

Possibility of style evolution of GUI based on modern art history

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Abstract. The styles of graphic user interface (GUI) of applications on computers and mobile platforms have changed from skeuomorphism to minimalism. In the process of examining the background of this evolution, we focus on the similar pattern between stylistic evolution of GUI and changing trend of modern (visual) art. That is, just as the paradigm of modern visual art changed from figurative to abstract in the 20th century, GUI design is also currently shifting from skeuomorphism to minimalism. In this paper, we examine the background to the style evolution of GUIs and forecast the future direction of this evolution. The current GUI style, which is predominantly an eclectic mix of figurative and abstract elements, is likely to develop in the direction of implicitly expressing the meaning of objects, the essence of information presented, and the current situations and emotions of users using basic visual elements such as dots, lines, faces, and colors. Based on this analysis, we argue that GUI design potentially evolves into a new style through which a user can express his or her personality and context.

Keywords: GUI, Style, Art, Modernism

1 Introduction

Since Apple launched the mobile operating system iOS 7 in 2013 and introduced its new design term called “flat design,” Google has released a “Material Design” language that is similar. Mobile Graphic User Interface (GUI) styles are rapidly changing from a state of skeuomorphism to one of minimalism. This GUI paradigm shift is not a temporary trend, but an attempt to create a new user experience in a digital environment. This study aims to analyze factors affecting and driving this paradigm shift in GUI design and forecast the direction of future change. GUI and visual art share the common ground of expressing the producer’s intention through visual elements. Considering the fact that design is derived from modern art, we suggest that GUI design might also exhibit a causal relation somewhat similar to that of the evolution of artistic styles. From the perspective provided by this idea, that the same mechanism of tech-

nological development is evident in the stylistic evolution of GUIs and that of modern art, and examined the coming direction of GUI design evolution after minimalism.

2 Theoretical background

2.1 Concept of GUI and stylistic evolution process

GUI refers to elements that help interaction between humans and computers using graphics. The concepts involved in a GUI and the design methods established in the initial stage of GUI development were mostly conceived and studied in terms of metaphors by which they resembled objects in reality [1]. For instance, icons in the initial stage all resembled the actual shapes of various physical tools, such as files, folders, documents, and recycle bins, to help users easily perceive the uses of the tools these icons represent in an unfamiliar computer environment on the basis of their daily life experience Figure 1. Realism was also the initial style of visual art, with the goal of fully reproducing actual objects to clearly convey some message or situation.



Figure 1. Early icons: Mac OS 1.0 (left) and Windows 95 (right)

GUIs in the 1980s and 1990s were represented in a simple style without decorations, mainly due to technical constraints. As the technical performance of computer hardware and software improved in the 2000s, GUIs have become capable of realistic representations such as photographs, a style referred to as skeuomorphism. However, starting with Microsoft's Windows 8 in 2012 and Apple's iOS 7 in 2013, the style has shifted from realistic representation to minimal or "flat" design.

2.2 Elements that have affected the stylistic evolution of GUIs

2.2.1 Changes in development environment due to advancement of technology

Previous studies have suggested that the GUI design of both Apple and Google evolves from skeuomorphism and chose flat design in order to make design expression more useful in various devices [2]. Minimal design is more useful in that it is more efficient due to requiring fewer resources compared to skeuomorphism and that it has high scalability. These features make it more flexible and convenient.

2.2.2 Changes in user behavior

The recent digital working environment has become different from that of the past in many aspects, and traditional GUI styles have parts that no longer coincide with the present user context. For example, icons symbolizing the “save” function in the past mostly took the shape of a floppy disk or CD, but now there is a need for other alternatives if the referent is to be understood. Given this need for methods to express the conceptual features of abstract objects, GUIs have evolved into abstract styles. This evolution is in line with the emergence of the abstract style of painting, which requires conceptual interpretation in the viewer’s brain instead of depending only on actual experience.

2.3 Development of photography techniques and changes in artistic styles

We can discover a pattern similar to the current evolution of GUI design in the way art changed due to the advent of techniques of mass production using machines, in conjunction with the invention of cameras. Traditional painting valued the ability to graphically reproduce reality, but after the invention of cameras in the 19th century, artists who had been engaged in reproducing objects were threatened by a loss of their footing and special role. However, this served not only as a crisis but also as an opportunity for artists to broaden the scope of their artistic expressions and try new styles by viewing objects from new perspectives and visualizing inner human ideas and emotions, moving away from mere reproduction of objects [3].

