數列級數於點陣式全像系統中應用與表現之探究

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摘　要

點陣式全像片是一種具有立體深度表現的視覺表現媒材。其影像具有點陣構成、光譜色彩流動、透光…等特質。本研究嘗試將基礎造形原理中常見的數列級數分割構成與點陣式全像媒材結合，透過六種不同的數列級數排列圖形，呈現於點陣式全像片並觀察其立體感表現。經由實驗觀察後，得到數列級數圖形透過點陣式全像材質的呈現時能夠強化立體感表現的結論，並且藉由點陣式全像達到有別於過去紙本呈現的視覺效果。

為了延伸點陣式全像的視覺表現以及空間表現，使用了三種透疊的方式(點陣式全像圖案與圖案之間的透疊、點陣式全像片與全像片之間的透疊、點陣式全像片與透明材質之間的透疊)。其中點陣式全像片與透明材質的測試，藉由六種不同的透明材質(方塊玻璃、毛玻璃、銀霞玻璃、光柵片、放大鏡光柵、凸透鏡)透疊後，讓點陣式全像所呈現的數列圖形在色彩與造形都產生了極大的變化，也讓原本點陣式全像影像所呈現的視覺效果有了更豐富多元的視覺效果。除了實驗研究的部份外，本研究在文獻探討部份將平面視覺中構成立體感表現的方法加以探討，彙整之後建構成表。此外，更嘗試將立體影像未來趨勢透過技術類別、視覺效果以及實際運用等三個層面進行整理，說明現代立體影像技術的進步。從科幻電影中呈現的立體影像技術中一窺未來立體影像發展的方向。

以下為本研究之研究結果：

1. 透過實驗發現，將數列級數圖形藉由點陣式全像媒材呈現後，發現等比數列、費波那齊數列、貝魯數列所發展出來的數列特質單位形變化差異大，因此對於立體層次表現的建立呈現較佳的效果。

2. 級數圖形藉由對稱的組合排列後，能夠發展出四種不同的立體造形，並能夠造成不

同的立體視覺效果。對稱排列之級數圖形透過點陣式全像片呈現後，讓圖形的立體感程度更加強烈，不同的對稱排列也造就了不同程度的立體表現。

3. 將級數圖形透過三種透疊形式呈現後均發展出豐富多元的視覺效果，三種透疊方式如下（1）點陣式全像圖案與圖案之間的透疊（2）點陣式全像片與全像片之間的透疊（3）點陣式全像片與透明材質之間的透疊。藉由不同的透疊形式，能夠延展點陣式全像媒材的視覺表現，更可進一步的拓展其應用層面。

4. 本研究提出點陣式全像的立體影像特質，有助於讓數列級數圖形的立體感表現更趨強烈，讓數列級數圖案與背景拉出景深般的空間感。這研究結論對於未來基礎設計教育以及設計實務運用上，都能提供另一個設計思考上的方向。

5. 本研究透過創作部份所得到的結果，點陣式全像片可以透過圖案構圖、排列上的變化強化其立體感表現，利用此特質能讓點陣式全像海報達到引人注目的目的。此外，點陣式全像媒材有著觀賞者移動觀看視點、光源角度就能改變色彩的影像特質，因此藉著動力裝置的韻律筆吶 i 以讓點陣式全像的視覺呈現注入一股新的活力。

關鍵字：重疊形式，視覺表現，立體影像，點陣式全像

The Application and Display Research of Progression in
the Dotprinter Holographic System

Abstract

The dot-matrix hologram is a visual medium which is capable of presenting the depth of stereo images. It has the characteristics of the dot-matrix composition, the flow of spectral colors, the pervious to light, etc. This research aims to combine the division and the composition of the sequence progression in the basic theory of shape with the dot-matrix holographic medium. This research uses six different sequence progressions to arrange images and display as the stimulus on the dot-matrix holograms to observe the stereo effects. Through experiment and observation, the conclusion shows that sequence progression images which display on the dot-matrix holograms are capable of intensifying the stereo effects. Moreover, it achieves the visual effects different from those in prints via dot-matrix holograms.

In order to extend the presentation of visual and space of the dot-matrix holograms, to experiment three different transparent overlaps: the first is combined the dot-matrix holographic image and the dot-matrix holographic image, the second is combined the dot-matrix hologram and the dot-matrix hologram, and the third is combined the dot-matrix hologram and transparent material. In the test of the third one, via six different transparent materials (the square glass, the frosted glass, the obscured glass, the optical grating, the magnifier optical grating, and the convex) the sequence patterns created by the dot-matrix holograms cause a huge variation at both color and shape, and the visual effects created by the original dot-matrix holographic images have richer and greater effects.

In addition to experiment, at the part of references the research explores the methods in

composing stereo presentation on flat visualization, and then compiles a table. Moreover, it arranges the future trend of stereo images via three aspects: technology category, visual effects, and actual application to interpret the progress of modern stereo technology.

The conclusions of this research:

1. Display the sequence progression patterns by using dot-matrix holographic medium. Geometric Progression, Fibonacci Series, and Pellie Series show great variation in the sequence unit shape. Therefore, they present better effects in creating stereo levels.

2. It develops four different kinds of stereo shapes and different stereo visual effects when compose the progression patterns with symmetry arrangement. Display the progression patterns of symmetry arrangement via the dot-matrix hologram will create stronger stereo degree. Different symmetry arrangements will cause different degrees of stereo presentation.

3. Through three transparent overlaps it causes various visual effects of the progression patterns: the first is combined the dot-matrix holographic image and the dot-matrix holographic image, the second is combined the dot-matrix hologram and the dot-matrix hologram, and the third is combined the dot-matrix hologram and transparent material. It would extend the visual presentation of the dot-matrix holographic medium through different forms of transparent overlaps, and it would also expand the application range.

4. This research brings up the stereo-image features of the dot-matrix holography, helps the stereo presentation of the sequence progression patterns to be stronger, and creates the space between sequence progression patterns and background like the depth of field. The conclusion of this research provides a direction of design thinking for future basic design education and design application.

5. The creation of this research draws a conclusion that the dot-matrix hologram could intensify its stereo presentation through the composition of the pictures and the variation of the arrangement. Take advantage of the characteristics will make the dot-matrix holographic

posters attractive. Moreover, the dot-matrix holographic medium has a feature that the color will change as the viewers move their position or the angle of light. With the aid of the swing of the dynamic device, it will infuse new life into the visual presentation of the dot-matrix holography.

Key words: Visual Representation, Stereo Image, Dotprinter Holographic, Overlapping Form