Considering Meanings and Effects of Frames without Onomatopoeias in Japanese Comics

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Abstract. Onomatopoeias - echoic, imitative, or mimetic words - are good for describing intuitive, sensitive, and ambiguous feelings that are difficult to express literally. They are often used in Japanese comics as an effective means of expression. In this study, we hypothesize that there are expressive techniques in comics such as "purposely not using onomatopoeia" and discuss the meanings and effects of frames without onomatopoeias. As a result, we confirm that frames without onomatopoeias frequently appear in significant scenes even though onomatopoeias are generally highly expressive in comics.

Keywords: Onomatopoeias, Japanese comics; Large sized frame, Enlargement of the body parts, Depiction in great detail, Background music (BGM).

1 Introduction

Onomatopoeias - echoic, imitative, or mimetic words - are an indispensable part of the Japanese language and are good for describing intuitive, sensitive, and ambiguous feelings that are difficult to express literally [1,2]. In terms of the expressive potential of Japanese onomatopoeias, Tajima [3] argued that "Onomatopoeias, which can concisely and concretely describe a certain sound or situation, can be seen and heard everywhere on TVs, radios, newspapers, books, and magazines." Needless to say, such onomatopoeias are widely used in Japanese daily life, and moreover, they are also often used in Japanese comics as effective means of expression.

Up to now, the meanings and effects of onomatopoeias in Japanese comics have been discussed particularly from the viewpoints of linguistics or media criticism. For example, Natsume [4] focused on the higher expressiveness and creativeness of onomatopoeias in comics and discussed their expressive potential. Izawa [5] investigated the expressiveness of onomatopoeias in comics in a qualitative manner and pointed out the important roles of onomatopoeia, for example, "Compared with novels, comics lack an overwhelming amount of information, such as multiple meanings, situations, backgrounds, and so on. However, such lack of information can be compensated for just with a simple onomatopoeia word."

However, in fact, not all frames in comics use onomatopoeias for effective expression. For example, we found that the rate of frames without onomatopoeias among all frames in the first volume of the Japanese volleyball comic "Haikyu!!" was about

64.7% (specifically, 770 frames without onomatopoeias among all 1191 frames). On the basis of this finding, we then hypothesized that there are expressive techniques in comics like “purposely not using onomatopoeia.” In this paper, we then investigate where onomatopoeia is NOT used in comics and discuss the meanings and effects of frames without onomatopoeias.

2 Related works

The previous studies focusing on onomatopoeias in research field of comic computing can be roughly divided into two categories: one is “proposing novel technologies to apply the expressive potential of onomatopoeias to comics,” and the other is “analyzing and considering the meanings and effects of onomatopoeias in comics.”

As examples of studies of the former category, “proposing novel technologies,” Hashimoto et al. [6] proposed a method for extracting onomatopoeias from frame images in comics and applying video effects to them. Matsushita et al. [7] proposed a creative tool that enables users to add motion effects to existing onomatopoeias in comics in order to build a new method for dynamically representing onomatopoeias, especially for e-comics. Sato et al. [8] also proposed a tool that can easily add animation effects to hand-written onomatopoeias when creating e-comics.

As examples of studies of the latter category, “analyzing and considering,” Uchiyama [9] analyzed the characteristics of onomatopoeias appearing in speech balloons in comics by means of natural language processing methods. Hira [10] investigated the effects of onomatopoeias from the viewpoint of “movement” and reported that these onomatopoeias are not used to enhance the effects of movement like a sound effect but are used as a tool for expressing movement per se in comic works. Natsume [4] argued that the higher expressiveness and creativeness of onomatopoeias in comics are greater than imagined and reported that such onomatopoeias can produce significant effects beyond linguistic symbols that simply manipulate the readers’ eye movements in comics.

It can be then said that these previous studies of both categories have focused on the existence of onomatopoeias per se. Therefore, our approach of focusing on the case where onomatopoeias are not used and considering the meanings and effects of frames without onomatopoeias is highly novel and challenging.

