A Study on Motion Factors Affecting a Sense of Being Alive Towards Enhancing Visualization

A Dissertation Presented

by

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ABSTRACT

Chapter 1: Introduction

Throughout history, visualization has played an important role in enabling effective communication. From ancient times to the present day, particularly in the digital age, visualizations have become prevalent and are often observed on screens. Over time, they have evolved to incorporate movement, resulting in an enhanced impact on viewers' emotions and overall effectiveness in communication. Understanding how humans perceive motion is crucial for ensuring effective communication between the sender and receiver. The participants' backgrounds and their interpretations of metaphors and intuitive understanding also influence how motion is perceived. While studies on motion graphics and evaluation have been conducted, there is still a lack of research focusing on motion and specific emotional evaluation, such as the feeling of a sense of being alive. The aim of this research is to examine how motion factors affect the feeling of a sense of being alive and clarify the interaction effect between these factors. This exploration includes considering a wide range of individual perspectives, such as nationality background and differences in gender.

Chapter 2: Experiment I: A Study to Verify the Characteristics that Elicit the Feeling of Being Alive

The purpose of this experiment was to verify the characteristics that tend to elicit the feeling of being alive in the artifacts. Through three experiments involving 1) experiment on the rhythms of light, 2) the rhythms of sound, and 3) the changing form of the artifacts, the results revealed that these characteristics affected the expression of a sense of being alive in the stimuli, which were the presence of fluctuations, sine curve waveforms, and unstable waveforms. The understanding of these characteristics provides valuable insights when applied to creating motion graphic stimuli.

Chapter 3: Experiment II: A Study to Clarify the Motion Graphics that Express a Sense of Being Alive

In this experiment II aimed to clarify the differences between motion graphics stimuli based on artifacts and those based on natural creatures. Two sets of motion graphics were created: one based on artifacts, consisting of three levels (*displacement* (*linear*), *sine curve*, and *fluctuation* factors), and another based on natural creatures. The results are as follows: 1) motion graphics based on natural creatures were rated higher than those based on artifacts, 2) *fluctuation* factors were found to be highly correlated with the expression of the sense of being alive. Moreover, it was found that *high* and *low fluctuation* factors positively influenced the evaluation of the sense of being alive more than those *without the fluctuation* factor.

Chapter 4: Experiment III: A Study to Clarify the Motion Graphic Factors that Influence the Expression of a Sense of Being Alive

The experiment III aimed to clarify the motion graphic factors that influence the expression of a sense of being alive and the interaction effects between these factors. Additionally, to examine whether participants' factors affect the evaluation of a sense of being alive through motion graphics. The stimuli consisted of three motion factors: *fluctuation*, *acceleration*, and *angle*. There were 20 questionnaires. In the evaluation of 10 questionnaires that are related to a positive expression of a sense of being alive: the *angle* factor had the most significant impact on the evaluation of a sense of being alive, especially at narrow degrees. Regarding the interaction effect between the factors, it was observed that the *without acceleration* and *fluctuation* at narrow degrees highly elicited a sense of being alive. In the majority of the evaluations, Thai participants generally rated the sense of being alive significantly higher than Japanese participants. It showed that background differences might impact the evaluation. For the other 10 questionnaires related to a negative expression of a sense of being alive: According to the evaluation by Japanese participants, *acceleration* and *fluctuation*, especially at narrow degrees, were found to be highly associated in this evaluation.

Chapter 5: Concluding Remarks and Discussion

This study aims to clarify the influence of motion factors on the perception of a sense of being alive. It highlights that motion with a narrow degree has a significant impact on the sense of being alive, possibly due to frequency perception resembling biological vibrations in processes like breathing or heartbeat rhythms. Furthermore, the change in acceleration, particularly from fast to slow, affects the evaluation of a sense of being alive. Differences in cultural backgrounds and experiences contribute to variations in evaluation, with Thai participants generally providing higher evaluations compared to Japanese participants. Further research is recommended to study different levels of narrow angles. Additionally, investigating groups of participants from the same nationality but different living areas can provide a comprehensive understanding of the influence of diverse environments on evaluation. The data obtained from this study leads to enhanced visualization in various fields, such as education. It can be effectively utilized to develop educational materials that facilitate easier understanding and elicit positive emotions among students.

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CHAPTER 1

INTRODUCTION

1.1. Visualization and enhancement

Visualization is becoming increasingly popular across various fields, with experts predicting it will become a highly influential and effective tool in this century [1]. Throughout history, the significant role of visualization has been observed. As stated by Fiona [2], humans used images on cave walls to represent their own experiences and tell stories. Cave paintings served various purposes, including recording pleasant events, educating the younger generation, and illustrating folk tales. The notable example is Figure 1.1 (left), found in the chambers of Lascaux in France. This image portrays a narrative in a cartoon-like manner, showing a man falling backward due to the attack of a bison with sharp horns [2], and [3]. During the late Medieval period until the Renaissance, images remained a primary mode of communication and storytelling. Narrative techniques through visualization have become more complex, incorporating symbolic and stylized representations. An example is the Maestà (Figure 1.1, right) is the one of Christian narrative art, created by Duccio, a religious artwork created on a wooden panel [4]. Pieta (Figure 1.2, left) is also one of sample of Christian narrative art that showcased that employed the skills to make the artwork more lifelike details and emotional expression [5]. The Last Supper (Figure 1.2, right), painted by Leonardo da Vinci, is also one of artwork that showed enhancing visualization by depictions of realistic human anatomy, consideration of perspective, light, and shadow [6].

Figure 1.1. Bison attacking a man (left) [7], and Maestà (right) [8]

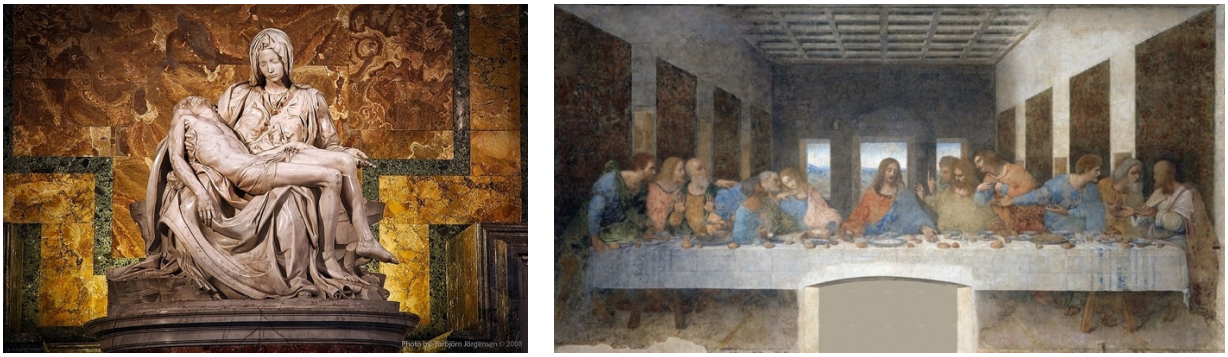

Figure 1.2. Pieta (left) [9], and Last Supper (right) [10]

Visualization and enhancing visualization remain significant in various fields even today. There have been studies focused on improving visualization by understanding how visual perception influences our ability to perceive objects. An example is Gestalt theory, which investigates how humans organize and interpret visual elements into meaningful patterns [11]. This includes studying techniques and strategies to create impactful visuals that effectively communicate, such as the principles of design [12].

This focus on enhancing visualization arises from the fact that the interpretation of visual content can vary due to multiple factors, leading to potential misunderstandings. Thus, enhancing visualization becomes crucial in bridging the gap between the sender and receiver, ensuring effective communication.

As media advances from the era of printing to the digital age, the way we communicate and obtain information is going through significant changes. Screens have become a major part of our daily lives, representing a primary medium. Motion plays an important role in the present media landscape, as it is a defining characteristic of film, video, and modern communication technologies like multimedia [13]. According to McLuhan [14], as important as the cognitive content, the mechanics of the media play an important role in conveying emotional impact. Motion is considered highly capable of evoking strong emotional responses in viewers [13], [15], and [16]. Motion captures viewers' attention and has the power to influence their emotions [17].

To effectively communicate messages and evoke emotional responses from the audience in motion graphic, designers should not only focus on color, text, and shape, but also consider

techniques such as adjusting movement speed, shape alterations, and movement direction to express specific emotions. In addition, considering how the receiver understands and interprets the meaning of the message in various contexts such as gender, age, or culture [18].

Humans acquire knowledge and understanding by directly engaging with their surroundings and experiences, and this knowledge is influenced by various factors such as the physical environment, personal characteristics, and cultural background [19]. These factors contribute to diverse responses to motion, as individuals' unique experiences and backgrounds shape their perceptions, interpretations, and emotional reactions.

To better understand viewers, it is important to consider the role of visual elements and metaphor-making. When people share emotional or subjective experiences, they often draw upon their knowledge of familiar and concrete concepts to make sense of abstract or complex ideas. Visual elements play a significant role in motion graphics, effectively conveying visual messages to the audience. Key factors to consider include primary visual elements such as dots, lines, shapes, colors, and directions, as well as composition and various visual techniques and styles, including methods of creating visual language (such as metaphor, stimulus, code, and abstraction) [20].

For example, viewers may interpret a rising object in a motion graphic as a representation of something positive or good because of the conceptual metaphor as Good is "Up" [19]. Another sample is seeds blossoming into something beautiful portrays the growth and success of a creative business. Another process of morphing involves a transitional change through motion. This can symbolize the progression of life, where something emerges or "goes in" and eventually fades away or "goes out," resembling the concept of birth and death [21]. When designing motion graphics, it is important for designers to consider these conceptual metaphors. Viewers will process and understand the motion graphics based on their previous experiences and associations with these metaphors.

There have been several studies conducted to investigate the effects of motion on emotions. One study specifically examined the impact of motion on individuals' emotional reactions, focusing on the levels of arousal and valence experienced in response to stimuli. Another study

found a correlation between the presence of motion on the screen and an increase in cortical arousal, as measured using the alpha frequency in Electroencephalography (EEG). Additionally, a different study found the relationship between motion and emotional arousal, revealing that motion influences arousal [13]. Another previous studied examined how design experience influences the interpretation of motion graphic values [18]. Results showed that design experience affects the evaluation of attributes like moving speed, aggressiveness, and pleasure. The study provides insights into the relationship between design experience and motion graphic evaluations.

However, there is a lack of research on the specific emotional feelings elicited by motion. In this study, we conducted research on how motion factors affect the evaluation of the feelings of a sense of being alive and examined the relationship between evaluation and participants' background.

1.2. Motion and a sense of being alive

Movement has been depicted for various purposes in visual media. Historically, the depiction of motion becomes evident in ancient cave paintings discovered in Spain's Altamira cave (Figure 1.3, left), and France's Lascaux cave (Figure 1.3, middle and right). These paintings portray animals with multiple legs, effectively conveying a sense of motion. Similarly, during the classical era, Greek Panathenaic amphorae, prized ceramic vases, implied movement through their artistic elements [19]. Figure 1.4 (left) shows the Terracotta Panathenaic prize amphora used in a foot race game. Furthermore, the famous marble sculpture named "Laocoön and His Sons" (Figure 1.4, right), originating from the Hellenistic Period, depicts a priest and his sons entangled with sea serpents, conveying movement [22]. Moving on to the early modern period, the artwork titled "Nude Descending a Staircase (No. 2)" by Marcel Duchamp (Figure 1.5, left) exemplifies the portrayal of motion [23]. Similarly, Umberto Boccioni's "Unique Forms of Continuity in Space" (Figure 1.5, right) displays continuous forward motion, providing a strong sense of movement.

Figure 1.3. The prehistoric cave paintings at Altamira cave (left) [24], Lascaux cave (middle and right) [25], and [26].

Figure 1.4. Terracotta Panathenaic prize amphora, a type of Panathenaic amphora in ancient Greek pottery (left) [27], and Laocoön and His Sons (right) [28]

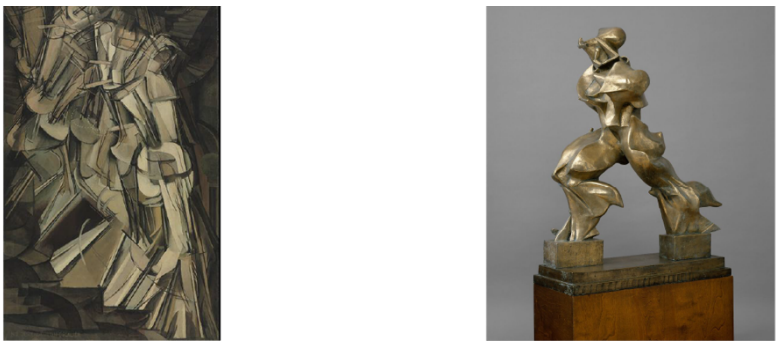

Figure 1.5. Nude Descending a Staircase (No. 2) (left) [29], and Unique Forms of Continuity in Space (right) [30].

In the early 20th century, technological advancements, industrial progress, postwar conditions, and social change set the stage for a revolution in painting and sculpture, leading to the emergence of new forms of expression like motion graphics [21].

Animation is frequently used as a method to create the illusion of motion. The etymology of animation is defined as giving the illusion of life to the inanimate, which brings us to the perception of movement (refers to life) that occurs in the inanimate [31]. Meanwhile, the dictionary

definition of the word animation is (1) the process of making films in which drawings or puppets appear to move, (2) liveliness or vivacity and (3) the condition of being alive (Collins English dictionary 2022, animation entry). In the context of creating animations, it is important to understand a fundamental principle of human vision. The human eye has the remarkable ability to retain an image for a short period after it disappears. When a rapid sequence of images is presented, our brain interprets them as continuous motion. This creates the illusion of seamless movement in animation. This interaction between visual perception and the persistence of retinal images effectively creates the illusion of movement in animation [21].

The thaumatrope, which developed in the 1820s, is an early successful device for creating a motion illusion. It comprises a small paper disc connected to two strings and held on opposite sides. When the disc is spun rapidly, the two images on it merge together, creating the perception of motion. Figure 1.6 (left) provides a sample of the thaumatrope optical illusion. Moreover, the Zoetrope, invented by William George Horner in 1833, is a device commonly known as “the wheel of life”. It achieves the illusion of motion through its compact cylindrical structure, featuring slots along the sides. As the cylinder rotates, viewers observe a sequential display of drawings [21], as demonstrated in Figure 1.6 (right). The concept of animation involves bringing life to inanimate objects, enabling us to perceive movement and associate it with a sense of being alive [31]. Consequently, animation serves as a bridge between perceiving motion in non-living entities.

Figure 1.6. A sample of thaumatrope optical illusion (left) [52] and zoetrope (right) [45].

The 1960s were a turning point for animators and motion graphic designers worldwide. Digital technology facilitated the widespread adoption of color film production and tape recording. At ABC (American Broadcasting Company), Harry Marks pioneered the concept of the moving

logo. The moving logo captivated audiences. These advancements significantly transformed content production and revolutionized visual storytelling in the broadcasting industry [21].

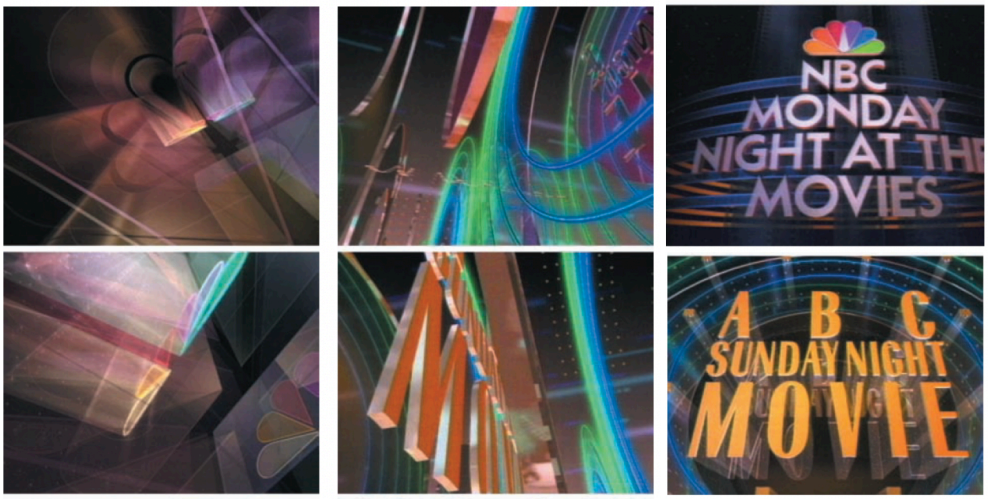

Figure 1.7. The frames of NBC's Monday Night at the Movies and ABC's Sunday Night Movie in 1989 [21]

Motion refers to the act or process of moving, or a particular movement or action (Cambridge English dictionary 2023, motion entry). Motion is a fundamental aspect of the world we inhabit. Our brains possess specialized cells that are responsible for sensing and comprehending motion [13], [32], and [33]. This ability to perceive motion is present from birth and plays a crucial role in helping us understand our physical surroundings. The ability to perceive motion is necessary for our understanding of the world we live in [13], [34], and [35]. According to Krasner [21], motion serves as a universal language. The way elements are visually animated and presented can have a stronger impact on the viewer than the content itself. Through motion, transitions, and effects, the visual representation affects emotion. For example, the movement of text can evoke various emotions. A slow and gentle appearance of text from a black background creates mystery and peaceful, while flipping and rapid text express playfulness, urgency, or inconstancy. Another examples such as the fall of a leaf from a tree in autumn can evoke a sense of sadness, while the rhythmic motion of a pendulum in an old clock can convey a feeling of ordered beauty [46].

Motion techniques such as blurs, zooms, scales, and pans are employed to explain information, guide viewers, and engage them. As we can see, the arrangement and manipulation of elements in motion graphics are crucial for evoking specific emotions and creating the desired atmosphere.

Moreover, motion also facilitates communication and guides people's behaviors and also serves as a valuable tool for understanding human behavior and expression [47]. The previous study highlights the significance of motion in enhancing usability, communication, and effective message delivery across various mediums. Designers can create engaging and meaningful interactions, thereby enhancing user experiences. For example, a study analyzes the communicative potential of kinetic typography due to it has proven to be an influential tool for evoking emotion [48]. Another study is about a study investigated the incorporation of movement in website interface design. The study's findings suggest that movement has significant potential as a communication tool in interface design [49].

Throughout history and up to the present day, humans have consistently attempted to enhance visualization by creating more realistic representations for various purposes, including education and storytelling. This includes incorporating elements of motion into visualizations. A sense of being alive is considered crucial for effective visualization, as it leads to effective communication between senders and receivers, facilitating emotional impact and clearer understanding of the story.

This study conducts research to verify how humans perceive and evaluate the sense of being alive which conveyed through motion, as well as how motion factors influence this perception and the interactions among these factors. The purpose of this research is to gain a better understanding of the evaluation, particularly the factors that contribute to it. The understanding gained from this research has the potential to enhance visualization.

1.3. Affective evaluation

Emotions, or affect, play a significant role in our daily experiences and social interactions [20]. The study of emotion has gained significant attention from communication scholars in recent years [13], and [36].

In recent years, there has indeed been an increased focus on incorporating the user's thoughts and emotions into the design process. User-oriented design is increasingly recognized, as well-designed products that meet users' psychological needs attract more attention [37]. By understanding the users' point of view, designers can develop products and experiences that meet their needs and preferences. This user-centered approach fosters effective communication between the designer and user [18] and leading to more successful design outcomes [38].

As stated before, motion has the power to capture viewers' attention and influence their emotions [17]. Motion is inherent in nature and can be depicted in pictures using dots and lines. Different shapes and movements, including helical, circular, zigzag, or direct, can be represented. Visual elements and shapes possess varying degrees of energy for movement. Repetition of moving visual elements creates a sense of rhythm in motion graphics. In terms of design, A study conducted by Davis [39], and [40] focused on the meaning of design elements in graphic design. The study revealed that lines have the ability to evoke specific perceptions. For example, horizontal lines are often associated with a sense of restfulness, diagonal lines convey dynamism and activity, and vertical lines are perceived as stable. Based on the information provided, it can be inferred that the study of emotions is important in the context of design.

There are studies on emotions, such as *Kansei* Engineering, which refers to an affective engineering methodology [50]. *Kansei* Engineering, originating in Japan during the 1970s, focuses on converting user emotions into specific design parameters [51]. *Kansei* engineering investigates the range of sensations, perceptions, feelings, and emotions experienced by humans in response to stimuli [41], [42], and [43]. These affective assessments provide valuable insights and a deeper understanding of the emotional dimensions and their relation with design elements.

As mentioned earlier (In the section on 1. Visualization and enhancement), previous studies have examined the impact of motion on emotions, specifically focusing on factors like arousal, valence, and cortical arousal. These studies have discovered correlations between motion and emotional responses. Furthermore, research has delved into the influence of design experience on the interpretation and evaluation of motion graphics. However, there is a lack of research concerning the specific emotions evoked by motion. In this research, we conducted study on how motion factors affect the evaluation of the feelings of a sense of being alive and examined the relationship between evaluation and participants' background.

1.4. Objective

This study aims to clarify the motion graphic factors that affect the evaluation of a sense of being alive. This is achieved through the following objectives:

1) To verify the characteristics to elicit the feeling of being alive in the artifacts.

2) To clarify the differences in evaluation between motion graphics stimuli based on artifacts and those based on natural creatures.

3) To clarify the motion graphic factors that influence the expression of a sense of being alive and the interaction effects between these factors. Additionally, to examine whether participants' attributes (e.g., gender or cultural background) affect the evaluation of a sense of being alive through motion graphics.

Based on these three objectives, the findings of this study contribute to a better understanding of how to evaluate the sense of being alive in motion graphics, ultimately leading to enhancements in the visualization in this sense.

1.5. Research structure

The research workflow is presented in Figure 1.8. To achieve the objectives of this study, the three experiments were conducted.

Experiment I: A Study to Verify the Characteristics that Elicit the Feeling of Being Alive

This experiment aimed to verify the characteristics to elicit the feeling of being alive in the artifacts. This phase consisted of three experiments: 1) the rhythms of light, 2) the rhythms of sound, and 3) the changing form of artifacts.

Experiment II: A Study to Clarify the Motion Graphics that Express a Sense of Being Alive

This experiment aimed to clarify the differences of the motion graphics based on artifacts with those based on natural creatures, examine the influential factors in expressing a sense of being alive in motion graphics based on artifacts. This experiment employed two sets of motion graphics: 1) stimuli based on artifacts and 2) stimuli based on natural creatures. For the motion stimuli based on artifacts, three factors with three levels were considered: *displacement* (*linear*), *sine curve*, and *fluctuation*.

Experiment III: A Study to Clarify the Motion Graphic Factors that Influence the Expression of a Sense of Being Alive

This experiment aimed to clarify the motion graphic factors that influence the expression of a sense of being alive and the interaction effects between these factors. Additionally, to examine whether participants' attributes (e.g., gender or cultural background) affect the evaluation of a sense of being alive through motion graphics. For the motion stimuli, three motion factors were combined with three levels: 1) *fluctuation*, 2) *acceleration*, and 3) *angle*. In total, the evaluation consisted of twenty questions. There are ten positively related questions and ten negatively related questions regarding the sense of being alive. This study involved participants from different countries, including those with Thai and Japanese backgrounds. Additionally, the study assessed gender differences to gain further insights into the evaluation.

