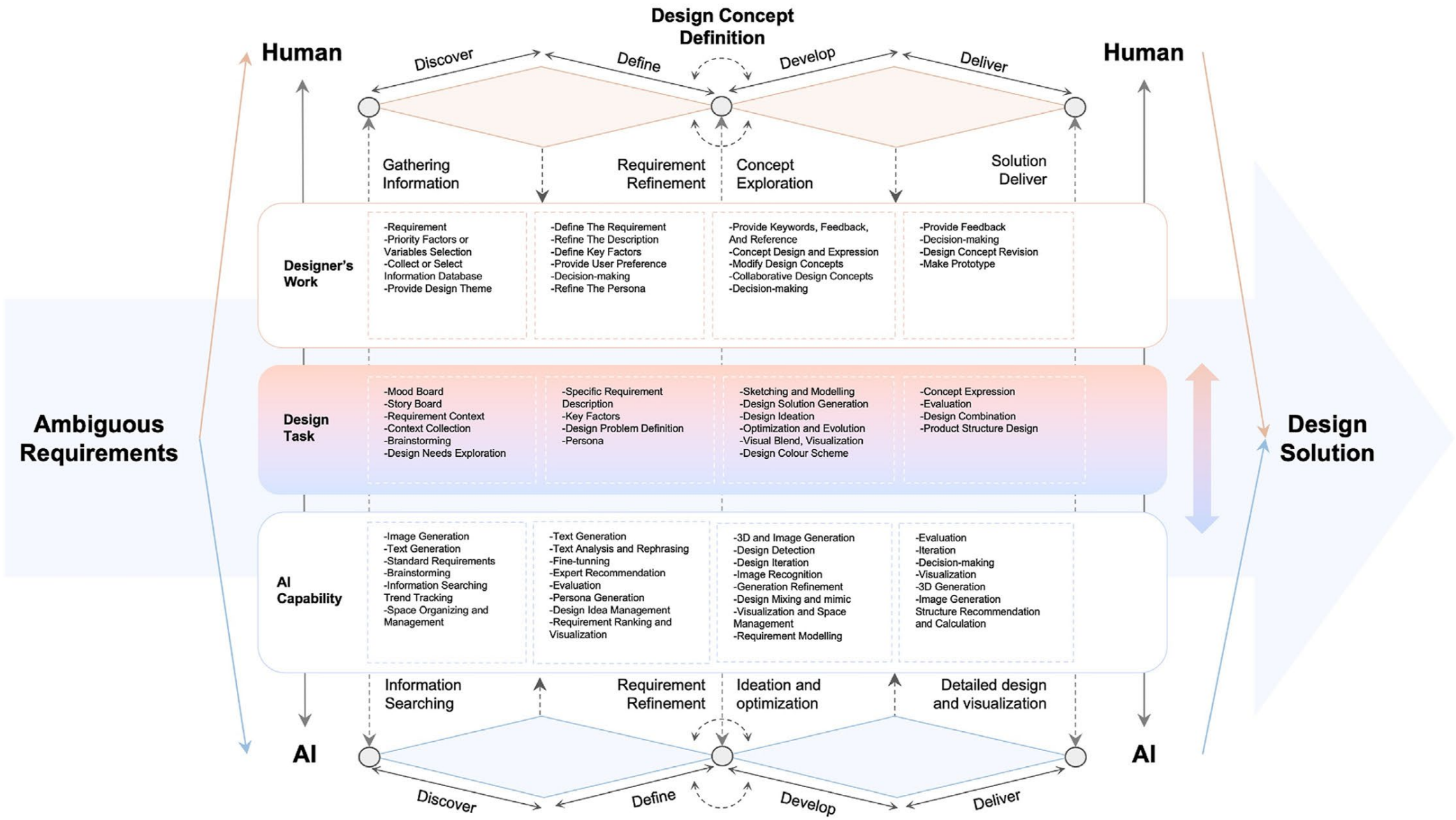
GenAI 帶來的改變

- **提升流程彈性**：GenAI 能快速生成草圖與3D模型，強化了「需求定義」與「概念發展」之間的連結，讓設計師能更頻繁地在兩個鑽石模型之間迭代。
- **促進共同演化** (Co-evolution)：設計師可以利用 AI 的生成能力，在模糊需求階段就探索潛在的設計概念，從而更好地激發「設計問題」與「設計解決方案」的共同演化。
- **從自我反思到人機協作**：設計師的流程從傳統的「自我反思循環」轉變為與 AI 互動的「人機協作循環」。





