

Emotional Expressions of *Hachioji Kuruma Ningyo* Nishikawa Koryu the Fifth: Analysis of Movements and Narration

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Abstract

Ningyo Joruri is a traditional Japanese performing art that is internationally recognized for its excellent emotional expressions. Previous studies have indicated that the movements of the puppets, such as arc movements and the rhythm of the *Jo-Ha-Kyū*, play an important role in expressing emotions. This paper analyzes several expressions chosen by *Hachioji Kuruma Ningyo* Nishikawa Koryu the fifth as important emotional expressions in *Hidakagawa Iriaizakura*. *Ningyo Joruri* is a form of performing art that involves the three elements of puppetry, narration, and music. This study focuses on the interaction between the actions of the puppeteer and the narration of the *gidayu* and scientifically analyzes the synergistic effects that are generated when the actions and narration are combined.

Keywords: *Hachioji-Kuruma-Ningyo*, Emotional Expressions, Interaction, Narration

Introduction

Ningyo Joruri Bunraku is one of Japan's representative traditional performing arts and is highly regarded for its rich expression of emotion, both in Japan and abroad. Donald Keene (1965), who identified *gidayu*, *shamisen*, and *ningyozukai* (puppeteer) as the three elements of *Bunraku*, stated that "there is true human emotion expressed in brilliant language, and the production is the result of careful attention to every detail, unlike today's makeshift popular entertainment. *Ningyo Joruri* has developed such that one feels true human emotion toward the puppets." When the appearance of an artificial object (a puppet or robot) approaches that of a human being beyond a certain level, a sense of discomfort arises; this phenomenon is called the uncanny valley phenomenon (Mori et al. 2012). As shown in Fig 1, *Bunraku* puppets overcome this "uncanny valley. Hayano (2020) showed that communication with others requires knowledge of the psychological states of understanding others (especially emotions), and that psychological anxiety arising from the lack of such information underlies the uncanny valley phenomenon. Hayano (2020) further explained that *Ningyo Joruri* overcame the uncanny valley because it resolved the lack of information on understanding others through superior emotional expression.

The research group to which we belong has investigated the reality of emotional expression in *Ningyo Joruri* and has conducted research on such artists as Kanjuro Kiritake the third (*Bunraku-za*: holder of a nationally important intangible cultural property [Fig. 2]) and Koryu Nishikawa the fifth (*Hachioji Kuruma Ningyo Nishikawa Koryu-za*: a nationally important intangible folk cultural property [Fig. 3]). The group's research has focused on rhythm (Dong et al. 2022; Dong et al. 2019) and circular movements (Hayano 2020, Hayano and Dong 2021), but there has been no analysis of the phonological characteristics of the *gidayu*. In this paper, we focus on the phonological characteristics of the *gidayu* and analyze the interaction between the phonological characteristics and the *ningyozukai's* gestures.

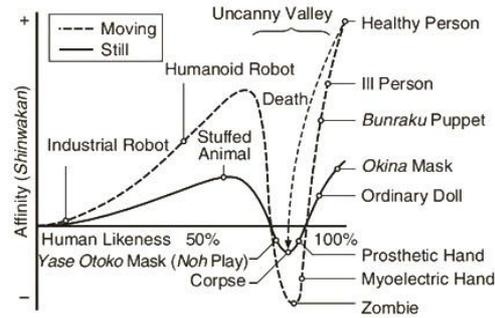


Fig 1



Fig 2



Fig 3

Hachioji Kuruma Ningyo

In *Ningyo Joruri*, the three *ningyozukai* (puppeteers) are the *omozeki* (the main puppeteer), the *hidarizukai* (left puppeteer), and the *ashizukai* (foot puppeteer). Ueda et al. (2010) reported that the *omozukai* leads the action (signaling *zu*) and maintains emphasis with the *hidarizukai*. The three-person puppet requires not only space for three puppeteers but also a suitable stage since the puppeteers are manipulated while suspended in the air on a *tesuri*, a board that divides the stage from the audience and which serves as a floor.