3 Investigation

3.1 Materials and methods

In this study, Japanese sports comics were selected as the target of our investigation because sports comics contain more onomatopoeias than ordinary comics. Specifically, the following seven works were selected: “Aoashi,” “Farewell, my dear Cramer,” and “DAYS” for soccer/football, “Ahiru no sora” for basketball, “Burning kabaddi” for kabaddi, “Haikyu!!” for volleyball, and “Hanebad!” for badminton. We investigated only the first volume of each work.

We manually extracted and counted the number of frames in which onomatopoeia was not used and considered what kinds of appearance characteristics these extracted frames had and which kinds of meanings they expressed. In this paper, onomatopoeias expressed inside of speech balloons were uncounted and excluded from our investigation. Table 1 shows the total numbers of all frames and the numbers of frames without onomatopoeias in the first 100 pages of the seven target comics. This table shows that "Burning kabaddi," "Haikyu!!", and "Ahiru no sora" had relatively lower rates, from 53.7% to 63.0%, of frames without onomatopoeias (this means these three used onomatopoeias frequently). However, the other comics had higher rates between about 65.7 and 78.8%.

Table 1. Total numbers of all frames and number of frames without onomatopoeias in first 100 pages of seven comics

Title	Numbers of all frames	Numbers of frames without onomatopoeias
Aoashi	505	398 (78.8%)
Farewell, my dear…	402	309 (76.9%)
DAYS	431	193 (65.7%)
Ahiru no sora	427	269 (63.0%)
Burming kabaddi	467	251 (53.7%)
Haikyu!!	609	378 (62.1%)
Hanebad!	417	289 (69.3%)

3.2 Characteristics of frames without onomatopoeias

As a result of our manual exploration into which kinds of frames do not have any onomatopoeias, we qualitatively identified that frames with the following three specific appearance characteristics had a strong tendency not to have onomatopoeias. The first characteristic is frames in which the body parts of the protagonists are depicted in an enlarged manner. Specifically, this type of frame makes readers focus on specific body actions by enlarging the significant parts of the body, like the limbs or eyes of the protagonists (Figure 1). The second characteristic is frames that are large in size themselves. In general comics, frames with different sizes are used, but frames with extraordinarily large sizes are sometime used. In this paper, we define "large sized frame" as larger than one third the size of the page (Figure 2). The third characteristic is frames that are depicted in great detail These frames express situations not in language but in pictures with detailed depictions (Figure 3).

Fig. 1. Large frame with enlarged body parts ©Haruichi Furudate 2012 “Haikyu!!”.

Fig. 2. Large frame with greatly detailed depiction of protagonist’s body movement ©Takeshi Hinata 2004 “Ahiru no sora”

Fig. 3. Large frame with greatly detailed depiction of protagonist’s background ©Tsuyoshi Yasuda 2013 “DAYS”

Table 2. Number of frames without onomatopoeia and total number of frames with "Enlarged body parts" in first 100 pages of target comics. (frames without onomatopoeia/total number of frames)

Titles	Frame with characteristic	Frame without characteristic	p-values
Aoashi	108/120 (90.0%)	297/451 (65.9%)	**p = 0.000**
Farewell, my dear…	102/126 (81.0%)	198/252 (85.3%)	p = 0.296
DAYS	105/141 (74.5%)	185/284 (65.1%)	p = 0.059
Ahiru no sora	112/147 (76.3%)	165/284 (61.7%)	**p = 0.000**
Burming kabaddi	65/95 (68.4%)	194/348 (55.7%)	**p = 0.034**
Haikyu!!	103/135 (76.3%)	345/559 (61.7%)	**p = 0.001**
Hanebad!	77/99 (77.8%)	198/296 (66.9%)	**p = 0.044**

Table 3. Number of frames without onomatopoeia and total number of frames with "Large size frame" in first 100 pages of target comics.

Titles	Frame with characteristic	Frame without characteristic	p-values
Aoashi	72/84 (85.7%)	351/423 (83.0%)	p = 0.182
Farewell, my dear…	82/112 (73.2%)	235/285 (82.5%)	p = 0.051
DAYS	66/111 (58.4%)	230/325 (70.8%)	**p = 0.019**
Ahiru no sora	67/110 (60.9%)	214/327 (65.4%)	p = 0.421
Burming kabaddi	42/97 (43.3%)	228/388 (58.8%)	**p = 0.008**
Haikyu!!	62/95 (65.3%)	378/687 (64.4%)	p = 0.908
Hanebad!	78/104 (75.0%)	228/322 (70.8%)	p = 0.453

Table 4. Number of frames without onomatopoeia and total number of frames with "Greatly Detailed Depiction" in first 100 pages of target comics.