GenAI-enhanced conceptual design (GECD) framework



GenAI-enhanced conceptual design framework

Current research status

- Focus on creative expression and design stimulation(RQ1)

  關注創意表達與設計靈感（研究問題1）
- Dominance of text and image medium (RQ2)

  文字和圖像媒介的主導地位（研究問題2）
- Divergent collaborative roles for GenAI and designers in conceptual design (RQ3)

  人工智慧與設計師在概念設計中不同的協作角色（研究問題3）

Future directions

Adoption and transparency issues when expanding

GenAI’ s role in whole conceptual design (RQ1)

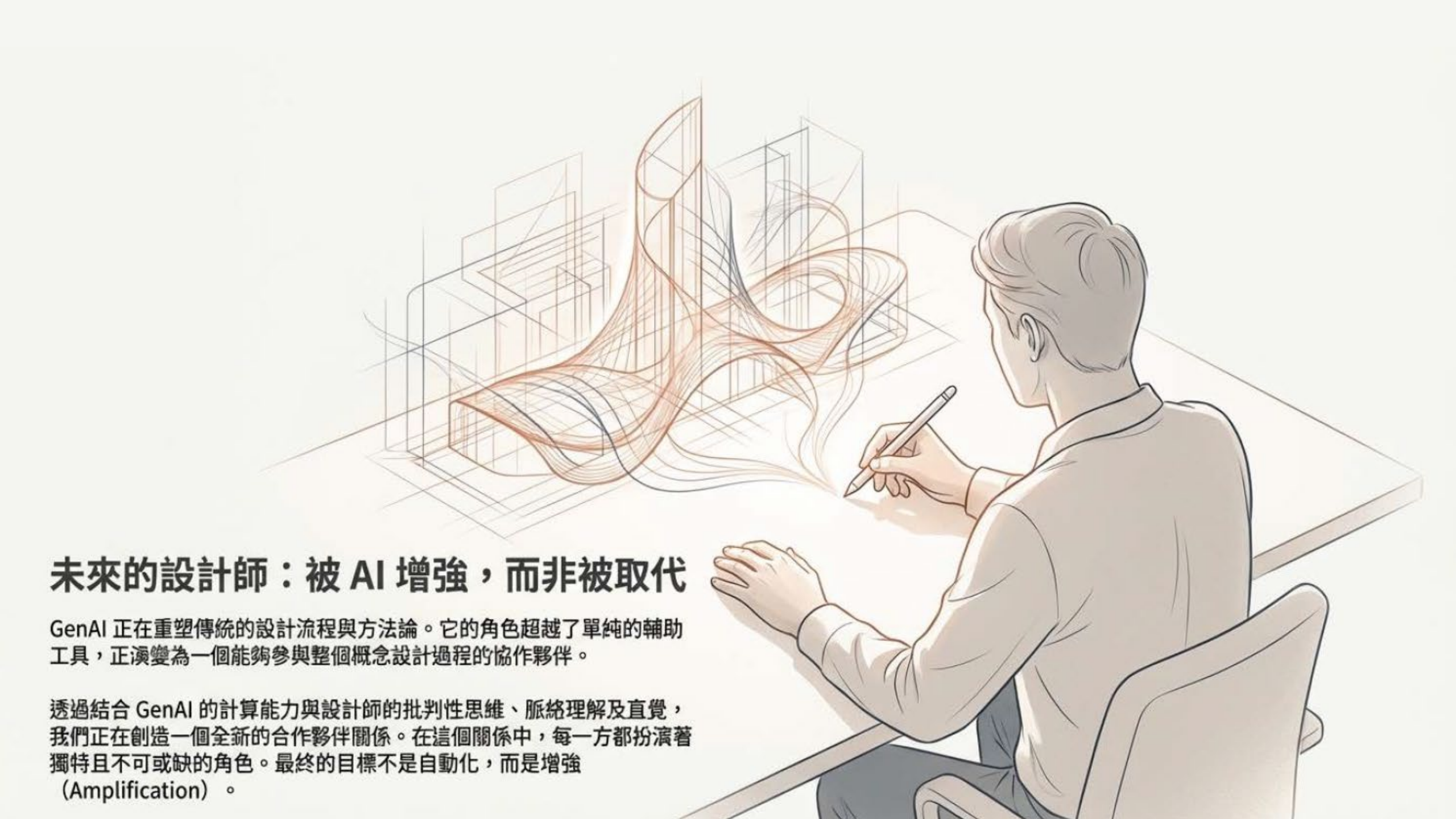
人工智慧在整體概念設計中的作用（研究問題1）

Multimodal and immersive interaction (RQ2)

