The possibility of 3D-origami system as a tourism promotion tool for Japan

RISA OGAWA*, TAKAYUKI FUJIMOTO
1, 2 Graduate School of Information Science and Arts, Toyo University, Tokyo, Japan

Abstract

For the coming Tokyo Olympic, promotions of Japan to overseas people have been active. Japanese emphasize the sightseeing to famous sights and the activities. However, they do not meet the needs of foreign tourists. In this study, we focused on Origami as a tool to introduce Japanese traditional culture, and we developed the application that expresses the making process of Origami by using the smartphone. There must be a wide variety of promotion tools to introduce Japanese. Among them, the authors assume that the beauty of Japanese traditional lifestyle culture is the fascinate cues.

Keywords: Origami, Japanese Culture, Mobile Device, 3D Expression, 3D Hologram, Sightseeing, Tourism Promotion

INTRODUCTION

For the coming Tokyo Olympic in 2020, campaigns to revive the Japanese tourism industry and promotions of Japan to overseas, people have been active. Because of Tokyo Olympic bidding and energetic Japanese promotions like Cool Japan policy, Japan has been receiving more attention from overseas. However, regarding Japanese promotion abroad, Japanese emphasize the sightseeing to famous sights and the activities such as Japanese lifestyle experiences. They do not meet the needs of foreign tourists. There is the data that shows foreign people want to be exposed to the culture from the real Japanese lifestyle. For example, they pay attention not to the Japanese culinary restaurant but to Aka-chochin (literally means Japanese red lantern indicating Japanese casual bar) and not to Kyoto that is one of the representative sightseeing spots but to downtown in Tokyo.

For example, there is Origami, Japanese popular culture and it gets foreign peoples interests. Origami needs only one paper and this technique makes various animals and objects. Its Japanese delicacy and beauty are popular abroad. The making process and completion of Origami that is steric and delicate represent Japanese manual dexterity and beautiful design and they attract increasing attention.

In this study, we focus on Origami as a tool to introduce Japanese traditional culture to foreign people. There are some books that show Origami works or explain how to fold Origami by images. However, there are no choices that visualize the making process dynamically. In this study, we developed the application that expresses the making process of Origami by using the smartphone. This application does not just express 3D image in the display. It can project Origami and its making process sterically out of the display with a use of a plastic reflector. There must be a wide variety of promotion tools to introduce Japanese attractive points. Among them, the authors assume that the beauty of Japanese traditional lifestyle culture is one of the cues that fascinate foreign people.

BACKGROUND

Foreign Peoples Interest in Japanese

Recently, campaigns to revive the Japanese tourism industry and promotions of Japan to overseas people have been active. As a result, foreign tourists visiting Japan are on the rise.

*Corresponding author: Risa Ogawa
1Email: S3B101600021@toyo.jp
According to statistics (the number of costumers by nationality and monthly) provided by Japan National Tourism Organization (2016), the number of the tourists from overseas have been increasing steadily since 2013 when the number exceeded 10 million, and it marked 13.41 million in 2014, 19.74 million in 2015 and 24.04 million in 2016 (Ministry of Land, Infrastructure, Transport and Tourism, 2016a).

The Government of Japan has set the goal to make the number of foreign visitors to Japan 40 million by 2020, in which the Tokyo Olympic Games will be held.

These statistics show that Japan has been attracting attention from overseas. Speaking of a-decade-ago old style Japanese sightseeing areas, these were Kyoto, Nara, Mt. Fuji, etc. However, in the present day, Japanese popular culture; for instance Japanese restaurants (Izakaya) and Japanese noodles (Soba), receives more attention from foreign people.

Japan National Tourism Organization (2016) published the following results of a survey on what foreign tourists have wanted to do during the travel before coming to Japan (multiple answers allowed.) Many foreign tourists travel to Japan for the purpose of experiencing Japanese pop culture, for example, eating Japanese food (73.1%), staying Japanese inn (22.5%), experience of Japanese history and traditional culture (18.9%) and experience of Japanese daily life (18.3%) (Ministry of Land, Infrastructure, Transport and Tourism, 2016b).

Judging by the results, the actual needs from foreign tourists are becoming subtly different from the sightseeing spots and Japanese culture activities that Japanese people have appealed.

Japan should be famous as a more attractive sightseeing destination by the activity that can respond to tourists demands certainly instead of just the one-sided sightseeing promotion of Japan that has been done so far.

Rising Interest in Origami by Foreign People

Because of active Japanese promotions like Cool Japan policy and Tokyo Olympic bidding, Japan has been receiving more attention from overseas. Speaking of a-decade-ago old style interests in Japan, these were sightseeing to Kyoto, Nara, Mt. Fuji, and typical Japanese contents; for example, Anime, games, Kabuki and Ninja.