Titles	Frame with characteristic	Frame without characteristic	p-values
Aoashi	62/65 (95.4%)	395/472 (83.7%)	**p = 0.009**
Farewell, my dear…	85/109 (78.0%)	298/372 (80.1%)	p = 0.685
DAYS	53/73 (72.6%)	281/401 (70.1%)	p = 0.780
Ahiru no sora	57/77 (74.0%)	247/385 (64.2%)	p = 0.114
Burming kabaddi	21/41 (51.2%)	250/432 (57.9%)	p = 0.414
Haikyu!!	22/41 (53.7%)	411/642 (64.0%)	p = 0.185
Hanebad!	25/26 (96.2%)	278/394 (70.6%)	**p = 0.002**

Tables 2 to 4 show the numbers of frames with and without onomatopoeias in cases with and without one of three appearance characteristics, as well as the results of a Fisher's exact test on the numbers with and without onomatopoeias between the cases with and without each appearance characteristic independently.

These results indicate that frames with enlarged body parts had significantly higher rates of frames without onomatopoeias; however, those with large sized frames and greatly detailed depictions did not. Although this result seems to deviate from our qualitative observations (i.e., frames with a large size and greatly detailed depiction suppress the use of onomatopoeias), we assume the following two reasons for this deviation; one is that the numbers of frames with these two characteristics were lower that those with enlarged body parts, so there was not enough to show a statistical difference, and the other is that there is a possibility that the effects of each of these characteristics are limited and that the combination of these characteristics has an adequate effect on suppressing the use of onomatopoeias (in our statistical analysis, this adequate effect was eventually concentrated on the first characteristic, "enlarged body part"). To clarify this issue, we have to reconsider the effects of one or a combination of these appearance characteristics in our following studies.

3.3 Meanings of frames without onomatopoeias

We confirmed that frames with some of the above three characteristics and without onomatopoeias frequently appeared in the following three specific situations. The first is the case when the protagonist recollects something or has a monologue or when the story is explained through narration, e.g., explaining the rules of a sport, the protagonist recalling memories or trauma, and so on (Figures 4 to 6). In such situations, it is common for the narration to objectively and unilaterally explain the above infor-

mation to readers regardless of the protagonists' emotional states, so it is reasonable to not use onomatopoeias, which are good for expressing the emotional states of protagonists.

The second situation is where the protagonist's emotional state drastically changes, e.g., joy, despair, or showing resolve (Figures 7 to 9). Specific cases in sports comics are when protagonists meet new rivals or friends, become friends with others, discover new challenges during competitions, and so on. Although it seems that onomatopoeias are suitable for expressing protagonists' emotional states in detail, it is quite interesting that such onomatopoeias are not often actually used in this situation.

Fig. 4. Protagonist recollects something ©Kousuke Hamada 2013 "Hanebad!""

Fig. 5. Spoken by main protagonist to teammates ©Haruichi Furudate 2012 "Haikyu!"

Fig. 6. Protagonist speaks about how to interpret game ©Kousuke Hamada 2013 “Hanebad!”

Fig. 7. Expressing friendship toward new friend ©Tsuyoshi Yasuda 2013 “DAYS”

Fig. 8. Protagonists’ team loses game, and rivals point out their problems ©Haruichi Furudate 2012 “Haikyu!!”

Fig. 9. Protagonist is overwhelmed by building of his new soccer team
©Yugo Kobayashi 2015 “Aoashi”

The third situation involves important scenes in the story, such as the moment of a clutch performance, when the protagonists get or lose an important point, and so on (Figures 10, 11). These frames are important to the story, so we expected that onomatopoeias that are more expressive to be frequently used; however, such onomatopoeias were rarely used. We assumed that not using such onomatopoeias succeeded in making the readers focus on the greatly detailed pictures themselves.

Fig. 10. Moment decisive point is scored in match ©Kousuke Hamada 2013 “Hanebad!”