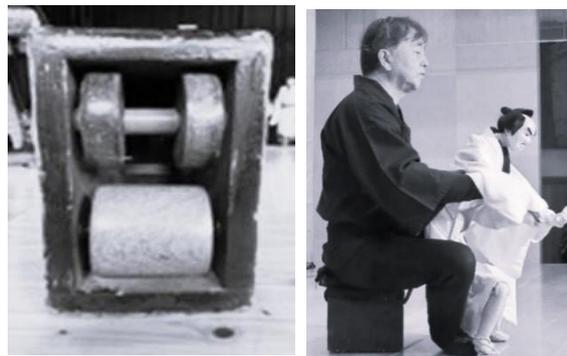


Fig 4

The subject of this study, the *Kuruma Ningyo*, which originated in *Edo Bunraku* has been modified to be performed by a single puppeteer, which allows a small number of performers to perform in a small theater. Normally, due to limitations in movement, a single puppeteer cannot perform the movements that a three-person team of puppeteers can. However, by using a *rokuroguruma* (Fig. 4), a single

puppeteer can perform movements like those that can be performed by three puppeteers. The *rokuroguruma* has two small front wheels and one large rear wheel. The rear wheel is nearly spherical with a bulge in the center, which allows it to move in all directions on level ground. The right figure in Figure 4 shows a puppeteer riding on a *rokuroguruma*.

Hachioji Kuruma Ningyo was developed at the end of the Edo period by Koryu Nishikawa the first, who was born in 1825 in Hanno City, Saitama Prefecture. For more information on the history of *Hachioji Kuruma Ningyo*, see *Hachioji Kurumaninngyo Kenkyukai* (1996) and Hachioji City Education Committee (2021).

Jo-Ha-Kyū

Jo-Ha-Kyū represents the three-part structure of a stage performance or play. Zeami brought this principle of *Jo-Ha-Kyū* to Noh and applied a progressively increasing rhythmic structure, which led to a major development that influenced *Ningyo Joruri* in the Edo period (Tanba 2004). Nakagawa et al. (2019) defined *Jo-Ha-Kyū* as three categories of speed and investigated the relationship between the rhythm of music (*shamisen* and *gidayu*) and the movement of the puppet, as well as the relationship between musical melody and the movement of the puppet. They clarify that *Bunraku* uses an introductory and rapid sequence to structure the movement (acceleration) of the stage and puppet.

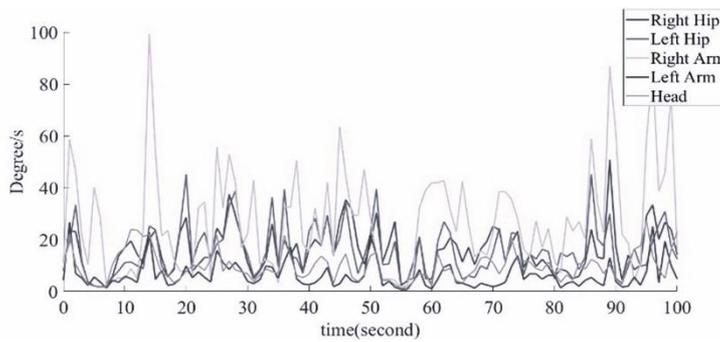


Fig 5

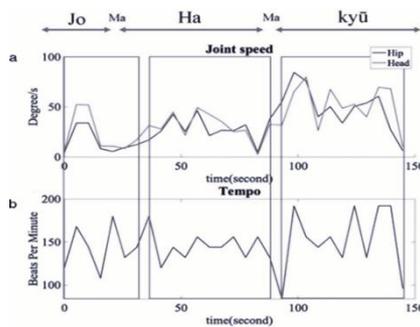


Fig 6



Fig 7

Dong et al. (2020) used a motion capture system to measure the angular velocity of the actions of Nishikawa Koryu the fifth (Fig. 5), and Dong et al. (2022) clarified the concept of *Jo-Ha-Kyū*, which was previously a vague concept (Fig. 6). The principle of *Jo-Ha-Kyū* motion is now being applied to AI robots to develop Japanese style technology (Fig. 7).

