The analysis of the Movement of Experienced and Inexperienced Persons in Japanese Bowing

Tomoko Ota
Chuo Business Group
Osaka, Japan
e-mail:promotl@gold.ocn.ne.jp

Tomoya Takeda
Taste Inc.
Kyoto Japan
e-mail:t.takeda@taste.jp

***Abstract*— In Japanese, to receive a guest with hospitality and assist him in various ways is called "omotenashi". The word "omotenashi" has become internationally recognized as designating a form of welcoming rooted in the traditions and culture of Japan. Greeting is the basis of omotenashi, and one of the ways to greet is to bow. We conducted an experiment on the difference in maneuver between an experienced and inexperienced person and measuring the positions and timing of the bowing motion. Furthermore for the inexperienced persons, we conducted an analysis of the improvement of the motion with presence or absence of instruction as variable. The bow of the experienced person had a stable angle, with the shoulder angle (θ1) being around 180 degrees all three times, and the angle of the waist (θ2) was at around 20 degrees all three times. The transitions from the beginning of the bow until the head was lowered and from the head beginning to rise until the end of the bow were about equal speed, and the speed of the head was relatively slow at 300 (mm/sec). Inexperienced persons can be trained to a certain level by watching footage of model bowing, though there are significant differences according to the individual.**

Keywords-Hospitality; Japanese; Japanese bow; Omotenashi

I. INTRODUCTION

In Japanese, to receive a guest with hospitality and assist him in various ways is called "omotenashi". The Japan Productivity Center defines "omotenashi" as "work to provide special service from the heart while valuing the perspective of customers and/or residents." In foreign countries, the same concept exists and called for example "hospitality (U.S.)," "*dai ke zhi dao* (China), and "*hospitalité* (France)," but recently the word "omotenashi" has become internationally recognized as designating, along with the definition above, a form of welcoming rooted in the traditions and culture of Japan. According to an investigation of the Japan Productivity Center, a majority of people in the U.S., China, and France have heard of the word "Omotenashi" [1].

One of the reasons for the rising awareness of omotenashi is the increase in foreign visitors to Japan. In 2013, the number of foreign visitors passed 10 million for the first time, due to economic growth in Asian countries as well as success in the promotion of travel to Japan by a tourism policy called "Visit Japan" that was devised in 2003. The Japanese government will further devise a plan to increase the number of visitors to 20 million by 2020. In 2020, Olympic and Paralympic Games will be held in Tokyo. As the host country for the Olympic and Paralympic, Japan has an urgent need to convey its culture to the world in a comprehensible way. As stated earlier, omotenashi is a form of hospitality rooted in the culture and traditions of Japan, one that gives importance to touchpoints with the customer, an original way of giving high quality service from the heart based on mutual communication. Omotenashi could be said to be Japan's most important aspect.

Greeting is the basis of omotenashi, and one of the ways to greet is to bow. Bowing has different shades of meaning according to the country or region, but generally speaking it is the action of bending from the waist to greet someone, express thanks, or apologize. In Japan, bowing also is a way to greet, give thanks, and apologize, but its role as the fundamental action of Japanese hospitality and culture known as "omotenashi" and its designation as high quality service from the heart gave it a different significance from that in other countries. Japanese bowing is classified according to the angle at which the bowing is done, the levels being "*eshaku* (greeting bow)", "*keirei* (respect bow)", and "*saikeirei* (highest respect bow)". The classified bowing are in Figure 1. The levels differ in degree of honoring and are used in different circumstances. The maneuver consists in these three stages: to stand tall, to bend from the lower back, and to return from the lower back.

To spread Japanese culture internationally, it is urgent to consider how to convey omotenashi in ways easily understood by foreigners starting from the act of bowing. In the field of traditional Japanese industry and care, there is a prior case studies on the comparison of experienced and inexperienced person by the motion analysis. Based on these previous studies, we conducted an experiment on the difference in maneuver between an experienced and inexperienced person by recording their movements using a video camera and measuring the positions and timing of the bowing motion. Furthermore for the inexperienced persons, we conducted an analysis of the improvement of the motion with presence or absence of instruction as variable [2]-[4].