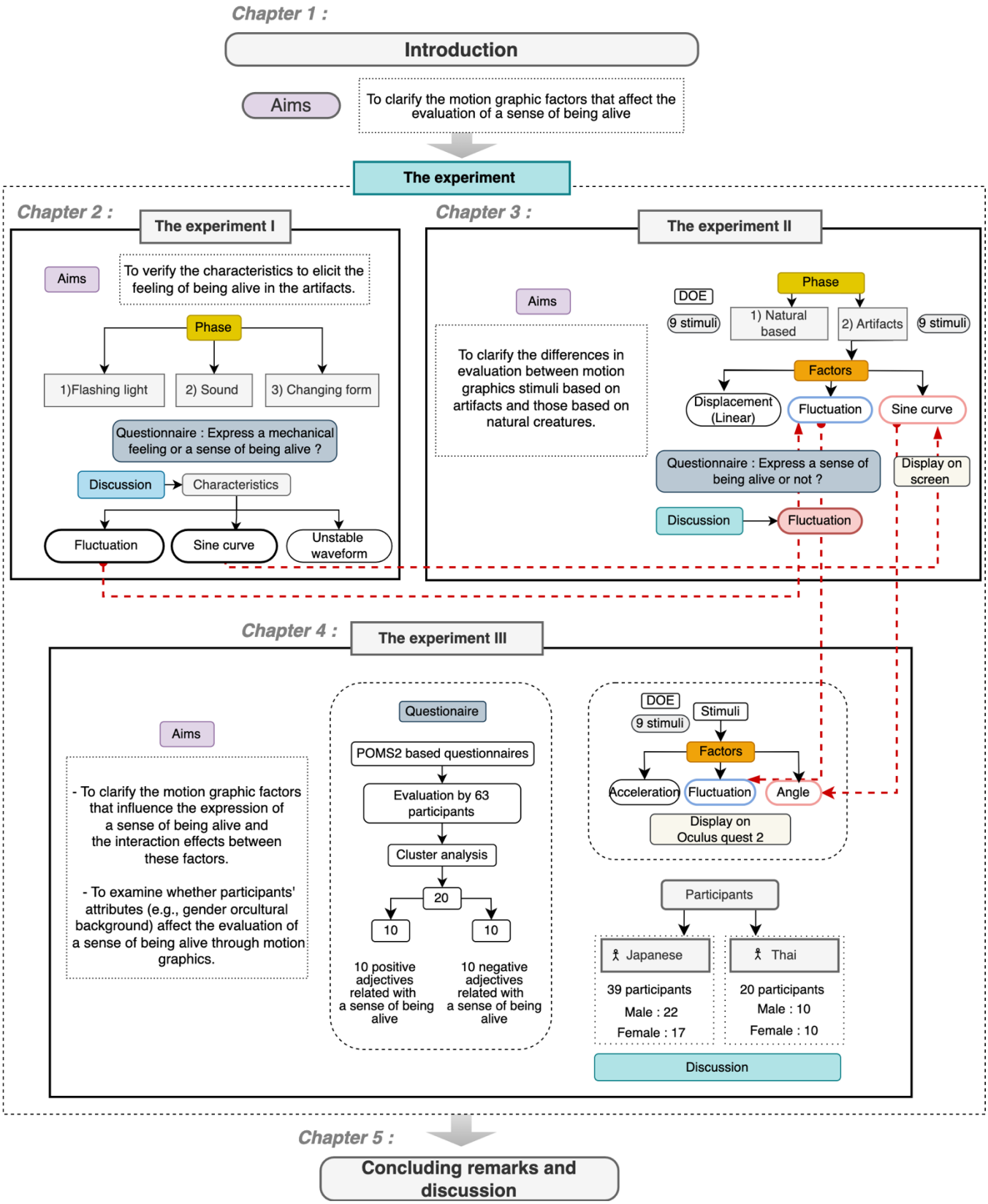

Figure 1.8. Structure of the research

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CHAPTER 2

EXPERIMENT I

A Study to Verify the Characteristics that Elicit the Feeling of Being Alive

2.1. Introduction

This chapter focuses on the study of the expression of a sense of being alive through experiments that incorporate flashing lights, sounds, and changing forms. The study on the experiment involving flashing lights and sounds was presented and received the Best Paper Award at the International Conference of *Kansei* Engineering and Emotion Research 2020 [1]. Additionally, the study exploring the experiment with changing forms was published in the International Journal of Affective Engineering in 2021 [2].

This experiment aimed to verify the characteristics of the artifact that elicits the feeling of being alive. According to the 2023 Merriam Webster online dictionary, “artifact” is defined as an item that displays human craftsmanship or alteration, setting it apart from natural objects. In this research, “artifacts” are defined as things made by humans, such as robots, art, machines, and digital content. Three experimental phases of artificial expression were conducted: 1) The rhythm of lights, 2) The rhythm of sounds, and 3) The changing forms. A multivariate analysis methodology was employed to verify the characteristics related to the expression of a sense of being alive in artifacts and to analyze the differences in characteristics between the expression of a sense of being alive and mechanical expression. Understanding the characteristics associated with expressing a sense of being alive provides valuable insights that can be applied to creating motion graphic stimuli in subsequent experiments.

2.2. Overview

The characteristics that contribute to expressing a sense of being alive was discussed as follows:

In accordance with the Oxford Advanced Learner's Dictionary 5th Edition (1995), an organism refers to 1. (a) A living being, often of small size, characterized by the coordinated functioning of its parts, (b) an individual plant or animal; 2. A system consisting of interconnected elements that rely on each other.

Living organisms possess distinctive characteristics that differentiate them from non-living entities. These attributes encompass the ability to respire, acquire nutrition, grow, excrete waste, reproduce, respond to stimuli, and exhibit movement [3]. Movement is a fundamental attribute that sets living beings apart from non-living entities. Living organisms have the inherent capacity to move independently without relying on external assistance. For instance, leeches serve as an example of living organisms that exhibit distinct looping patterns of movement without requiring external support [4]. Additionally, locomotion is observed in humans [5], further highlighting their ability to move autonomously.

These characteristics of living organisms can serve as a foundation for the development of artifacts that aim to evoke a sense of being alive. Previous studies have demonstrated that incorporating bio-inspired elements into artifacts can elicit this feeling. For example, artist Klein created living sculptures that incorporated biological factors, providing viewers with a sense of being alive [6]. Another example is "The Senster," a cybernetic sculpture created by Ihnatowicz in 1970, which evoked a sense of being alive through its random movements and autonomous behavior, creating a lifelike impression [7]. Additionally, the kinetic sculptures known as "Strandbeests," developed by Jansen in 1990, resembled organisms as they moved independently without external assistance and possessed features enabling survival in various environments [8].

According to Row [9], there are four essential characteristics that contribute to artifacts expressing a sense of being alive: physical appearance, dynamic behavior, user recognition, and independence, where independence refers to self-determinability. Anthropomorphic behavior is considered significant in conveying a sense of being alive [10]. An example of such behavior can be observed in certain plants that exhibit leaf orientation towards sunlight as a means to thrive and survive [11].

When considering the characteristics that represent the expression of a sense of being alive, it is observed that independence and instability, inspired by biological attributes, contribute to a heightened sense of being alive. On the other hand, characteristics such as predictable sequences and stable rhythms, lacking independence and variability, may result in a reduced sense of being alive.

2.3. Objective

To verify the characteristics to elicit the feeling of being alive in the artifacts.

2.4. Methodology

There were three experiment phases as follows:

2.4.1) Experimentation for the rhythm of flashing lights. This phase aimed to study the evaluation of artificial expression through flashing light signals.

2.4.2) Experimentation for the rhythm of sounds. This phase aimed to study the evaluation of artificial expression through sound.

2.4.3) Experimentation for the changing forms. This phase aimed to study the evaluation of artificial expression through changing form.

To evaluate the characteristics of the artificial expression in these experiments, survey questions were designed to assess the distinction between expressing a sense of being alive and conveying a mechanical feeling. A 7-point Likert scale (From 1 = “highly observe mechanical expression” to 7 = “highly observe a sense of being alive”) was used in this study. The outcomes of the experiments were assessed using multivariate analysis.

2.4.1. Experiment for the rhythm of lights

There were 91 participants. A total of 27 stimuli of artificial expressions were created by considering these characteristics: 1) fluctuation (with or without), 2) random rhythms (random or routine), and 3) frequency (high or low). The stimuli were produced using Adobe After Effects

software with black and white images. The white image represented 100% lightness and complete opacity, while the black image represented 0% lightness and complete transparency.
The stimuli were presented in 30-second video files.

2.4.1.1. Results and consideration of the experiment for the rhythm of lights

For difference in evaluation tendency, cluster analysis was utilized to group similar data based on the information found in the data [12]. As shown in Figure 2.1, the characteristics were classified into six groups:

A – Triangular waveforms which consisted of various wavelengths.

B – The majority of the waveforms presented repetitive wave rhythms.

C – Low frequency smooth waves with wavelengths presented in three or six seconds.

D – Low frequency waves with some fluctuations.

E – Square waves with various wavelengths.

F – High frequency triangular waves with a wavelength of one second.

Principal Component Analysis (PCA) is a method employed to evaluate relationships in continuous multivariate data and describe the variance-covariance structure of the information [13]. Figure 2.1 illustrated a PCA plot of the stimulus data, with Principal Component 1 (PC1) represents 25.4%, and Principal Component 2 (PC2) represents 8.5% (Figure 2.1).

The left side of the x-axis represents waveforms with high frequency, and hard formations. Most of the wavelengths in this group are one second intervals.

The right side of the x-axis represents waveforms with low frequency, and some fluctuations. Most of the wavelengths in this group are three and six-second intervals.

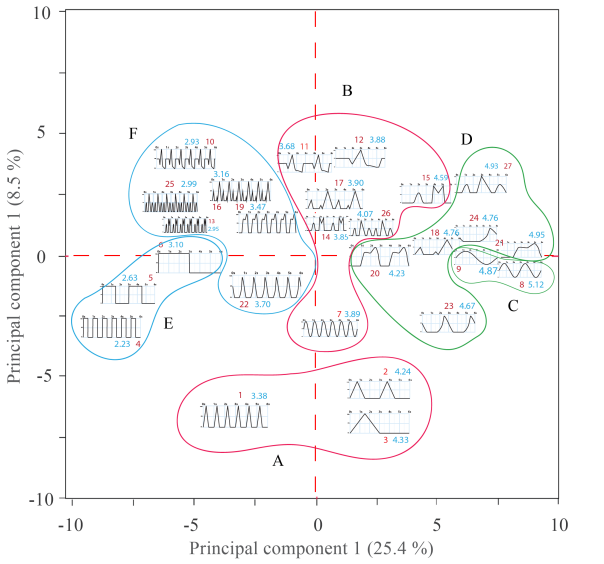
The top of the y-axis shows waveforms with fluctuations.

The bottom of the y-axis shows waveforms without fluctuations.

The results indicate the stimuli that received high ratings associated with a sense of being alive, which were stimuli no. 8, 21, 27, and 9. These stimuli had average scores of 5.12, 4.95, 4.93, and 4.87, respectively.

On the other hand, the stimuli that were rated highly for mechanical expression were stimuli no. 4, 5, 10, and 25, with average scores of 2.23, 2.63, 2.93, and 2.99, respectively.

The characteristics of the waveforms that were considered as providing a sense of being alive were as follows: 1) smooth wave, 2) low-frequency waveform with an average frequency of 0.16-0.66 Hz, 3) waveforms with fluctuations, and 4) non-repetitive waveforms consist of various wavelengths. On the other hand, the waveforms that were considered to express a machine feeling to the participants were characterized as follows: 1) square or triangular waveforms, 2) high frequency waveforms, 3) most of the waveforms were presented in one-second wavelengths, and 4) repeated waveforms.



Note : The number of the stimuli (written in red) corresponds to each average value (written in blue).
Figure 2.1. The first and second principal components of the experimentation for the rhythm of lights and classified by cluster analysis.

2.4.2. Experiment for the rhythm of sounds

There were 40 participants. A total of 27 stimuli of artificial expressions were designed. These stimuli were created by considering these characteristics: 1) non-repeated and repeated waveforms, 2) many note pitches and few note pitches, 3) soundwaves with fluctuations and without any fluctuations. The stimuli were generated using the Vocaloid Software, version 5 (Yamaha Corporation, Japan), which utilized the voicebank of Cyber Songman. Each stimulus had a duration of 6 seconds.

2.4.2.1. Results and consideration of the experiment for the rhythm of sounds

For differences in evaluation tendency, a cluster analysis was used to categorize similar data into three groups, namely A, B, and C (Figure 2.2):

A – The square waves with a smaller number of note pitches:

The minimum number of notes was one, and the maximum number of notes was two.

B – A combination of a single tone and acoustic waves was utilized.

The minimum number of notes was one, and the maximum number of notes was five.

C – Waveforms consisted of varying notes and some fluctuations.

The minimum number of notes was two, and the maximum number of notes was six.

The results of a PCA revealed that Principal Component 1 (PC1) represents 51% of the variance, and Principal Component 2 (PC2) represents 8.4% (Figure 2.2).

The left side of the x-axis, the results revealed the group of square waveforms were displayed, particularly those with fewer notes. The minimum number of notes in this group was one, and the maximum was two.

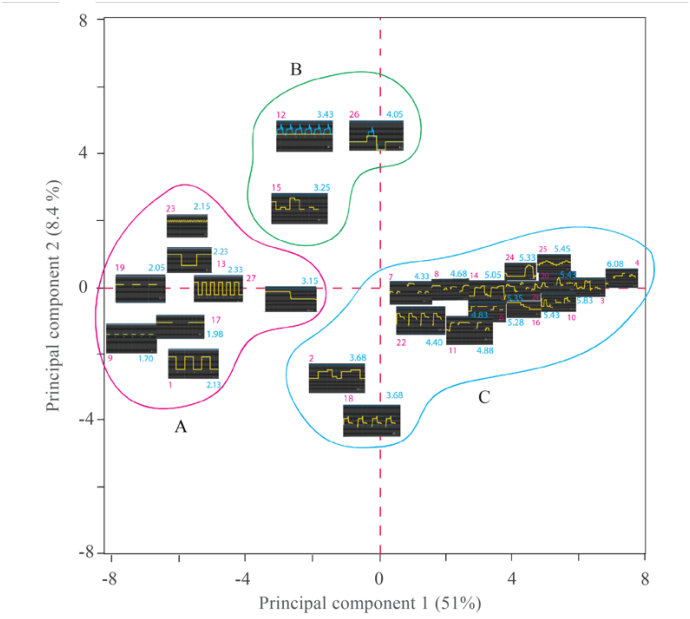
The right side of the x-axis, the results showed waveforms with fluctuations and multiple note pitches. The minimum number of notes was two, and the maximum was six.

The top of the y-axis represented the group of acoustic waves.

The bottom of the Y-axis, we observe the presence of frequency waveforms with one-second and three-second wavelengths. Most of these waveforms exhibit a smaller number of notes.

Based on the obtained data, stimuli no. 4, 3, 25, 20, and 10 had average values of 6.08, 5.83, 5.45, 5.43, and 5.43, respectively. These stimuli were selected as being related to the expression of a sense of being alive in the evaluation. On the other hand, waveforms 9, 17, 19, 1, and 23 had average values of 1.70, 1.98, 2.05, 2.13, and 2.15, respectively. These stimuli were selected as being related to the expression of a mechanical feeling.

The characteristics of the waveforms that were related to expressing a sense of being alive can be specified as follows: 1) waveforms with fluctuations, 2) waveforms that resemble the breathing patterns of living things, such as inhaling or exhaling, and 3) unstable waveforms.
On the other hand, the waveforms that were examined to evoke a mechanical feeling include: 1) waveforms comprising only a few note pitches, 2) square-shaped waveforms, and 3) waveform arranged in a sequence and stability.



Note : The number of the stimuli (written in red) corresponds to each average value (written in blue).

Figure 2.2. The first and second principal components for the experimentation of soundwave and classified by cluster analysis.

2.4.3. Experiment for the changing form

There were 46 participants. A total of 22 stimuli were created using these characteristics: 1) waveforms with fluctuations and without fluctuations, and 2) waveforms with random rhythms and without random rhythms. These stimuli were built by utilizing two fans. The first fan was designed to represent inhalation, while the second fan represented exhalation. The body of the artifact was produced using 0.01-millimeter plastic sheets. A personal portable laptop (Intel Core i7, 2.2 GHz, 16 GB) and the Arduino Uno rev board, along with Arduino software IDE version 1.8.9 (Arduino LLC, USA), were used to control the artifact. The stimuli were presented within a video duration of 52 seconds.

2.4.3.1. Results and consideration of the experiment for the changing form

For differences in evaluation tendency, a cluster analysis was used to classify similar observations into five groups: A, B, C, D and E (refer to Figure 2.3).

A – The low-frequency waveforms.

B – The medium-frequency waveforms in sequence.

C – This group consisted of multiple types of waveforms, with a majority displaying sequenced rhythms.

D – The high-frequency waveform with slight fluctuations.

E – The waveforms exhibited sequenced rhythms and showed some fluctuations.

According to the PCA, Principal Component 1 (PC1) represents 26.7% of the variance, and Principal Component 2 (PC2) represents 9.6% (Figure 2.3).

The left side of the x-axis represents the group of low-frequency waveforms with sequenced rhythms.

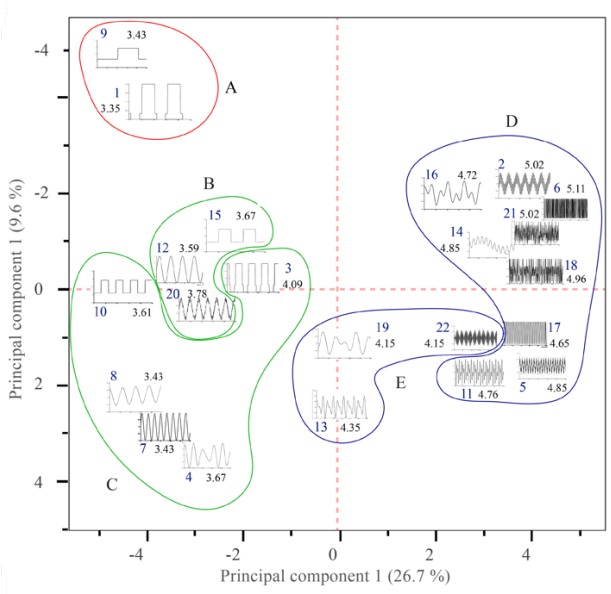
The right side of the x-axis represents the group of high-frequency waveforms with fluctuations.

The top of the y-axis represents the group that does not include any fluctuations.

The bottom of the y-axis represents the group of waveforms with some fluctuations.

From the results, stimuli no. 6, 21, 2, 18, and 14 had average values of 5.11, 5.02, 5.02, 4.96, and 4.85, respectively. These stimuli were found to be highly associated with the expression of a sense of being alive in the evaluation. On the other hand, stimuli no. 1, 9, 8, 7, and 12 had average values of 3.35, 3.43, 3.43, 3.43, and 3.59, respectively. These stimuli were perceived as highly related to the expression of a mechanical feeling.

The characteristics of the waveforms that were categorized as expressing a sense of being alive can be described as follows: 1) waveforms with an unstable period, and 2) waveforms with high fluctuations. On the other hand, the group of waveforms that were associated with providing a mechanical feeling can be characterized by: 1) waveforms with a stable period, and 2) waveforms without fluctuations.



Note : The number of the stimuli (written in red) corresponds to each average value (written in blue).
Figure 2.3. The first and second principal components for the experimentation for changing form and classified by cluster analysis.

2.5. Discussion

The data obtained from the three experiments revealed three characteristics of the stimuli that were associated with expressing a sense of being alive in the artifacts. These characteristics included: 1) waveforms with fluctuations, 2) sine curve waveforms, and 3) unstable waveforms. The discussion follows:

1) The waveforms with fluctuations: fluctuations were found to be highly associated with the expression of a sense of being alive compared to waveforms without fluctuations. “Fluctuation” refers to irregular rises and falls in numbers, rates, or similar variables, as defined in the Oxford Advanced Learner’s Dictionary fifth edition (1995). In the context of waveforms, irregular motion consisting of fluctuations differs from repetitive patterns, which evoke a sense of non-repetition. One example of irregularity can be observed in living things, as natural phenomena often display variations and irregularities. For instance, the growth of plants or flowers showcases irregular patterns. Furthermore, irregularity can also be found in the movements of living beings, as evidenced by the irregular breathing rhythms observed in humans [14]. On the other hand, repetitive movements, as seen in machine operations, often demonstrate repeated patterns in their working processes, such as those performed by industrial robots.

2) Sine curves: the expression of artifacts through sine curves had a more pronounced impact on evaluating a sense of being alive compared to other waveform types, such as triangular or square waveforms. It was observed that most waveforms in triangular and square shapes maintained a consistent frequency between fixed minimum and maximum values, along with waveform durations falling within the same range. This characteristic might lead participants to perceive an unnatural and non-living quality, as machines are typically programmed for constant and repetitive motions. Consequently, waveforms of these types were strongly associated with conveying mechanical feelings. In contrast, sine curves featuring multiple variable values could be more strongly linked to the evaluation of a sense of being alive.

3) The unstable waveforms: the unstable waveforms are also associated with expressing a sense of being alive compared to stable waveforms. Unstable waveforms, as defined in this study,

consist of diverse shapes and durations. These waveforms exhibit irregularity and diversity, leading to a feeling of unpredictability. This feeling of unpredictability can be observed in living things in nature, where organisms display adaptive responses to their surroundings. For example, some plants exhibit anthropomorphic behaviors that demonstrate sensitivity and independent expressions. Sunflowers, for instance, have the ability to grow towards the sun, while carnivorous plants capture insects with their leaves. These behaviors are influenced by external stimuli and are not predetermined or repetitive.

In contrast, repetitive waveforms are easily identifiable and predictable, often following a consistent pattern highly associated with the mechanical feeling. The term “machines” can be defined as apparatuses with moving parts designed for specific tasks, groups of people controlling an organization, or individuals who act automatically without thought or emotion, according to the Oxford Advanced Learner’s Dictionary 5th edition. Machines differ from living beings in that they lack independence and originality. This predictability may evoke a mechanical feeling, similar to the repetitive motions of machines. While machines have their purpose, they lack the ability to express a sense of being alive and independent expression. The concept of independence can be defined as self-determinability [9].

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CHAPTER 3

EXPERIMENT II

A Study to Clarify the Motion Graphics that Express a Sense of Being Alive

3.1. Introduction

The study focused on evaluating the sense of being alive through motion, using motion based on artifacts and natural creatures. The artifact set consisted of three levels of factors: *displacement* (*linear*), *sine curve*, and *fluctuation*. This experiment was presented at the International Conference of *Kansei* Engineering and Emotion Research 2022 [1].

In a previous experiment described in Chapter 2 (Experiment I), the objective was to verify the characteristics to elicit the feeling of being alive in the artifacts through the experiment involving rhythmic flashing lights, sounds, and changing forms. The results of the previous experiment revealed the characteristics associated with expressing a sense of being alive in the artifact, including fluctuations, sine curve waveforms, and unstable waveforms. The purpose of this experiment was to investigate the influence of motion factors on the evaluation of the sense of being alive. The evaluation utilized two sets of motion stimuli: artifacts and natural creatures. The artifact set consisted of three levels of factors: *displacement* (*linear*), *sine curve*, and *fluctuation*. The *sine curve* and *fluctuation* factors were determined based on the findings of Experiment I.

3.2. Objective

The research objectives included: 1) to clarify the differences in evaluation between motion graphics stimuli based on artifacts and those based on natural creatures. 2) to clarify the factors that influence the expression of a sense of being alive in motion graphics based on artifacts. 3) to understand the differences in evaluation based on participants' attributes.

3.3. Methodology

There were 23 Japanese participants (14 males and 9 females, mean age: 19.21) who participated in the experiment. There were 18 motion graphics stimuli divided into two sets of motion graphics stimuli namely, artifacts (9 stimuli) and natural creatures (9 stimuli). The stimuli were presented on a 15-inch monitor (MacBook Pro, Intel Core i7, 16 GB).

Before the evaluation of the experiment, participants were given an introduction that explained the purpose of the study and provided information about the survey process. They were then asked to evaluate the motion graphics after watching them. A questionnaire was created using Processing software version 3.5.4 (MIT Media Laboratory, USA). This software was used to collect the evaluations and record the evaluation time of each stimulus. Participants were asked to evaluate using a 5-point Likert scale (ranging from 1 = "not alive" to 5 = "alive"), as shown in Figure 3.1.

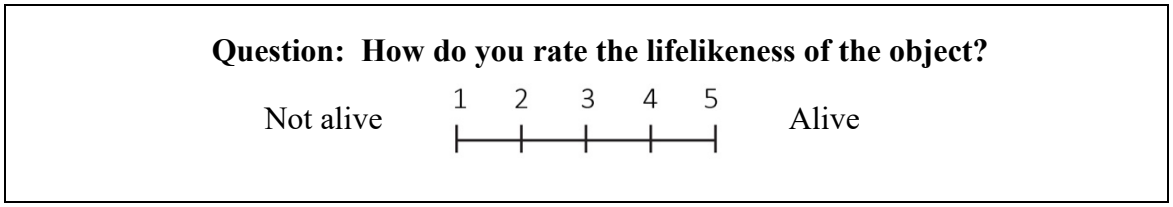


Figure 3.1. Questionnaire asking the participants to rate scores for 18 motion stimuli

3.3.1. Motion based on the artifact

There were 9 stimuli based on the artifact, each with three levels of motion factors: 1) *displacement* (*linear*), 2) *sine curve*, and 3) *fluctuation*.

1) *Displacement* refers to the linear movement only along the X-axis, with a unit of time set at 1/60 seconds. Lower values of displacement result in slower movement of the circle, while higher values lead to faster movement. For the Y-axis, the displacement was set as a constant value for both displacement and speed. 2) *Sine curve* represents a curved motion pattern, and 3) *Fluctuation* involves random patterns. Each of these motion components had three different levels: low, high, and no component (Table 3.1). To create a fractional factorial design, Taguchi's

orthogonal array method L9 (9 tests, 3 variables, and 3 levels) was utilized to generate the 9 stimuli. This method is known for its ability to reduce variation [2].

In Figure 3.1, the stimuli are represented as white 2D circles with a size of 30 × 30 pixels (width x height), displayed on a black background measuring 748 x 544 pixels. The stimuli were created using Processing software version 3.5.4 (MIT Media Laboratory, USA). The starting points of the white 2D circles were randomized. Detailed attributes of the stimuli can be found in Table 3.1.