Arc Movement

The arc movement (circular movement) is as important to the expression of emotion as the rhythm of the opening and closing lines (Hayano 2019; Dong et al. 2022). In terms of expression, Kanjuro Kiritake the third (Bunraku-za) described this movement as “the movement of eight,” while Koryu Nishikawa the fifth (since: Koryu) described it as the “arc movement” (Hayano and Dong 2021). Since the *Hachioji Kuruma Ningyo* is the subject of this paper, the term “arc movement” is used. Hayano (2019) indicated that arc movements, which are commonly seen as basic movements in Noh plays and *Ningyo Joruri*, give a sense of life to a performance by contrasting the straight-line movements and angular movements of robots and mimes who imitate robots (robot mimes). Hayano and Dong (2021) analyzed the effects of the circular movements in *Hidakagawa Iriaizakura* performed by Koryu and the expression of emotions through *Jo-Ha-Kyū* from motion-captured 3D data (Fig. 8). Hayano and Dong (2021) reported that slow, large, circular movements are used to express affection and serenity and that increasing the angular velocity of movements and using turbulent circles express sadness and other emotions.

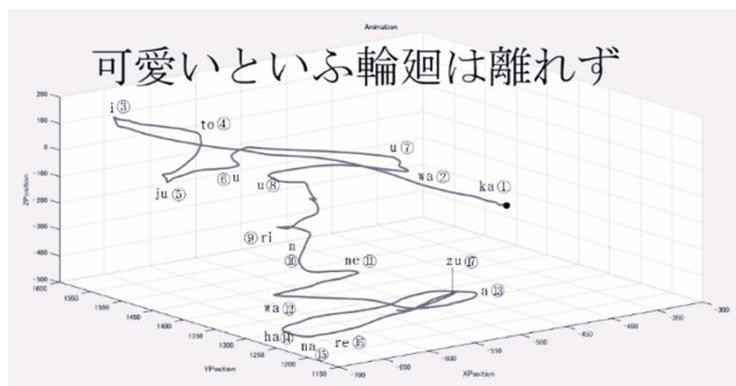


Fig 8 Kashira motion trajectory

Survey

On March 20, 2022, we conducted an on-site survey of Koryu, Nishikawa, and Takemoto Koshiko (*gidayu*). The investigators were Shingo Hayano, Ran Dong, and Minori Ezawa. Motion capture technology (Fig. 9) was used to collect data from five plays, including *Hidakagawa Iriaizakura*, *Tsurionna*, and *Tokaido Chu Hizakurige*. In addition, the speech of the *gidayu* was recorded. This paper focuses on *Hidakagawa Iriaizakura*, which includes few conversations with other puppets and in which specific emotional expressions can be easily captured. Previously, speech analysis was conducted using recordings of the *shamisen* and narration, but the *shamisen* sound prevented the accurate extraction of the narration. Therefore, this time, we sampled the speech of puppet gestures and the *gidayu* without the *shamisen*. Of note, the absence of the *shamisen* sound may have caused a difference in rhythm, though Koryu commented that the absence of the *shamisen* was not a particular problem.

On October 27, 2020, an interview survey was conducted with Koryu regarding emotional expression. The two investigators were Ezawa and Ogata. Koryu explained the process very carefully. The survey was conducted to ascertain what kinds of emotional expressions Koryu was trying to express.

Hidakagawa Iriaizakura is a *gidayu-bushi* period piece consisting of five act and was first performed at the Takemoto-za Theater in Osaka in February 1759. A famous scene occurs in the fourth act, in which Kiyohime learns of Anchin's betrayal, becomes a snake, and crosses the Hidaka River to Dojoji Temple. Normally, only this fourth act is performed at the Nishikawa Koryu-za.



Fig 9

Method

Nishikawa Koryu's comments

Koryu selected important emotional expressions in the script (*yukahon*) of *Hidakagawa Iriaizakura* (fourth act) (underlined parts of the script) and confirmed in detail how he interpreted and acted out these parts. Ogata and Ezawa transcribed Koryu's comments, and Hayano organized the content and underlined the comments. The following nine underlined passages are important in terms of emotional expression.