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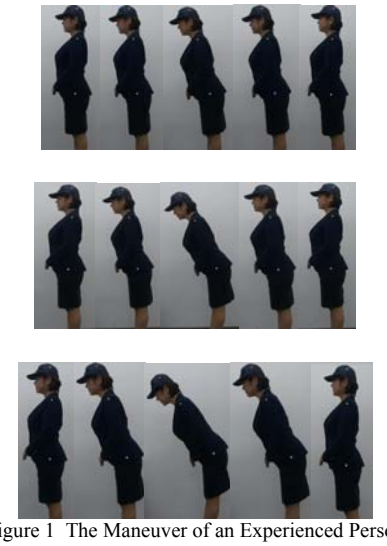

Figure 1 The Maneuver of an Experienced Person
Upper : eshaku (greeting), Middle: keirei (respect),
Lower: saikeirei(highest respect)

By performing this analysis, for the provider of services, it is expected that the point of the teaching becomes clear. On the other hand, for the receiver side of the service, by being able to quickly reach the elementary level that can understand the hospitality, and it is expected to deepen the understanding of the Japanese culture.

The rest of this paper is organized as follows. Section 2 describes experimentation method. Section 3 describes the measured angle, and speed of the bow. Section 4 is discussing this experiment. Section 5 goes into conclusion of this paper.

II. EXPERIMENTATION METHOD

A. *The Test Subject and the Bowing*

The test subjects were one experienced person with a history of teaching omotenashi for 7 years and 4 inexperienced persons. Gender, age and physical condition are shown in TABLE 1. Japanese persons who had never received instruction in the motion of a bow. For the bowing, we used "*keirei*".

TABLE 1 GENDER / AGE / PHYSICAL CONDITION

Test Subject	Experience	Gender	Age	Hight
1	Experienced	female	46	163
2	Inexperienced	female	26	154
3	Inexperienced	female	53	153
4	Inexperienced	male	35	183
5	Inexperienced	male	24	170

B. *Experimentation Method*

As shown in Figure 2, a marker was placed at the head, shoulder, waist, and knees of the test subjects, and the bowing motion of each was recorded by a video camera, and measurements were made for the passing of time and the location of the markers.

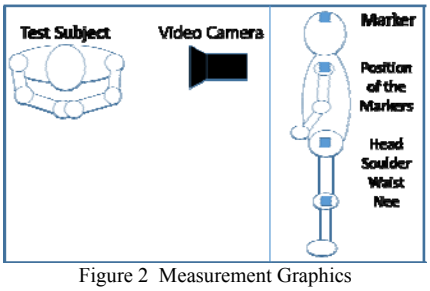

Figure 2 Measurement Graphics

Furthermore, with the inexperienced subjects, measurements were made with three divisions: "bowing without any outside influence", "bowing after looking at the bow of the experienced person", and "bowing after receiving instruction from the experienced person".

1) The bow of the experienced person. With a marker placed on the head, shoulder, waist, and knee of the experienced person, a recording with a video camera was made from the side of the "keirei" bow. The same motion was made three times.

2) Bowing without outside influence. The four inexperienced persons who had never received instruction in bowing each performed a bow as they understood it three times and this was recorded by a video camera.

3) Bowing after looking at the bow of the experienced person. After looking at the footage of the experienced person's bow, the four inexperienced persons performed a bow and this was recorded by video camera.

4) Bowing after receiving instruction from the experienced person. The inexperienced persons were made to study from a video that explains the meaning of bowing, and afterwards they performed a bow and it was recorded by video camera. The explanation video was common for both genders and taught the following 5, items1. The meaning of the act of bowing in Japan. 2. Types of bowing. 3. Speed of bowing. 4. Posture while bowing. 5. Gaze while bowing.

C. *Analysis Method*

With the measured time and information of the markers' locations we discerned the transition of location and speed. We paid special attention to the speed of the head (**V**h). And from the distance between the four points of head, shoulder, waist, and knees, we calculated the angle of head-shoulder-lower back (θ1) and the angle of shoulder-waist-knee (θ2).

III. THE TIME, MEASURED ANGLE, AND SPEED OF THE BOW

A. *Time Needed for Each Test Subject to Bow*

Three measurements were made, and the results are shown in TABLE 2 according to test subject. The three measurements were divided as "from the beginning of the

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bow until the head is lowered" as motion 1, "the head lowered and stopped" as motion 2, and "from the raising of the head until the end of the bow" as motion 3.