In a related development, as mass production became possible due to new mechanical techniques beginning in the 19th century, the aesthetic value of products weakened as efficiency and simplicity were emphasized. As a reaction, some 19th century artists tried to express their inner thoughts on canvas, beyond what could be observed in daily life. They viewed the essence of painting as not just expressing what the eyes can see, but condensing the impression they got from an object, eliminating and simplifying all non-essential elements [4]. This attempt led to cubism, futurism, dadaism, and constructivism in the early 20th century, creating all kinds of expressionistic trends that had not existed before [5], all sharing the common ground of trying to get to the minimal expression of the condition of humans affected by the rapid changes of the times to simplify complicated concepts, and return the object to its pure, basic form. Now, as the core value of design shifts from user convenience to subjective satisfaction through the reflection of user context, the value of human factors is gaining more significance. From this perspective, if we apply the features of styles attempted by 20th century art to cope with the changes of the times in the context of GUI design, we will be able to find a GUI development solution that takes account of and transcends the limitations of contextual expression.

3 Mobile GUI trends and directions

In the terms of art history, GUI is currently in the initial stage of abstraction. While the representation methods of GUIs in the past were specific and complicated, now they are proceeding toward an abstract, simple direction, mostly focusing on stylization of the exterior. Accordingly, many of the features of the object are omitted. However, if the exterior of the object is expressed too simply, as shown in Table 1, there may be constraints in conveying the meaning.

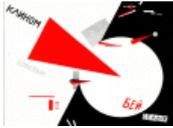
Table 1. Limitations of currently applied minimalist GUIs

Object	Symbol	Attributes	Evaluation/issues
Call		Phone, List of calls, Communication, Content delivery	Maintains the traditional receiver metaphor. Fails to represent the diverse functions and attributes of the call app
Calendar		Calendar, Schedule management, Appearances, Plans	Merely indicates today's date, and fails to convey the diverse functions of the app.
Photo		Photos, Memories, Records, Memo	Fails to clearly convey the meaning of a photo gallery due to excessive abstraction.

To resolve such issues, it seems that there is a need for multi-layered information representations in GUIs, which thus need to evolve beyond the current simple minimalism into a new form. Like abstract painters, GUIs will also inevitably need to make attempts at various new methods of expression to depict the fluid characteristics and multi-layered meanings of the content. Table 2 shows the features of some abstract artistic styles that are likely to be effective for GUIs in this context.

Table 2. Features of artistic styles applicable to GUIs

Artistic style	Main image	Features and GUI applicability
Cubism		Features: Cubism returns nature and humans to a basic, geometric, simple form to express the essence of the object in an era where it is meaningless to describe the object as it is, thereby destroying the viewpoint of conventional perspective. Keywords: flattened, geometry Idea: The current abstract icons have limitations in implying the functions of the applications, which are becoming more complicated. These attributes of the applications could be expressed using the other space such as the back or side of the icon.
Futurism		Features: Futurism intends to express the mobility and speed of contemporary society brought by machine civilization with a new form of beauty. It denies traditions and pursues novelty, youth, machinery, and speed. Sounds or flow of time are visualized.

		Keywords: Dynamics, simultaneity
		Idea: Today, as dynamic expressions are becoming more important than static expressions, it will be possible to express and predict information flow and current status using dynamic movements.
Constructivism		Features: Constructivism expresses human emotions, which have been overlooked, using the basic elements of visual construction such as lines, colors, and shapes. These are not just abstract symbols, but are organically entwined with human emotions. Keywords: Lines, faces, colors, geometry Idea: It will be possible to express emotions using only lines, colors, and shapes in the GUI environment, where it will be necessary to express personalized emotions.

4 Conclusion

As art came to lose the value of objective reproduction of the object due to the invention of photography, artists began to concentrate on expressing the inner side of humans and the essence of objects. In the present context, similarly, as differentiation became difficult to achieve when the completeness of realistic expression faded in importance with new technological developments, GUIs also faced an evolution, returning to an aesthetics of simplicity. This change occurred due to the way users, who were perfectly adapted to the digital environment, perceived the surrounding environment and objects becoming different from the analog days of the past. As happened in art, GUI expression methods will continue to evolve in the direction of embracing the essence of the objects and human emotions by using basic visual elements such as dots, lines, faces, and colors. With the intention of predicting the direction of GUI evolution in light of art history, this study can be applied in the rapidly changing field of digital media designs. Follow-up research must provide designs that reflect the possibility of GUI evolution presented in this study.

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