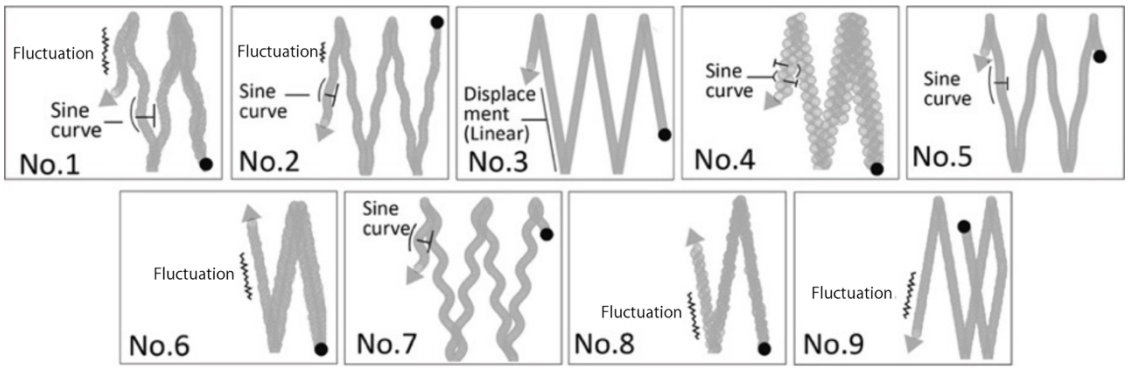


Figure 3.2. Example of the motion graphics stimuli based on the artifact

Table 3.1. The combination of attributes with different levels for creating the motion stimuli

No.	The attributes of the motion graphics stimuli		
	Displacement (Linear)	**Sine curve**	**Fluctuation**
1	High	High	High
2	High	Low	Low
3	High	Without	Without
4	Low	High	Low
5	Low	Low	Without
6	Low	Without	High
7	Without	High	Without
8	Without	Low	High
9	Without	Without	Low

3.3.2. Motion based on the natural creature

The 9 stimuli (depicted in Figure 3.3) were produced using information gathered from the movement of a natural organism. Fish movement, specifically the locomotion of Neon Tetra fish, was selected in this experiment due to its appropriateness for allowing participants to easily observe motion's displacement, speed, and acceleration in comparison to other living creatures.

The movement of the fish was recorded, and Image J software (National Institutes of Health, USA) was used to track the fish's motion and export the two-dimensional (2D) XY values to a .CSV file. This data was then employed in the processing software, version 3.5.4, to create the stimuli. The appearance and display size of the stimuli matched those of the stimuli based on the artifact, as described in Section 3.2.1 (Motion graphics based on the artifact). Figure 3.3 illustrates the path of motion stimuli with acceleration. The dark path color represents slow movement, while the light path color represents fast movement.

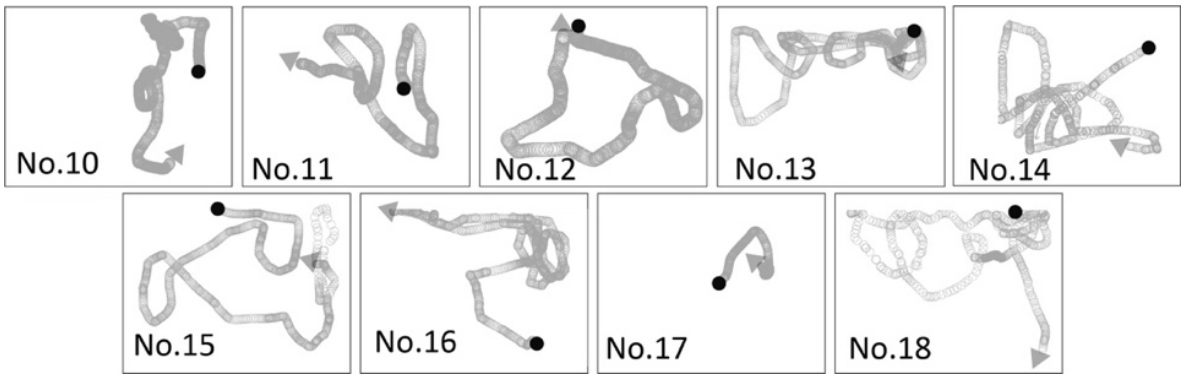


Figure 3.3. Example of the motion graphics stimuli based on natural creature

3.4. Results

The objective of this study was to 1) to clarify the differences in evaluation between motion graphics stimuli based on artifacts and those based on natural creatures. 2) to clarify the factors that influence the expression of a sense of being alive in motion graphics based on artifacts. 3) to understand the differences in evaluation based on participants' attributes. To achieve this, the research employed analysis of variance (ANOVA) and two-way ANOVA to examine the factors that influenced the expression of a sense of being alive. Furthermore, cluster analysis was employed to categorize the stimuli into groups and examine the similarities and differences within each group.

3.4.1 Data analysis results of the stimuli based on the artifact

To evaluate the similarity in evaluation tendency, a cluster analysis was conducted to group the motion graphics stimuli. As a result, the 9 stimuli were categorized into three clusters: Group A, Group B, and Group C (Figure 3.4). Group A consisted of stimuli with *low*, and *high fluctuation*. Group B included stimuli *without fluctuation*. Group C comprised stimuli with *low fluctuation*, and *without displacement* (*linear*). The mean score in Group A was the highest among the clusters (Group A = 3.59, Group B = 2.37, and Group C = 2.77). The study observed and discussed the difference between the highest scoring group (Group A) and the lowest scoring group (Group B). Group A, which received the highest score, consisted of stimuli that included both *low* and *high* levels of *fluctuation*. In contrast, Group B, which received the lowest score, consisted of stimuli *without fluctuation*. These findings suggest that the presence of *fluctuation* significantly influenced evaluation of a sense of being alive.

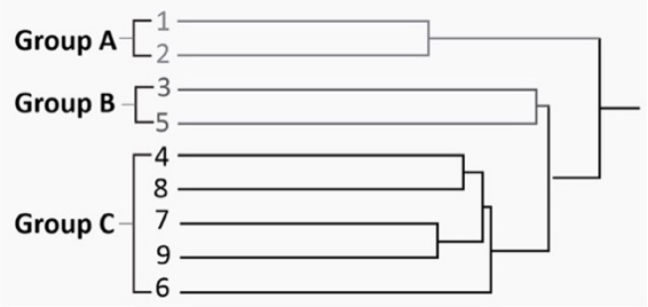


Figure 3.4. Result of the cluster analysis categorized the motion graphics stimuli in three groups

In terms of evaluation tendency, there were no significant differences between gender regarding to the evaluation of a sense of being alive expressed by the stimuli based on artifacts (Figure 3.6, i). The mean evaluation scores were as follows: males (2.97), and females (2.68).

The ANOVA results for the three factors of the stimuli (*displacement* (*linear*), *sine curve*, and *fluctuation*) revealed significant differences between stimuli *without fluctuation* and those with *low* and *high fluctuation* for both males ($p < .05$) and females ($p < .05$), as depicted in Figure 3.6, iv. The findings for both genders indicated that evaluations *without fluctuation* received the lowest scores among the *fluctuation* factors. The mean scores were as follows: for males (*without fluctuation*: Mean = 2.57, and SD = 1.17, *low fluctuation*: Mean = 3, and SD = 1.36, *high fluctuation*: Mean = 3.36, and SD = 1.39), and for females (*without fluctuation*: Mean = 2.30, and SD = 1.07, *low fluctuation*: Mean = 2.63, and SD = 1.21, *high fluctuation*: Mean = 3.11, and SD = 1.12).

The results of the two-way ANOVA revealed a significant interaction effect between *fluctuation* levels and evaluation (Figure 3.5). The main effect of fluctuation was also found to be significant ($p < .01$). However, no significant interaction effect between *fluctuation* and gender was observed. The findings suggest that the presence of *high* and *low* levels of *fluctuation* affected the evaluation of a sense of being alive compared to stimuli *without fluctuation* (Figure 3.5). This indicates that the presence of *fluctuation* positively influenced the evaluation of a sense of being alive. Regarding the *displacement (linear)* and *sine curve* factors, no significant interaction was observed between these factors and the evaluation for both genders.

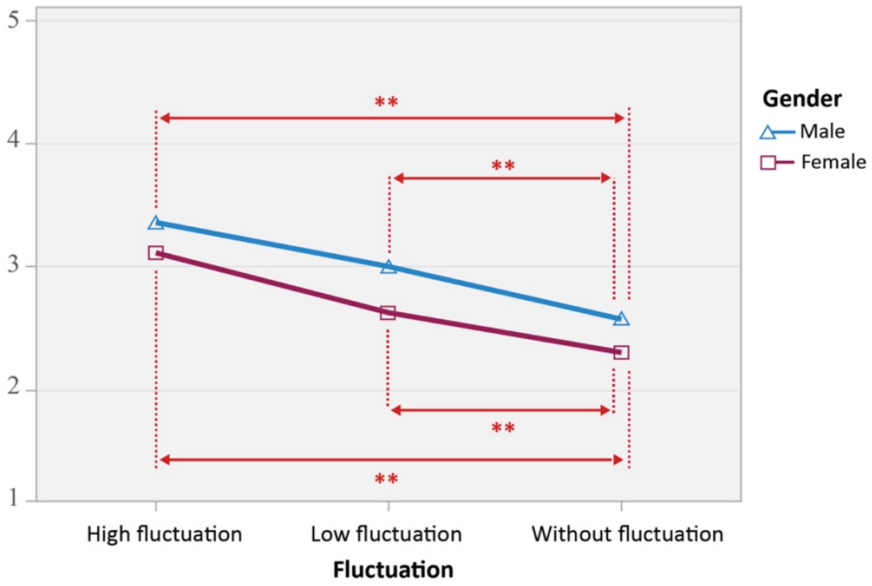
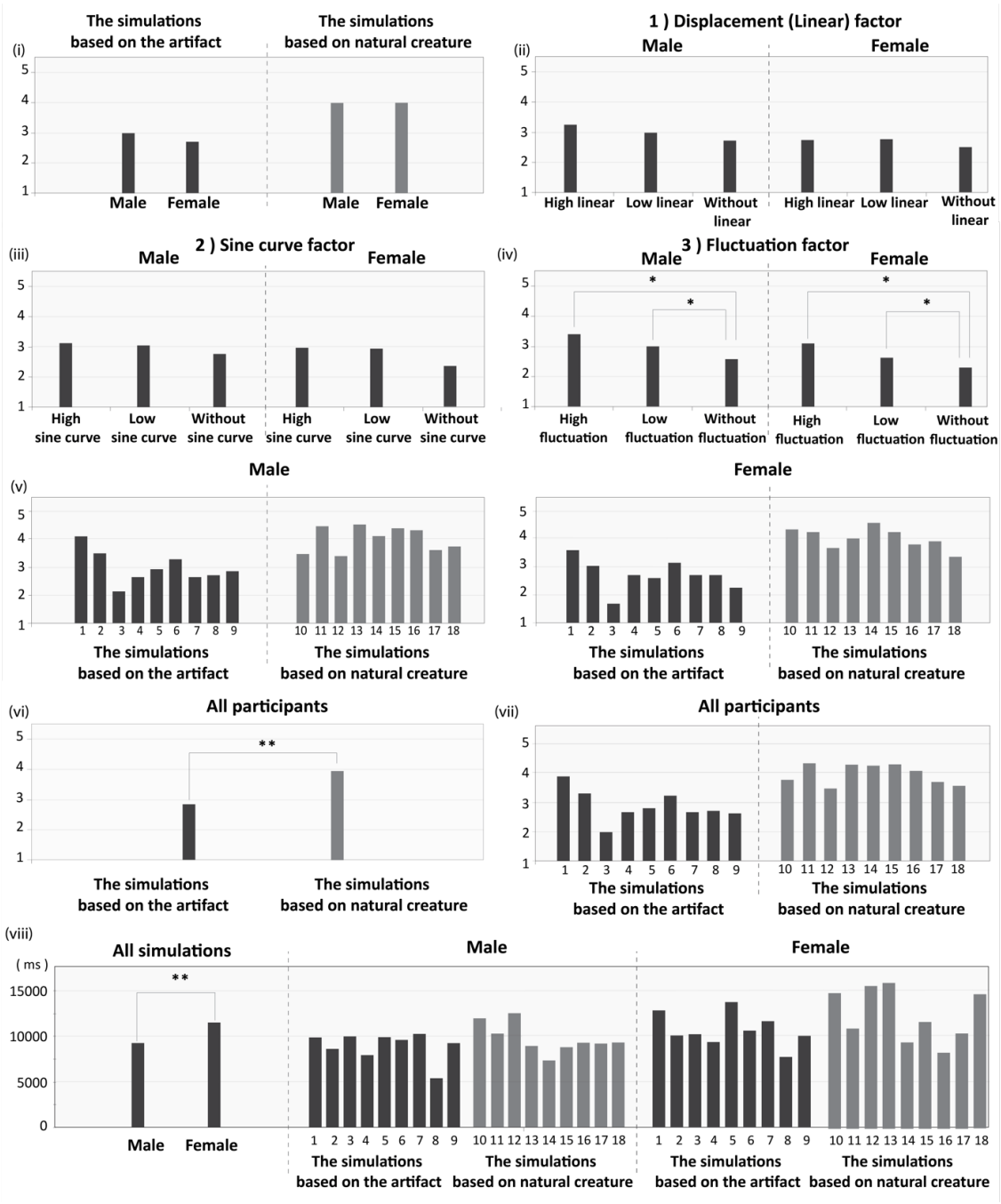


Figure 3.5. Two-way analysis of variance was used to analyze the three levels of *fluctuation* and the evaluation scores for males and females. A significant difference was found as $^{**}p < .01$.



(i) Two set of motion graphics stimuli and mean rating score of male and female
(ii-iv) Mean rating of male and female with three factors of motion graphics stimuli based on the artifact
(v) Mean rating of male and female with two set of motion graphics stimuli
(vi) Mean rating score of all participants with two set of motion graphics stimuli
(vii) Mean rating score of all participants with the motion graphics stimuli from no.1 to no.18
(viii) Mean response times of all participants, and male and female with two set of motion graphics stimuli

Figure 3.6. Results of evaluation. A significant difference was found as $*p < .05$ and $**p < .01$

3.4.2 Data analysis results of both stimuli based on the artifact and natural

The ANOVA showed a significant difference between the stimuli based on artifacts and the stimuli based on natural creatures ($p < .01$) (Figure 3.6, vi). The differentiation in motion patterns might have influenced the evaluation of a sense of being alive. The stimuli based on natural creatures exhibited irregular paths, while those based on artifacts followed repetitive paths. The repetitive paths were easier for participants to memorize and predict, whereas the irregular paths evoked unexpected feelings, potentially contributing to a heightened sense of being alive.

Regarding the difference in evaluation tendency, no significant differences were found between genders in the evaluation of stimuli based on the natural creature (right side of Figure 3.6, i). In the stimuli based on the natural creature, the average evaluation scores of males were lower than females (male = 3.97, and female = 4). However, in the case of artifact stimuli, the average evaluation scores of males were higher than females (male = 2.97, and female = 2.68). This study examined the variation in evaluations among participants. For stimuli based on artifacts, the standard deviation (SD) was 1.34 for males and 1.17 for females. Similarly, for stimuli based on natural creatures, the SD was 1.19 for males and 1.11 for females.

When comparing response times, it was found that females had longer response times for all stimuli compared to males ($p < .01$) (as depicted on the left side of Figure 3.6, viii). This suggests that female participants took more time to provide their evaluations compared to male participants. Additional examination in the future study could be necessary to comprehend the underlying reasons for this variation, potentially involving an examination of participants' backgrounds. Previous studies suggest that females tend to engage in more complex thinking and demonstrate greater carefulness and thoughtfulness compared to males, which might be related to their use of time in evaluating [3] and [4].

3.4.3 Cluster analysis

A cluster analysis classified 18 stimuli into two distinct clusters: Group A and Group B (Figure 3.7).

Group A primarily consisted of stimuli based on natural creatures, along with a few artifact stimuli, specifically no. 1 and no. 2. Stimuli no. 1 consisted of *high displacement* (*linear*), *high sine curve*, and *high fluctuation*, while stimulus no. 2 consisted of *high displacement* (*linear*), *low sine curve*, and *low fluctuation*. On the other hand, Group B included stimuli based on artifacts. The average score in Group A was higher compared to Group B (Group A = 3.91, and Group B = 2.65).

Group A mainly consisted of stimuli based on natural creatures, while Group B comprised artifact stimuli. Stimuli no. 1 and 2 within Group A exhibited similarities to the stimuli based on natural creature, showing attributes such as variations in *fluctuation* that positively influenced the evaluation of a sense of being alive. Therefore, it is worth considering the presence of the *fluctuation* factor, as it may enhance the perception of a sense of being alive.

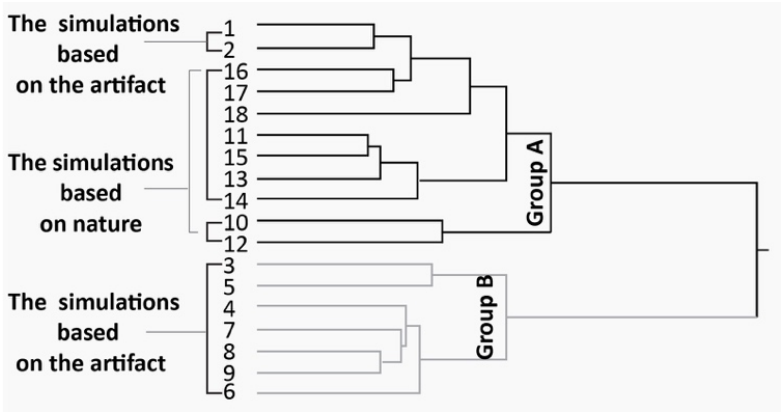


Figure 3.7. Result of the cluster analysis generated all motion graphics stimuli in two group

3.5. Discussion

The objective of this experiment was to clarify the factors that influence the expression of a sense of being alive in motion graphics. The results indicated that the presence of *fluctuation* significantly affect with the evaluation of a sense of being alive in the artifact stimuli (Figure 3.5). Stimuli with varying levels of f*luctuation* demonstrated notable differences compared to those *without fluctuation* (Figure 3.6, iv). *High* and *low fluctuation* factors were found to be positively associated with the perception of being alive, while stimuli lacking *fluctuation* received lower evaluations. In terms of the *displacement* (*linear*) and *sine curve* factors, no significant differences were observed in their influence on the evaluations.

A comparison between stimuli based on artifacts and those based on natural creatures revealed significant differences (Figure 3.6, vi). Stimuli based on natural creatures received higher evaluations compared to stimuli based on artifacts. However, two artifact stimuli were grouped together with the stimuli based on natural creature according to the result from the cluster analysis (Figure 3.7). These two stimuli shared characteristics of *low* and *high fluctuation*. Gender was not found to be related to the evaluation of the expression of a sense of being alive in the stimuli. Moreover, it was noted that female participants took longer to provide their evaluations compared to male participants (Figure 3.6, viii). The findings showed that the significance of incorporating *fluctuation* factors in effectively conveying a sense of being alive, offering valuable insights for future research in this field. Additionally, considering the background and characteristics of participants is crucial for gaining a deeper understanding of the evaluation of the sense of being alive in the future study.

Chapter 3: Bibliography

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CHAPTER 4

EXPERIMENT III

A Study to Clarify the Motion Graphic Factors that Influence the Expression of a Sense of Being Alive

4.1. Introduction

This Experiment III aimed to clarify the motion factors that influence the sense of being alive and the interaction effects between these factors. Additionally, it investigated the participants' attributes in relation to their evaluation of the sense of being alive. This experiment will be presented at the International Association of Societies of Design Research in 2023 [1].

The motion graphic stimuli incorporated three factors: *angle, acceleration*, and *fluctuation*. The selection of the *fluctuation* and *angle* factors was based on data obtained from the experiment in Chapter 3, Experiment II. Specifically, the previous experiment highlighted the significance of the *fluctuation* factor in influencing the sense of being alive. This underscores the importance of studying the *fluctuation* factor. Additionally, the experiment includes the *acceleration* factor, which has shown a high association with the expression of a sense of being alive, as discussed in Section 4.3.1, Motion Stimuli. Moreover, this experiment also investigates whether the participants' attributes influenced their evaluation of the stimuli, including country differences (participants from Japan and Thailand) and gender differences. Studying the participants' attributes may contribute to a better understanding of the evaluations.

To select the most suitable questions related to the feeling of a sense of being alive for this study, 65 affective phrases from the Profile of Mood States 2nd edition were presented to participants. The participants were asked to rate these phrases based on their association with the sense of being alive. From their responses and analysis, 20 evaluation phrases were chosen to be included in the questionnaires. These 20 phrases consisted of 10 that were positively related to the sense of being alive and 10 that were negatively related to the sense of being alive. Additionally, the stimuli were presented using an HMD (Head-Mounted Display) in this experiment.

4.2. Objective

This research aims to understand the evaluation of the sense of being alive as expressed in motion. For this purpose, we conducted an analysis of 1) the motion graphic factors that influence the expression of a sense of being alive 2) the interaction effects between these factors on the evaluation of the sense of being alive. 3) The differentiation of participant attributes (e.g., gender or cultural background) affect the evaluation of a sense of being alive through motion graphics.

4.3. Methodology

4.3.1 Motion stimuli

For this study, a total of 9 motion stimuli were created, incorporating three types of motion factors with three levels each (Figure 4.1). The selected factors included *angle*, *acceleration*, and *fluctuation*. These factors were chosen based on the data obtained from the previous experiment conducted in Chapter 3, which focused on *displacement* (*linear*), *sine curve*, and *fluctuation*. The results from Chapter 3 indicated that *fluctuation* had the most significant impact on expressing a sense of being alive. However, it is important to note that the *fluctuation* patterns were random. The *displacement* (*linear*) and *sine curves* did not have a significant impact on the sense of being alive. This lack of impact might be attributed to the absence of *acceleration*. The presence of *acceleration* has been identified as a contributing factor to the feeling of being alive. According to the study conducted by Szego and Rutherford [2], a strong correlation was revealed between *acceleration* and our perception of animacy.

In this study, three factors were investigated with three different levels (Table 4.1): 1) *Angle*: *angle* factors considered were *60°, 90°,* and *120°*. 2) *Acceleration*: three acceleration conditions were *without acceleration* (*WA*), *slow to fast* (*STF*), and *fast to slow* (*FTS*). 3) *Fluctuation*: three *fluctuation* factors were *without fluctuation* (*WF*), *low fluctuation* (*LF*), and *high fluctuation* (*HF*). Regarding the design of *fluctuation*, the *low fluctuation* condition involved *90°* in the direction of movement, repeated twice (stimulus no.2 in Figure 4.1). The high fluctuation condition featured the same *90°* repeated four times (stimulus no.1 in Figure 4.1). The *without*

fluctuation condition represented a lack of any *fluctuation* in the direction of movement (stimulus no.3 in Figure 4.1).

The motion stimuli were presented within a white sphere, moving from left to right, and lasted approximately 15 seconds. Maya software version 2023.1 (Autodesk Incorporation, United States) was used to design the stimuli, which were presented through the Head-Mounted Display (HMD), using Oculus Quest 2. Moreover, the Unity game engine version 2020.3.19f1 (Unity Software Incorporation, United States), facilitated the process of presenting the stimuli on the HMD.

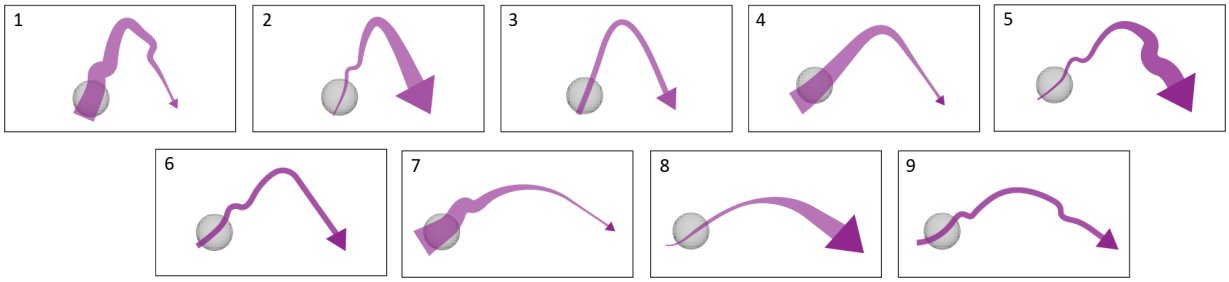

Figure 4.1. The motion stimuli (The figure displays an arrow that indicates the angle and direction of movement, the thickness representing the speed. A change in thickness from thick to thin indicates *fast to slow*, a change in thickness from thin to thick indicates *slow to fast*. The absence of both thickness and thinness indicates *without acceleration*. The *presence* or *absence* of *fluctuations* is indicated by *high*, *low*, or *without fluctuation*).