①姫はあるにもあらればこそ「エ」聞こえませぬ 聞こえませぬ 安珍さま、②恨みはこつちにあるものを、かへつてこの身に恥かゝされ、③何と永らへゐられうぞいなう、今日とても父上の御意見、ごもつともは思へども、女は一度わが夫(つま)と思ひこんだらいかなこと、例え地獄へ落ちるとも可愛いといふ輪会(りんね)は離れず、まして五月の宮詣でにふつと見染めしその日より、愛しい床しい恋しいと夢現にも忘れかね、④焦がれ焦るゝ恋人に逢ふて嬉しい言の葉を、語らふ聞さへ情なや、⑤恋の呵責にくだかれて身は煩惱に繋がるゝ、⑥紅蓮の氷、大焦熱阿鼻修羅地獄へ落るとも、思ひ切られぬ安珍さま、聞こえぬわいな」と身をもだへ ⑦『わつ』とばかりに声を上げ、嘆く涙の雨車軸、その名も高き紀の国や、日高の川に水増して堤も穿つごとくなり

Data collection by motion capture

Manipulations of the puppet's actions were measured using an inertial sensor-type motion capture system. The collected data were used to create a 3D skeletal model (avatar) using Autodesk's Motion Builder (Fig. 10), and the puppet's movements were recorded in detail. The 3D model can be animated. By comparing the behavior of the skeletal model created in this way with the video of the car puppet recorded during data collection, it is possible to analyze the puppet's behavior in detail.

The sensor attached to the doll was connected to a PC by a cable, and a skeletal model created from the collected data was displayed on the top of the PC screen. The sensors that detected the movement of each part of the doll were attached to the parts corresponding to human joints. However, the doll's body is hollow, and its limbs are not fixed, so they do not precisely match human joints. In addition, the doll's torso and neck can stretch, and the skeleton cannot be made constant (Dong et al. 2021). Therefore, in this study, we used a puppet in the *tachiyaku* role (male role), to which it is easy to attach a sensor, and which is easy to manipulate.

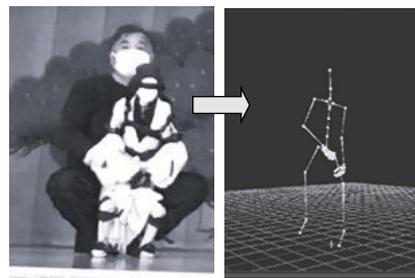


Fig 10

Analysis

The following is Koryu's commentary and explanation of the puppet's movements.

- ① 姫はあるにもあらればこそ「エゝ聞こえませぬ聞こえませぬ 安珍さま」

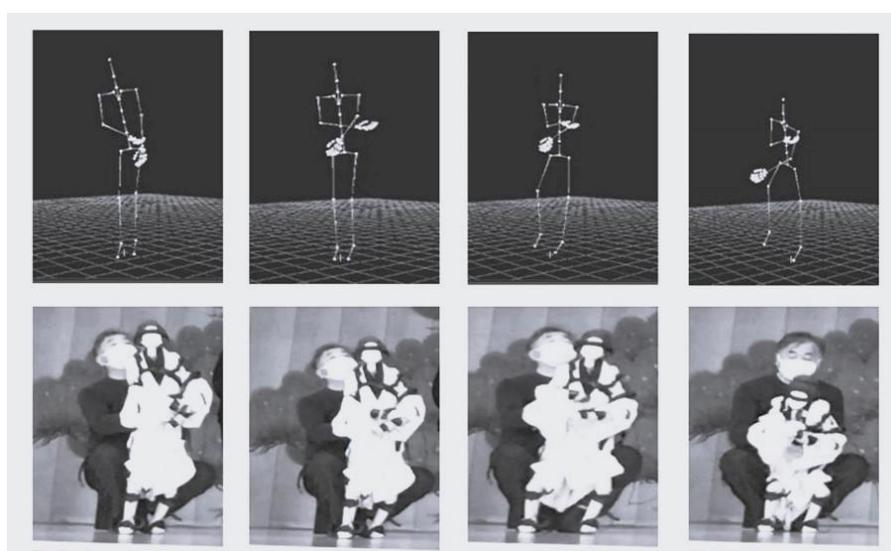


Fig 11

Koryu's Comments : This phrase is expression of anger. According to the expression, Kiyohime thinks she is at fault. Because she is deeply in love with Anchin, her anger is the opposite of love. Ultimately, Anchin leaves without saying anything. So, she does not come to know Anchin's true feelings. She may understand, but she does not want to understand; she wants to groan. The doll's gesture expresses her love and anger toward Anchin and her feeling that the boatman's words are unheard.

