Giving Emotions to Characters Using Comic Symbols

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ABSTRACT

The purpose of this study is the realization of a digital picture book system. This desired system would use comic symbols as input to change the emotion of characters. Comic symbols are popular expressions that appear in comics. In general comics, comic symbols help emphasize or clarify the emotion of characters. The proposed system utilizes this characteristic; a user assigns comic symbols to characters, and, as a result, the content of the scene changes dynamically. The association between these comic symbols and the emotions of characters is a key part of this system. For this association, it is necessary to clarify types of comic symbols and their meanings. In this paper, we clarify this correspondence. Comic symbols used in comics were collected and classified in terms of meaning and usage in a hierarchical structure.

Author Keywords

Comic symbols, Character emotion, Comic computing

ACM Classification Keywords

H.5.2. Information interfaces and presentation (e.g., HCI): User Interfaces; Interaction styles (e.g., commands, menus, forms, direct manipulation)

INTRODUCTION

The purpose of this study is to create novel interactive content that uses "comic symbols" as triggers for interaction. Comic symbols are popular marks that appear in comics. In a comic, these symbols are used to express emotions and/or the status of characters. They allow the emotion of a character to be expressed more clearly, sometimes in an emphasized manner.

In this study, we would like to employ these comic symbols for a digital picture book system. We aim to achieve an interactive digital picture book system that dynamically changes the scene deployment by attaching comic symbols

to a character. To achieve such a system, it is necessary to determine the emotions and behavior that are suitable for the comic symbols that are given to a character. However, one comic symbol can be used for several meanings. For instance, a comic symbol that is shaped like a water drop can be used for sweat or tears. In addition, these symbols do not have clear classification criteria nor adaptation rules to express a specific meaning and usage. Therefore, the association between an attached symbol and its intended meaning becomes ambiguous. To avoid this ambiguity, this paper attempts to clarify the representation criteria of comic symbols. First, we collected comic symbols used in comics. We then classified the collected symbols according to their meaning and usage in a hierarchical structure.

EXPRESSION TECHNIQUES IN COMICS

Comics are composed of a series of ordered frames on one or more pages [1]. Figure 1 presents some basic components that appear in one comic frame. A frame basically consists of a picture that expresses a scene (Figure 1-A) and text that expresses dialogue and narrates the scene (Figure 1-B). These components are generally surrounded by a rectangle that is called a panel (Figure 1-C). The text is surrounded by a frame that is called a speech balloon (Figure 1-D). These are to enable the identification of a subject to speech, lines, and commentary. In addition, there is a distinctive symbolic representation that includes "comic symbols" (Figure 1-E), "effect lines" (Figure 1-F), and "sound metaphors" (Figure 1-G) in the picture. Comic symbols are mainly used to visually represent emotions and the state of the character. Effect lines are mainly used to express a subject's motion and attract the attention of readers. They are applicable not only to characters but also backgrounds, where they are called "background effect" (or tones). Sound metaphors express sound and the psychological state of a character using onomatopoeia. The sound metaphors add dynamism to a picture; they enhance the realism of scene. These are mainly expressed as hand-drawn text.

Among all the elements of comics, we focus on particular comic symbols in this study. These can change emotion easily by simply placing them on the face of the character. By using this characteristic in electronic content, a user is free to change the target expression.
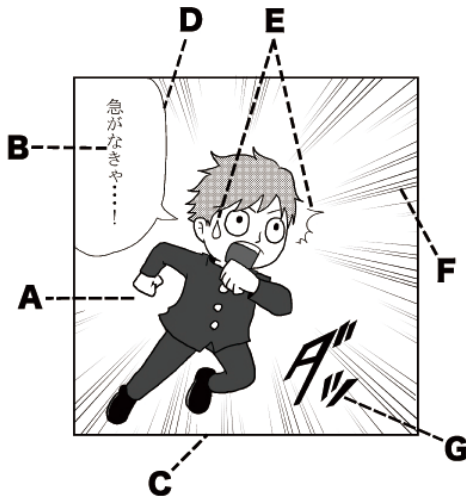
Figure 1. Components of comics

RELATED WORK

Examples of electronic content using the expression techniques of comics include Comic Chat [2] and Manga Generator [3].

Comic Chat [2] is a system that converts the contents of a chat into comic format and outputs it. This is done not only for the text in the chat, but also for nonverbal information such as character expressions and gestures in the chat. Therefore, Comic Chat can express the contents of a conversation and feelings of users clearly, even for communication through electronic channels. Manga Generator [3] is a system in which the user becomes a character in the comic. First, the user poses to match the presented story. The image of the user is then incorporated into the comic. Further, these effects are added to a comic that is determined based on the pose that was produced.

From these systems, it is clear that expression techniques in comics could allow the creation of content that can facilitate intuitive understanding and manipulation.