Table 4.1. The combination of the factors with the different levels for creating the motion stimulus

Number of the stimuli	**The attributes of the motion stimuli**		
	Angle	**Acceleration**	**Fluctuation**
1	60°	FTS (Fast to Slow)	HF (High Fluctuation)
2	60°	STF (Slow to Fast)	LF (Low Fluctuation)
3	60°	WA (Without Acceleration)	WF (Without Fluctuation)
4	90°	FTS (Fast to Slow)	WF (Without Fluctuation)
5	90°	STF (Slow to Fast)	HF (High Fluctuation)
6	90°	WA (Without Acceleration)	LF (Low Fluctuation)
7	120°	FTS (Fast to Slow)	LF (Low Fluctuation)
8	120°	STF (Slow to Fast)	WF (Without Fluctuation)

4.3.2 Questionnaire design

4.3.2.1. Finding the appropriate evaluation phrases for use in the questionnaires

In order to identify the evaluation phrases that best portray the sense of being alive, we utilized 65 affective phrases from the Profile of Mood States 2nd edition (POMS 2) in the questionnaire. The Profile of Mood States (POMS) is a widely used psychological assessment tool for measuring an individual's mood state [3]. The POMS 2nd Edition, an updated version of the original POMS, helps measure transient and fluctuating moods through various dimensions such as Tension-Anxiety (TA), Depression-Dejection (DD), Anger-Hostility (AH), Vigor-Activity (VA), Fatigue-Inertia (FI), Confusion-Bewilderment (CB), and Friendliness (FR) (Lin et al., 2014). These phrases were evaluated by 63 Japanese university students on a 5-point Likert scale (ranging from 0 = “not at all”, 1 = “a little”, 2 = “moderately”, 3 = “quite a lot”, 4 = “extremely”). The purpose was to identify the phrases associated with expressing the sense of being alive.

4.3.2.2. Selecting the appropriate evaluation phrases for use in the questionnaires

The cluster analysis was utilized to identify similarities among the evaluation phrases. Based on the analysis results, the 65 evaluation phrases were classified into two distinct categories. Group A primarily consisted of words from the positive sub-scale of the POMS 2, specifically Vigor-Activity (VA) and Friendliness (FR). On the other hand, Group B mostly comprised words from the negative sub-scale of the POMS 2, including Tension-Anxiety (TA), Anger-Hostility (AH), Depression-Dejection (DD), Confusion-Bewilderment (CB), and Fatigue-Inertia (FI). The result revealed that the mean score for Group A was higher than that of Group B (Group A = 2.18, and Group B = 1.53).

Based on the obtained results, it was found that the phrases in the subgroup of Group A were associated with Vigor-Activity, while the majority of the other subgroup mainly comprised Friendliness (FR) phrases. The phrases related to Vigor-Activity reflect a positive mood characterized by energy and liveliness. In contrast, the Friendliness (FR) phrases were closely connected to interpersonal aspects [4]. In the questionnaire, 10 evaluation phrases were selected.

These phrases were considered to be positively associated with the feeling of being alive. The chosen phrases included of *lively*, *vigorous*, *cheerful*, *uneasy, active, alert*, *energetic*, *useful, full of life*, and *efficient*.

To gain a better understanding of the evaluation of the sense of being alive and motion factors, we conducted a study using a questionnaire that included another set of 10 evaluation phrases negatively associated with the feeling of being alive. This 10 evaluation phrases were primarily derived from the negative sub-scale of the Profile of Mood States 2 (POMS 2), specifically Anger-Hostility (AH). The only phrase not from the negative sub-scale was "carefree," which was taken from the positive sub-scale of Vigor-Activity (VA). The chosen evaluation phrases are as follows: *carefree, rebellious, angry, spiteful, bad tempered, resentful, furious, peeved, furious, and ready to fight*.

Participants were requested to rate these phrases on a 5-point Likert scale (From 0 = “not at all”, 1 = “a little”, 2 = “moderately”, 3 = “quite a Lot”, 4 = “extremely”). The decision to use the Likert scale as the preferred scaling technique in this study was based on its effectiveness in assessing individual perceptions and attitudes compared to another method, such as the semantic differential technique. While the semantic differential technique requires a larger number of words and higher cognitive ability [5], the Likert methodology was chosen to reduce participants’ reading time [6].

4.3.2.3. Evaluation method

This experiment was conducted in two experiment phases, with each phase involving a different group of participants. Phase I: the first group consisted of 39 Japanese participants, Phase II: the second group included 20 Thai participants. Both groups were provided with the same experimental structure, except for the type of questionnaire, which was provided in Japanese language for the first group and Thai language for the second group.

The study involved two groups of participants to gain a deeper understanding of participants’ attributes and evaluations. For evaluation, the questionnaire was translated into the

native language of the participants' group. To ensure a precise understanding of the intended meaning by the target group while maintaining cultural appropriateness, the study enlisted the services of the following translators: Professional translators from Pawano Software Solution, a translation company based in Thailand, to handle translations from English to Thai and Japanese to Thai (Pawano Software Solution, 2022). Additionally, a skilled freelance translator from Fastwork.com was enlisted for translating from Japanese to Thai (Fastwork.com, 2022). Furthermore, another expert translator proficient in English, Japanese, and Thai, who has previous experience working for the translation company Gowell Co., Ltd. in Japan, also contributed to the translation process. As part of the final step, the author checked the quality of the translations.

Before starting the experiment, we provided the participants with an overview of the study's structure, explained the purpose of the research, and highlighted the importance of the questionnaire. Participants were instructed to take a seated position and wear a Head-Mounted Display (HMD), which allowed them to observe the presented stimuli. Following each stimulus, participants were required to remove the HMD and complete a questionnaire to provide their evaluations. The use of the HMD ensured that all participants experienced the experiment under consistent conditions. Each participant's involvement in the experiment lasted for a duration of 20 minutes.

4.4. Result

4.4.1. Results of 10 evaluation phrases positively associated with a sense of being alive: A study with Japanese participants

There were 39 Japanese participants (22 males and 17 females, mean age: 20.51) in this experiment. The results of the experiment were reported as follows:

4.4.1.1. The interaction effect of the three factors on the evaluation of a sense of being alive

The study employed a two-way ANOVA to analyze the interaction effect of the three factors (*angle*, *acceleration*, and *fluctuation*) on the evaluation of the sense of being alive. The two-way ANOVA was conducted separately for three combinations: **(1) *angle* and *acceleration*, (2) *acceleration* and *fluctuation*, and (3) *angle* and *fluctuation*.** The data was reported as statistically significant at $p < .05$ and highly statistically significant at $p < .01$. The obtained results are as follows:

(1) *Angle* and *acceleration*: Regarding the interaction effects between the factors, significant interaction effects were detected between the *angle* and *acceleration* factors in the evaluation of *efficient* ($p < .01$), as well as in the evaluation of *vigorous* and *active* ($p < .05$).

In the evaluation of *efficient* (Figure 4.2, left), the obtained results revealed a significant interaction effect ($p < .01$). At the *60°*, *WA* received a significantly higher evaluation compared to *FTS* and *STF* ($p < .05$). At the *90°*, *FTS* received a significantly higher evaluation than *WA* ($p < .05$). Conversely, at the *WA*, the *60°* received a higher evaluation compared to the *90°* ($p < .01$) and *120°* ($p < .05$).

In the evaluation of *vigorous* (Figure 4.2, right), a significant interaction effect was observed ($p < .05$). Additionally, the results indicated significant main effects for *angle* ($p < .05$) and *acceleration* ($p < .05$). Specifically, at the *90°*, *FTS* received a significantly higher evaluation

compared to *WA* ($p < .05$). At the *120°*, *FTS* obtained a significantly higher evaluation than *STF* ($p < .05$). Furthermore, at the *WA*, the *60°* received a higher evaluation than both the *90°* and *120°* ($p < .01$).

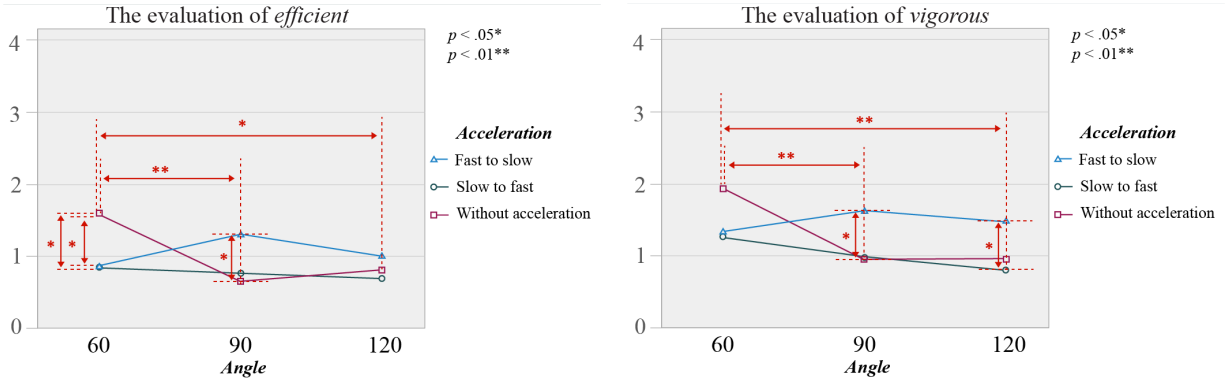

Figure 4.2. Significant interaction effect between *angle* and *acceleration* in the evaluation of *efficient* (left), and *vigorous* (right)

In the evaluation of *active* (Figure 4.3), the result revealed a significant interaction effect ($p < .05$) and the significant main effects for *acceleration* ($p < .05$). At the *90°*, the *FTS* was significantly higher than the *WA* ($p < .05$). While, at the *WA*, the *60°* had significant higher score than the *90°* and *120°* ($p < .05$).

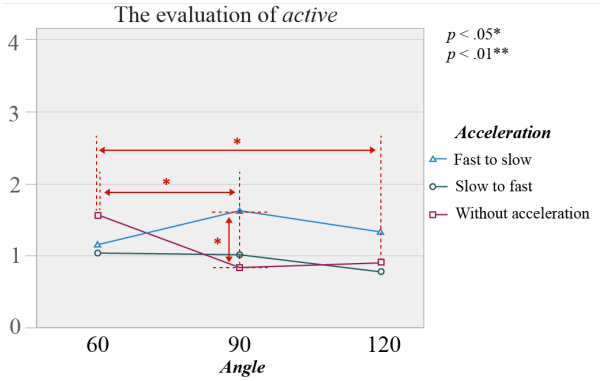

Figure 4.3. Significant interaction effect between *angle* and *acceleration* in the evaluation of *active*

Regarding the main effects, the results revealed significant main effects for both *angle* and *acceleration* in the evaluation of *full of life* (*angle*: $p < .01$, *acceleration*: $p < .01$), *lively*

(*angle*: $p < .01$, *acceleration*: $p < .01$), *cheerful* (*angle*: $p < .01$, *acceleration*: $p < .05$), *uneasy* (*angle*: $p < .05$, *acceleration*: $p < .05$), and *energetic* (*angle*: $p < .05$, *acceleration*: $p < .05$).

In the evaluation of *full of life* (Figure 4.4, left), significant main effects were observed for *angle* ($p < .01$) and *acceleration* ($p < .01$). Specifically, at *90°*, *FTS* received significantly higher evaluation compared to *WA* ($p < .05$). Moreover, at *120°*, *FTS* obtained significantly higher evaluation compared to both *STF* and *WA* ($p < .01$). Meanwhile, at *WA*, the *60°* received higher evaluation compared to both *90°* and *120°* ($p < .01$).

In the evaluation of *lively* (Figure 4.4, right), significant main effects were found for *angle* ($p < .01$) and *acceleration* ($p < .01$). The findings revealed that at *90°*, *FTS* received significantly higher evaluation than *WA* ($p < .05$). Similarly, at *120°*, *FTS* obtained significantly higher evaluation than both *STF* ($p < .01$) and *WA* ($p < .05$). Additionally, at *WA*, the *60°* received a higher score than *90°* and *120°* ($p < .01$).

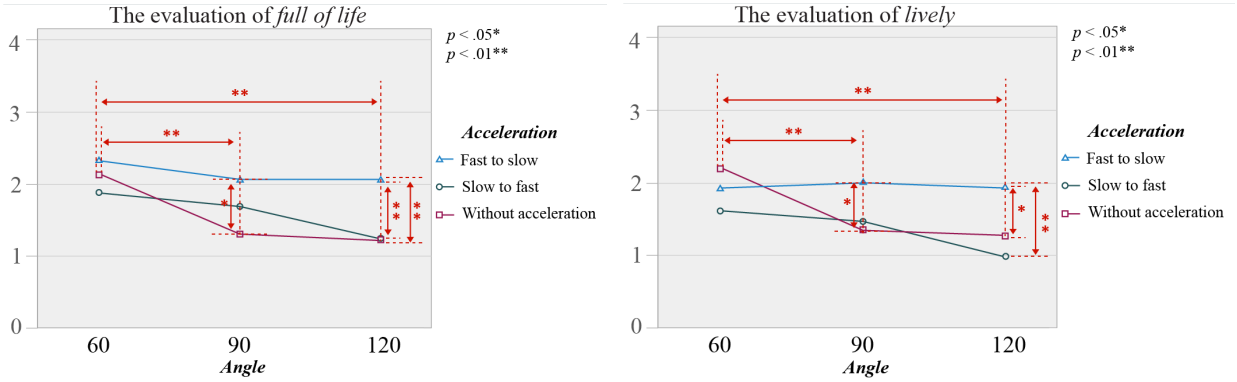

Figure 4.4. The main effect of both angle and acceleration was reported in the evaluation of *full of life* (left), and *lively* (right)

In the evaluation of *cheerful* (Figure 4.5, left), significant main effects were reported for *angle* ($p < .01$) and *acceleration* ($p < .05$). Specifically, at *90°*, *FTS* received a significantly higher evaluation than *WA* ($p < .01$). Similarly, at *WA*, the *60°* obtained a significantly higher evaluation than both the *90°* and *120°* ($p < .01$).

In the evaluation of *uneasy* (Figure 4.5, right), the results revealed a significant main effect of *angle* ($p < .05$) and *acceleration* ($p < .05$). Specifically, at *WA*, the *60°* received a significantly higher evaluation compared to both the *90°* and *120°* ($p < .05$).

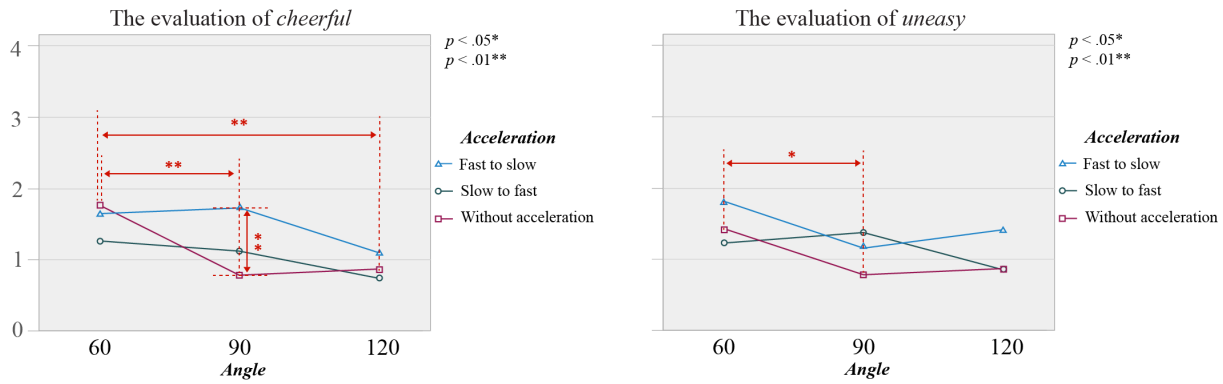

Figure 4.5. The main effect of both *angle* and *acceleration* was reported in the evaluation of *cheerful* (left), and *uneasy* (right)

In the evaluation of *energetic* (Figure 4.6, left), significant main effects were reported for *angle* ($p < .05$) and *acceleration* ($p < .05$). Specifically, at *90°, FTS* received a significantly higher evaluation than *WA* ($p < .05$). Conversely, at *WA*, the *60°* obtained a significantly higher evaluation compared to both *90°* and *120°* ($p < .01$).

In the evaluation of *helpful* (Figure 4.6, right), a significant difference was report at *60°, WA* obtained higher evaluation than *FTS* and *STF*. Moreover, at *WA*, *60°* obtained a significantly higher than *90°*.

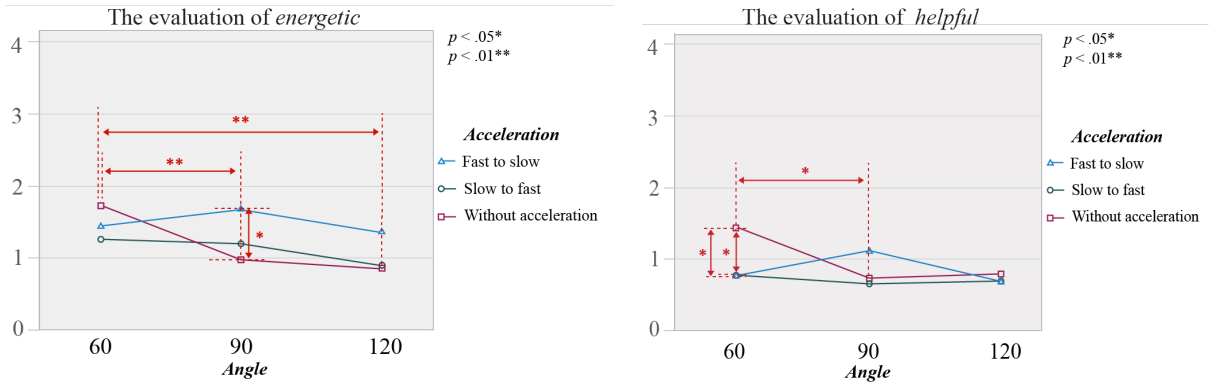

Figure 4.6. The main effect of both *angle* and *acceleration* was reported in the evaluation of *energetic* (left), and a significant difference was reported in the evaluation of *helpful* (right)

In the evaluation of *alert* (Figure 4.7), there were no significant differences reported.

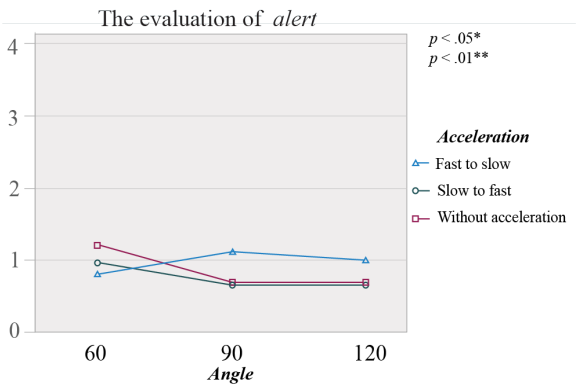

Figure 4.7. There were no significant differences reported in the evaluation of *alert*

(2) *Acceleration* and *fluctuation*: Regarding the interaction effects between *acceleration* and *fluctuation*, the results revealed significant interaction effects in the evaluation of *lively* and *full of life* ($p < .01$). Additionally, significant interaction effects were reported in the evaluation of *vigorous* and *energetic* ($p < .01$). In the evaluation of *uneasy*, a significant main effect was detected ($p < .05$).

In the evaluation of *lively* (Figure 4.8, left), a significant interaction effect was reported ($p < .01$). Furthermore, the results revealed main effects for *acceleration* ($p < .01$). Specifically, at *WF* condition, *STF* received a significantly lower evaluation compared to both *FTS* and *WA* ($p < .01$).

In the evaluation of *full of life* (Figure 4.8, right), a significant interaction effect was reported ($p < .01$). Additionally, a main effect of *acceleration* was detected ($p < .01$). Specifically, at *WF*, the *STF* received a significantly lower evaluation compared to both *FTS* and *WA* ($p < .05$). Furthermore, at *HF* condition, the *FTS* obtained a significantly higher evaluation than *WA* ($p < .01$), and at *LF*, *FTS* also demonstrated a significantly higher evaluation than *WA* ($p < .05$). Moreover, at *WA*, *WF* received a higher evaluation compared to both *HF* and *LF* ($p < .01$).

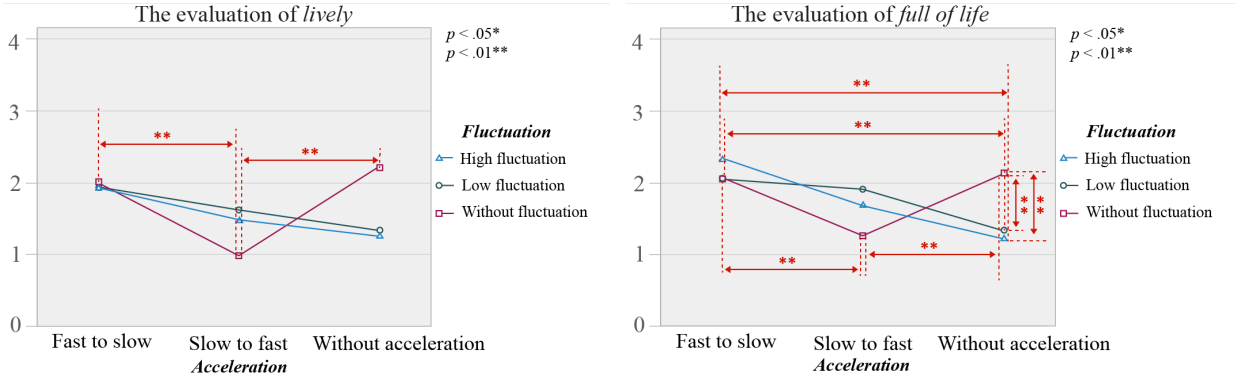

Figure 4.8. Significant interaction effect between *acceleration* and *fluctuation* in the evaluation of *lively* (left) and *full of life* (right)

In the evaluation of *vigorous* (Figure 4.9, left), a significant interaction effect was detected ($p < .01$). Furthermore, a main effect of *acceleration* was reported ($p < .05$). Specifically, at *WF*, *STF* received a significantly lower evaluation compared to both *WA* and *FTS* ($p < .01$). Additionally, at *WA*, *WF* obtained a significantly higher evaluation than both *HF* and *LF* ($p < .01$).

In the evaluation of *energetic* (Figure 4.9, right), a significant interaction ($p < .01$) and a main effect of *acceleration* ($p < .05$) were reported. Specifically, at *WF*, *STF* received a significantly lower evaluation compared to *WA* ($p < .01$) and *FTS* ($p < .05$). On the other hand, at *WA*, *WF* obtained a significantly higher evaluation than *LF* and *HF* ($p < .01$).

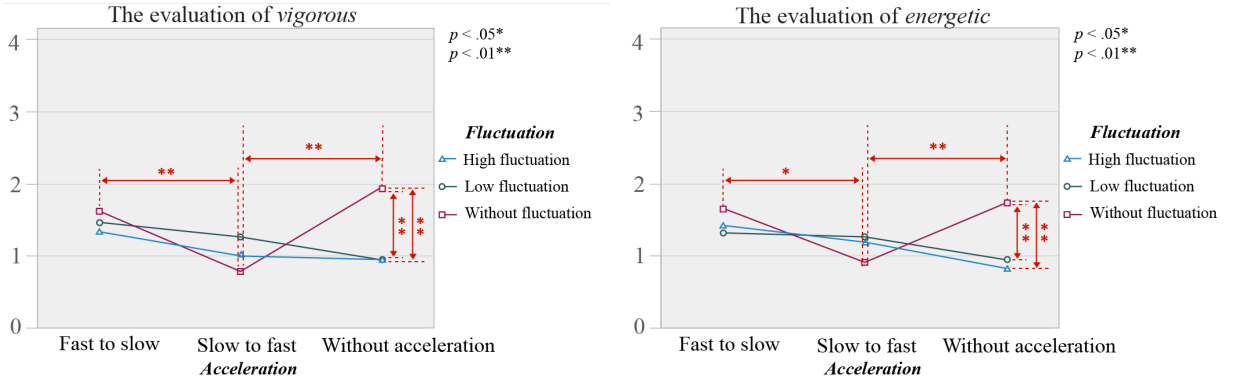

Figure 4.9. Significant interaction effect between *acceleration* and *fluctuation* in the evaluation of *vigorous* (left), and *energetic* (right)

In the evaluation of *uneasy* (Figure 4.10, left), a significant interaction effect ($p < .05$) and a main effect of *acceleration* were detected ($p < .05$). Specifically, at *HF*, *FTS* obtained a significantly higher evaluation than *WA* ($p < .01$). Additionally, at *LF*, *FTS* got the significantly higher evaluation compared to *WA* ($p < .05$). Moreover, at *WA*, *WF* got a higher evaluation than *LF* ($p < .05$).

In the evaluation of *cheerful* (Figure 4.10, right), a significant difference was reported at *WF, STF* obtained the lower evaluation than *FTS* and *WA* ($p < .01$). At *HF*, *FTS* got the significantly higher evaluation than *WA* ($p < .05$). Additionally, at *WA*, *WF* got the higher evaluation compared to *HF* and *LF* ($p < .01$).