多模態與沈浸式互動（研究問題2）

Challenges in GenAI-Human design collaboration (RQ3)

人工智慧與人類設計協作的挑戰（研究問題3）



未來的設計師：被 AI 增強，而非被取代

GenAI 正在重塑傳統的設計流程與方法論。它的角色超越了單純的輔助工具，正演變為一個能夠參與整個概念設計過程的協作夥伴。

透過結合 GenAI 的計算能力與設計師的批判性思維、脈絡理解及直覺，我們正在創造一個全新的合作夥伴關係。在這個關係中，每一方都扮演著獨特且不可或缺的角色。最終的目標不是自動化，而是增強（Amplification）。

Synesthetic Interactions: Exploring the Multisensory Relationships Between Color and Scent in Human Perception

聯覺互動：探討人類知覺中顏色與氣味的多感官關係

Researcher:Anna Barbara, Vanessa Faschi, Anna Gilchrist, Carlotta Magagnoli, Federica Sanchez, Reejy Atef Abdelatty Mikhail
Source:Design Issues, Vol. 41, No. 1, (2025)

報告者: 陳映涵 D11430006
授課教授:李傳房 教授

課程:114-1專題研討
報告時間:114年12月10日

1.Introduction: Background and Motivation

The Mystery of Cross-Modal Perception 跨感官知覺的奧秘

- The interplay between our senses shapes our perception of the world; the relationship between odors and colors is particularly intriguing, rooted in cross-modal perception.
- A stimulus in one modality (e.g., smell) involuntarily elicits a perception in another (e.g., vision).

Synesthesia and Learning 聯覺與學習

- Some connections may be partly hardwired in the brain, known as Synesthesia.
- Much of the odor-color relationship is believed to be learned and culturally influenced (e.g., lemon-yellow).

Practical Application Value 實務應用價值

- Implications in fields like marketing, product design, psychology, and neurology.
- Congruence between packaging color and expected odor can influence consumer behavior.

2.Research Aims and Experimental Design

Research Aim

To deepen our understanding of multisensory integration and its implications for cognitive science and practical applications through five experiments.

Five Experiments Overview

Experiment 1: Duration of Visual and Olfactory Memories.

Experiment 2: How Color Influences Perception of Fragrance Purity.

Experiment 3: Neurological Connections Between Colors and Smells.

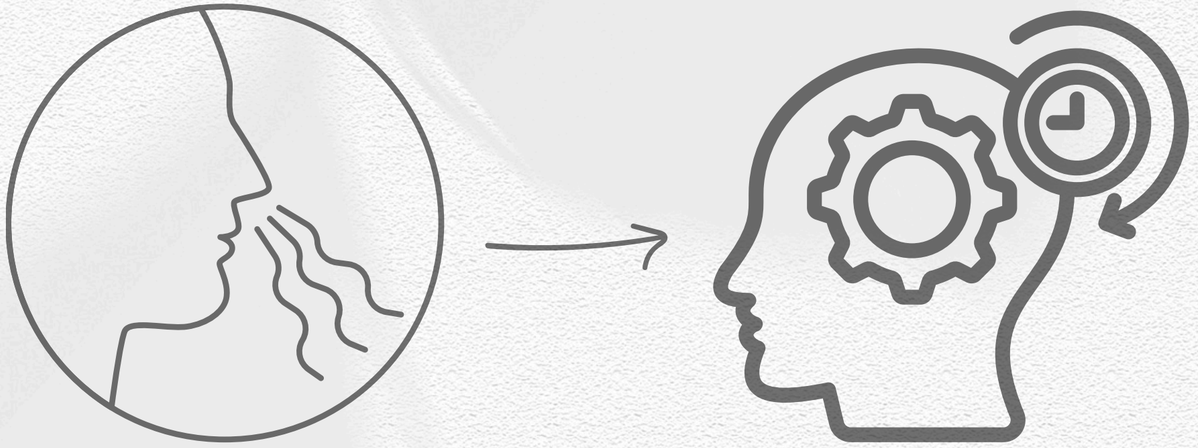
Experiment 4: Effect of Color Intensity on Scent Perception.