The total time for the experienced person was 1,122ms, but for the inexperienced persons it ranged from 1,206ms to 1,812ms. The difference between the inexperienced individuals was great, and compared to the experienced person more time was required.

TABLE 2 MOTION TIME OF EACH TEST SUBJECT
(TIME UNIT: MS)

	Number of Motions	1st	2nd	3rd	Average
Test Subject 1	Motion 1	333	400	383	372
	Motion 2	400	350	433	394
	Motion 3	350	350	367	356
	Total	1083	1100	1183	1122
Test Subject 2	Motion 1	600	433	367	467
	Motion 2	183	433	383	333
	Motion 3	433	400	383	406
	Total	1217	1267	1133	1206
Test Subject 3	Motion 1	417	567	650	544
	Motion 2	483	633	517	545
	Motion 3	383	400	467	417
	Total	1283	1600	1633	1506
Test Subject 4	Motion 1	367	583	400	450
	Motion 2	367	317	600	428
	Motion 3	517	533	500	517
	Total	1250	1433	1500	1394
Test Subject 5	Motion 1	533	650	533	572
	Motion 2	700	833	883	806
	Motion 3	503	400	400	434
	Total	1737	1883	1817	1812

B. *The Bow of the Experienced Person*

The transition of the angle of the bow of the experienced person is shown in Figure 3. The angle of the shoulders, θ 1 is about 180 degrees all three times and hardly shows any difference. Also the angle of the lower back, θ 2 is held at about 20 degrees all three times.

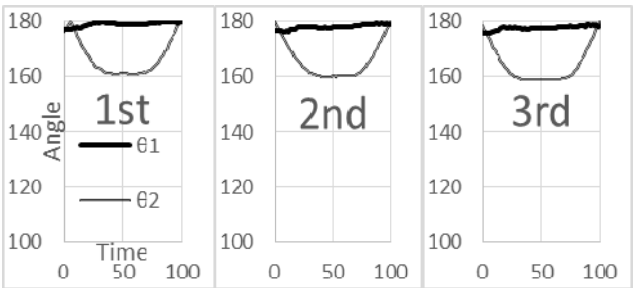


Figure 3 Standardized Transition of Angle of the Bow of the Experienced Person (θ1/θ2)

In Figure 4, the transition of the speed of the experienced person's bow is shown. Motion 1, from the beginning of the bow until the head is lowered, and motion 3, from the raising of the head until the end of the bow, had almost the same speed during the transition.

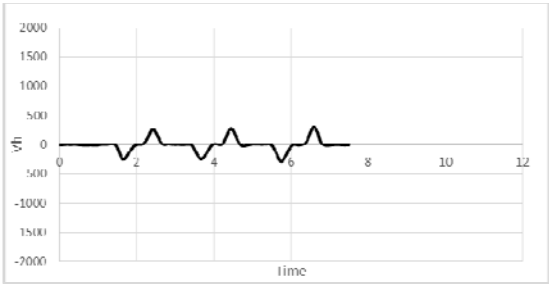


Figure 4 Transition of the Speed of the Head (Vh:mm/sec)

C. *Mastership of Bowing*

Here, we measure for each inexperienced person the influence that the bowing instruction had on their motions.

1) Bowing without any Outside Influence. The test subjects were made to do three bows that they felt were correct, and θ 1 and θ 2 were measured. As a result, a tendency for θ 1 and θ 2 to be synchronized was seen, so bending at the waist occurs simultaneously with the motion of bending the neck. The speed is generally faster than test subject 1 who is experienced, and also there were cases of motion 3 being faster than motion 1 and of speed increasing or decreasing as the three bows were performed (Figures 5~8).