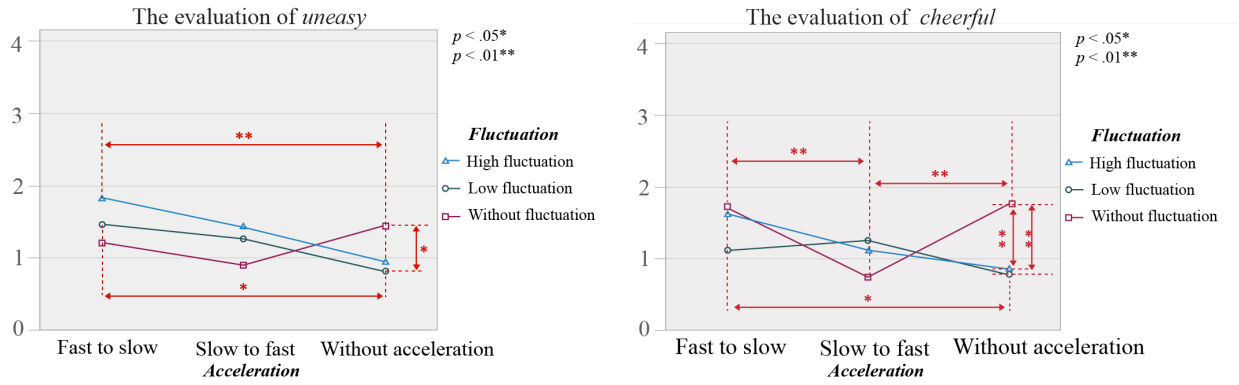

Figure 4.10. Significant interaction effect between *acceleration* and *fluctuation* in the evaluation of *uneasy* (left) and significant difference was reported in the evaluation of *cheerful* (right)

For the main effects, a significant main effect of *acceleration* was detected in the evaluation of *active* ($p < .05$). Moreover, a significant main effect of *fluctuation* was reported in the evaluation of *helpful* ($p < .05$).

In the evaluation of *active* (Figure 4.11, left), a main effect of *acceleration* was reported ($p < .05$). At *WF*, *STF* received a significantly lower evaluation compared to both *WA* and *FTS* ($p < .05$). Additionally, at *WA*, the *WF* had a significantly higher evaluation compared to both *LF* and *HF* ($p < .01$).

In the evaluation of *helpful* (Figure 4.11, right), a main effect of *fluctuation* was reported ($p < .05$). At *WF*, *WA* got significantly higher evaluation than *STF* ($p < .05$). At *WA*, *WF* had significantly higher scores than *LF* ($p < .05$).

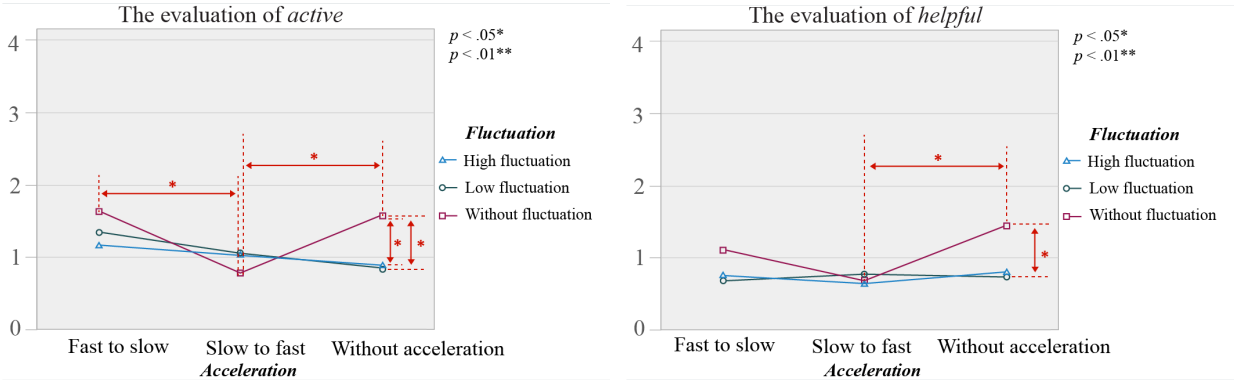

Figure 4.11. Significant interaction effect between *acceleration* and *fluctuation* in the evaluation of *active* (left), and *helpful* (right)

In the evaluation of *efficient* (Figure 4.12, left), significant difference was report at *WF*, *STF* got the higher evaluation than *WA* ($p < .01$). Moreover, at *WA*, *WF* got the higher evaluation compared to *HF* ($p < .05$) and *LF* ($p < .01$).

In the evaluation of *alert* (Figure 4.12, right), there were no significant differences reported.

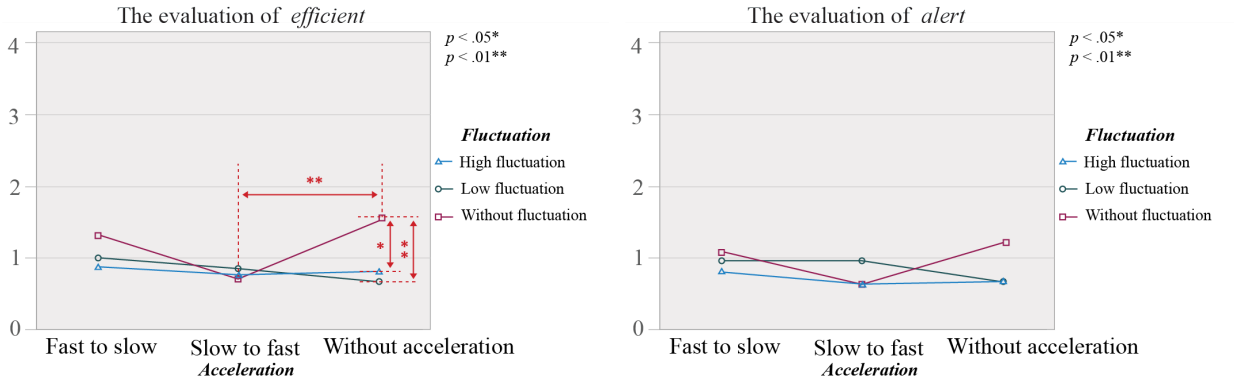

Figure 4.12. Significant difference was reported in the evaluation of *efficient* (left), and no significant differences were reported in the evaluation of *alert* (right)

(3) *Angle* and *fluctuation*: The findings revealed a significant interaction effect in the evaluation of *lively*, *full of life*, *vigorous*, *active*, and *efficient* ($p < .01$). Additionally, a significant main effect was reported in the evaluation of *cheerful*, *uneasy*, and *energetic* ($p < .05$).

In the evaluation of *lively* (Figure 4.13, left), a significant interaction effect ($p < .01$) and a main effect of *angle* were detected ($p < .01$). At *90°*, *WF* received a significantly higher evaluation compared to *LF* ($p < .05$). Similarly, at *120°*, *LF* obtained a higher evaluation than *WF* ($p < .01$) and *HF* ($p < .05$). On the other hand, at *WF*, *120°* received significantly lower evaluation than *60°* and *90°* ($p < .01$).

In the evaluation of *full of life* (Figure 4.13, right), the results revealed a significant interaction effect ($p < .01$) and a main effect of *angle* ($p < .01$). At *90°*, *WF* received a significantly higher evaluation compared to *LF* ($p < .05$). Similarly, at *120*, *LF* obtained a significantly higher evaluation than *HF* and *WF* ($p < .01$). On the other hand, at *WF*, *120°* had significantly lower evaluation compared to *60°* and *90°* ($p < .01$). At *HF*, 60° angle had significantly higher evaluation than *120°* ($p < .01$). Furthermore, at *LF*, *120°* received higher scores compared to *90°* ($p < .05$).

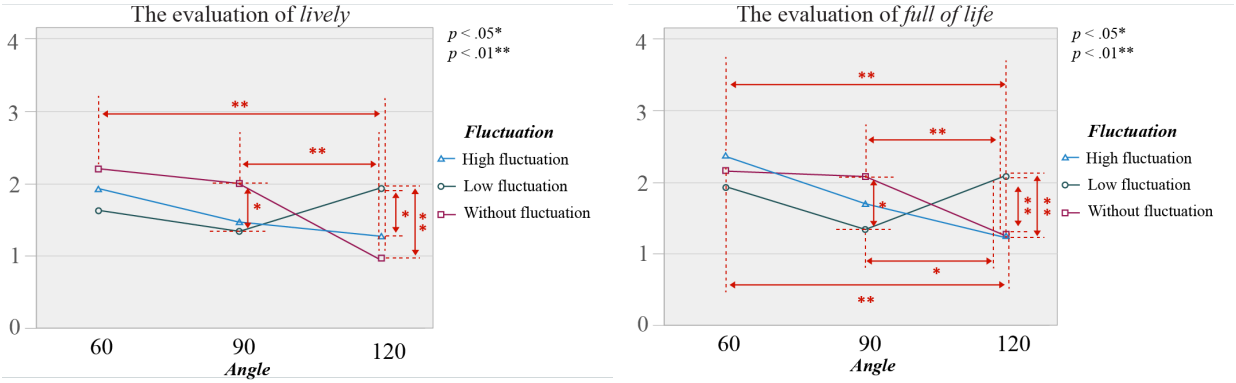

Figure 4.13. Significant interaction effect between *angle* and *fluctuation* in the evaluation of *lively* (left) and *full of life* (right)

In the evaluation of *vigorous* (Figure 4.14, left), the interaction effect was detected ($p < .01$). Moreover, a main effect of angle was reported ($p < .05$). At *90°*, *WF* received a higher evaluation compared to *LF* ($p < .05$). Similarly, at *120°*, *LF* obtained a significantly higher evaluation than

WF ($p < .05$). On the other hand, at *WF*, *120°* had a significantly lower evaluation than both *60°* and *90°* ($p < .01$).

In the evaluation of *active* (Figure 4.14, right), a significant interaction effect was reported ($p < .01$). At *90°*, *WF* received a significantly higher evaluation compared to *LF* ($p < .05$). Conversely, at *WF*, *120°* received a significantly lower evaluation than both *60°* and *90°* ($p < .05$).

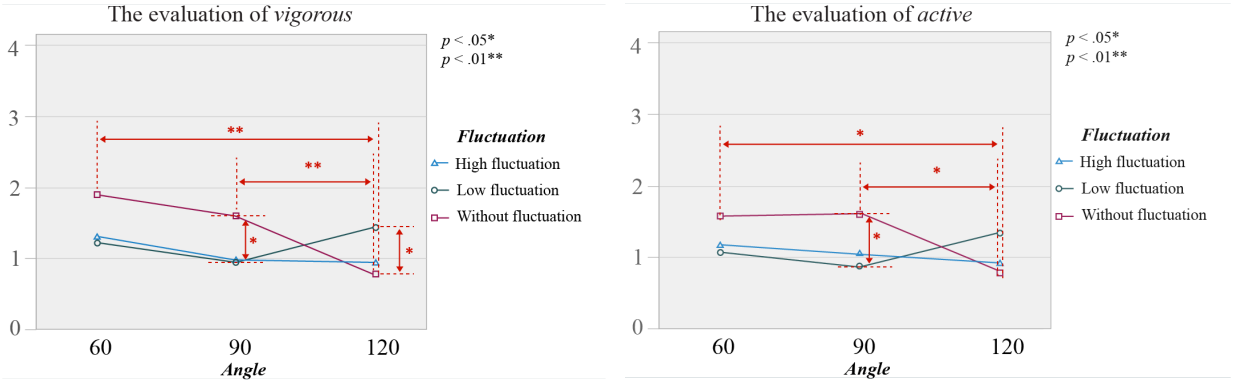

Figure 4.14. Significant interaction effect between *angle* and *fluctuation* in the evaluation of *vigorous* (left) and *active* (right)

In the evaluation of *efficient* (Figure 4.15, left), a significant interaction effect was reported ($p < .01$). Additionally, a main effect of *fluctuation* was observed ($p < .01$). At *60°*, *WF* received a higher evaluation compared to both *HF* and *LF* ($p < .05$). Similarly, at *90°*, *WF* obtained a significantly higher evaluation than *LF* ($p < .05$). At *WF*, *60°* received a significantly higher evaluation than *120°* ($p < .01$).

In the evaluation of *cheerful* (Figure 4.15, right), a significant interaction effect ($p < .05$) and a main effect of *angle* were reported ($p < .01$). At *90°*, *WF* received significantly higher evaluation compared to *LF* ($p < .01$). At *HF*, *60°* obtained a significantly higher evaluation than *120°* ($p < .05$). At *WF*, *120°* got significantly lower evaluation compared to both *60°* and *90°* ($p < .01$).

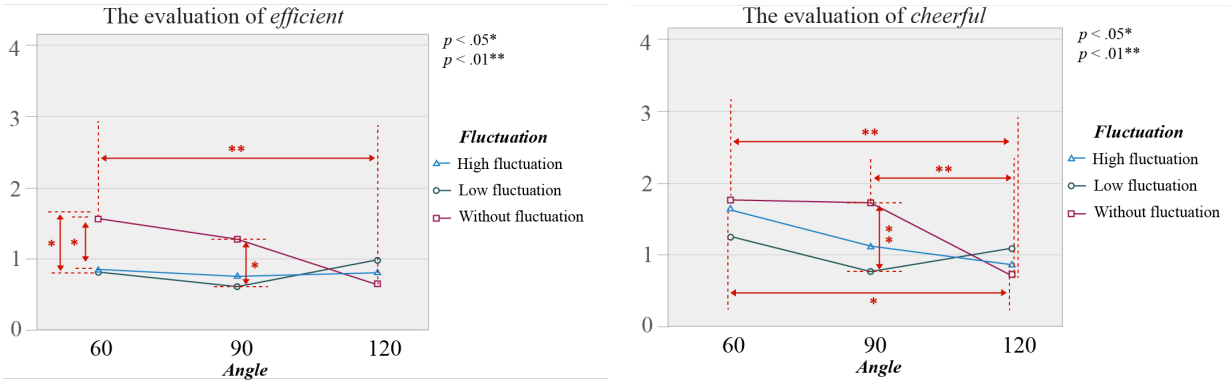

Figure 4.15. Significant interaction effect between *angle* and *fluctuation* in the evaluation of *efficient* (left) and *cheerful* (right)

In the evaluation of *uneasy* (Figure 4.16, left), a significant interaction effect ($p < .05$) and a main effect of *angle* ($p < .05$) were reported. At *HF*, *60°* got significantly higher evaluation than *120°* ($p < .01$). At *LF*, *120°* received significantly higher evaluation compared to *90°* ($p < .05$).

In the evaluation of *energetic* (Figure 4.16, right), the results revealed a significant interaction effect ($p < .05$) and a significant main effect for *angle* ($p < .05$). At *90°*, *WF* received significantly higher evaluation compared to *LF* ($p < .05$). Moreover, at *WF*, *120°* had a significantly lower evaluation compared to both *60°* ($p < .01$) and *90°* ($p < .05$).

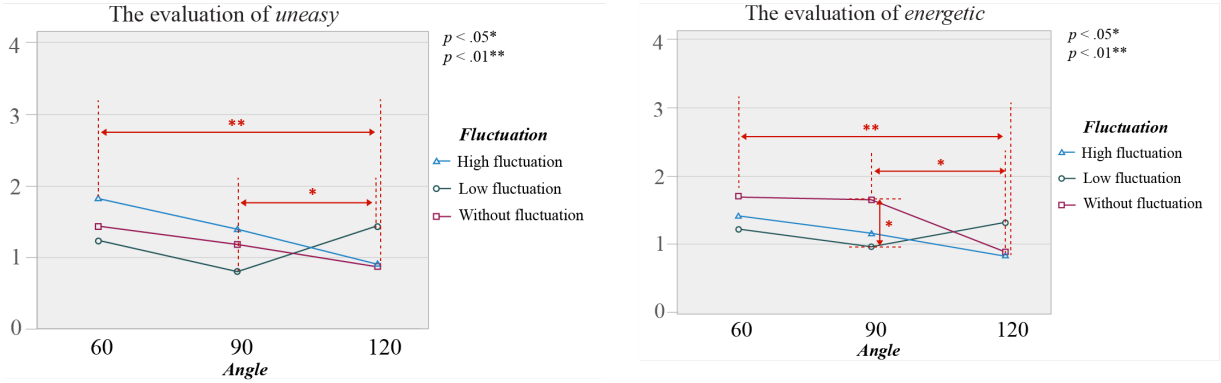

Figure 4.16. Significant interaction effect between *angle* and *fluctuation* in the evaluation of *uneasy* (left) and *energetic* (right)

Regarding the main effect, a significant main effect of *fluctuation* was reported in the evaluation of *helpful* ($p < .05$).

In the evaluation of *helpful* (Figure 4.17, left), the results revealed that at *60°*, *WF* received significantly higher evaluation compared to both *HF* and *LF* ($p < .05$). Moreover, at *WF*, *60°* had significantly higher evaluation than *120°* ($p < .05$).

In the evaluation of *alert* (Figure 4.17, right), there were no significant differences reported.

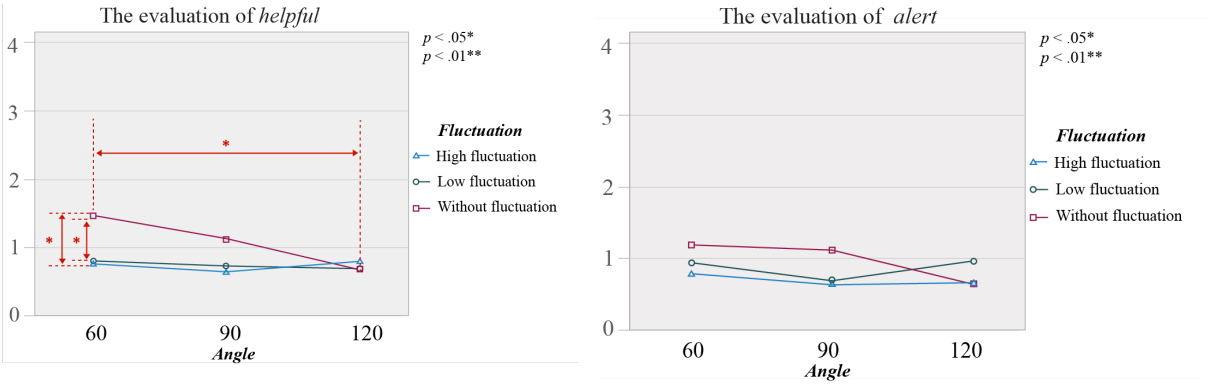

Figure 4.17. A main effect of fluctuation was reported in the evaluation of *helpful* (left) and no significant difference was reported in the evaluation of *alert* (right)

4.4.1.2. Evaluation on the evaluation tendency based on gender differences

The study employed a two-way ANOVA to analyze the interaction effect of three levels of three factors (*angle, acceleration,* and *fluctuation*) and evaluation on the evaluation tendency based on gender differences. The data was reported as statistically significant at $p < .05$ and highly statistically significant at $p < .01$. The results that were obtained are as follows:

(1) *Angle* factor: In terms of the *angle* factor, there was a main effect of gender on the evaluation of *lively, vigorous, uneasy, active, alert, energetic, helpful*, *full of life,* and *efficient* ($p < .01$) and *cheerful* ($p < .05$). Additionally, a main effect of *angle* was reported on the evaluation of *lively*, *energetic*, and *full of life* ($p < .01$), as well as on the evaluation of *vigorous* and *uneasy* ($p < .05$).

At *60°*, female participants rated the evaluation scores significantly higher than male participants in the evaluation of *lively, vigorous, uneasy, active, alert, helpful, energetic* and *full of life* ($p < .01$). They also gave higher ratings in the evaluation of *efficient* ($p < .05$).

At *90°*, female participants had significantly higher scores than male participants in the evaluation of *vigorous, active, alert, helpful,* and *efficient* ($p < .01$), and in the evaluation of *full of life* ($p < .05$).

At *120°*, the result also showed that the female scores were significantly higher than male in the evaluation of *active, alert,* and *helpful* ($p < .01$), as well as in the *evaluation vigorous, energetic,* and *efficient* ($p < .05$).

For at the female participants, the evaluation scores at *60°* were significantly higher than those at *120°* on the evaluation of *lively, cheerful, energetic,* and *full of life* ($p < .01$) and on the evaluation of *uneasy* ($p < .05$).

In the evaluation of *lively* (Figure 4.18, left), at the *60°*, the female participants significantly rate higher evaluation compared to the male participants ($p < .01$). Moreover, for female participants, *60°* had a significantly higher evaluation compared to *120°* ($p < .01$).

In the evaluation of *vigorous* (Figure 4.18, right), the female participants significantly rate higher evaluation compared to the male participants at *60°* and *90°* ($p < .01$), and *120°* ($p < .05$)

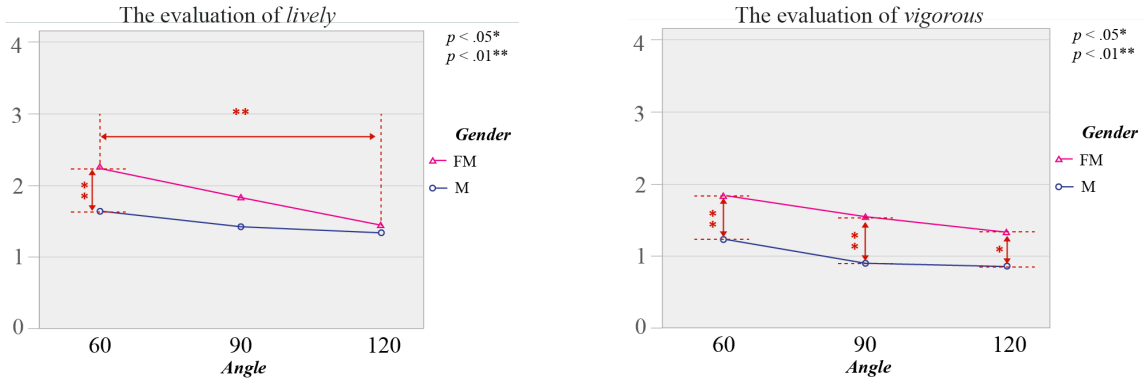

Figure 4.18. Gender Differences in the evaluation of *lively* (left) and *vigorous* (right)

In the evaluation of cheerful (Figure 4.19, left), at *60°*, the female participants significantly rate higher evaluation compared to the male participants ($p < .05$). Moreover, for female participants, *60°* had a significantly higher evaluation compared to *120°* ($p < .01$).

In the evaluation of *uneasy* (Figure 4.19, right), the female participants significantly rate higher evaluation compared to the male participants at *60°* and *90°* ($p < .01$). Moreover, for female participants, *60°* had a significantly higher evaluation compared to *120°* ($p < .05$).

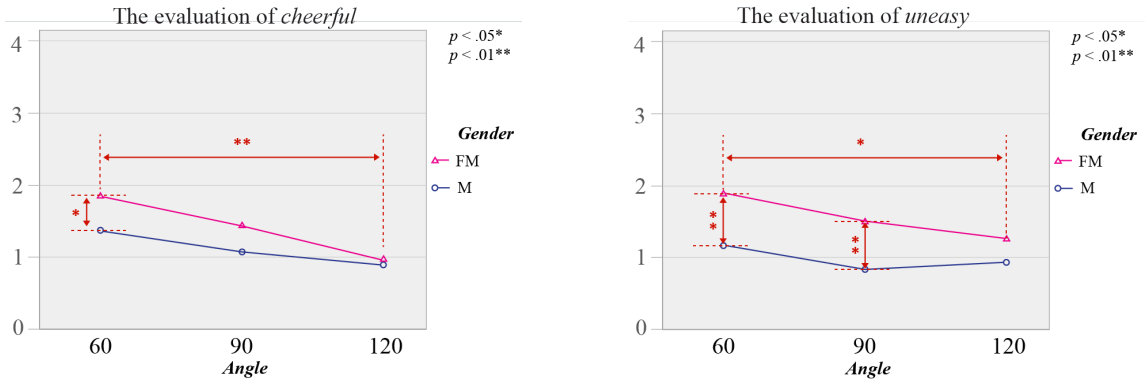

Figure 4.19. Gender Differences in the evaluation of *cheerful* (left) and *uneasy* (right)

In the evaluation of *active* (Figure 4.20, left), female participants significantly rate higher evaluation compared to male participants at *60°*, *120°* and *90°* ($p < .01$).

In the evaluation of *alert* (Figure 4.20, right), female participants significantly rate higher evaluation compared to male participants at *60°*, *120°* and *90°* ($p < .01$).

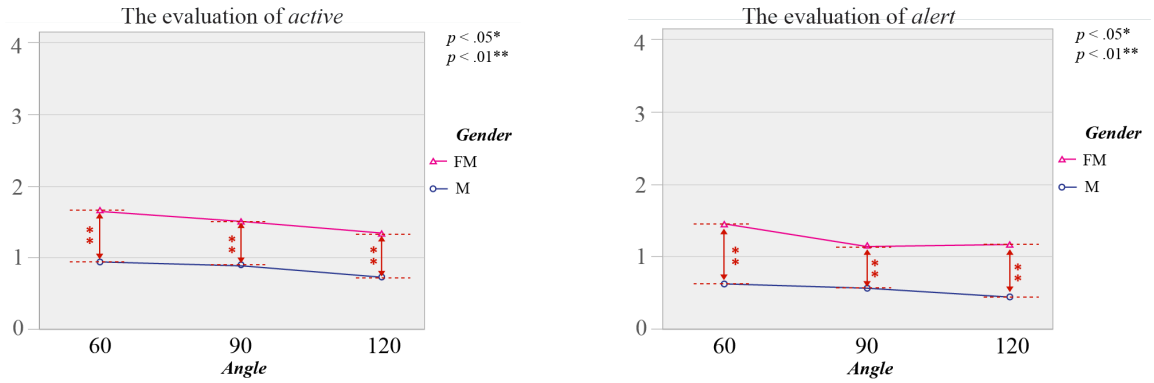

Figure 4.20. Gender Differences in the evaluation of *active* (left) and *alert* (right)

In the evaluation of *energetic* (Figure 4.21, left), female participants significantly rate higher evaluation compared to male participants at *60°*. Moreover, for female participants, *60°* had a significantly higher evaluation compared to *120°* ($p < .05$).

