

# A New System to Appreciate the Visual Characteristics of a Painting

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## ABSTRACT

A painting-viewing system is proposed as a tool to help painting appreciation and to improve the museum experience. This system simultaneously highlights certain visual characteristics of multiple paintings, thus informing users of the links between paintings and the semantic elements that may appear superficially different, and also conveying the art-historical explanation of those characteristics. Through this system's evaluation, the approach based on "the awareness of the visual characteristics" may be effective as a method of developing the user's interest in the paintings. When this system is placed in museums and galleries as a mediation tool, it will be useful to a viewer's preparation for the art-viewing experience. This paper presents the concepts behind the system's development and the results of the first survey as a piece of a larger project to explore the improvement of painting appreciation as a museum experience.

## Introduction

When viewers peruse a painting, it does not provide us with a verbal explanation of itself. However, if they pay attention to the semantic information contained in the visual characteristics of the painting, this may provide cues for how to appreciate it. For example, in religious paintings the saints were depicted with similar visual characteristics even by different artists. These characteristics were consistent as semantic elements of the paintings in their art-historical context.



Figure 1. The characteristic elements of multiple paintings are displayed concurrently in order to indicate the shared elements and links between their meanings. © 2008 DNP Co., Ltd.

Thus, iconography was a central concern in development of this new system of assisting art appreciation [1]. Calling attention to such visual characteristics can enhance viewers' capacity for art appreciation when they look at paintings of similar genres in museums and galleries. In this painting-viewing system, as in all art appreciation, the starting point remains the most fundamental act of "seeing." The system visually highlights the noteworthy characteristics of the painting and provides their semantic context based on art history. The characteristic elements of the painting are highlighted so that viewers can become more visually aware of the painting and its various aspects. Moreover, the characteristic elements of multiple paintings are shown concurrently in order to compare the semantic elements. This system was developed to enhance viewers' perception of the art-historical context through awareness of semantic elements linking multiple paintings.

## Previous Work

There is much previous research on art appreciation from the perspective of the visual perception of art, and this work has provided penetrating insights into the methods of art appreciation. Clark has described an approach to art appreciation and how to read paintings through their visual features and art historical significance [2]. The relationship between the visual system of the human brain and art appreciation has also been explored. Various artworks and artists' opinions about looking at art have been cited, leading to a definition of the experience of art perception [3].

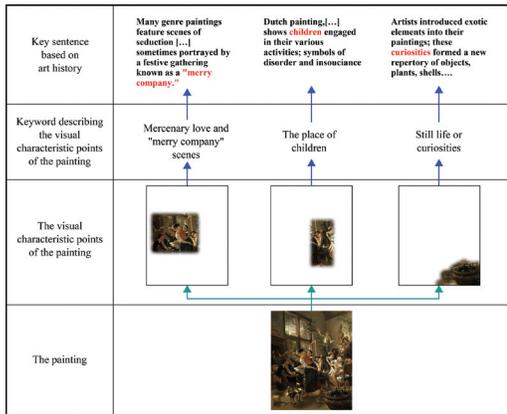


Figure 2. Connection between visual characteristics of painting and terms. © 2008 DNP Co., Ltd., Musée du Louvre.

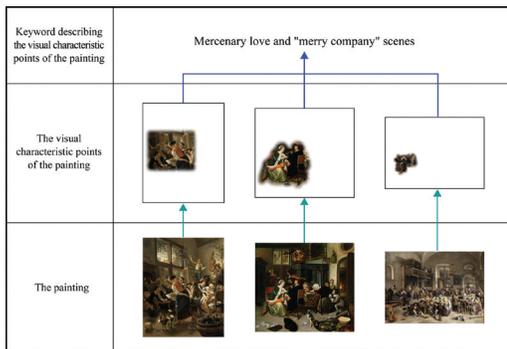


Figure 3. Keyword for multiple paintings with shared visual characteristics. © 2008 DNP Co., Ltd., Musée du Louvre.