Motion Commentary : In this scene, Kiyohime shakes her head from side to side, and looks up the face with at the "ぬ" in "聞こえませぬ," and retreated her right leg significantly in response to the words. Figure 11 shows the action during "安珍さま" with the upper figure showing motion capture data and the lower figure showing the actual action. As Koryu explained, this scene expresses her anger at Anchin's treatment of her, saying, "I cannot even hear the words of the boatman."

- ② 恨みはこつちにあるものを、かへつてこの身に恥かゝされ

Koryu's Comments : This phrase is an expression of resentment. In the beginning, affection is very strong, resentment is not very strong. It is a resentment of kindness, and part of the little girl is still in Kiyohime. Anchin must have felt something ugly inside Kiyohime and resented it. This part of the story expresses her shame of being left behind even after promising to marry her. Therefore, a stubborn feeling arises that there is no choice but to move forward. In fact, Anchin does not remember being engaged, but Kiyohime thinks she is. This means she was distressed by a thought that is very important to a woman.

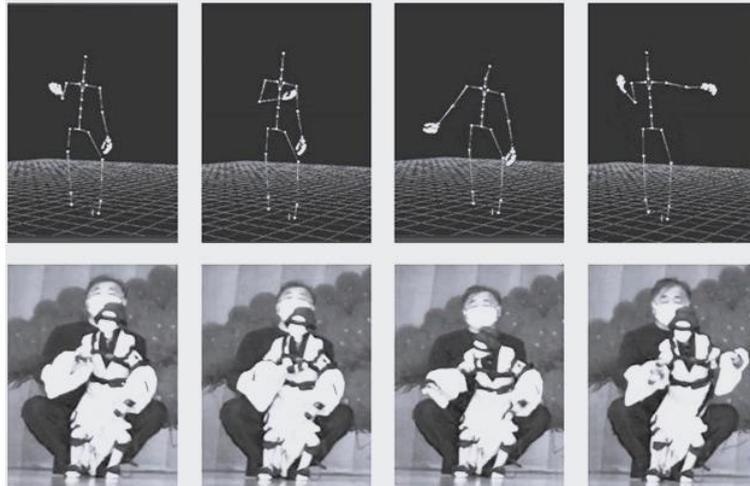


Fig 12

Motion Commentary : In "こつち", the puppet makes a motion to wipe its tears. After completing the motion, the puppet raises its face and turns to face the audience. The fact that the puppet turns its gaze toward the audience suggests that it has released its feelings. This narrative and the gesture of asking for sympathy from the audience are thought to have the effect of sharing Kiyohime's feelings with the audience. In "かえつて", the right hand points in a small gesture toward the audience, then to the chest to indicate "this myself. Next, the puppet's head is turned down, and the right hand makes a downward arc motion. In "恥かかされ", both hands are aligned, and the puppet makes a downward arc from the lower part of the stage to the upper part of the stage. The right hand is then placed face down, drawing a downward arc with the right hand. Fig. 12 shows the motion in "かえつてこの身に恥かかされ".

③ 何と永らへゐられうぞいなう

Koryu's Comments : This phrase is an expression of lamentation. This scene is not a lament for Anchin, but for Kiyohime herself. It seems that Kiyohime is partly ashamed of herself for what she has done. With this phrase, the puppeteer stops his performance for the moment. The puppeteer moves from Anchin's story to a scene-changing performance.

Motion Commentary : In "永らえ", the right hand is lowered gently as if flowing, and in the following "ゐられうぞい" point, the right hand is lowered slightly. In "なう", he takes one step with his right foot toward the audience and stands up as if stretching. In the lamentation expression, the puppet is making a gesture as if it is about to fall apart. Figure 13 shows the whole motion of "何と永らへゐられうぞいなう".