In the evaluation of *helpful* (Figure 4.21, right), female participants significantly rate higher evaluation compared to male participants at *60°*, *90°* and *120°* ($p < .01$).

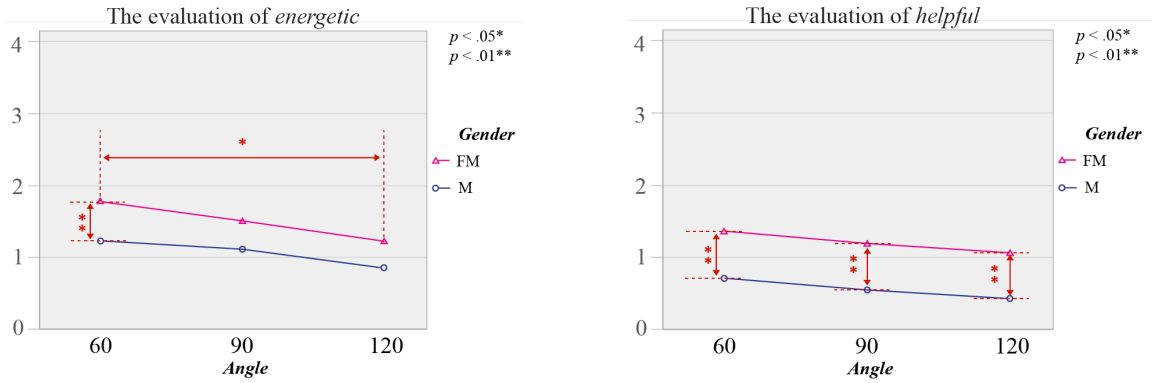

Figure 4.21. Gender Differences in the evaluation of *energetic* (left) and *helpful* (right)

In the evaluation of *full of life* (Figure 4.22, left), female participants significantly rate higher evaluation compared to male participants at *60°* ($p < .01$) and *90°* ($p < .05$). Moreover, for female participants, *60°* had a significantly higher evaluation compared to *120°* ($p < .01$).

In the evaluation of *efficient* (Figure 4.22, right), female participants significantly rate higher evaluation compared to male participants at *90°* ($p < .01$), *60°* ($p < .05$) and *120°* ($p < .05$).

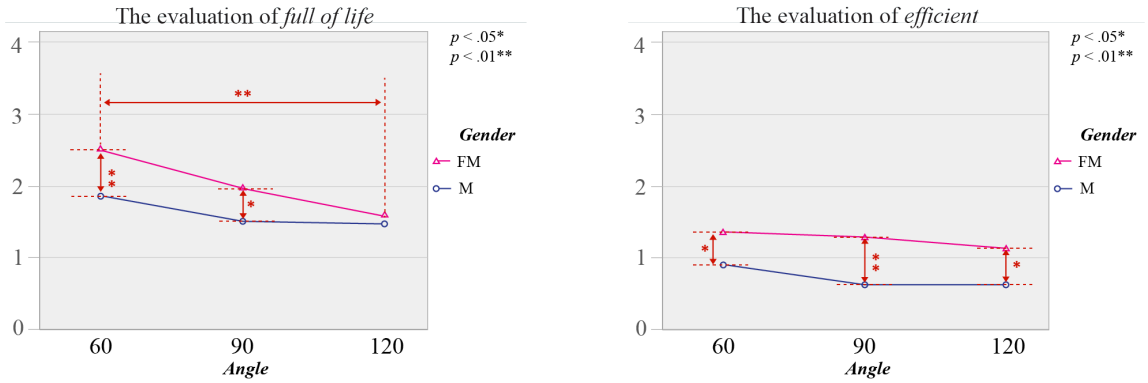

Figure 4.22. Gender Differences in the evaluation of *full of life* (left) and *efficient* (right)

(2) *Acceleration* factor: In terms of the *acceleration* factor, a main effect of gender was reported on the evaluation of *lively, vigorous, uneasy, active, alert, energetic, helpful, full of life,* and *efficient* ($p < .01$). There was a main effect reported on the evaluation of *lively* and *full of life* ($p < .01$), as well as on the evaluation of *vigorous, uneasy, active, and energetic* ($p < .05$).

At *STF*, there were significant results showing that females rated the evaluation scores higher than males on the evaluation *of lively, vigorous, uneasy, active, alert, helpful*, and *efficient* ($p < .01$).

At *FTS*, female participants rated significantly higher scores in the evaluation of *helpful* and *energetic* ($p < .01$), as well as on the evaluation of *vigorous, uneasy, active,* and *alert* ($p < .05$).

At *WA*, the obtained results showed that the female participants' scores were significantly higher than male participants on the evaluation of *alert,* and *helpful* ($p < .01$), and it was also reported on the evaluation of *uneasy, active,* and *full of life* ($p < .05$).

At male participants, *FTS* had significantly higher evaluation scores than *STF* on the evaluation of lively ($p < .01$), and on the evaluation of vigorous, alert, full of life, and efficient ($p < .05$). Furthermore, the finding showed that the FTS had significantly higher evaluation scores than WA on the evaluation of full of life ($p < .05$).

In the evaluation of *lively* (Figure 4.23, left), at *STF*, female participants significantly rate higher evaluation compared to male participants ($p < .01$). Moreover, for male participants, *FTS* had a significantly higher evaluation compared to *STF* ($p < .01$).

In the evaluation of *vigorous* (Figure 4.23, right), female participants significantly rate higher evaluation compared to male participants at *STF* ($p < .01$) and *FTS* ($p < .05$). Moreover, for male participants, *FTS* had a significantly higher evaluation compared to *STF* ($p < .01$).

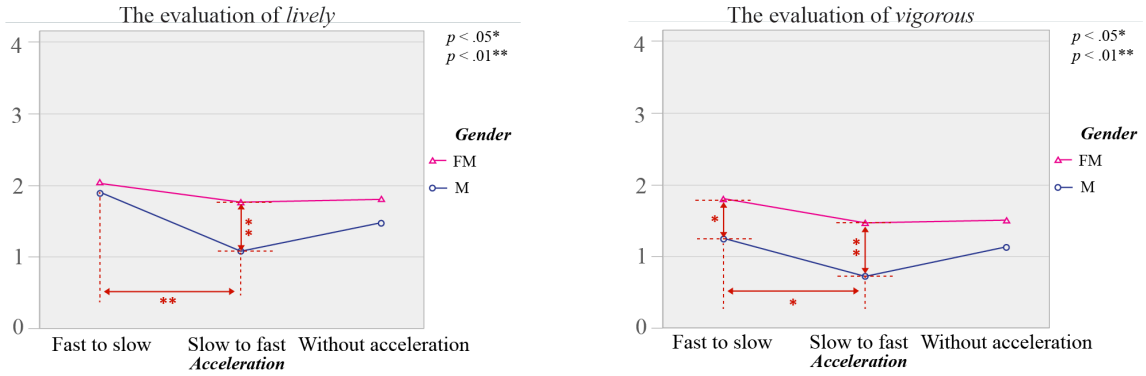

Figure 4.23. Gender Differences in the evaluation of *lively* (left) and *vigorous* (right)

In the evaluation of *uneasy* (Figure 4.24, left), female participants significantly rate higher evaluation compared to male participants at *STF* ($p < .01$), *FTS* ($p < .05$) and *WA* ($p < .05$).

In the evaluation of *active* (Figure 4.24, right), female participants significantly rate higher evaluation compared to male participants at *STF* ($p < .01$), *FTS* ($p < .05$) and *WA* ($p < .05$).

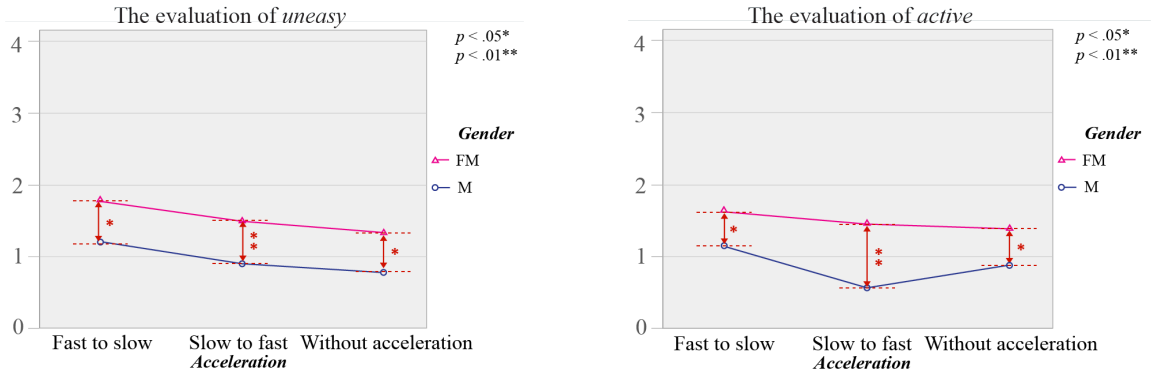

Figure 4.24. Gender Differences in the evaluation of *uneasy* (left) and *active* (right)

In the evaluation of *alert* (Figure 4.25, left), female participants significantly rate higher evaluation compared to male participants at *FTS, STF* and *WA* ($p < .01$). For male participants, *FTS* had a significantly higher evaluation compared to *STF* ($p < .05$).

In the evaluation of *energetic* (Figure 4.25, right), female participants significantly rate higher evaluation compared to male participants at *FTS* ($p < .01$).

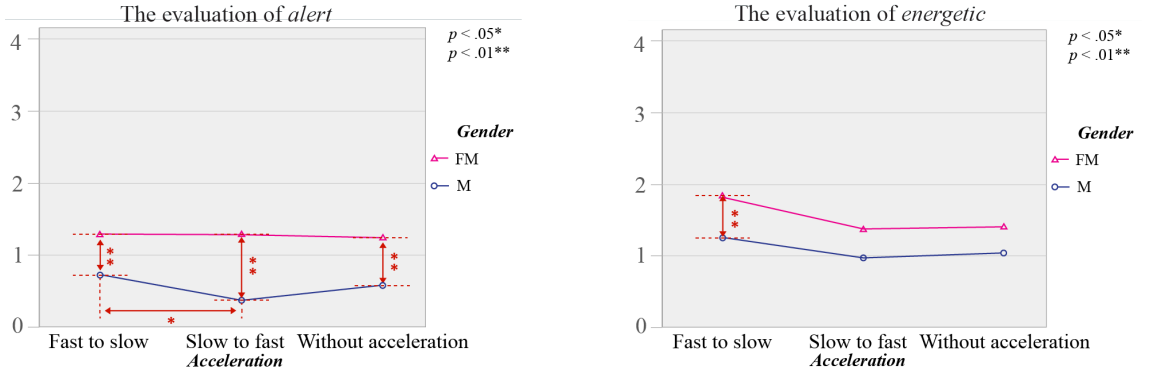

Figure 4.25. Gender Differences in the evaluation of *alert* (left) and *energetic* (right)

In the evaluation of *helpful* (Figure 4.26, left), female participants significantly rate higher evaluation compared to male participants at *FTS*, *STF* and *WA* ($p < .01$).

In the evaluation of *full of life* (Figure 4.26, right), female participants significantly rate higher evaluation compared to male participants at *WA* ($p < .05$). Male participants, *FTS* had a significantly higher evaluation compared to *WA* ($p < .01$) and *STF* ($p < .05$).

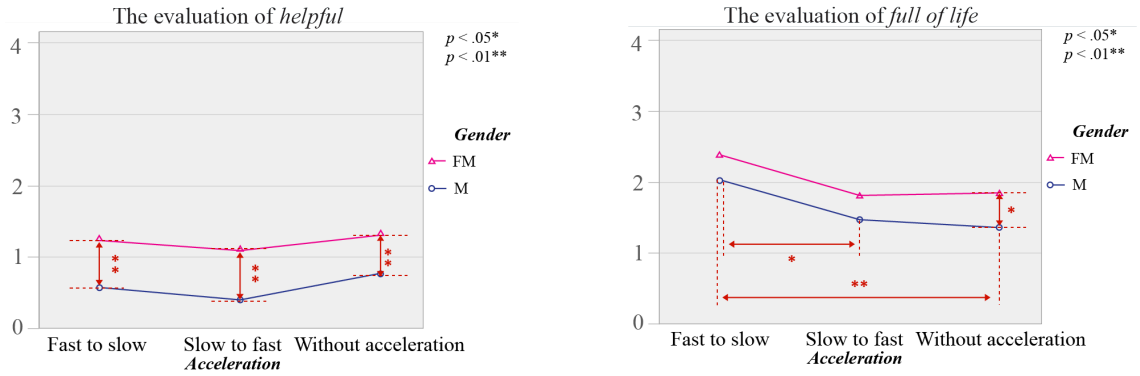

Figure 4.26. Gender Differences in the evaluation of *helpful* (left) and *full of life* (right)

In the evaluation of *efficient* (Figure 4.27, left), female participants significantly rate higher evaluation compared to male participants at *STF* ($p < .01$), and *WA* ($p < .05$). For male participants, *FTS* had a significantly higher evaluation compared to *STF* ($p < .05$).

In the evaluation of *cheerful* (Figure 4.27, right), There were no significant differences reported between genders.

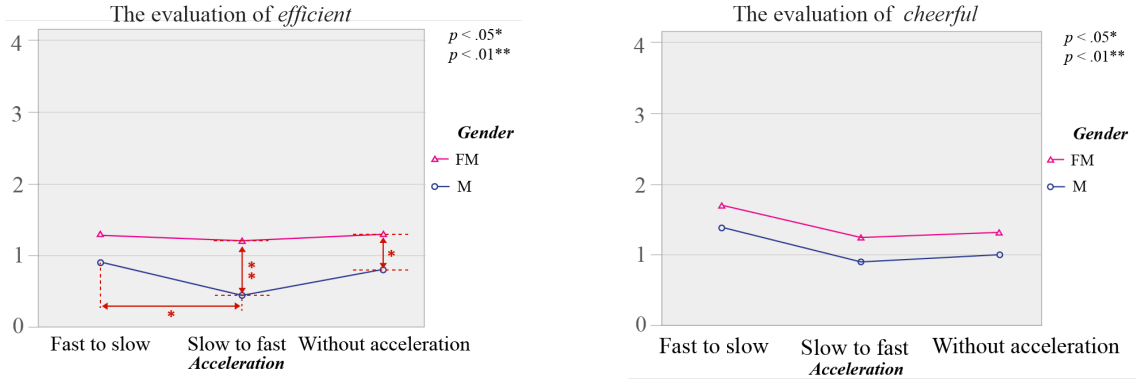

Figure 4.27. Gender Differences in the evaluation of *efficient* (left) and no significant difference was reported in the evaluation of *cheerful* (right)

(3) *Fluctuation* factor: In terms of the *fluctuation* factor, a main effect of gender was reported on the evaluation of *lively, vigorous, uneasy, active, alert, energetic, helpful, full of life*, and *efficient* ($p < .01$) and on the evaluation of *cheerful* ($p < .05$).

At *HF*, female participants rated significantly higher scores than male participants on the evaluation of *active* and *alert* ($p < .01$), as well as on the evaluation of *vigorous, energetic, helpful, uneasy* and *efficient* ($p < .05$).

At *LF*, the results also showed that female participants evaluated significantly higher scores than male participants on the evaluation of *vigorous*, *active*, *alert, helpful*, and *efficient* ($p < .01$) and on the evaluation of *cheerful* and *uneasy* ($p < .05$).

At *WF*, female participants also significantly rated higher scores than male participants on the evaluation of *alert*, *vigorous, helpful*, and *active* ($p < .01$), and additionally on the evaluation of *uneasy, energetic* and efficient ($p < .05$). For male participants, it was reported that in *WF* condition, they received significantly higher scores than in the *LF* condition ($p < .05$) on the evaluation of *efficient*.

In the evaluation of *vigorous* (Figure 4.28, left), female participants significantly rate higher evaluation compared to male participants at and *HF* ($p < .05$), and *LF, WF* ($p < .01$).

In the evaluation of *cheerful* (Figure 4.28, right), female participants significantly rate higher evaluation compared to male participants at *LF* ($p < .05$).

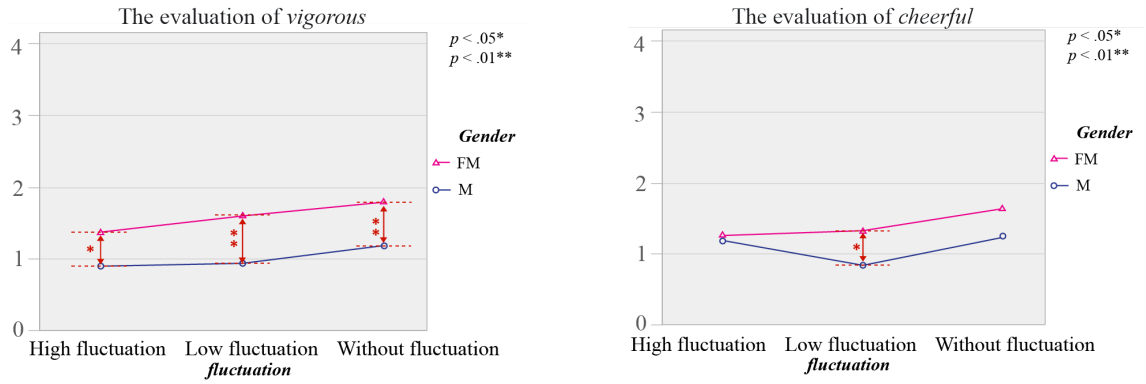

Figure 4.28. Gender Differences in the evaluation of *vigorous* (left) and *cheerful* (right)

In the evaluation of *uneasy* (Figure 4.29, left), female participants significantly rate higher evaluation compared to male participants at *WF* ($p < .01$), *HF* ($p < .05$), and *LF* ($p < .05$).

In the evaluation of *active* (Figure 4.29, right), female participants significantly rate higher evaluation compared to male participants at *HF, LF* and *WF* ($p < .01$).

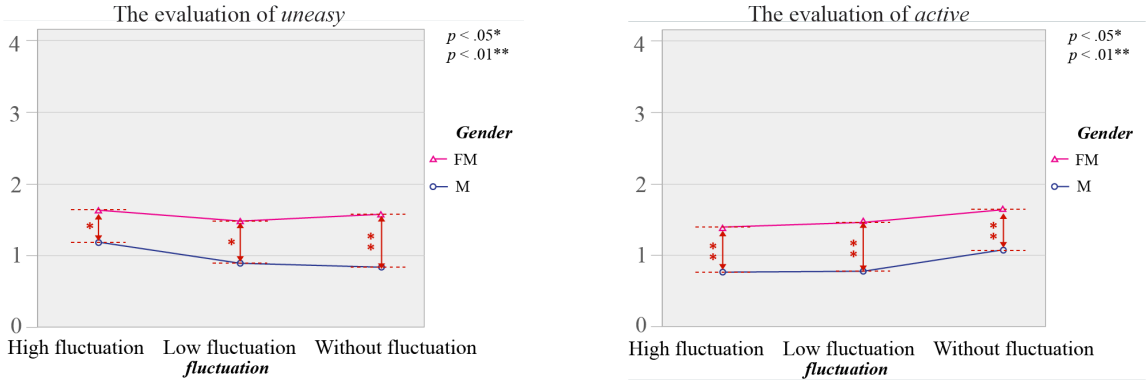

Figure 4.29. Gender Differences in the evaluation of *uneasy* (left) and *active* (right)

In the evaluation of *alert* (Figure 4.30, left), female participants significantly rate higher evaluation compared to male participants at *HF*, *LF* and *WF* ($p < .01$).

In the evaluation of *energetic* (Figure 4.30, right), female participants significantly rate higher evaluation compared to male participants at *HF* and *WF* ($p < .05$).

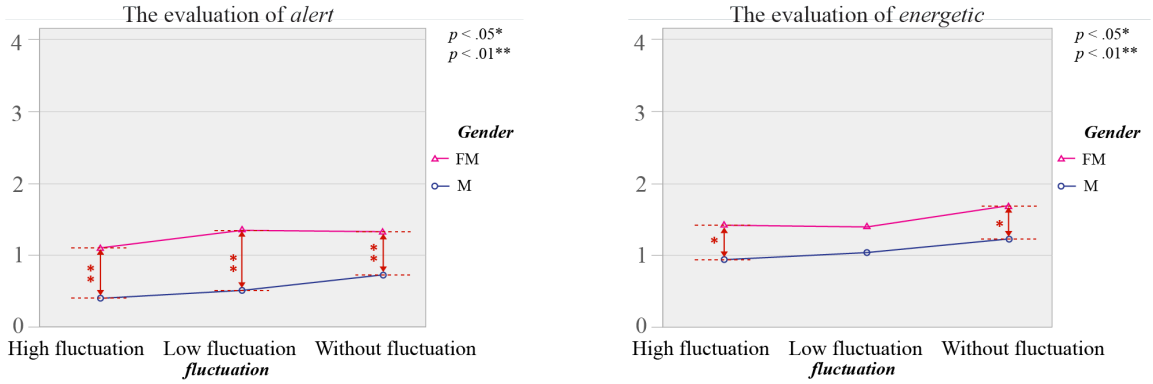

Figure 4.30. Gender Differences in the evaluation of *alert* (left) and *energetic* (right)

In the evaluation of *helpful* (Figure 4.31, left), female participants significantly rate higher evaluation compared to male participants at *LF* ($p < .01$), *WF* ($p < .01$) and *HF* ($p < .05$).

In the evaluation of *efficient* (Figure 4.31, right), female participants significantly rate higher evaluation compared to male participants at *LF* ($p < .01$), *HF* ($p < .05$), *and WF* ($p < .05$). For male participants, *WF* had a significantly higher evaluation compared to *LF* ($p < .05$).

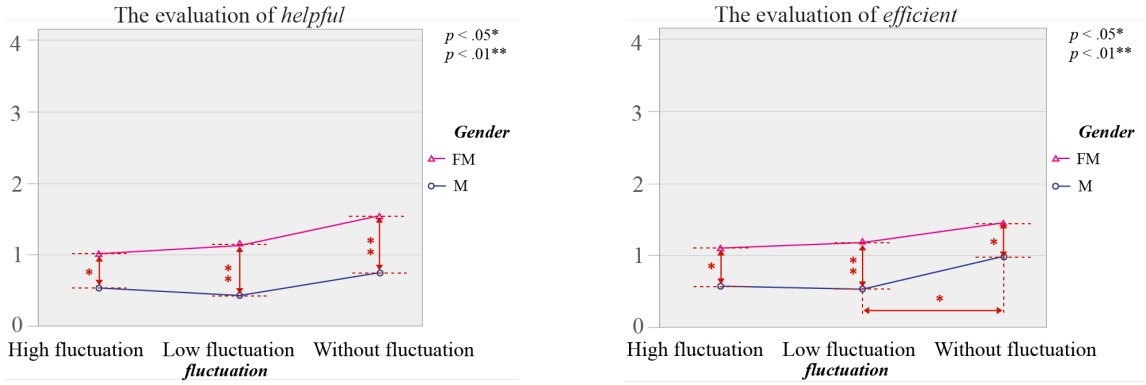

Figure 4.31. Gender Differences in the evaluation of *helpful* (left) and *efficient* (right)

In the evaluation of *lively* (Figure 4.32, left), and *full of life* (Figure 4.32, right), there were no significant differences reported between genders.

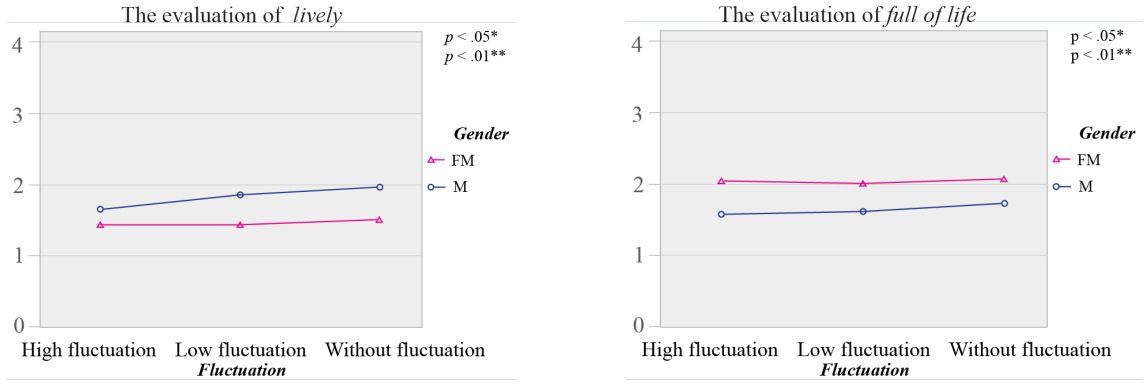

Figure 4.32. no significant difference was reported in the evaluation of *lively* (left) and *full of life* (right)

4.4.1.3. Conclusion

Regarding the interaction effects of the three factors (*angle, acceleration*, and *fluctuation*), this study employed a two-way ANOVA to examine the effects of these factors on the evaluation of the sense of being alive.