Amid growing interests in Origami, there are many books and websites that introduce the works of Origami and how to create Origami. Some of them are provided in Japanese, and some are translated into English and other languages. We can find that Japan is becoming popular (Tatsuya & Yasuo, 2012; Uriko & Nobuko, 2017).

ASSOCIATED RESEARCH

What is Origami

Origami (Figure 1) is one of the Japanese cultures and attracts attention not only in Japan but also overseas. Though there are various opinions on the origin of Origami, it is said that, Origami have been developed uniquely in Japan (Tokyo Origami Museum, 2016)

Moreover, Origami has an artistic aspect and Origami is a traditional representative play of Japan, which is beginning to be familiar all over the world. Origami is not only a children’s plaything or educational material but also the play that adults can enjoy because the delicate and highly artistic types of Origami have been designed recently.

Figure 1. Origami image
One of the attractions of Origami is the fact that people can create fine and complex works from a square sheet of paper. Even for Japanese people, it is difficult to imagine what kind of production process the creator went through by only looking at a completed work of Origami.

If the manufacturing process is stereoscopically expressed, we can convey the three-dimensional and delicate charms of origami works more effectively.

**Tourism Promotion of Japan**

Cool JAPAN means the Japanese attractions that foreign people think as cool, for example, the contents (animation, cartoon and games), food, traditional cultures, designs, robots, environmental technologies and so on. Cool JAPAN strategy is a branding strategy that transforms this attractiveness to economic growth in Japan by bringing in the world economys growth; effectively developing each process of information, transmission, overseas expansion of the products and the services, and inbound tourism consumptions. It is one of the strategies to make tourism promotion of Japan more attractive by creating excellent designs, and promote collaborations across the barriers amongst public/private sectors and various industries for wider development (Cabinet Office, 2012)

Moreover, one of the points is to incorporate the perspective of foreign people. In Japanese tourism promotions, there are many cases that there is a gap between Japanese and foreign peoples point of views.

However, they are supposed to become more effective promotions by carrying out the revisions with foreign peoples perspective.

**3D REPRESENTATION SYSTEM WITH MOBILE DEVICES**

**3D Image by Smartphone**

There is an easy way to express a 3D image by using a combination of a smartphone and a tetrahedral reflecting mirror made of four clear trapezoidal plastic parts (Figure 2). It is easy to see 3D image. Moreover, we can make the reflector with familiar materials. In this study, we use this hologram technique. Figure 3 is the 3D image of Tsuru displayed in the tetrahedral reflector, which was actually created (Miyazaki, Yasuda, Yokoi, & Toriwaki, 1996; Risa & Takayuki, 2016).

![Figure 2. 3D image by a tetrahedral reflector and a smartphone (ex: Origami box)](image)

**Structure of the Tetrahedral Reflector**

The dimensions of the prototype reflectors to express 3D Origami by smartphone is shown in Figure 4 below. The reflector is designed so that the angle of the smart phone screen and the plastic plate is 45°C, when the reflector is set up as indicated in Figure 3.

The reflection by the plastic plates to bounce the light from the images displayed on the device like a smartphone reaches the observers eyes. This is an application of mirror physics: The light of the object reflected by the mirror reaches the observers eyes. We can see the image as if the object existed within the mirror, as far as the distance between the object and the mirror surface.
The 3D hologram by the reflector uses the system of the mirror physics. The light (image) that is beamed from the device like smartphone intersects the face of the plastic plate normally. Then, the light is reflected at the same angle of incident by the plate. After that, the light reaches the eyes of the observer. At this time, the observer has error of sense that there is an image in the reflector, and they can see the image by 3D expression (Figure 4).

**OVERVIEW OF ORIGAMI APPLICATION**

**Contents of Application**

We suggested the system by which the user can experience 3D expression easily with a smartphone. We developed the application for foreign people by which they can enjoy Japanese Origami culture easily and suggest the system that enables the experience of the 3D expression by using the plastic reflector (Ogawa & Fujimoto, 2017).

In this paragraph, we introduce the contents of the origami application. The application basically consists of the following four sections.

1. Tutorial of the way to make Origami
2. 3D view of the completed creation
3. Introduction of how to project 3D Origami
4. Introduction of how to make the tetrahedral plastic reflector

First part is the tutorial function to introduce how to fold Origami. The user is required to tap the tutorial button in the Origami catalog. He or she can take each step to fold Origami using a tetrahedral plastic reflector.

There are go and back button displayed in the screen. When the go button is tapped, the page changes to the next step following the procedure to fold Origami. Similarly, when the back button is tapped, the page goes back to the previous page.

The authors implemented the smartphone application as described above in our past paper, The development and evaluation for Japanese Origami application with 3D expression (Ogawa & Fujimoto, 2017).
Origami Catalog

The following are the Origami that are explained in this application. This application demonstrates three kinds; Japanese traditional ORIGAMI, furniture type ORIGAMI and unit type ORIGAMI. Japanese traditional ORIGAMI is a type of design from old times.