Fig. 11. Moment where victory is achieved by three-point shot at end of game
©Takeshi Hinata 2004 “Ahiru no sora”

3.4 Meanings of frames without onomatopoeias

On the basis of our observation, we also found that frames with frequently used onomatopoeias appeared just before or immediately after frames without onomatopoeias (Figures 12 to 14). When frames with many onomatopoeias suddenly change to the ones without them, the reader might feel that the flow or rhythm of the story has suddenly changed or been interrupted. This change eventually causes readers to pay stronger attention to frames without onomatopoeia. In addition, frames without onomatopoeias have specific appearance characteristics, e.g., the frame sizes are rather large, the protagonist’s bodies are enlarged, and the images are depicted in great detail. Therefore, these frames can effectively fascinate the readers due to the higher aesthetical potential, so frames without onomatopoeias are effectively used in important scenes in the story.

Comics usually form a story with linguistic information by using speech balloons or narration and with visual information depicted through images. Therefore, determining and switching which kinds of information should be expressed by linguistic or visual information might be a significant technique for expression in comic creations.

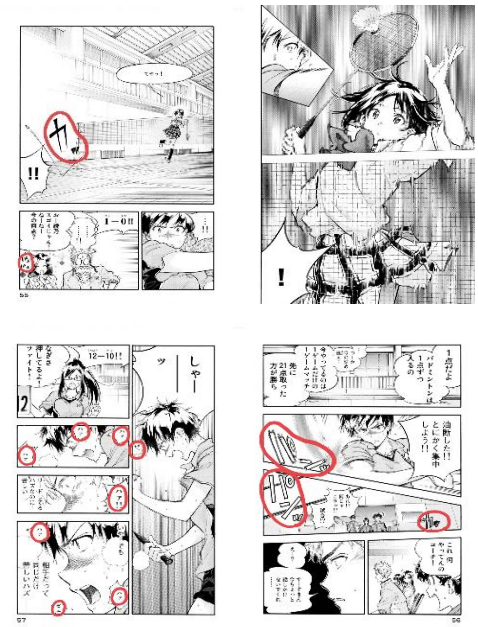

Fig. 12. Combination of frames with and without onomatopoeias (red circle indicating onomatopoeias) ©Kousuke Hamada 2013 “Hanebad!”

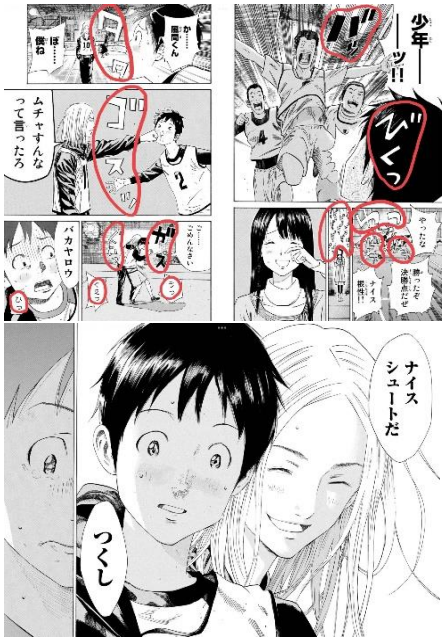

Fig. 13. Combination of frames with and without onomatopoeias ©Takashi Yasuda 2013 “DAYS”