***Angle* and *acceleration*:** Although both *angle* and *acceleration* are important factors in the perception of the sense of being alive, the findings revealed that the angle factor has a greater significance compared to the *acceleration* factor. Regarding the evaluation of attributes such as *efficient, vigorous, cheerful, active, lively*, and *energetic*, this group of stimuli is considered to represent positive movement characteristics. *Without acceleration* significantly affects the evaluation of these attributes, particularly within the narrow degree of *60°*. In this case, the perception is better expressed *without acceleration*. On the other hand, for wider degrees such as *90°* and *120°*, the presence of *acceleration*, such as *FTS*, is more effective in eliciting these sensations. *STF* did not have a significant impact in these evaluations. IN the evaluation of *uneasy* and *full of life*, this specific group of stimuli can be interpreted as representing forceful movements and a high-energy. In this group, the presence of *acceleration* such as *FTS*, has a significant impact, especially within the narrow degree of *60°*, on these evaluations. For wider angles, specifically *90°* and *120°*, the presence of *acceleration* was reported, as observed in *FTS* on *120°* or both *FTS* and *STF* on *90°*.

Therefore, in the case of positive movement attributes (*efficient, vigorous, cheerful, active, lively,* and *energetic*), a narrow angle of *60° without acceleration* may elicit a sense of being alive. On the other hand, for negative movement attributes or the expression of high energy or force (*uneasy* and *full of life*), the presence of *acceleration*, such as *FTS*, may be more advantageous. Moreover, *acceleration* can affect the sense of tension associated with *uneasy*, particularly for stimuli with a narrow angle. Both groups of stimuli indicate that a wide angle of *120°* with *acceleration* is more effective in enhancing the evaluation of the sense of being alive.

***Acceleration* and *fluctuation*:** The results revealed in the evaluation of attributes, such as *lively, active, vigorous,* and *energetic*, indicates of the movements that convey a sense of motion

and *energy*. The absence of *fluctuation* (*WF*) appears to be an important factor in the *acceleratio*n of *FTS* or *WA*. While the presence of *fluctuation*, such as *HF* and *LF*, seem to be better associated with the *Sti*jn the evaluation of *full of life* and *uneasy*, these attributes might refer to movements that consist of high energy or force. The presence of *fluctuation* seems to be a necessary factor, especially when associated with acceleration, such as *FTS* and *STF*. On the other hand, the absence of *fluctuation* (*WF*) is also better associated with the *WA*. The findings suggest that stimuli *without fluctuation* are more effective in situations where there is no *acceleration* in the evaluation of the sense of being alive.

Fluctuation is not always necessary for movements, particularly when conveying a sense of motion and energy. While the presence of *fluctuation* seems to be an essential factor for movements that represent more high energy or force, such as *HF* on *FTS* or *STF*, particularly in the evaluation of attributes such as *uneasy*.

***Angle* and *fluctuation*:** In the evaluation of attributes such as *lively, efficient*, *energetic, vigorous, active, cheerful,* and *helpful*, this group may refer to positive energy movements. The *angle* factor was reported as an important factor compared to *fluctuation*. Specifically, in narrow angles such as *60°* and *90°* on the *WF*, it is better than *LF* and *HF*. On the other hand, in the wider angle of *120°*, the presence of *fluctuation* is more important compared to the absence of *fluctuation*. In the evaluation of attributes such as *uneasy* and *full of life*, the group may refer to movements that consist of high force and uneasy. For both attributes, at the narrow angle of *60°*, *HF* is better than *WF* and *LF*. At the wider angle of *120°*, *LF* is better than *HF* and *WF*. However, in the evaluation of *uneasy*, at the *angle* of *90°*, *HF* is better than *WF* and *LF*, while in the evaluation of *full of life*, *WF* is better than *HF* and *LF*. According to the findings, for attributes related to positive energy movement, the absence of *fluctuation* in narrow angles such as *60°* and *90°* received high evaluations. On the other hand, the presence of fluctuation in wider angles such as *120°* may better represent the feeling of being alive. For movements that express high forces, high fluctuation in narrow angles such as *60°* and *90°* might be more effective, especially in the evaluation of uneasy, where high fluctuation appears to be particularly important.

The study found a significant role of the angle factor in the perception of the sense of being alive. It also revealed that fluctuation and acceleration are not always necessary for perceiving this sense. The findings indicate that a narrow *angle* of *60° without acceleration* and *fluctuation* can still evoke a sense of being alive, especially when evaluating movements associated with positive attributes. However, in evaluations related to feelings of *uneasy* or *full of life*, which might refer to movements with high force, the presence of *acceleration* or *fluctuation* may be required to enhance this sensation.

Regarding gender differences in the evaluation, the results that were obtained are as follows:

***Angle*:** The study found significant differences between male and female participants in the evaluation. At *60°*, female rated higher compared to male in the evaluation of attributes such as *lively, vigorous, cheerful, uneasy, active, alert, energetic, helpful, full of life,* and *efficient*. At *90°*, female rated higher compared to male in the evaluation of *vigorous, uneasy, active, alert, helpful, full of life,* and *efficient*. At *120°*, female rated higher compared to male in the evaluation of *vigorous, active, alert, helpful* and *efficient*.

***Acceleration*:** The study found significant differences between male and female participants in the evaluation. In the *FTS* condition, female participants rated the evaluation higher than male in the evaluation of *vigorous, uneasy, active, alert, energetic,* and *helpful*. In the *STF,* female participants rated the evaluation higher than male in the evaluation of *lively*, *vigorous, uneasy, active, alert* and *helpful.* In the *WA,* female participants rated the evaluation higher than male in the evaluation of *uneasy, active, alert, helpful* and *full of life.*

***Fluctuation*:** In the *HF* condition, female participants rated the evaluation higher than male in the evaluation of *vigorous, uneasy, active, alert, energetic, helpful* and *efficient*. In the *LF* condition, female participants rated the evaluation higher than male in the evaluation of *vigorous, cheerful, uneasy, active, alert, helpful* and *efficient*. In the *WF* condition, female participants rated the evaluation higher than male in the evaluation of *vigorous, uneasy, active, alert, energetic, helpful* and *efficient*.

4.4.2. Results of 10 evaluation phrases positively associated with a sense of being alive: A study with Thai participants

4.4.2.1. The interaction effect of the three factors on the evaluation of the sense of being alive

There were 20 Thai participants (10 males and 10 females, mean age: 22.23) in this experiment. The results of the experiment were reported as follows:

The study employed a two-way ANOVA to analyze the interaction effect of the three factors (*angle, acceleration, and fluctuation*) on the evaluation of the sense of being alive. The data was reported as statistically significant at $p < .05$ and highly statistically significant at $p < .01$. The results that were obtained are as follows:

(1) *Angle* and *acceleration*: The were no significant interaction effects between factor on the evaluation. A significant main effect of angle was report in the evaluation of *lively* ($p < .01$).

In the evaluation of *lively* (Figure 4.33, left) and *vigorous* (Figure 4.33, right), no significant differences were observed.

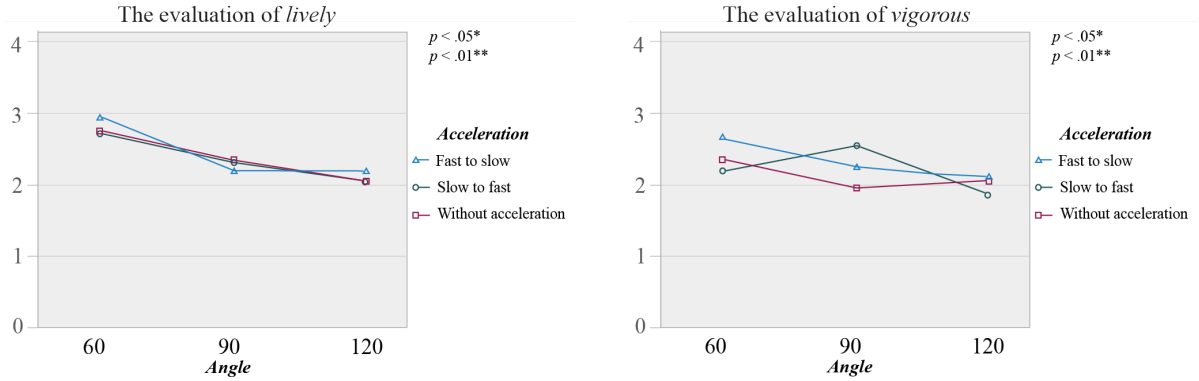

Figure 4.33. Interaction effect between angle and acceleration in the evaluation of *lively* (left), and *vigorous* (right)

In the evaluation of *cheerful* (Figure 4.34, left) and *uneasy* (Figure 4.34, right), no significant differences were reported.

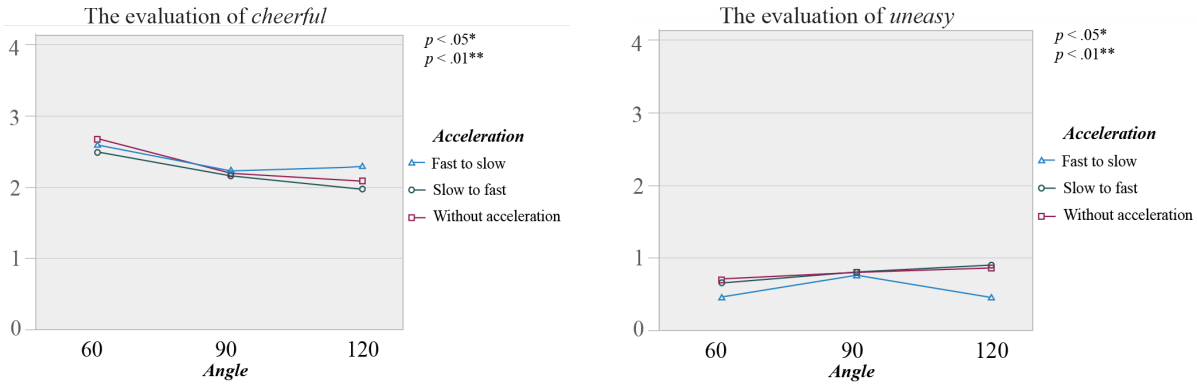

Figure 4.34. Interaction effect between angle and acceleration in the evaluation of *cheerful* (left), and *uneasy* (right)

In the evaluation of *active* (Figure 4.35, left) and *alert* (Figure 4.35, right), there were no significant differences.

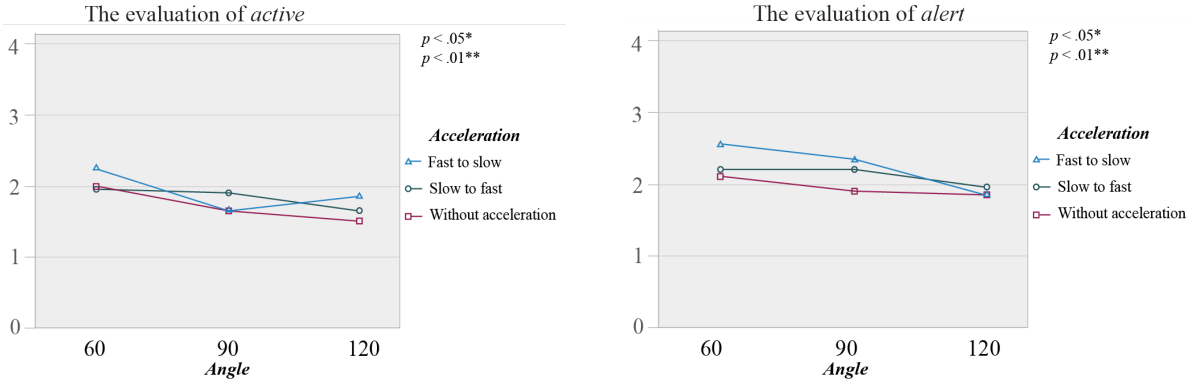

Figure 4.35. Interaction effect between angle and acceleration in the evaluation of *active* (Left), and *alert* (Right)

In the evaluation of *energetic* (Figure 4.36, left) and *helpful* (Figure 4.36, right), no significant difference was observed.

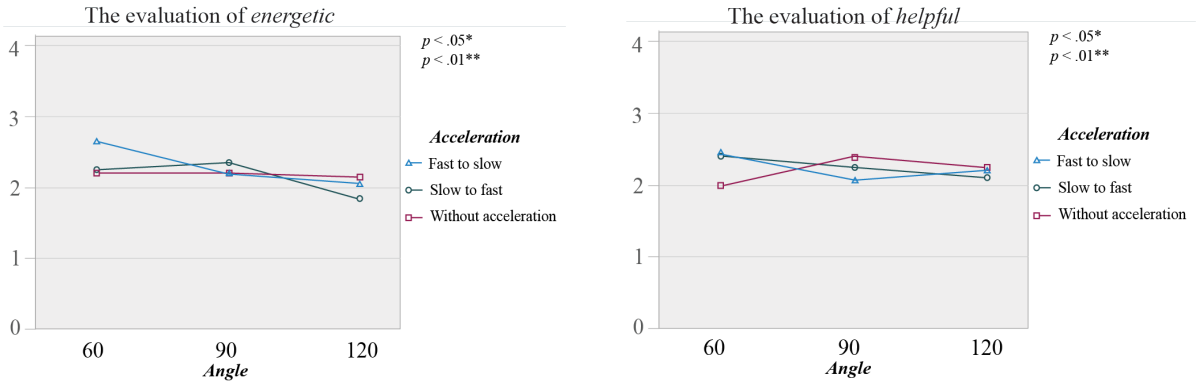

Figure 4.36. Interaction effect between angle and acceleration in the evaluation of *energetic* (left), and *helpful* (right)

In the evaluation of *full of life* (Figure 4.37, left) and *efficient* (Figure 4.37, right), no significant difference was observed.

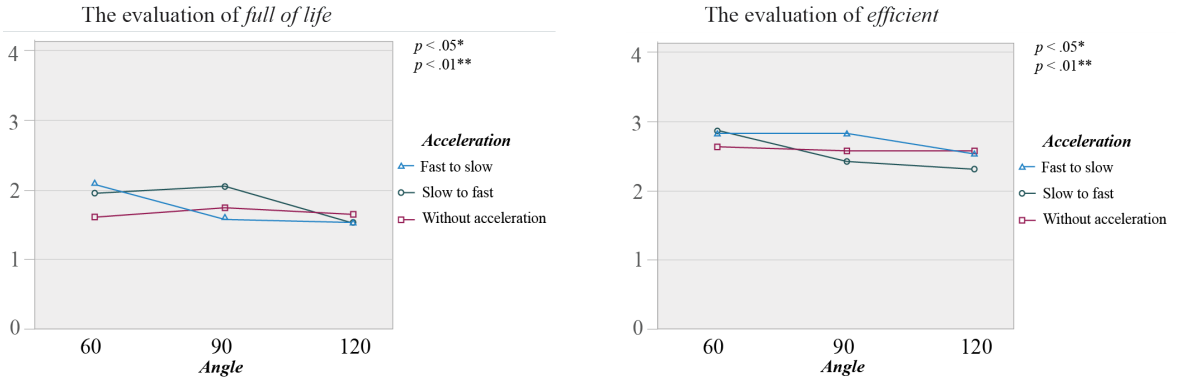

Figure 4.37. Interaction effect between angle and acceleration in the evaluation of *full of life* (left), and *efficient* (right)

(2) *Acceleration* and fluctuation: Regarding the interaction effects between *acceleration* and *fluctuation*, the results revealed significant interaction effects in the evaluation of *lively* ($p < .01$).

In the evaluation of *lively* (Figure 4.38, left), a significant interaction effect was reported ($p < .01$). The findings revealed that at *HF*, *FTS* received a significantly higher evaluation than *WA* ($p < .05$).

In the evaluation of *vigorous* (Figure 4.38, right), no significant difference was reported.

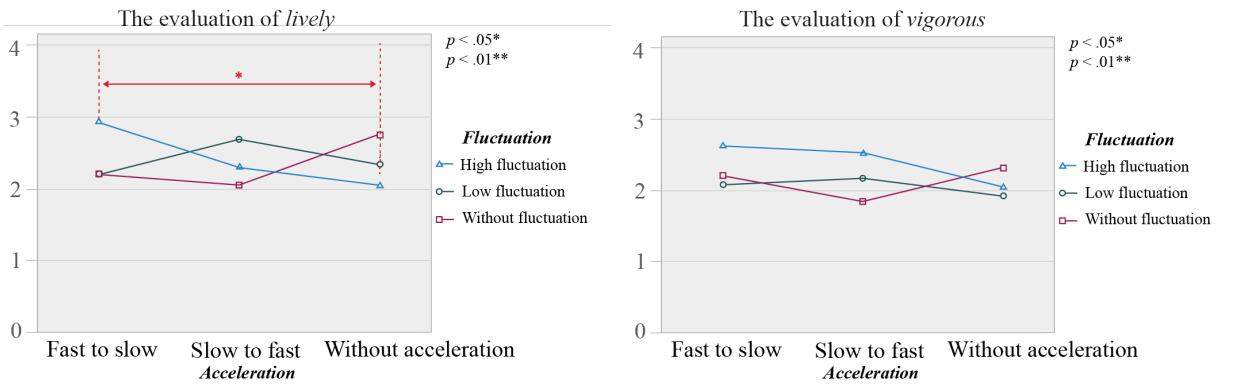

Figure 4.38. Interaction effect between acceleration and fluctuation in the evaluation of *lively* (left), and *vigorous* (right)

In the evaluation of *cheerful* (Figure 4.39, left) and *uneasy* (Figure 4.39, right), no significant difference was reported.

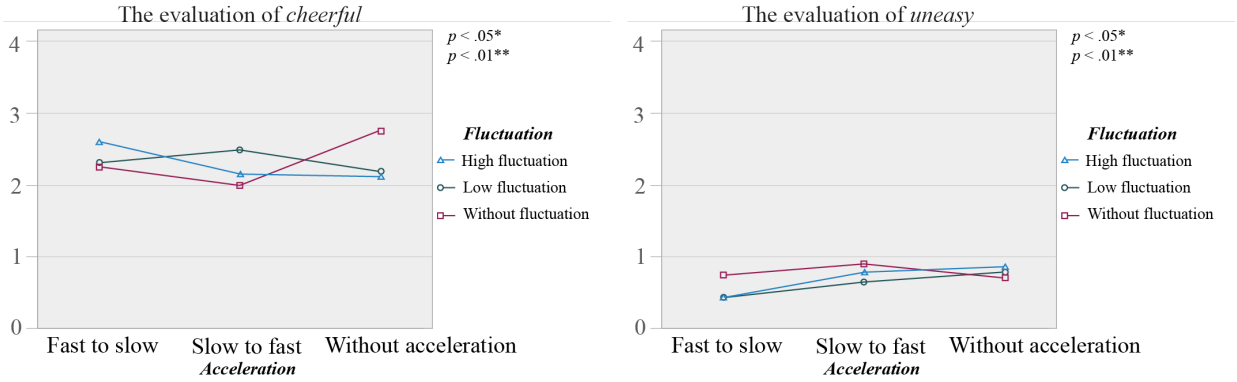

Figure 4.39. Interaction effect between acceleration and fluctuation in the evaluation of *cheerful* (left), and *uneasy* (right)

In the evaluation of *active* (Figure 4.40, left) and *alert* (Figure 4.40, right), no significant differences were observed.

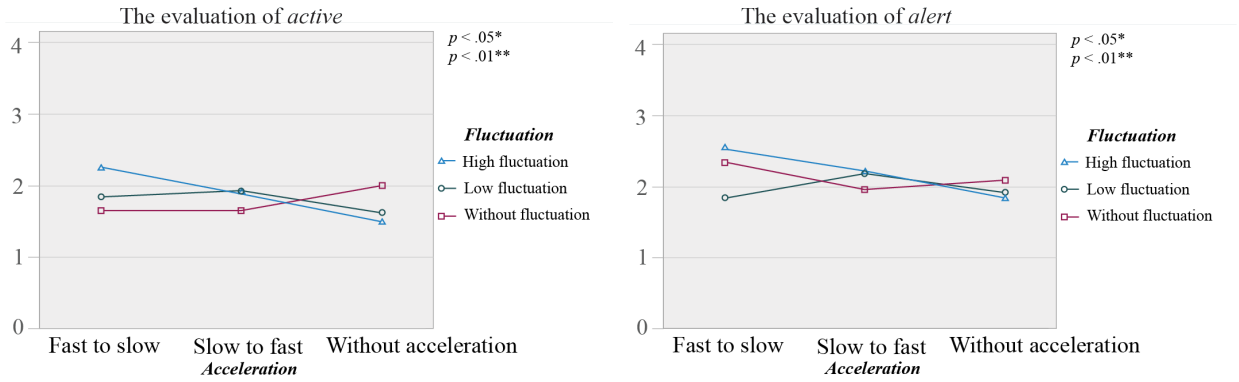

Figure 4.40. Interaction effect between acceleration and fluctuation in the evaluation of *active* (left), and *alert* (right)

In the evaluation of *energetic* (Figure 4.41, left) and *helpful* (Figure 4.41, right), no significant difference was reported.

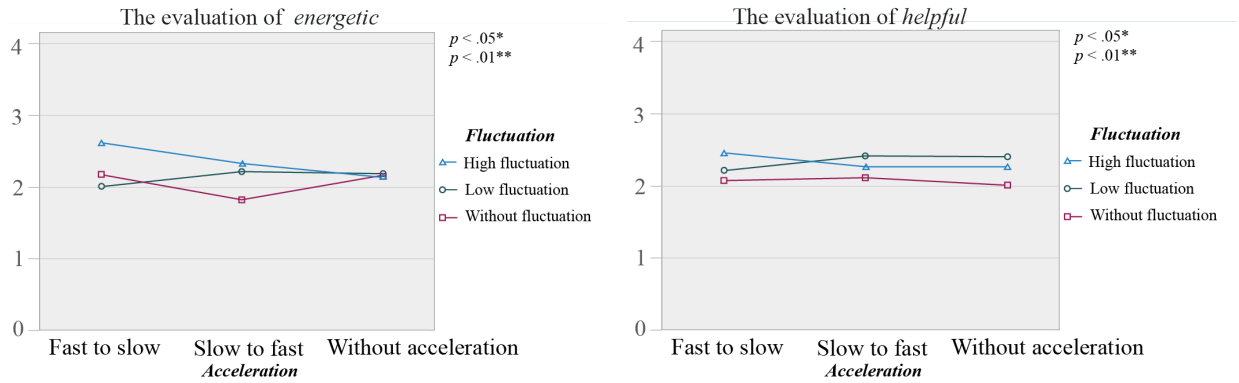

Figure 4.41. Interaction effect between acceleration and fluctuation in the evaluation of *energetic* (left), and *helpful* (right)

In the evaluation of *energy* (Figure 4.42, left) and *helpful* (Figure 4.42, right), no significant difference was reported.

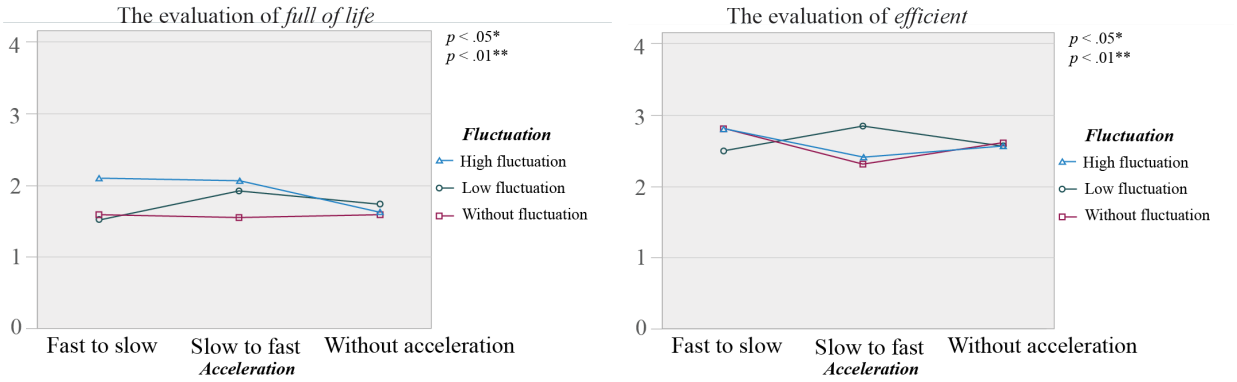

Figure 4.42. Interaction effect between acceleration and fluctuation in the evaluation of *full of life* (left), and *efficient* (right)

(3) *Angle* and *fluctuation*: The findings revealed a significant main effect was reported in the evaluation of *lively* ($p < .01$).

In the evaluation of *lively* (Figure 4.43, left), at *HF*, *60°* received a higher evaluation than *120°* ($p < .05$).

In the evaluation of vigorous (Figure 4.43, right), no significant difference was observed.