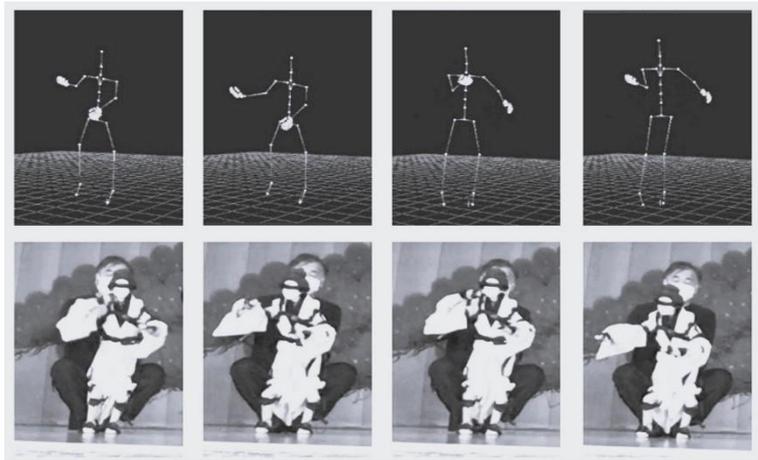


Fig 13

④ 焦がれ焦るゝ恋人に逢ふて嬉しい言の葉を、語らふ間さへ情なや

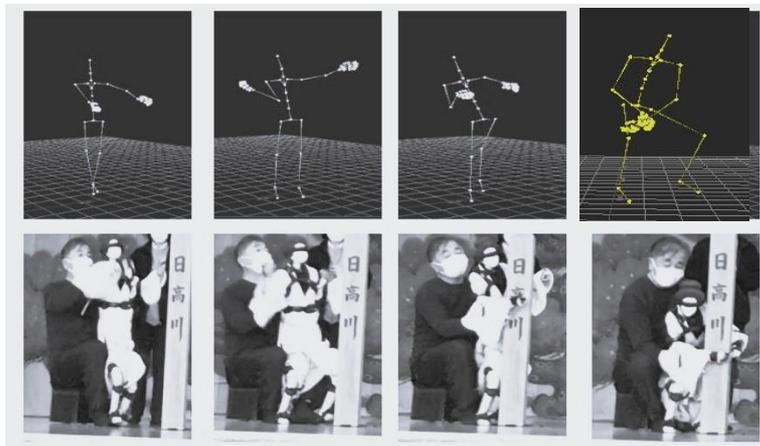


Fig 14

Koryu's Comments : This phrase is an expression of grief .So the affection for Anchin rises to the extreme. People's emotions go down when they reach their highest. And when they down to the end, affection turns into anger. This scene is that transition. Until then, there are memories and affection, and of course there is resentment, but affection is stronger. As a reaction, the emotions become the exact opposite.

Motion Commentary : The puppet places its right hand on its right knee in "逢ふて" and spreads its arms while lifting its hips toward the lower part of the body in "嬉しい". Then, as if to give impetus, the doll draws its right hand to its chest and spreads its arms again in a circular motion. At the same time, stand erect with knees extended. In "情けな," spread your arms wide and raise yourself up as if you are stretching toward the main pillar. In "や", the puppet is hunched heavily along the main pillar, visually expressing

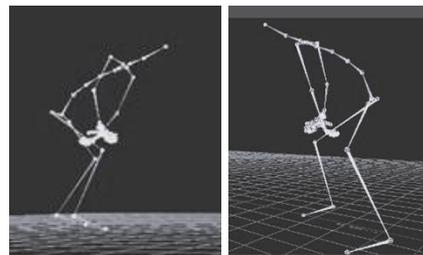


Fig.15

the depression of the heart. Figure 14 shows the motion of "情けなや". Figure 15 shows the rightmost figures in Figure 14 from another angle. The advantage of motion capture data is that the motion can be analyzed from all angles.

⑤ 恋の呵責にくだかれて

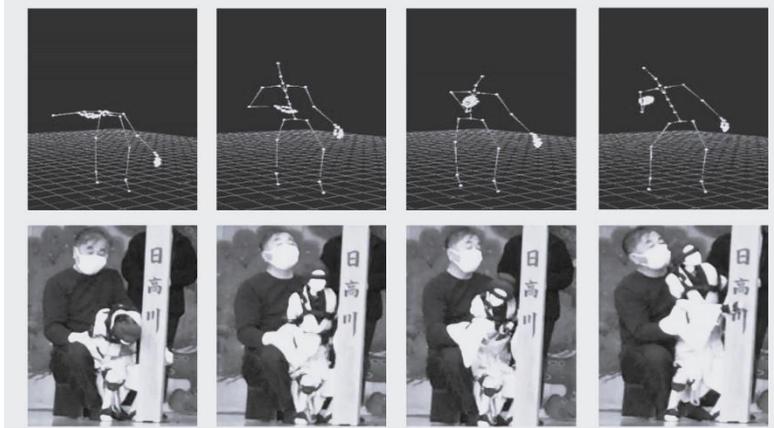


Fig 16

Koryu's Comments : This phrase is primarily an expression of resentment. At this scene , Kiyohime is not yet completely resentful. For Kiyohime, feelings of resentment and anger well up all at once, deep down she still loves Anchin. I express that feeling in these short words. This is the part where you think of Anchin with all your heart, but this becomes a vexation. That is why I (Koryu) interpret it to mean that she was shattered by her vexation.