Earlier projects have explored the connection between different art works in an examination of interface design [4]. However, the focus there was on presenting information in graphic and relational data form [5]. In terms of interface design, this project referred to the Museum of Modern Art's web site, Design and the Elastic Mind [6]. As Clark has pointed out that viewers need "active participation" in order to appreciate a painting at the early stage, the focus was on the visual characteristics of paintings as effective elements for the viewers. The project assumed that when viewers notice the visual characteristics as semantic elements in multiple paintings, they then perceive the clue for appreciating painting. This approach should provide a new method of developing viewers' perceptions by relating visual elements to verbal understanding.

### Content Development

In structuring the content, the system extracts visual characteristics from the paintings as semantic elements, then expresses those characteristics as a unified set in semantic terms. Figure 2 shows the information structure provided by this system. A painting's visual characteristics and the links with its respective keywords are emphasized. The keywords are not simply verbalizations of what can be seen with the eyes; rather, they are meta-keywords that help users to generally

remember the visual characteristics as semantic elements. Moreover, the short phrases (hereafter, key sentences) include the keywords that explain the context of the visual characteristics based on art history.

The keyword in Figure 3 shows that the visual characteristics of multiple paintings can be expressed. This allows users to understand the points of connection between paintings that seem at first glance to have different visual characteristics. The information structure is organized so that the key sentence includes the keyword, providing an easily understandable structure: "painting's visual characteristics -> keyword -> key sentence."

Selecting the artworks, deciding on the key sentences and visual characteristics, and preparing the final version in art-historical context according to the content structure were the responsibility of the painting department of the Musée du Louvre. The museum team featured 17th-century European paintings as the theme for the system because of its diverse wealth of excellent painters,



Figure 4. The display. © 2008 DNP Co., Ltd.

such as Rembrandt and Vermeer, and the abundant availability of their characteristic works. They selected approximately 120 examples for use in the system. They also described key sentences expressing 29 themes, with each theme highlighting the common visual characteristics of several paintings selected from the entire database of 120 paintings. The key sentences explain the visual features of each genre of 17th-century European painting (for example, genre scenes, portraits, and landscapes) in art-historical terminology. Moreover, two or three key terms within the sentences for each painting are visually linked to specific visual characteristics of the painting.

## Device Design

Since the purpose of this device is to evaluate the concept, the first prototype adopted commercially available products. Efforts were made in the planning process to provide imagery that is as large as possible, along with simultaneous display of multiple images. The system employs liquid-crystal display panels to provide the high-quality images necessary for viewing the paintings. As Figure 4 shows, the display consists of a Sharp 65-inch main screen, with three Sharp 21-inch sub-screens arranged horizontally beneath the main screen. All four screens are equipped with touch-panel functions.

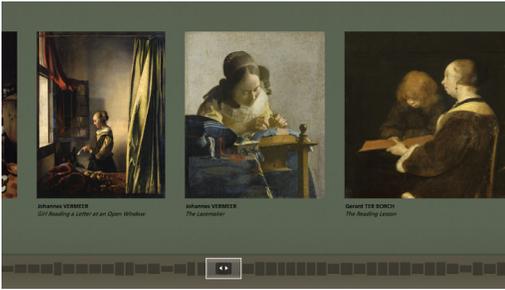


Figure 5. Overview of images lined up in a row.  
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Figure 6. Interface design: placement of selected painting and surrounding connected paintings. © 2008 DNP Co., Ltd.,  
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them as a unified set formed by links between semantic elements. The limitations of screen resolution prevent display of all of the related paintings in the same keyword, so some of the lines run to the edge of the screen, suggesting the presence of other images off-screen at their endpoints [7]. Figure 7 shows how giving attention to specific visual characteristics changes the animation. The characteristic features of each painting are highlighted according to keyword, a view shown whenever the user selects the image of a painting. The attention of the user is focused on the visual characteristics of the paintings through repeated viewing of these semantic elements. The view of the highlighted characteristics is brief, so a redisplay function is embedded in the icon of the keyword. Figure 8 also shows the animation of the circle used to draw the user's attention to the key sentence. The timing and order of the display of content are designed to lead the user's gaze from the noteworthy characteristics of the image to the text. In terms of

## Interface Design

The content is structured using two basic models for on-screen presentation. The first screen serves as a catalogue that stores entire paintings selected by users; the second displays multiple paintings and the links between their semantic elements.