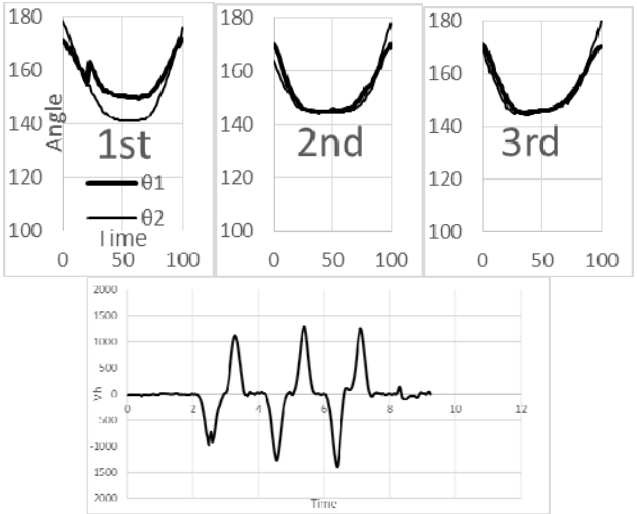


Figure 5 Vh and θ1/ θ2 and Vh of Test Subject 2 (Vh:mm/sec)

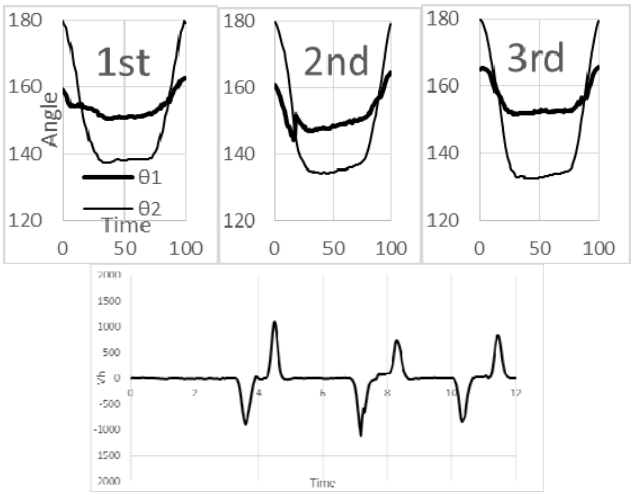


Figure 6 Vh and θ1/ θ2 of Test Subject 3 (Vh:mm/sec)

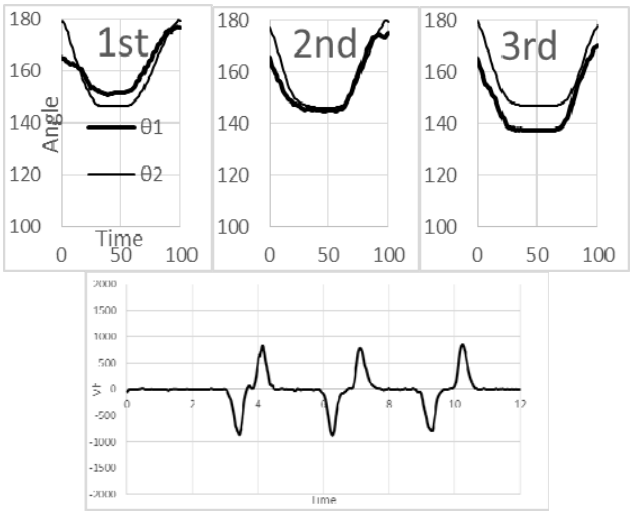


Figure 7 Vh and θ1/ θ2 of Test Subject 4 (Vh:mm/sec)

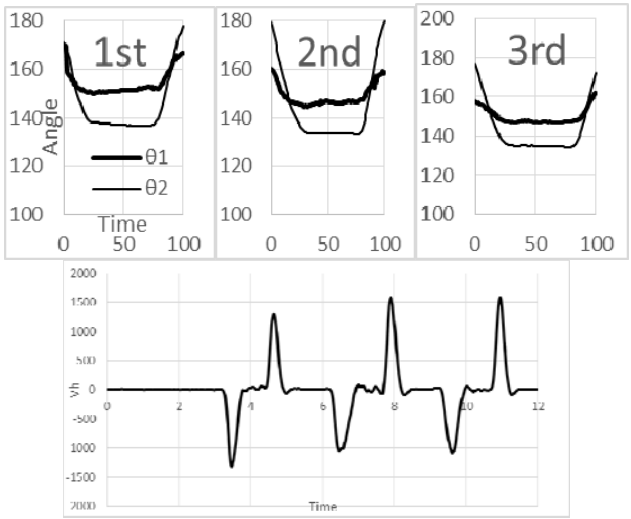


Figure 8 Vh and θ1/ θ2 of Test Subject 5 (Vh:mm/sec)

2) Changes after Observing the Experienced Person's Bow. The results of bowing three times after observing the experienced person's bow are shown in Figures 9~12. There was no change for test subjects 2 and 4 for θ1 and θ2 to synchronize, but with test subjects 3 and 5, θ1 holds a steady angle. This is thought to be because they noticed that the experienced person's bow has no change in the shoulders' angle and the motion is done by bending at the waist. For test subject 5, speed is clearly lowered.