Motion Commentary : In "恋の呵責に," the right arm draws a large arc and the hand is placed on the back of the head to quickly pull out the *kanzashi*. In "砕かれて" the upper body first falls forward vigorously, and the knotted hair is untied in an instant to show the emotional intensity of the motion. The motion of untying the vigorously tied hair in an instant is called "*kamisabaki*," and in *Ningyo Joruri*, it is meant to release the performer from the bondage he or she had previously been in. Figure 16 is in "砕かれて" motion, and the image on the leftmost is the "*kamisabaki*" picture. Figure 17 is a scene from the "*kamisabaki*" performed by Nishikawa Ryugyoku (Nishikawa Koryu-za) in 2021.



Fig 17

⑥ 紅蓮の氷、大焦熱阿鼻修羅地獄へ落るとも

Koryu's Comments : This phrase is an expression of anger. The part where anger is most expressed is in "紅蓮の氷". The part "大焦熱阿鼻修羅地獄へ落るとも" means that my body will burn up (melt away) as if it were ice. The most flamboyant gesture as an act is performed in "紅蓮の氷、大焦熱阿鼻修羅地獄." This is the part where the most flamboyant motions are made to show the audience. Even the mind that thinks of the other person (Anchin) has been shattered. This is all about feelings of "anger," "sadness," and "despair. This is where the scene of the "*mie-wo-kiru* (to strike a pose). The emotion of

anger is expressed as a "kata". Next, the sound of "tsuke"(to make a sound with a clapper in time with the motion of a puppet) is included in the gashan. This is followed by the sound of the shamisen. The piece ends with "阿鼻修羅地獄へ" and "大焦熱".

Motion Commentary : In this part of the performance, the arms are spread wide in "紅蓮の" and the body is turned toward the lower part of the stage while maintaining the angle of the arms. In addition, in the "氷" gesture, the left leg is pulled back, the hips are lowered, and the right arm draws a large circle. The entire puppet moves in what Koryu describes as the most flamboyant manner, with exaggerated movements (Figure 18). In "落るとも," each note of the narrative is pronounced slowly, and the puppet's body trembles in time.

