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摘要

數位設計媒材，例如電腦輔助建築設計軟體、電腦影像處理與合成技術、以及網際媒材等，正在逐步介入與擴增我們所熟知的空間型態。不論電腦與網路的技術如何發展，實體空間還是我們所關注的焦點，傳統的空間定義與構成仍然是我們進行新設計的基礎。廣義看來目前有三個主要空間型態：實體空間、虛擬空間、以及網路空間。本研究將實體空間定義為真實建造完成的建築空間，虛擬空間表示僅建構於電腦之中具有三度空間經驗且不被真實建造的空間，網際空間是指以文字為基礎輔以圖像與圖形建立於網際網路之中的空間。但是，個別空間型態與數位設計媒材之間的關係是什麼？交互關係的因子為何？關鍵性的交互作用過程是什麼？有無在數位設計媒材多樣化演變之下繼續衍生與變化？(只有三個類型的空間型態嗎?)。本研究的研究問題是探討在數位設計媒材與三類空間型態：實體、虛擬、與網際空間，之間的交互作用之下，如何獲得一些交互關係的現象。主要研究目標因此是以空間與媒材因子探討一些整合的先期交互關係之現象。次要研究目標是由於設計之目的與手法的不同，空間型態的可能組合發展。

本研究分成兩大步驟，第一是三類空間的實驗，每類空間分別選擇一個實驗案例，呈現空間型態的數位媒材劃分為三大類：二維圖說、三維模型、以及動態畫面等。實驗的因子是空間與媒材各自分別使用 30 個由文獻回顧推論而得到的因子。實驗的受測者劃分為設計類以及非設計類學生，每組 10 人，總共進行了 6 次實驗。實驗的步驟首先是請受測者觀看由三類媒材共同呈現的空間內容，其次是勾選他們所感知到的空間以及媒材因子，接著請受測者連結有關聯的兩組因子，最後請他們進一步的說明空間與媒材因子之間的關聯性。本研究的第二個步驟是提出先期的整合性交互作用之現象，綜合分析與比較三類空間型態之間的相似性與差異性，藉以建構一個整合三類單元空間型態的交互關係架構。

研究的結果指出，三類空間型態的交互作用現象呈現出三個層次：空間與空間、媒材與媒材、以及空間與媒材。每個層次也包含了三個向度：個別空間型態、空間型態成對比較、以及三類空間型態整體比較。近年來在數位設計媒材與建築設計過程的研究著重於工作上的新技術、設計表現工具、設計思考媒材、與新的溝通方式等，缺乏深入的探討各類空間型態與數位設計媒材之間的關聯性。本研究的研究成果彌補這個未被重視的研究範圍，並且提出了三類空間型態與數位設計媒材之交互作用之下所產生的一些先期整合現象。後續研究可以從幾個主要面向發展，包括各類空間型態進一步的交互關係現象研究、建築設計的案例研究、原案分析、以及可能空間型態的深入研究等，本研究目前的先期整合交互作用現象會因此更加完備，並且進一步提出空間與媒材的交互關係之理論模型。

Inter-relationships of physical, virtual, and net spaces in terms of spatial and media factors

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ABSTRACT

Following the rapid developments of computer and communication technologies, digital design media, such as computer-aided architectural design, image processing, and web-based media, have gradually intervened and expanded the familiar spatial types. In general, there are three major spatial types: physical, virtual, and net spaces. This study defines physical space as existing architectural space; virtual space exists only in computer with three-dimensional spatial experiences; net space is constructed in the internet and based on texts, figures, and graphs. However, what are the inter-relationships of the three spaces? What are the significant elements and processes derived from the inter-relationships? The research problem of this study is how to obtain some phenomena resulted from the inter-relationships of the three spaces. The major objective of this thesis is to study inter-relationships of physical, virtual, and net spaces in terms of spatial and media factors. The second objective is to investigate the possible combinations of the three spatial types.

There were two research steps of this thesis. The first one was the experiments of the three spaces. Digital design media were also separated into three types: 2D drawings and images, 3D digital models, and dynamic media. The subjects were consisted of twenty students that were separated into two groups: architecture and non-architecture. The initial step of experiment was to represent the contents of space to subjects. Then I asked subjects to select both spatial and media elements which they perceived during the experiment. Next they indicated relations of two groups of elements. Finally, it was a short interview which subjects described inter-relations of both space and media. The second research step was to analyze and to compare phenomena of inter-relationships in the three spaces.

As a result, this study indicated three levels of phenomena of inter-relationships of the three spatial types: space and space, media and media, as well as space and media. Each level was also consisted of three dimensions: individual spatial type, comparison of each two spatial types, and comparison of the three spatial types. These findings are significant to the theories of digital architecture, and inter-relationships between space and digital design media. Future studies will focus on the research of inter-relationships of space and media in each spatial type, case studies of architecture design, the protocol analysis, and case studies of possible combinations of spaces.