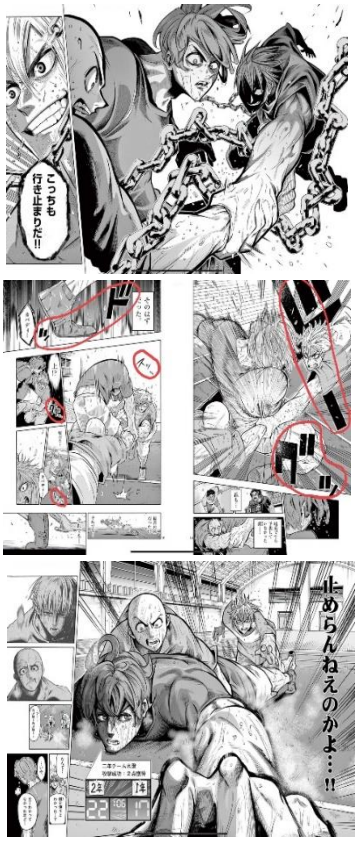

Fig. 14. Combination of frames with and without onomatopoeias

4 Conclusion

We investigated where onomatopoeia is not used in Japanese sports comics and discussed the meaning and effects of frames without onomatopoeias. As a result, we qualitatively identified the appearance characteristics of frames without onomatopoeias, and we also confirmed that frames with these characteristics and without onomatopoeias frequently appeared in significant scenes in the story. Moreover, we also found that frames with many onomatopoeias appear just before or immediately after frames without them. Such contrast between frames with and without onomatopoeias eventually causes readers to pay stronger attention to frames without onomatopoeia. On the basis of the results of our investigation, we confirmed that frames without onomatopoeias feature protagonists with enlarged body parts and are depicted in great detail. Therefore, when cartoonists use visual information to express their intentions,

they might depict images in certain frames in great detail. This eventually might inhibit the use of literal information including onomatopoeias.

We noticed that the effects of onomatopoeias in comics are quite similar to those of background music (BGM) in movies While BGM can enrich the nuances and intentions conveyed in a story to viewers, it can also make them focus on visual images themselves by intentionally suppressing or muting the BGM. We believe that this viewpoint, "onomatopoeias in comics = BGM in movie," could be a significant finding to understanding the flow or rhythm of a story on the basis of the meanings and effects of the frames with or without onomatopoeias.

This study was manually conducted by two of the authors. Therefore, it does not succeed in providing quantitative results but rather qualitative ones. In the near future, it will be indispensable to construct technological tools for performing quantitative analysis, e.g., extracting frames with and without onomatopoeias and annotating the meaning of the extracted frames. This will contribute to our remaining work of reconsidering the effects of one or a combination of these appearance characteristics.

In the research field of comic computing, automatically extracting important scenes from comics has been intensively studied in order to create summary generators for comics or comic content understanding. For example, Hisayuku et al. [11] defined a metadata model for objects appearing in frames in comics and realized a way of extracting scenes in accordance with the story by means of a machine learning method. Nonaka et al. [12] developed GT-Scan, which can automatically detect the frames in comic books. Whomor inc developed a comic frame cropping tool called "Mizuhanome[1]."[1] Furthermore, Hiraoka et al. [13] estimated the importance of frames using a database on the size of frames and links between frames, and Imaizumi et al. [14] proposed a scene segmentation method based on changes in the form of protagonist groups. We assume that our significant finding of this study, that "frames without onomatopoeias indicate the important scenes of a story," can be highly valuable knowledge in creating technologies for extracting important scenes

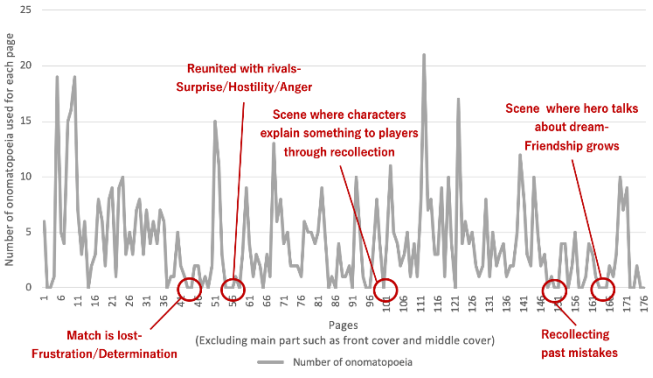

Fig. 15. Numbers of onomatopoeias per page in first volume of "Haikyu!!"

[1] Mizuhanome URL https://whomor.com/blog/1542 (accessed 2022-05-08)

For example, Figure 15 shows numbers of onomatopoeia every page in the first volume of “Haikyu!!” We show red circles where pages do not have frames with onomatopoeias, and we annotated the points of the story. It appears that these red parts could be used to extract the important scenes of this story, e.g., losing the match, recalling a mistake in the past, establishing friendship with teammates, and so on. Therefore, it is expected that a novel method for extracting scenes could be proposed by combining the existing techniques of the previous studies with our finding in this study.