The interface for the first screen was designed for the user to select a painting from among images aligned in a sequence determined by the curator. Figure 5 shows the first screen, where users select the painting image that interests them. By scrolling the wall to the right or left, the user can glance through all of the paintings included in the system. When the user clicks on an image of a painting, as seen in Figure 6, the painting appears in the center of the main screen, which simultaneously displays visual features from related paintings.

The interface enables the user to intuitively notice how those characteristics are linked to other paintings. Connections between the selected painting and the related paintings are graphically indicated by connecting lines. Figure 6 shows the paintings on the main screen with the keywords that explain the connections between the images, displaying

user interface, system operation has been simplified, focusing on a “click-style” touching of buttons and images of paintings on both the main and sub-screens.

Assuming that users will touch all of the displayed images on the main screen, the touch function was imbedded in all images and buttons. Figure 9 shows changes in the screen according to which button or image was selected by the user. In particular, it is hoped that users will reconfirm the link between the paintings by using the functions to display their visual characteristics.

### Implementation

The contents were constructed using Flash technology from Adobe Systems Incorporated. The main and sub-screen content is controlled by Adobe Flash Media Server (hereafter, FMS). Utilizing FMS functions, the system can synchronize and provide smooth animation between

main and sub-screen content. The information architecture consists of XML (Extensible Markup Language) files that are loaded into a Flash movie. Figure 10 shows the structure of the XML: “Painting\_master.xml” and “Keyword\_relation.xml” are composed of systematized identification codes, while “Painting\_detail.xml,” “Keyword\_detail.xml,” and “Sentence\_detail.xml” are rendered in three languages (Japanese, English, and French) for text display on the screen.

### Observation and User Response

The prototype of this viewing system was completed on 4 December 2008, and evaluation is still in progress. For this evaluation, as seen in Figure 11, users were classified into four categories according to the frequency of their visits to museums and their level of interest in or knowledge of art. A pilot survey performed observational research and interviews with the cooperation of seven subjects distributed among these four categories.

Of the seven interviewed, six said that they could see some kind of relationship between the multiple paintings. They also felt that explanation by linking the visual features of multiple paintings would provide a new and interesting way to appreciate art. However, the subjects could not immediately grasp that the key sentences explain those related features. The idea of key sentences explaining visual characteristics in comprehensible terms was impressive to the subjects. However, they experienced difficulty understanding the key sentences with conceptual expressions or

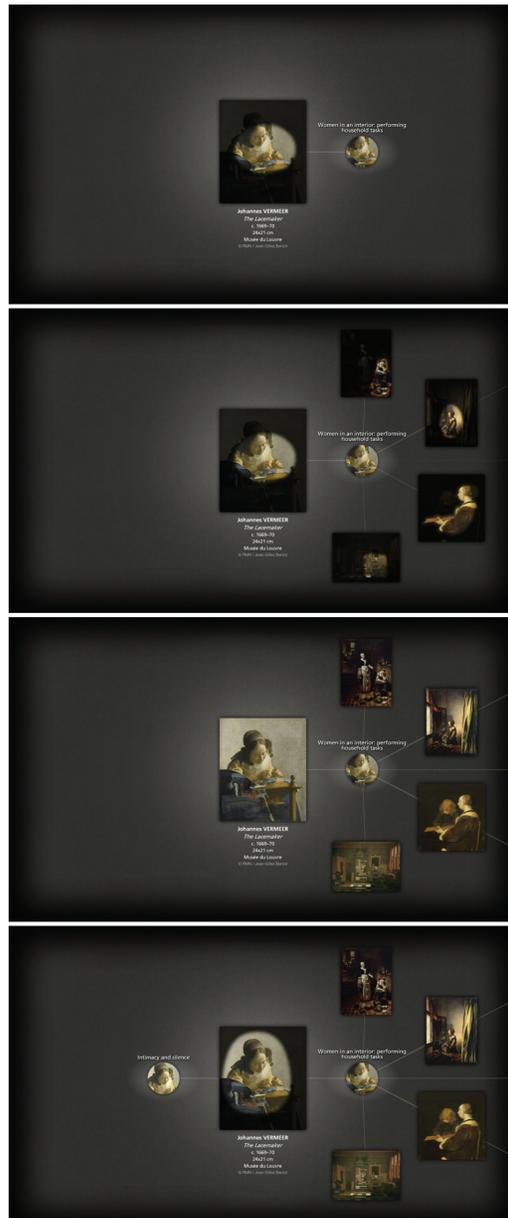


Figure 7. A sequence of animation to emphasize the visual characteristics. © 2008 DNP Co., Ltd.