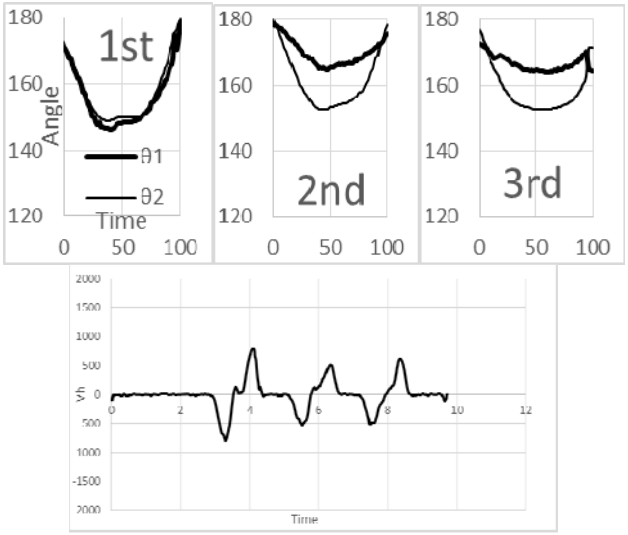


Figure 9 Vh and θ1/ θ2 of Test Subject 2(Vh:mm/sec)

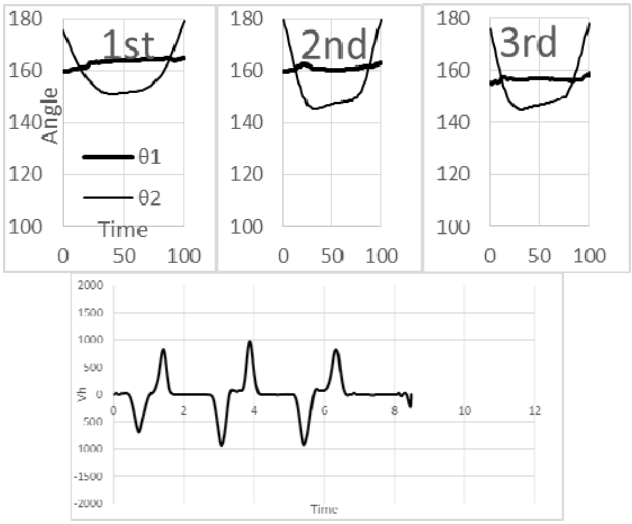


Figure 10 Vh and θ1/ θ2 of Test Subject 3 (Vh:mm/sec)

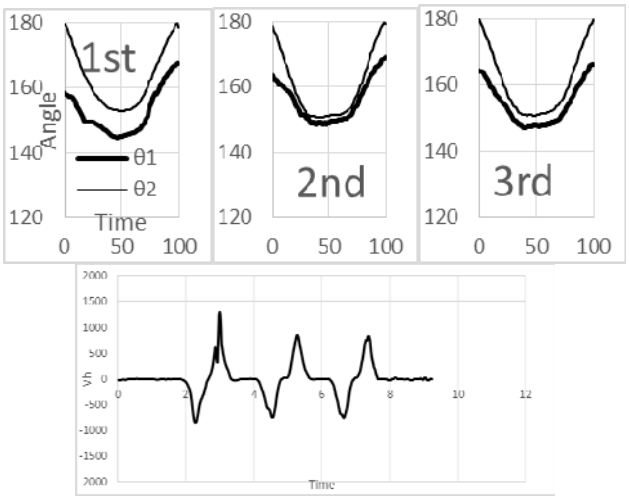


Figure 11 Vh and θ1/ θ2 of Test Subject 4(Vh:mm/sec)