Experiment 5: How Visual and Olfactory Elements Combine to Create Pleasant Atmospheres.

3.Methodology and Process

Exp 1: Memory Duration and Color Association 記憶持續時間與顏色聯想

- Method: Used interviews and questionnaires. Participants were asked about the duration of their oldest visual and olfactory memories.
  採用訪談與問卷法。詢問參與者關於他們記憶最久遠的視覺與嗅覺記憶的持續時間。
- Task:Participants noted the number and type of colors associated with their olfactory memories.
  參與者須寫下與其嗅覺記憶相關聯的顏色數量及種類。



3.Methodology and Process

Exp 2: Color Influence on Fragrance Purity

顏色對香氣純度的影響

- Method: Participants were given five tests, in which they were shown three cards of different colors and sprayed with the same type and dosage of essential oil.
  向參與者進行五測試，展示三張顏色不同的卡片，並噴灑相同種類與劑量的精油。

- Task:They were asked to choose the card that smelled most like the "pure" single fragrance, measuring the influence of color cues on perceived purity.
  要求選擇聞起來最接近「純淨」單一香氣的卡片，用以測量顏色線索對感知純度的影響。

Table 1. Structure of the experiment.

Session	Scent	Card Colors
1	Pure orange	Orange, red, blue
2	¾ ylang ylang ¼ neroli	Yellow, white, green
3	⅗ cinnamon ⅕ ylang ylang ⅕ orange	Brown, black, orange
4	Pure geranium	Red, green, black
5	½ orange ½ lemongrass	Orange, yellow, green

3.Methodology and Process

Exp 3: Neurological Link and Cognitive Performance

神經學連結與認知表現

- Method:The first phase presented a predicted scenario (e.g., red as a visual stimulus, pomegranate scent as an olfactory stimulus)；the second phase presented an unpredictable scenario

  第一階段呈現了一個預期的情境（例如，紅色作為視覺刺激，石榴香味作為嗅覺刺激）；
  第二階段呈現了一個不可預測的情境。

- Measurement: The time taken to complete a standardized neuropsychological test was measured to assess cognitive fluency.

  透過標準化的神經心理學測試，測量他們完成任務所需的時間，以評估認知流暢性。

協調一致的香氛/色彩搭配:
1.石榴/紅色
2.白麝香/淺藍色
3.柑橘/橙色
4.香草/白色

不協調一致的香氛/色彩搭配:
5.薄荷/紅色
6.肉桂/淺藍色
7.薰衣草/橙色
8.丁香/白色

3.Methodology and Process

Exp 4: Color Intensity on Scent Intensity

顏色強度對氣味強度的影響

- Method:Participants were given nine bottles containing lemon essential oil at varying concentrations (1%, 10%, 100%) and tinted with different intensities of yellow.

  給予參與者九個裝有不同濃度檸檬精油（1%, 10%, 100%）並染有不同黃色色度的瓶子。

- Measurement:They were asked to arrange the bottles based on the perceived intensity of the odor, including colored and no-color control groups.

  要求他們根據聞到的氣味強度將瓶子進行排列，包含有色和無色對照組。

測試一
A:1%精油濃度(EO)+深黃色瓶
B:10%精油濃度+中黃色瓶
C:100%精油濃度+極淺黃色

測試二
A:10%精油濃度+極淺黃色瓶
B:10%精油濃度+中黃色瓶
C:10%精油濃度+深黃色

測試三
A:10%精油濃度+無色瓶
B:100%精油濃度+無色瓶
C:1%精油濃度+無色

3.Methodology and Process

Exp 5: Mental Processing of a Pleasant Atmosphere
宜人氛圍的心智處理

- Method:Participants were asked to elaborate on a "pleasant atmosphere" starting from a black-and-white landscape by adding visual (color, shape) and olfactory elements.