The motivation for this study is to generate a digital picture book system using comic symbols. In previous digital picture books, it has been possible to input onomatopoeia. Uema proposed a digital picture book system that dynamically represents a picture by user input onomatopoeia [4]. This can change the state of a picture in the system (e.g., house, tree) according to the user input onomatopoeia.

This study considers comic symbols as input, similar to Uema's system. In this way, we believe the system could be intuitively operated. In addition, this system is expected to work such that the user can easily understand the emotion of characters, similar to Comic Chat [2], by using comic symbols.

DESIGN GUIDELINES

In this study, our motivation is to implement an interactive digital picture book system that changes emotional displays according to comic symbols. As the system of Uema [4] demonstrated, it is possible for a digital picture book to introduce dynamic representations and interactive elements that require user input. However, in most cases, current digital picture books proceed along a single storyline that is predetermined. Therefore, the dynamic story change methods of current digital picture books are not adopted.

Our plan is to use comic symbols as input to dynamically change a story. Comic symbols have various types. In addition, the intention of the expression may change according to the position and number of symbols, even if they are of the same type (e.g., sweat or tears). We think that these characteristics are able to convey various expressions such as emotions, appearance, and behavior for a character in a digital picture book. Furthermore, changing the emotion of a particular character also makes it possible to change the state of a scene and the relationship between characters.

SYSTEM STRUCTURE

In this system, the user first selects comic symbols from several candidates (Figure 2-A). When the user moves a comic symbol into the scene, a rectangular frame is displayed (Figure 2-B). This frame indicates the position at which the comic symbol will be located. The position and size of the frame is changed in accordance with the selected comic symbol. When the user moves the comic symbol into the frame, the animation that expresses the emotions of the character begins to play (Figure 2-C). This animation is associated with the comic symbol selected by the user. The animation is stopped when the user clicks on the screen. The user can change the animation by changing the comic symbol (Figure 3). When the user clicks a button while the animation is playing, the next scene is presented, as shown in Figure 4-A. The content of this scene is changed according to the kinds of comic symbols input by the user (Figures 4-B and 4-C). In other words, the system allows the user to control the story. It is thought that this system will enable a new type of reading for these digital picture books.
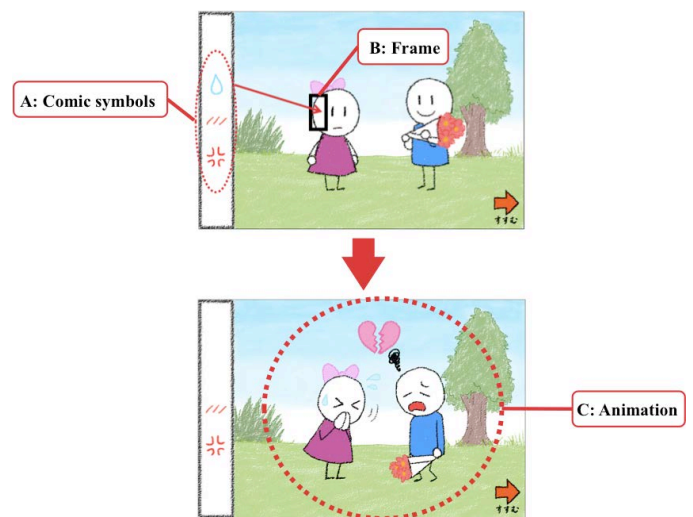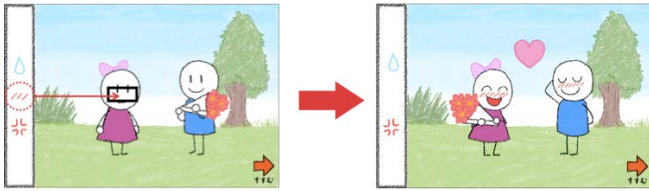

Figure 2. Interface of the system

Figure 3. Emotions of the character when the user input "slanted line"
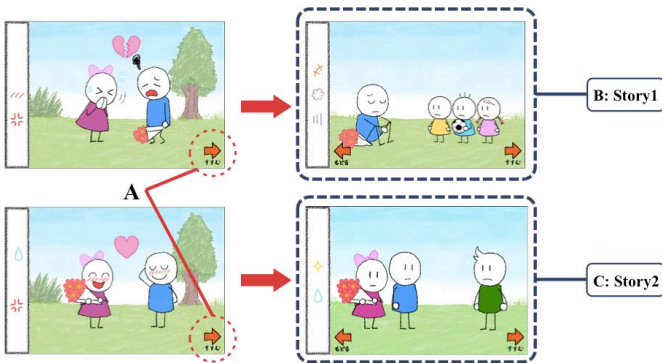

Figure 4. Multi-story function

MEANING AND USE OF COMIC SYMBOLS

It is necessary to investigate the types of comic symbols used in comics to implement the proposed system. Therefore, we collected comic symbols that appear in Volume 1 of *Doraemon* [5]. A list of the collected comic symbols is shown in Table 1. The number in parentheses indicates the number of appearances of this symbol.