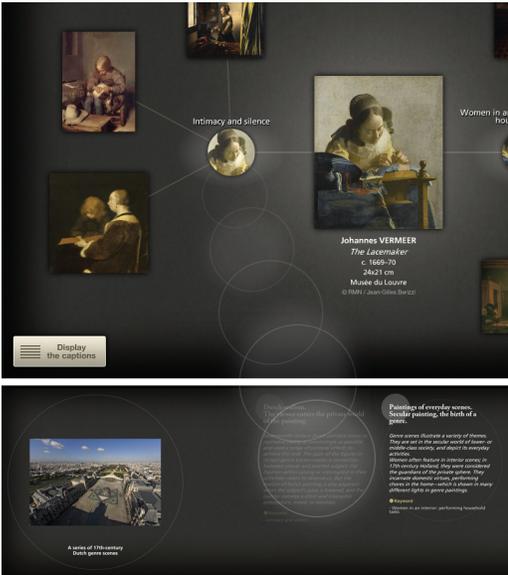


Figure 8. Display leading the gaze to key sentences. © 2008 DNP Co., Ltd., Musée du Louvre.

technical terms and lost interest before they finished reading.

Three subjects, including two from category 1, said that the key sentences were too abstract and difficult to understand. Two subjects belonged to category 2; they showed interest in the system’s approach of linking multiple paintings by semantic elements. In their interviews, they stated that they were aware of the paintings’ noteworthy points. Moreover, they realized that the system’s approach was related to their previous museum experiences. The subjects in category 4 said that they understood the concept and purpose of this system, but given their knowledge and experience of art, they felt that the system’s explanations were too general and not meaningful for them. Rather, they hoped for more specific information, such as the artist’s biography, or deeper descriptions of the works

and their techniques. They also said that they were able to notice paintings that they usually would have overlooked for not being famous, because multiple paintings were displayed simultaneously. They understood the display of multiple paintings as a new exhibition method employing the semantic elements of the paintings. They acknowledged the importance of this