  要求參與者從一個黑白景觀開始，透過添加視覺（顏色、形狀）和嗅覺元素來建構一個「宜人氛圍」。

- Measurement:Collected and analyzed which sensory element (visual or olfactory) the respondents identified as the main atmosphere activating element.

  收集並分析受訪者認為哪個感官（視覺或嗅覺）是主要的氛圍啟動元素。

根據五組物品與五種香氣，加入能豐富此景觀的視覺與嗅覺元素。

物品依色彩特性分類：
暖色、冷色、暗色、鮮明色與低彩度色。

提供的精油：蜜蜂花、橙花、雪松、肉桂與丁香

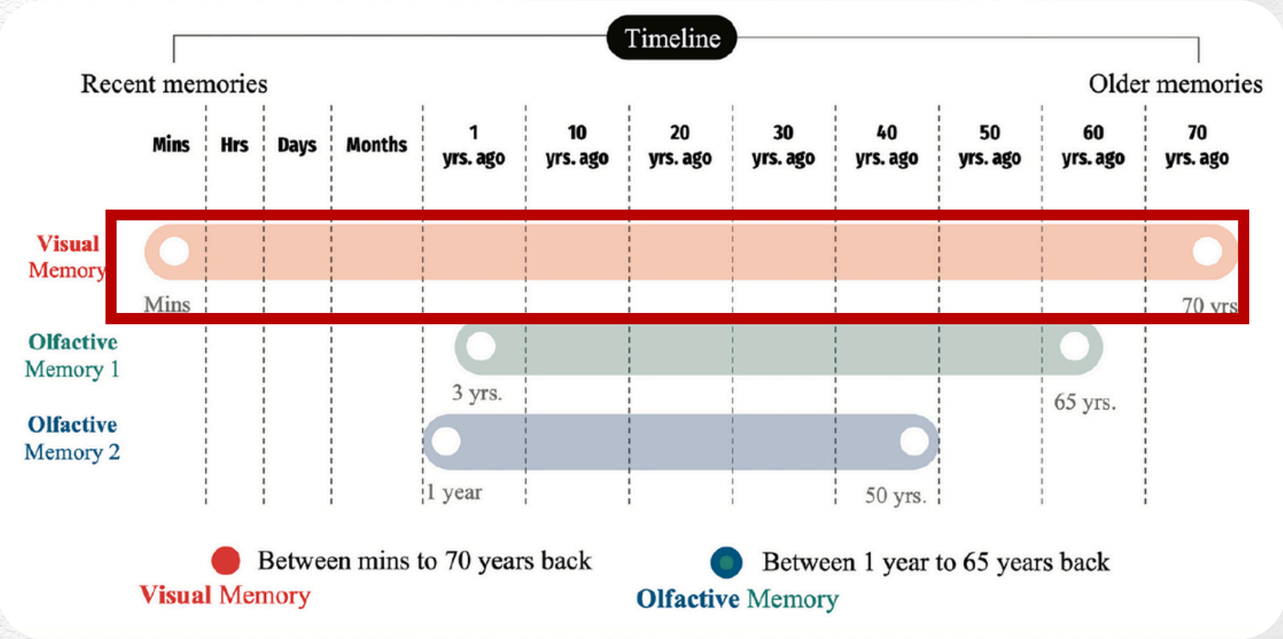
分別代表草本、柑橘、木質與辛香氣味種類。

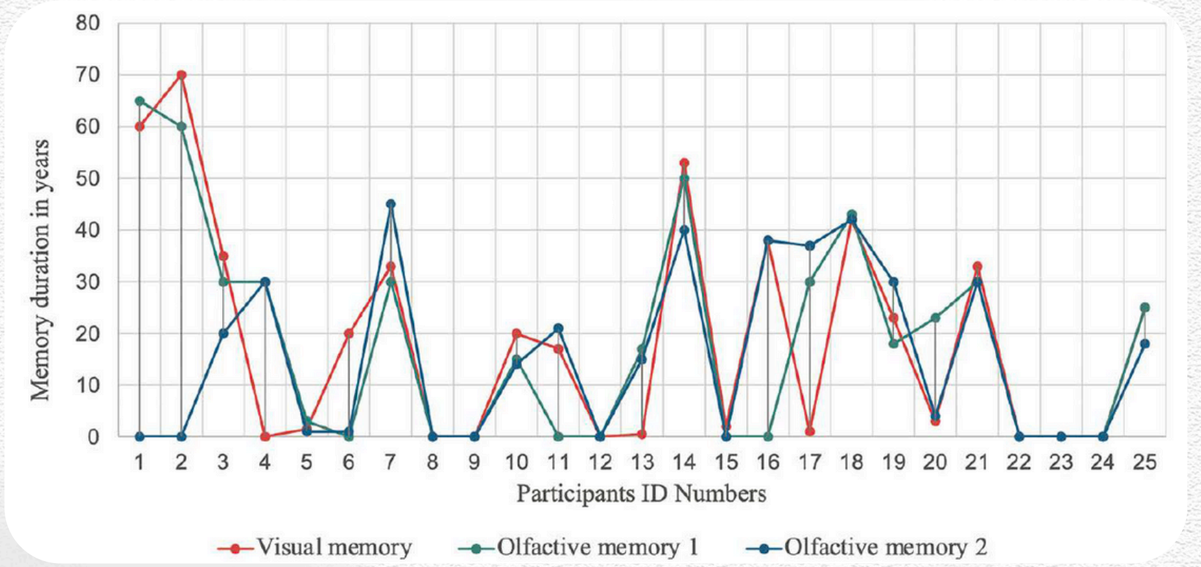
4.Experiment Results