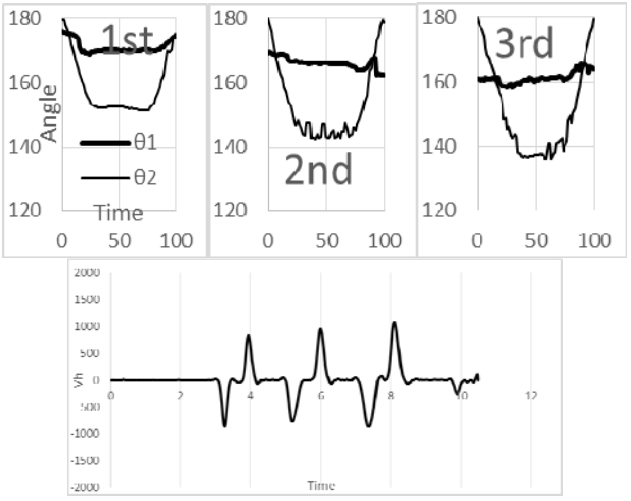
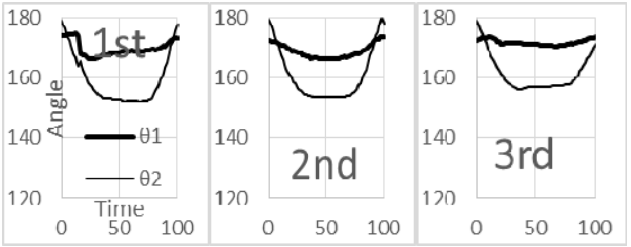


Figure 12 Vh and θ1/ θ2 of Test Subject 5(Vh:mm/sec)

3) Bowing after Receiving Instruction from the Experienced Person. Next, we examined the changes in bowing of the inexperienced persons after receiving concrete instructions of bowing by the instructor.



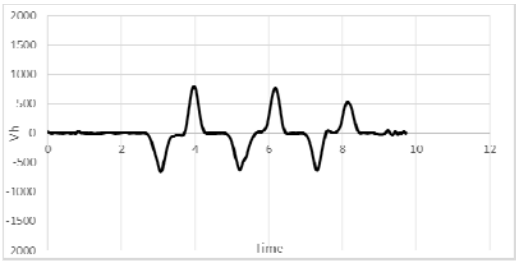


Figure 13 Vhand θ1/ θ2 of Test Subject 2 (Vh:mm/sec)

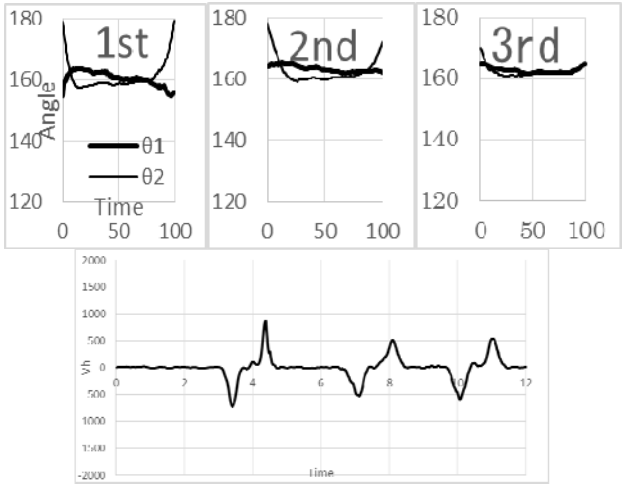


Figure 14 Vh and θ1/ θ2 of Test Subject 3 (Vh:mm/sec)

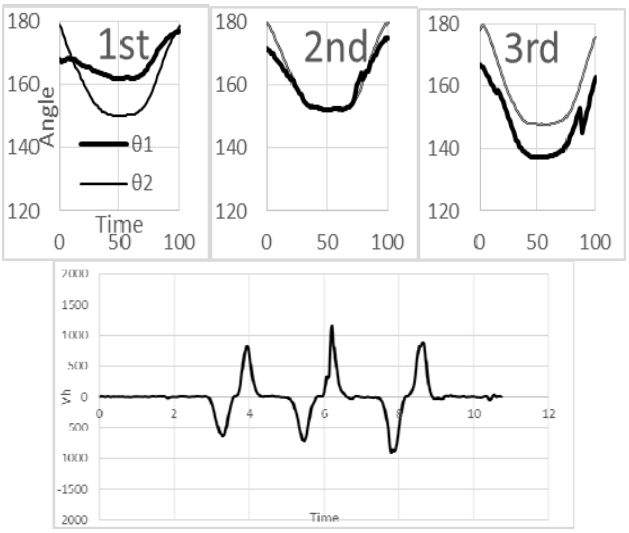


Figure 15 Vh and θ1/ θ2 of Test Subject 4 (Vh:mm/sec)