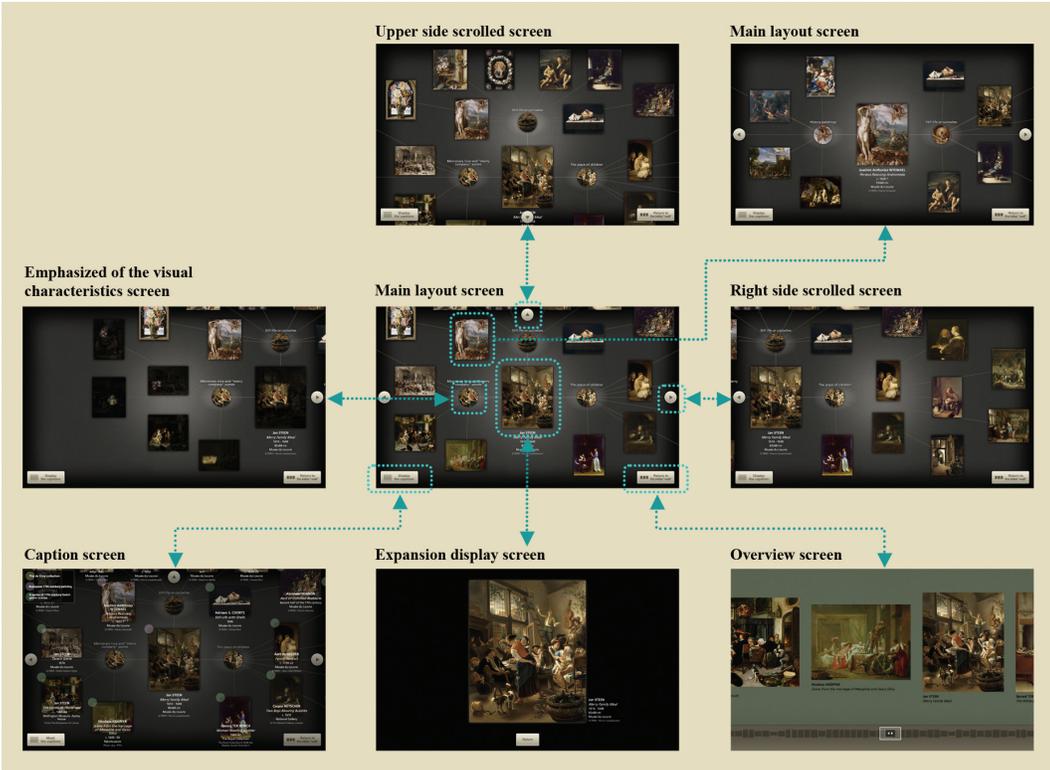
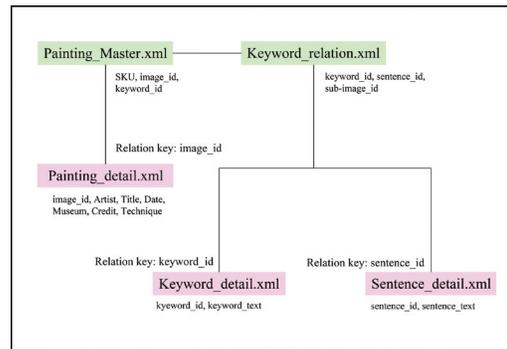


Figure 9. All main screen functions. © 2008 DNP Co., Ltd.



**Figure 10. The relation between XML and data component.**  
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<p><b>Category 2</b></p> <p>Novice art admirer [This type is the priority target.]</p> <p>Number of subjects; 2</p>	<p><b>Category 4</b></p> <p>Interest in or knowledge of art</p> <p>Number of subjects; 2</p>
<p><b>Category 1</b></p> <p>Art appreciation beginner [This type is the secondary target.]</p> <p>Number of subjects; 2</p>	<p><b>Category 3</b></p> <p>Those with considerable knowledge about art</p> <p>Number of subjects; 1</p>

**Figure 11. User classification by levels of interest and knowledge of art.** © 2008 DNP Co., Ltd.

trial and felt that if such a system were used in a museum, its explanation of a painting's visual characteristics would be useful to prepare viewers to appreciate it.

In the observational research, six subjects turned their gaze from the images of the paintings to the key sentence, following the animation. Most of the subjects focused on browsing through the painting images. No subjects used all of the functions. However, according to the interview result, the satisfaction rating of this system was high from the subjects who used most of the functions.

### Conclusion

The subjects of the first survey were positive about the concept of this system. The basic idea, noticing the visual characteristics of multiple paintings, was accepted by the subjects. Given the small size of the first survey group, we cannot at present definitively describe the effect of the system. However, this approach, based on awareness of visual characteristics, was effective in developing user interest in the paintings by displaying the links between the visual characteristics of multiple paintings. The survey results from subjects in categories 2 and 4 indicate the effectiveness of this system for use in viewer preparation for art appreciation. These results will be helpful for advancing development of this system. However, the survey shows this approach may be more suitable for art admirers than art beginners. Since art beginners are our secondary target, the information structure and content will be examined to make this system more useful to them.

Continuing evaluation of this system will look for more useful ways to provide painting appreciation hints to the user and make learning based on awareness of visual characteristics more intuitive.

### Future Work

The goal of this project was to develop tools to help viewers understand paintings by creating an awareness of their visual characteristics. The project will continue to develop the process of editing and composing the content giving deeper consideration to what the system should convey and how it should be used. Production of the animation and the interaction design must also be carefully considered. From the user's perspective, this system development will aim toward simple interface design and interaction, regardless of how rich or complex the content might be.

## Acknowledgement

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