The works are created in the motif of the Japanese symbolic animals and tools. For example, Tsuru (crane) is a representative example of Origami. How to fold "Japanese traditional ORIGAMI" has been inherited from long time ago. There are various Origami designs that every Japanese have an experience of folding in his or her childhood (Risa & Takayuki, 2017; Yuya & Makoto, 2011).

The following are Japanese traditional ORIGAMI instructed in the application. (Figure 5 Tsuru, Figure 6 Balloon and Figure 7 Kabuto) Kabuto is one of the Japanese traditional Origami. This is a Japanese traditional protective weapon on head.

Figure 5. Origami image and 3D image (Tsuru)

Figure 6. Origami image and 3D image (Balloon)

Figure 7. Origami image and 3D image (Kabuto)
Furniture type ORIGAMI is a type of Origami to model general items such as a fancy box and a vessel by one piece of paper. Furniture type ORIGAMI in this application are shown below (Figure 8 Vessel).

![Image of Vessel Origami](image)

**Figure 8. Origami image and 3D image (Vessel)**

Unit type ORIGAMI is a paper folding technique to use two or more than two sheets of papers and it is the way to create one model by combining multiple units. (Figure 9 Ninja star) (Risa & Takayuki, 2016).

![Image of Ninja Star Origami](image)

**Figure 9. Origami image and 3D image (Ninja star)**

**Photographing Origami**

For the images of Origami tutorial, the photographs of all the actual steps of how to fold each Origami were taken from four-directions. Figure 10 shows the images of how to make Tsuru created for this application.

![Images of Tsuru Origami](image)

**Figure 10. Images for origami crane, Tsuru**
APPLICATION TO TOURISM PROMOTION TOOL

Comparison of Existing Promotions

*Introducing the actual products:* This is the way to display samples of the products ready to the hand of the consumers. The merit is that consumers can purchase cosmetics or skin care products after they actually try one. Furthermore, this promotion can effectively convey texture and smells that cannot be transmitted only with the package (Figure 11).

![Figure 11. Image of introducing the actual products](image)

Digital Signage

It is one of the promotion tools that utilize video and sound in digital devices. For example, at the cosmetics sections in drugstores, products are introduced in small displays near shelves on which they are lined up. The previous main stream of the product introduction was to convey information to consumers with still images. With moving pictures on the digital signage, the vendors can introduce products effectively by gathering viewers’ interests.

Recently, the digital signage embedded in the pillars of the stations premises attracts peoples attention by displaying the advertisements (Figure 12).

![Figure 12. Digital signage](image)

Food Sample

It is a method to display food models to simulate real food when providing information on food. This can quickly convey detailed information about the dishes to the consumers when explaining about food because they can see the completion figure same as the actual one (Figure 13).

Furthermore, food sample can be displayed for a long time and people can easily introduce information such as price and ingredients because it is reproduced with material that does not deteriorate but resembles the real one (Carta Osaka, 2017).
Brochures or Pamphlets

Brochures are documents used for introducing sightseeing spots and maps. We can describe the objects and places in detail for introductions. There are not only Japanese versions but also translated versions in other languages. Many tourists use this type of documents. The brochure is made of text information and images on 2D on the assumption that the user actually goes to sightseeing spots (Figure 14).

Whereas we can use these types of documents in one hand, they are sometimes too much to carry and we need certain space for browsing them.

Application Example to Sightseeing Promotion Tool

Thanks to current promotion activities abroad for Japan, there are some results that the number of foreign visitors to Japan is increasing. On the other hand, the activities foreigner people really need do not match the tourism and the cultural experiences that positively featured by the Japanese. What many of the foreign people are interested in is the experiences of delicacy that Japanese culture has. Based on this, we supposed that Origami application devised by the authors could be applied to the field of tourism promotion. Because the system can easily express images in three dimensions by combining a tetrahedral reflector made of plastic plates and a mobile device.

We will create a tool that empower Japanese sightseeing activities by reproducing sightseeing spots and traditional cultures in tourists hands with the system that has enabled the users to enjoy the delicate and steric charms of 3D-ORIGAMI. Using this tool, the user can transmit information more effectively.

The following is a picture that Japanese castle is projected as three-dimensional representation by 3D hologram technology (Figure 15).

On the websites, other than them, we just had to go to the actual spots. With this system, the users can enjoy seeing sightseeing objects stereoscopically in hand.
Moreover, they can enjoy the visual expressions that they have never experienced before if we use some motives that we cannot take a look at closely or touch by hand. For example, they are world heritages and important cultural properties.

By changing the objects for reproductions, they can freely enjoy seeing something that they have previously recognized only in the texts or by 2D images. Additionally, foreign visitors consumption behaviors are expected to become active because of the effective product introductions and information transmission by the new representation that is totally different from the other existing approaches.

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REFERENCES