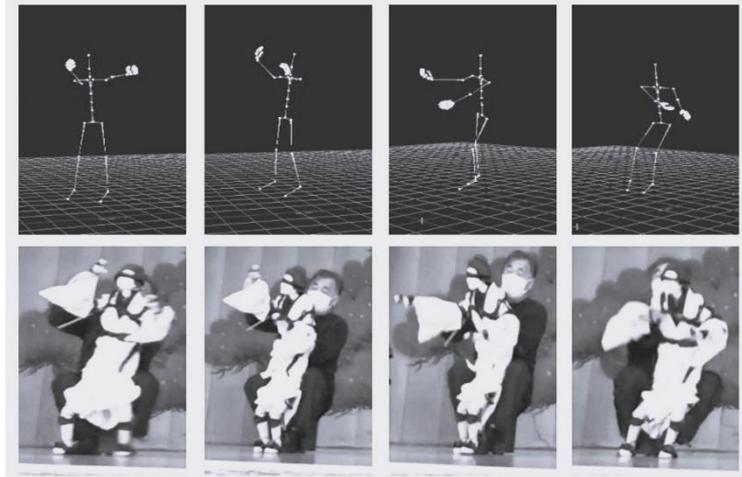


Fig 18

⑦ 『わつ』とばかりに声を上げ、嘆く涙の雨車軸

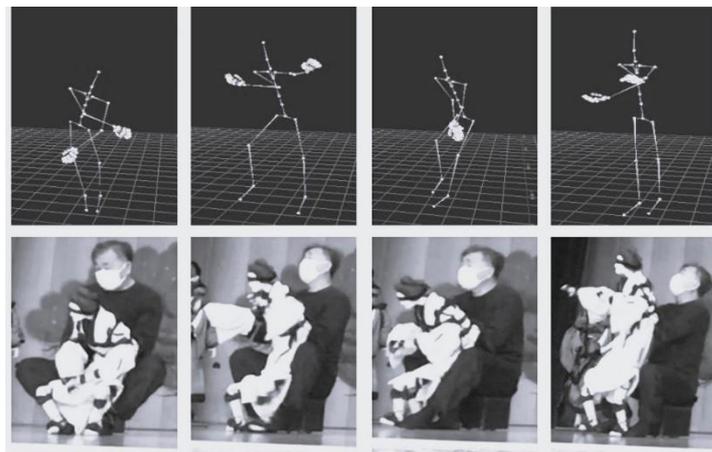


Fig 19

Koryu's Comments : This phrase is a lamentation expression. The "ainote" (a part in which only shamisen is used between lines) is performed before the "わつ" part. Kiyohime's affection turns to lamentation. Here, she cries a lot. Along with those tears, all my feelings for Anchin are gone. By letting all the tears run down, there will be no more love. Kiyohime's emotional state is changing as her kind heart and humanity are rapidly disappearing.

Motion Commentary : In the "わつ" section, Kiyohime stands up slowly from her midriff (the leftmost figure in Figure 19) and makes a motion of crying violently. She then draws her right hand to her chest while tilting her upper body slightly forward in "声を" and aligns both feet together. During the "嘆く涙の雨車軸" section, she backs up a bit and finally falls to her midriff, as if he has run out of strength. Figure 18 shows the motion of "「わつ」とばかりに声を上げ."

Conclusion

In the case studies from (1) to (7) discussed here, the puppets' motions conveyed rough "anger," "sadness," "lamentation," "resentment," and other emotions. The motion capture analysis reveals that the motions include a variety of movements that cannot be realized by humans. For example, the joints of the neck and body can be stretched. In motion capture, the AI creates an algorithm based on the skeleton, but if the joints are stretched or contracted, it judges the person as a different person, and manual corrections are made each time. In other words, by stretching the neck and body, they achieve movements that are impossible for humans. As discussed by Hayano & Dong (2021), it was confirmed that the motions of the puppet are performed in units of phrases spoken by the gidayu. Gidayu performed the verbal expression of emotion, and the puppets matched it with the expression of emotion through motion. The puppet then emphasizes its emotional expression through exaggerated movements. For example, in the "*kamisabaki*" scene shown in Figure 17, Kiyohime lowers her right hand once, then raises her right hand in a circular motion until it reaches the "*kanzashi*" in her hair, and then unties its hair in one motion. It was confirmed that such exaggerated movements based on "arc movements" and the rhythm of the "*Jo-Ha-Kyū*" convey emotions more intensely than realistic performances such as dramas.

Appendix

This research was conducted as part of Grant-in-Aid for Scientific Research, Core C (21K01061), "Motion Analysis and Digital Archiving of Hachioji Kuruma Ningyo by Motion Capture" (Principal investigator: Shingo Hayano). This study was organized based on the graduation theses of Ezawa & Ogata, who were supervised by Prof. Hayano. This paper is a substantially added and revised version of the Ezawa & Ogata paper in Graduation Thesis 48, 2022, Department of Japanese Literature, Faculty of Letters, Tsuru University.

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八王子車人形五代目西川古柳の感情表現：人形遣い「所作」と義太夫「語り」の分析

江澤実紀 小形花 早野慎吾

【要旨】

人形浄瑠璃は、優れた感情表現で国際的にも評価されている日本の伝統芸能である。これまで、筆者ら(AI 人形浄瑠璃研究会)は、「円(八の字)」の動きや「序破急」のリズムなどが感情表現に重要な役割を果たしていることを分析してきた。今回は、八王子車人形五代目西川古柳に対面調査を行い、どのような感情をどのような所作で表現しようとしているかなどを確認した。本研究では、八王子車人形西川古柳が舞う『日高川入相花王』を例にして、人形の所作と義太夫語りの相互作用によりどのような相乗効果は生じるかを分析した。ケーススタディではあるが、義太夫のことばによる感情表現の内容が、人形の所作により強調されていることが確認できた。なお、西川古柳のモーションデータは、早野(2021)で採取したモーションキャプチャデータを使用した。