We next classified the meaning and usage of these comic symbols. The analysis of the comic symbols confirmed that some symbols appeared frequently. Of these, we show their various meanings in Table 2. Looking at the breakdown, the comic symbol "drop" appeared the most frequently. Further, this symbol was most frequently used to convey the sense of "sweat" (Figure 5). However, it was also used to express states such as "tears" and "mucus" by changing its position and the number of symbols. In addition, "drops" were also observed to express the nature of materials, such as "dirty water" or "spray" (Figure 6). From these results, it was revealed that comic symbols that appeared frequently were used for a variety of expressions. In addition, it was also confirmed that the expression changes according to the position of the comic symbols.

STRUCTURING OF COMIC SYMBOLS

In this study, we created a hierarchical classification for the comic symbols that is structured by meaning and usage.

First, we classified the meanings of a comic symbol based on its position (e.g., near the forehead or eye) and the information in Table 2. Next, we classified usage according to part of speech. The usage is based on the illustrations and

context. The final structure for the drop symbol is shown in Figure 7. We note that comic symbols can also give meaning to a thing or an animal. It is expected that the association of the character will become possible using this comic symbol structure.

Comic	Comic Symbols (number of appearances)				
	◊ (489)	＼ｌｌ／ (328)	☁ (209)	☆ (66)	／／／／ (53)
Doraemon **Vol. 1**	〰 (31)	♪ (25)	‖‖ (21)	✗ (17)	ᕦ (12)
	⁉ (9)	⊕ (4)	⺕ (3)	⁰ₒ (2)	◀ (1)

Table 1. List of collected comic symbols.

Comic Symbols	meaning (number of appearances)
◊	sweat (373), tears (52), water (39), mucus (23), spittle (6), urine (1), unclear (1)
＼ｌｌ／	awareness (181), sound (96), shock (46), attention (31), change (4), light (2), unclear (6)
☁	dust (99), steam (86), sigh (40)

Table 2. Meaning and number of appearances of comic symbols. (*Doraemon* Vol. 1)
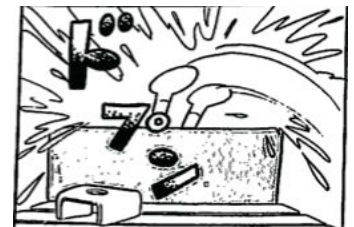

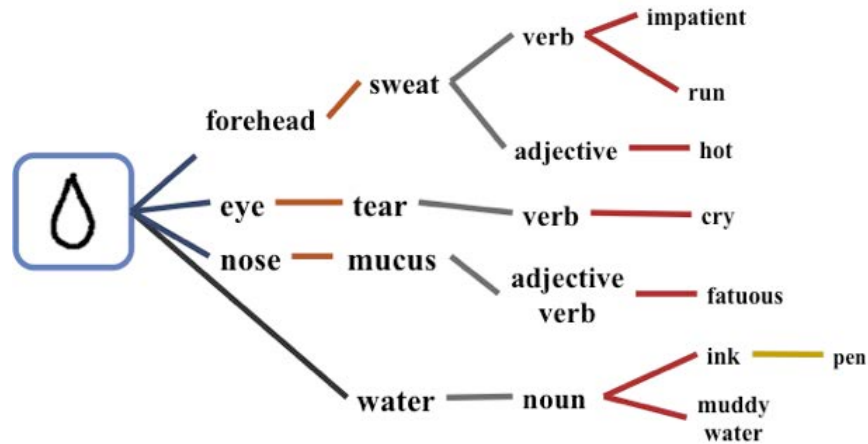**Figure 5. Sweat**

Figure 6. Spray

Figure 7. Hierarchical structure for "drop."

FUTURE WORK

This study was conducted using Volume 1 of *Doraemon* [5]. However, there is a possibility that different comics use different comic symbols in a different way, even for identical emotional meanings. Therefore, it is necessary to collect and investigate more comic symbols from other comics. This will form a part of our future work.

The purpose of this paper was to clarify the meaning and usage of comic symbols by investigation. However, there were also scenes that used a combination of some comic symbols in the comics. We plan to clarify the expressions that are conveyed by combined comic symbols in future. Therefore, we will investigate the co-occurrence relations of comic symbols in the same panel. In addition, we will examine the overall constitution of the story and the use of structured comic symbols using our proposed system.

CONCLUSION

The motivation for our research is the creation of a digital picture book system in which a story can be interactively changed by assigning comic symbols to characters. As a basic step, the study reported in this paper collected comic symbols used in comics and investigated their meaning and usage. Furthermore, a hierarchical structure for this classification was generated. As a result, we believe it will be possible to associate facial expressions and the behavior of characters with comic symbols. In future, we will investigate the co-occurrence relations of symbols and collect them from other comics to further our analysis. In addition, this study attempts the implementation of this system using structured comic symbols.

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