Exp 1: Memory Duration and Color Association 記憶持續時間與顏色聯想

- Duration Range: Visual memory spanned from minutes up to 70 years, whereas olfactive memory spanned from 3 to 50 years.

  持續範圍： 視覺記憶範圍更廣（幾分鐘到 70 年），嗅覺記憶範圍較短（3 到 50 年）。

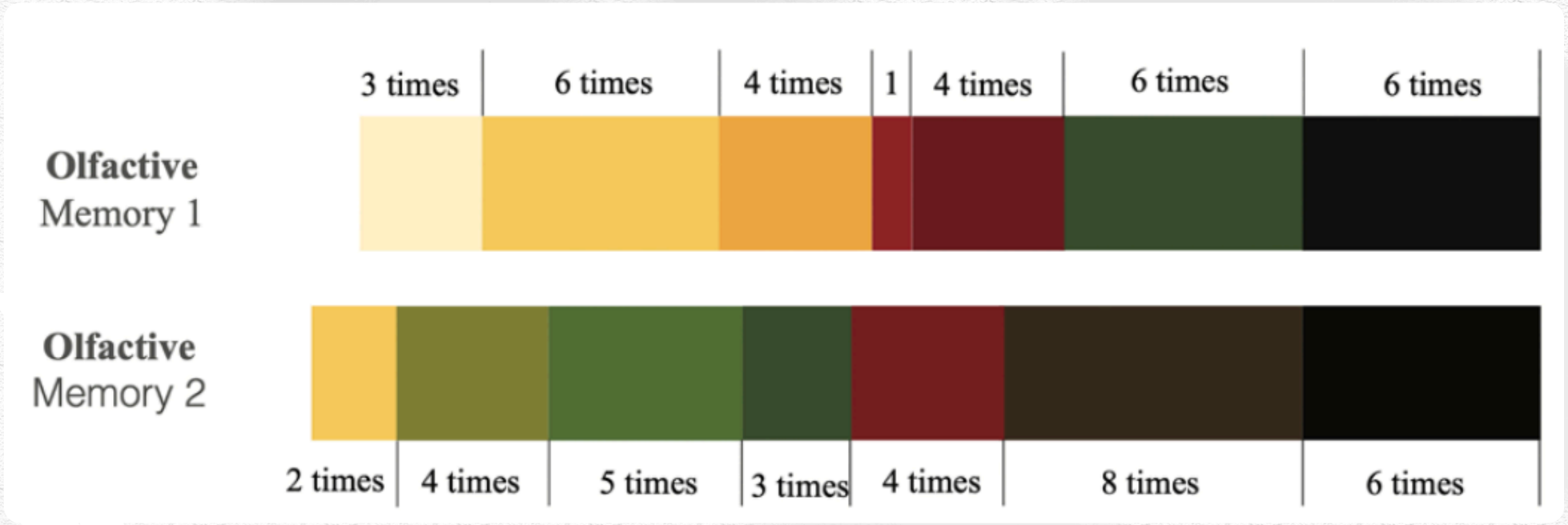




4.Experiment Results

Exp 1: Memory Duration and Color Association 記憶持續時間與顏色聯想

- Age Comparison: Olfactive memories were often older than visual ones for the same individual.
  年齡比較： 個人的嗅覺記憶往往比視覺記憶更久遠。