References

1. Tamori, I. 1988. Japanese Onomatopoeias and Verb-less Expressions, Jimbun Ronshu, 24, 2, 1-25.
2. Millington, S. 1993. NIHONGO PERA PERA!: A User’s Guide to Japanese Onomatopoeia, Charles E. Tuttle Company, Rutland, VT.
3. Tajima, K. 2006. Onomatopoeia (Giongo Gitaigo) Ni Tsuite (On Onomatopoeia (Mimetics)). Kansai Gaikokugo Daigaku Ryuugakusei-Bekka Nihongo Kyouiku Ronsyuu [Stud. Jpn. Lang. Edu. Int. Cent. Kansai Gaidai Univ.] 16, 193-205 (In Japanese).
4. Natsume, F. 2013. Manga Ni Okeru Onomatopoeia (Onomatopoeia in Manga). In: Shinohara, K., Uno, R. (Eds.), Onomatopoeia Kenkyu No Shatei: Chikazuku Oto to Imi. Hitsuji Shobo, Tokyo, pp. 217-241 (In Japanese).
5. Izawa, S. 2018. Manga Ni Okeru Onomatopoeia No Hyougenryoku (Expression of Onomatopoeia in Manga). Tokyo Joshi Daigaku Gengo Bunka Kenkyukai [Tokyo Woman's Christian University Studies in Language and Culture], pp. 217- 241 (In Japanese).
6. Hashimoto, N., Sawano H., Sato, T., Suzuki, Y., and Hotta, S. 2018. Manga No Komagazou Karano Tegaki Onomatopoeia Chushutsu to Sono Kouka Fuyo Shuhou no Teian (Extraction of handwritten onomatopoeia from comic frame images and application to visual effects). The 80th National Convention of IPSJ, no. 1, pp. 177-178 (In Japanese).
7. Matsushita, M. and Imaoka, N. 2011. Kinetic Onomatopoeia Generation System for Creating an Attractive Digital Comic. The 25th Annual Conference of the Japanese Society for Artificial Intelligence.
8. Sato, K., Nakamura, S., and Suzuki, M. 2016, Denshi Comic no Hyogen wo Yutaka ni suru Tegaki Moji Animation Seisei Shuho (Handwritten Text Animation Generation Method to Enrich the Expression of Electronic Comics), JSAI2016, vol. 4, L4-4, in part 2, pp. 1-4 (In Japanese).
9. Uchiyama, S. 2014. Manga no Serifu ya Onomatopoeia ni okeru Gengoteki Tokucyo Bunseki (Linguistic Feature Analysis in Comic Script and Onomatopoeia), Memoirs of Shonan Institute of Technology 48 (1), pp. 63-68 (In Japanese).
10. Hira, M. 2020. “Ugoki” wo Arawasu Manga no Onomatopoeia ―“Aruku Hashiru” wo Rei to Shite― (Onomatopoeia of Comic Express Moving ―e.g., working and running―), Bulletin of Center for Japanese Language and Culture, no. 17, pp. 19-37 (In Japanese).
11. Hisayuku, C., Mihara, T., Nagamori, M., and Sugimoto, S. 2017. Manga Metadata Provider to Help Scene Extraction by Machine Learning -Description of Frame Attributes of Manga and its Use Based on Linked Open Data-, The 31st Annual Conference of the Japanese Society for Artificial Intelligence.
12. Nonaka, S., Sawano, T., and Haneda, N. 2012. Development of “GT-Scan,” the Technology for Automatic Detection of Frames in Scanned Comic, FUJIFILM Research & Development, no. 57, pp. 46-49.

13. Hiraoka, T., Yamanishi, R., and Nishihara, Y. 2018. A Study of Frame Importance Detection by Link Relationship among Frames on Comics, The 32nd Annual Conference of the Japanese Society for Artificial Intelligence.
14. Imaizumi, K., Yamanishi, R., Nishihara, Y., and Ozawa, T. 2021. Estimating Groups of Featured Characters in Comics with Sequence of Characters' Appearance, Proceedings of the 2021 International Joint Workshop on Multimedia Artworks Analysis and Attractiveness Computing in Multimedia (MMArt-ACM '21), pp. 13-18.