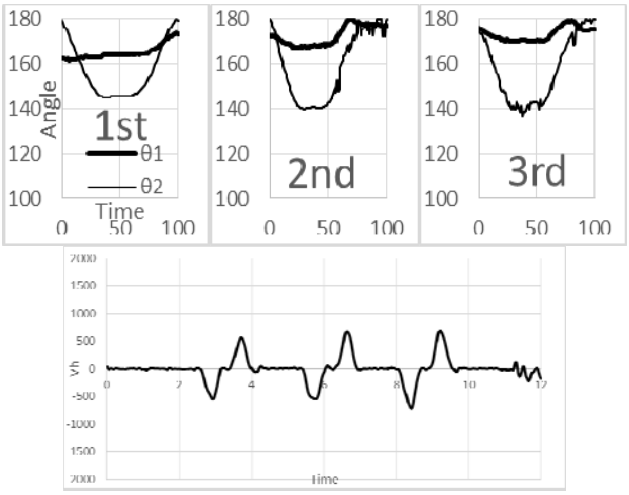


Figure 16 Vh and θ1/ θ2 of Test Subject 5 (Vh:mm/sec)

From the instruction test subjects 2 , 3 and 5 were able to maintain a steady θ1. Speed generally became stable at a low speed (Figures 13~16).

IV. DISCUSSION

First, we will consider angles (θ1/ θ2). The angle of the shoulders, θ1 of the experienced person is about 180 degrees all three times without much change. Also the angle of the waist, θ2 is maintained at about 20 degrees all three times. A bow is done by bending from the waist, and must not be done by bending the angle of the shoulder, or in other words the neck must not be bent. The basics of a Japanese bow are being performed here. For the speed of the head, it could be seen that the speed is relatively low at 300 (mm/sec).

The bows of the four test subjects were standardized from the ones they thought were correct to begin with. As a result, θ1 and θ2 tended to synchronize. This shows that the waist and neck are bent simultaneously. In terms of speed, there were cases of motion 3 being faster than motion 1, the motions becoming faster as the three bows progressed, and the motions becoming slower as the three bows progressed.

For the results of bowing three times after observing the experienced person, θ1 and θ2 being synchronized did not change with test subjects 2 and 4, but with test subjects 3 and 5 θ1 maintained a steady angle. This can be said to be because they noticed that a bow should be done by only bending the waist and not the shoulders. In terms of speed no changes especially were noticed.

In the results of bowing after receiving instruction from the experienced person's bow, subjects 2, 3 and 5 were able to maintain a steady θ1. This is considered to be because they received instruction from the experienced person and understood the meaning of a bow which made them realize they must not change the angle of the shoulders, but go through the bending motion from the waist.

The level of change before and after receiving the instruction differed for each individual test subject, and each motion lacked stability. This is thought to be because there is individual difference in perspective and understanding, even if they all observe the experienced person or receive instruction, and because it is difficult to measure the angle of one's shoulders and waist by oneself. And with speed, regardless of there being instruction or not, the difference between the experienced person and inexperienced persons was great, which shows that verbal instruction is insufficient for learning the "gentleness" of the experienced person's bow. For instruction it is considered that there needs to be more depth in instruction method for stability and maintaining a gentle speed or for skills such as where to look when maintaining the angle of the shoulders.

V. CONCLUSION

In this research, we focused on Japanese bowing, a form of greeting which is fundamental to omotenashi, and conducted experiments involving the angles of bowing of experienced and inexperienced persons, the difference in speed, and the changes that take place when inexperienced persons received instruction. As a result, the following things were understood.

- The bow of the experienced person had a stable angle, with the shoulder angle (θ1) being around 180 degrees all three times. In other words, the head was straight and the angle of the waist (θ2) was at around 20 degrees all three times.
- The transitions from the beginning of the bow until the head was lowered and from the head beginning to rise until the end of the bow were about equal speed, and the speed of the head was relatively slow at 300 (mm/sec).
- Inexperienced persons can be trained to a certain level by watching footage of model bowing, though there are significant differences according to the individual.

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