4.Experiment Results

Exp 2: Color-Dependent Fragrance Purity 顏色對香氣純度的影響

- People's judgments about fragrance purity were influenced by the color they popularly associate with those scents.
  參與者對香氣純度的判斷受到他們對該氣味普遍聯想的顏色影響。
- In the pure orange fragrance test, the orange card was the most chosen.
  純橘子香氛測試中，橘色卡片最常被選為「最純淨」。
- Cognitive Bias: Despite all three cards being olfactorily identical, participants were led by the color cues, failing to choose the only correct answers, "none" or "all" of them.
  認知偏誤： 即使三個卡片嗅覺上相同，參與者仍傾向選擇與氣味相符的顏色，未能選出正確答案「皆非」或「皆是」。

4.Experiment Results

Exp 3: Neurological Relationship (Cognitive Performance)顏色與氣味的神經學關係 (認知表現)

- Basis: Free Energy Principle and Processing Fluency Theory.
  自由能原理與加工流暢性理論。

- Hypothesis: Matching odor and visual stimuli could enhance cognitive performance.
- Results confirmed that the time spent on cognitive tasks (Trail-Making Test) was shorter after coherent (matched) color-smell associations.
  假設： 匹配氣味和視覺刺激會增強認知表現。
  實驗結果證實：相干（匹配）的顏色-氣味組合，完成認知任務（Trail-Making Test）的時間較短。

- Limitation: The experiment lacked a fully controlled environment, and a between-subjects design is suggested for more reliable conclusions.
  研究局限： 實驗環境非完全受控，且建議設計應採用受試者之間 (between-subjects design) 以提高可靠性。

4.Experiment Results

Exp 4: Color Intensity on Perceived Scent Intensity 顏色強度對氣味強度的影響

- Results: Showed mixed results. In the test where color intensity was inversely related to odor intensity (Test 1), most participants correctly ordered the bottles, but a significant proportion got it wrong.
  結果不一致。在色度與氣味強度反向的測試 (Test 1) 中，多數參與者能正確排列，但也有顯著比例答錯。
- No-Color Control: Without color cuing (Test 3), the ability to correctly order was reduced (7/24), suggesting color can be helpful in identification.
  無色對照組： 無顏色提示 (Test 3) 下，正確排列能力降低（7/24），表明顏色可能在識別中有所幫助。

4.Experiment Results

Exp 5: Mental Processing of a Pleasant Atmosphere 宜人氛圍的心智處理

- 52% of respondents identified color as the primary activating element, compared with 17% for olfaction.

  52% 的受訪者認為顏色是主要的啟動元素，17% 選擇嗅覺。

- Atmosphere Composition: While visual elements dominate, multisensorial integration was important to better compose an engaging image.

  氛圍組成： 雖然視覺元素佔主導地位，但多感官整合對於更好構成引人入勝的形象至關重要。

- Scent Connection: When scent was the primary driver, the atmosphere was more specifically associated with a particular geographical location or a familiar lived experience.

  氣味聯結： 當氣味是主要驅動因素時，氛圍與特定的地理位置或熟悉的生活經驗更相關。

5.Conclusion

Summary

- Color can influence scent perception and judgment of fragrance purity.
  顏色可影響氣味知覺和香氣純度判斷。
- Matching color and scent enhances cognitive performance.
  顏色與氣味匹配會增強認知表現。
- Colors dominate emotional responses; scents are significantly tied to memories and comfort.
  顏色主導情感反應；氣味與記憶和舒適感密切相關。

5.Conclusion

Design Implications

- Cognitive Enhancement: Strategic use of color and scent combinations can enhance cognitive function in educational settings.
  認知增強： 在教育環境中，戰略性使用顏色和氣味組合可增強認知功能。
- Product Design: Elevate product perception through packaging design.
  產品設計： 透過包裝設計提升產品知覺。
- Environmental Design: Influence emotional responses and memory formation in interior design.
  環境設計： 在室內設計中影響情感反應和記憶形成。

Thank You