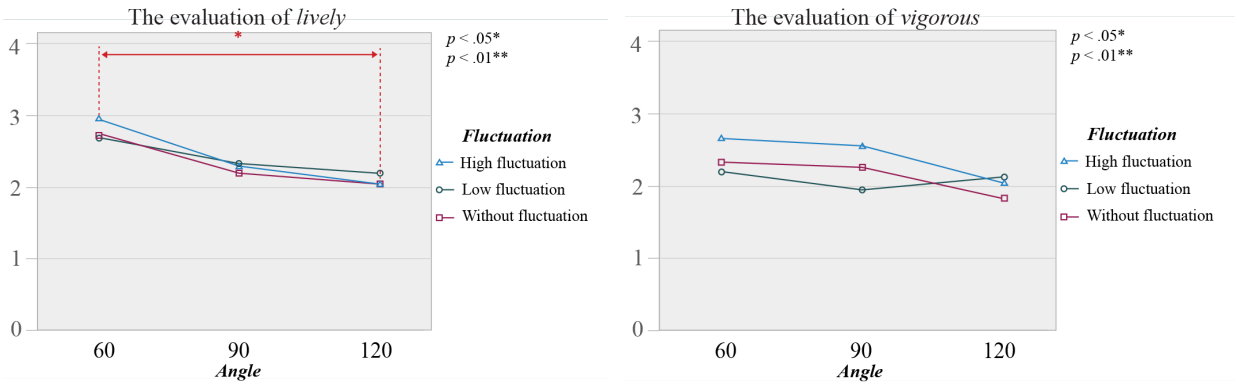

Figure 4.43. Interaction effect between angle and fluctuation in the evaluation of lively (left), and vigorous (right)

In the evaluation of *cheerful* (Figure 4.44, left) and *uneasy* (Figure 4.44, right), no significant difference was detected.

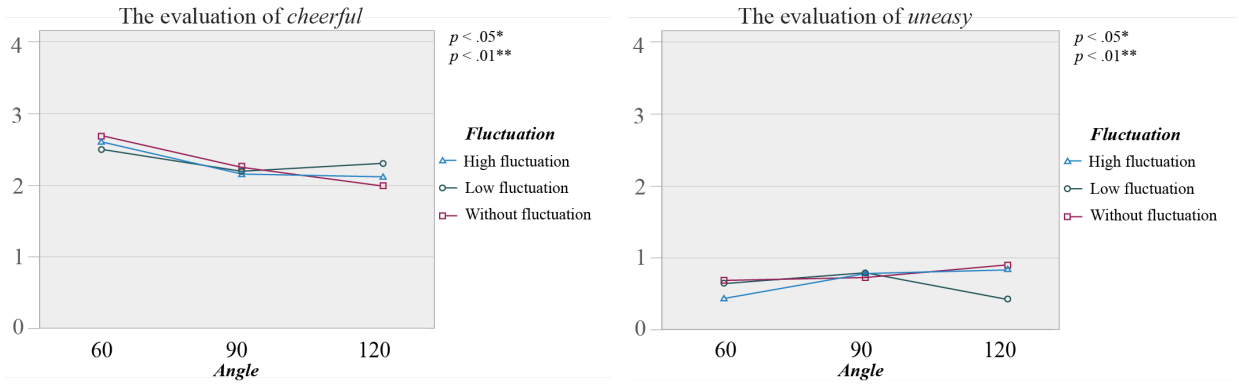

Figure 4.44. Interaction effect between angle and fluctuation in the evaluation of *cheerful* (left), and *uneasy* (right)

In the evaluation of *active* (Figure 4.45, left) and *alert* (Figure 4.45, right), no significant difference was reported.

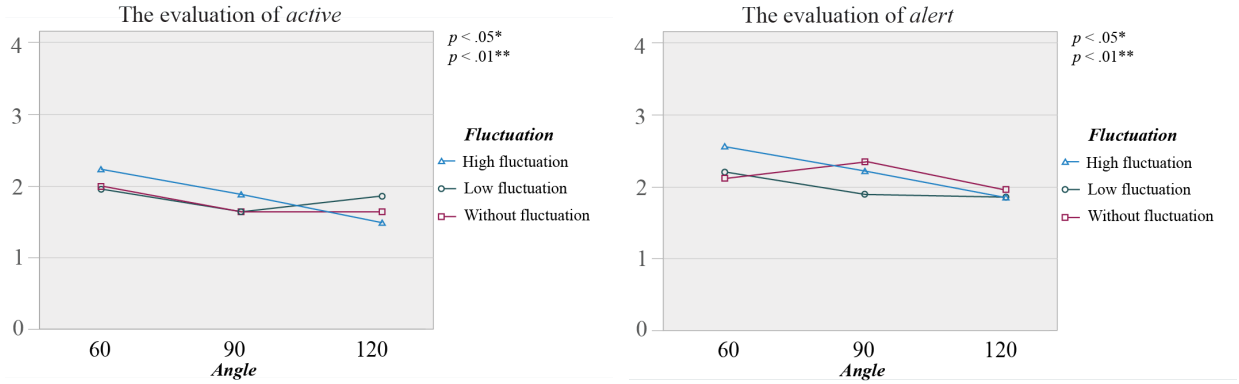

Figure 4.45. Interaction effect between angle and fluctuation in the evaluation of active (left), and alert (right)

In the evaluation of *energetic* (Figure 4.46, left) and *helpful* (Figure 4.46, right), no significant differences were reported.

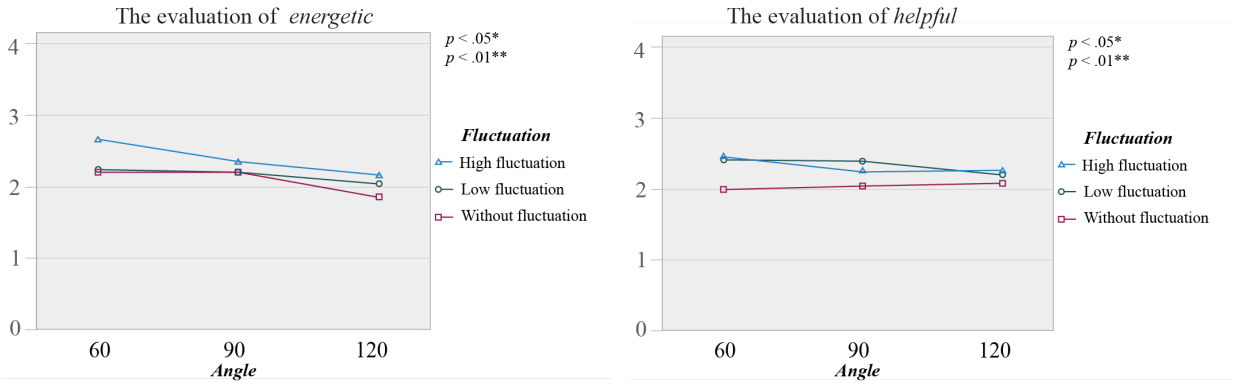

Figure 4.46. Interaction effect between acceleration and fluctuation in the evaluation of *energetic* (left), and *helpful* (right)

In the evaluation of *full of life* (Figure 4.47, left) and *efficient* (Figure 4.47, right), no significant differences were reported.

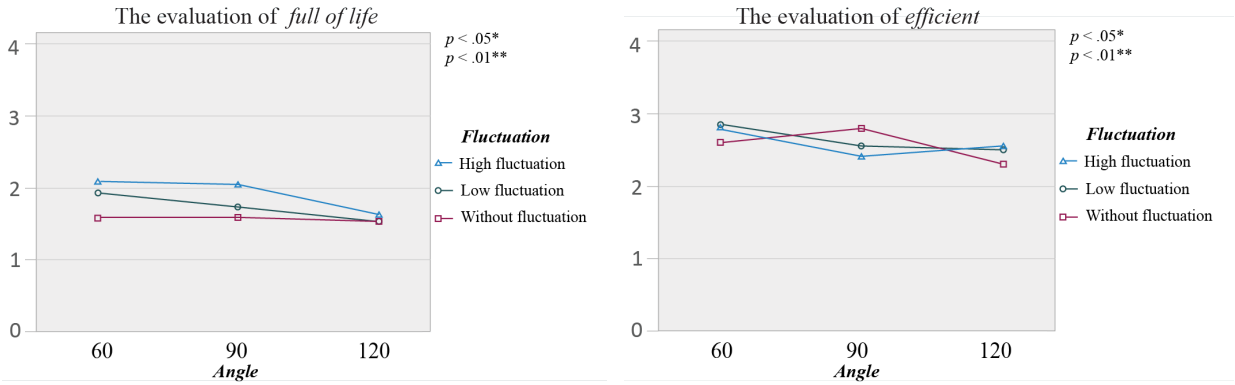

Figure 4.47. Interaction effect between acceleration and fluctuation in the evaluation of *full of life* (left), and *efficient* (right)

4.4.2.2. Evaluation on the evaluation tendency based on gender differences

The study employed a two-way ANOVA to analyze the interaction effect of three levels of three factors (*angle, acceleration, fluctuation*) and evaluation on the evaluation tendency based on gender differences. The data was reported as statistically significant at $p < .05$ and highly statistically significant at $p < .01$. The results that were obtained are as follows:

(1) *Angle* factor

In the evaluation of *lively* (Figure 4.48, left), for male participants, *60°* had a significantly higher evaluation compared to *120°* ($p < .05$).

In the evaluation of *vigorous* (Figure 4.48, right), no significant differences were reported.

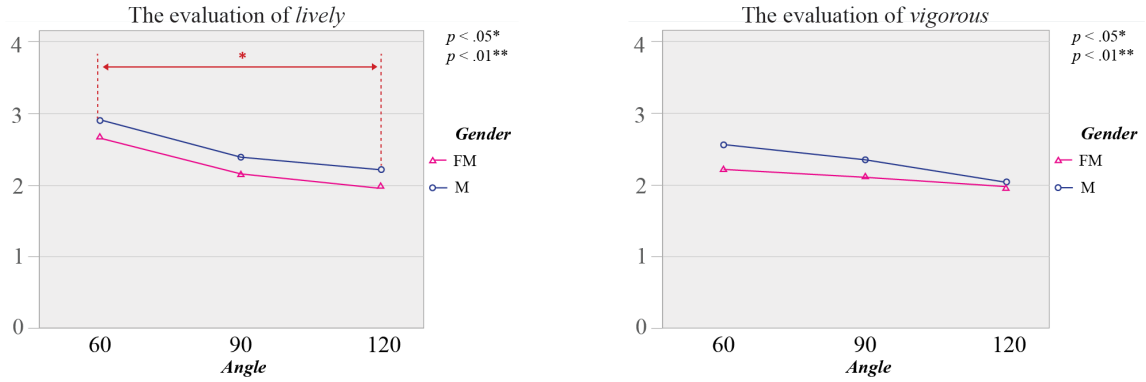

Figure 4.48. Gender Differences in the evaluation of *lively* (left) and *vigorous* (right)

In the evaluation of *cheerful* (Figure 4.49, left), and *uneasy* (Figure 4.49, right), no significant differences were reported.

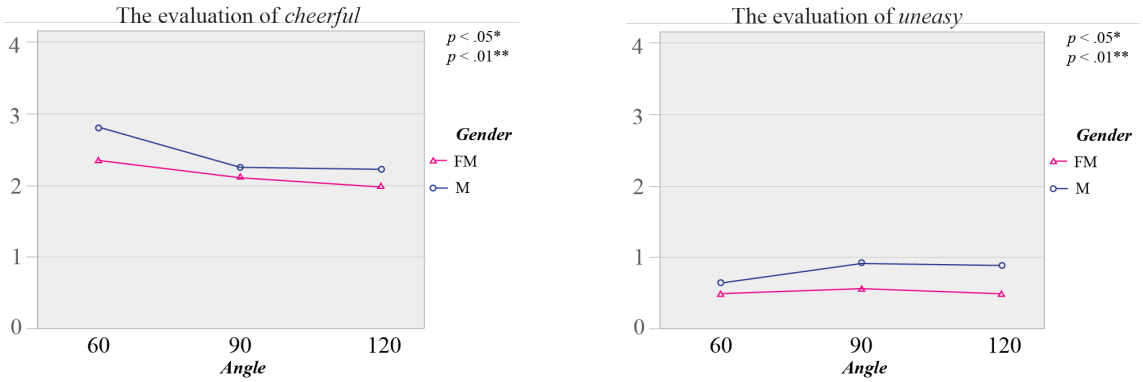

Figure 4.49. Gender Differences in the evaluation of *cheerful* (left) and *uneasy* (right)

In the evaluation of *active* (Figure 4.50, left), there were no significant differences reported.

In the evaluation of alert (Figure 4.50, right), the significant differences were reported between the male and female at *60°* ($p < .01$).

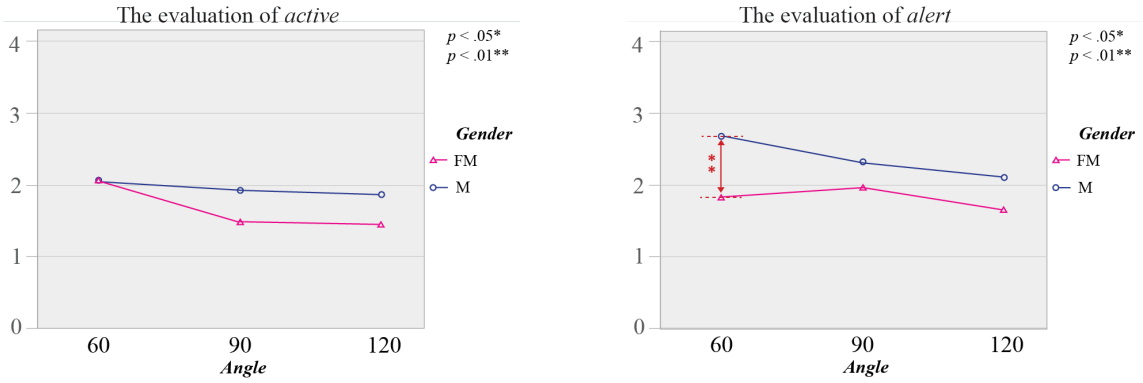

Figure 4.50. Gender Differences in the evaluation of *active* (left) and *alert* (right)

In the evaluation of *energetic* (Figure 4.51, left) and *helpful* (Figure 4.51, right), there were no significant differences reported.

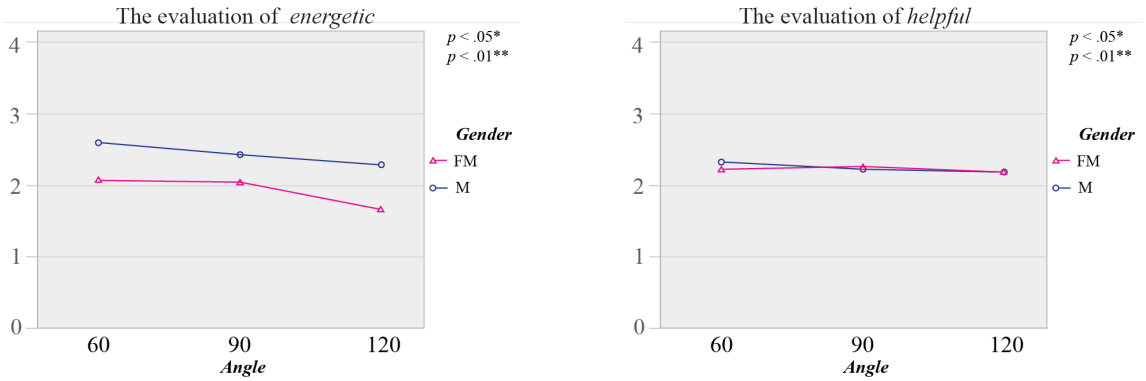

Figure 4.51. Gender Differences in the evaluation of energetic (left) and helpful (right)

In the evaluation of *full of life* (Figure 4.52, left) and *efficient* (Figure 4.52, right), no significant differences were reported.

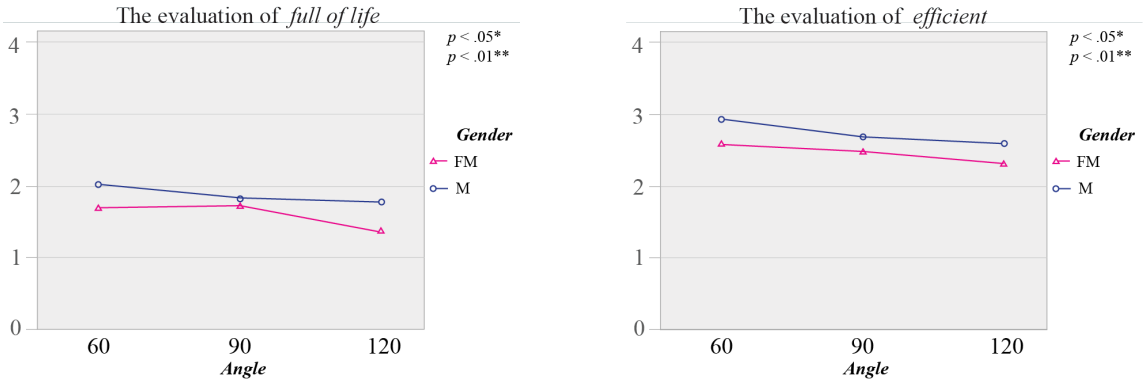

Figure 4.52. Gender Differences in the evaluation of *full of life* (left) and *efficient* (right)

(2) *Acceleration* factor

In the evaluation of *lively* (Figure 4.53, left) and *vigorous* (Figure 4.53, right), no significant differences were reported.

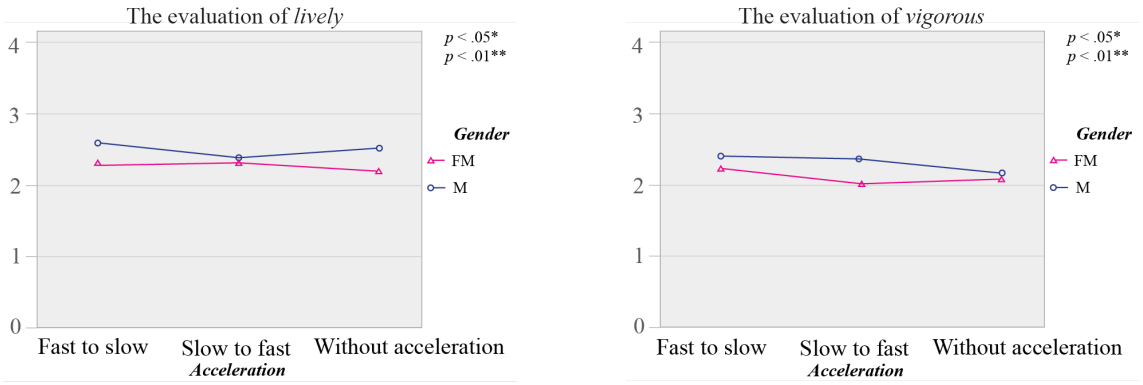

Figure 4.53. Gender Differences in the evaluation of *lively* (left) and *vigorous* (right)

In the evaluation of *cheerful* (Figure 4.54, left) and *uneasy* (Figure 4.54, right), there were no significant differences reported.

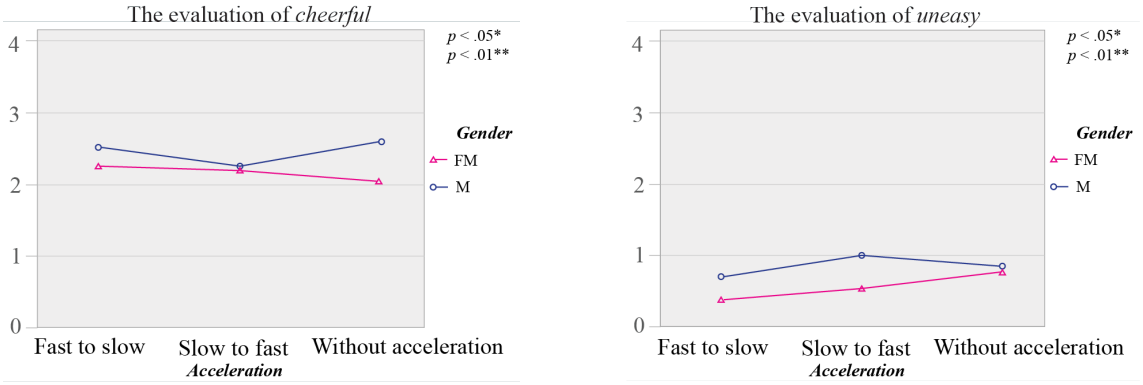

Figure 4.54. Gender Differences in the evaluation of *cheerful* (left) and *uneasy* (right)

In the evaluation of *active* (Figure 4.55, left) and *alert* (Figure 4.55, right), no significant difference was reported.

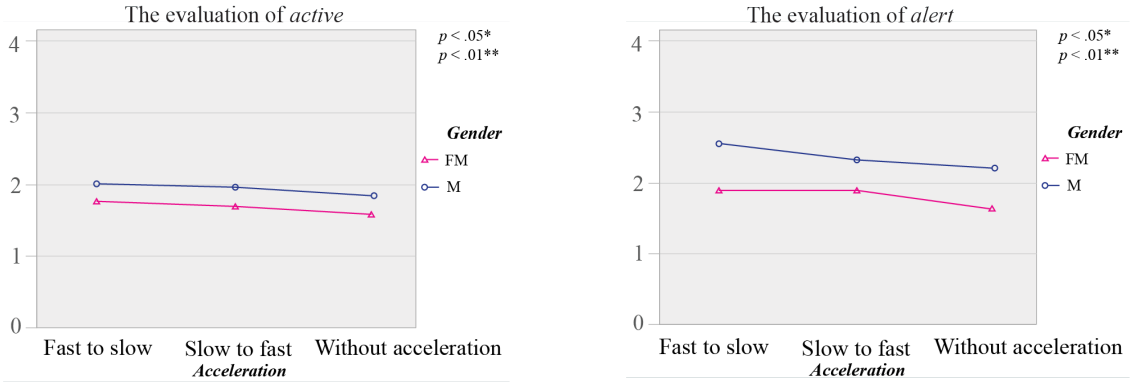

Figure 4.55. Gender Differences in the evaluation of *active* (left) and *alert* (right)

In the evaluation of *energetic* (Figure 4.56, left) and *helpful* (Figure 4.56, right), no significant differences were detected.

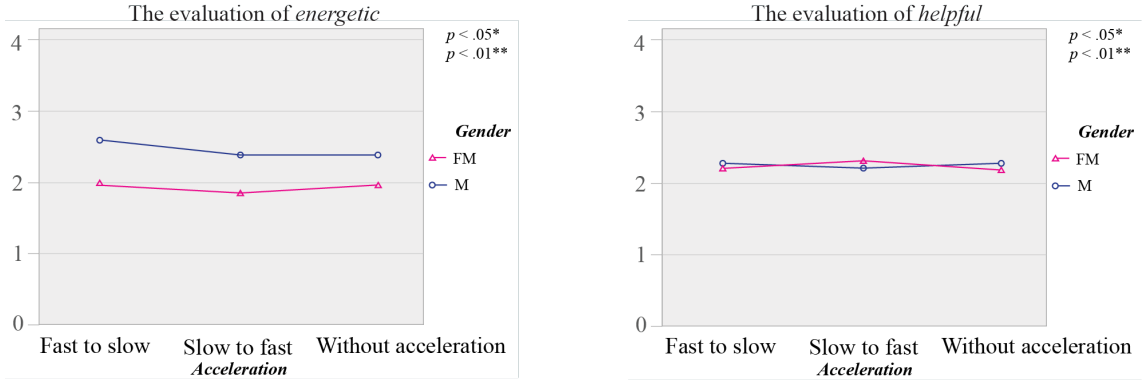

Figure 4.56. Gender Differences in the evaluation of *energetic* (left) and *helpful* (right)

In the evaluation of *full of life* (Figure 4.57, left) and *efficient* (Figure 4.57, right), there were no significant differences reported.

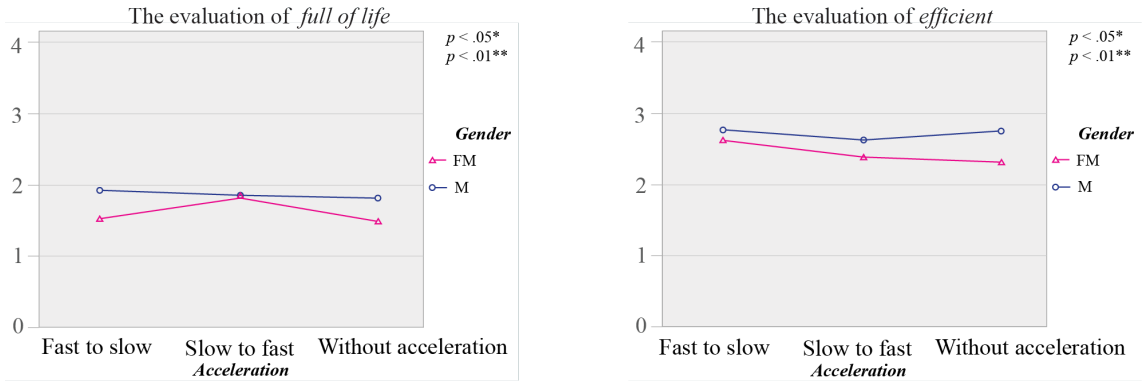

Figure 4.57. Gender Differences in the evaluation of *full of life* (left) and *efficient* (right)

(3) *Fluctuation* factor:

In the evaluation of *lively* (Figure 4.58, left) and *vigorous* (Figure 4.58, right), there were no significant differences reported.

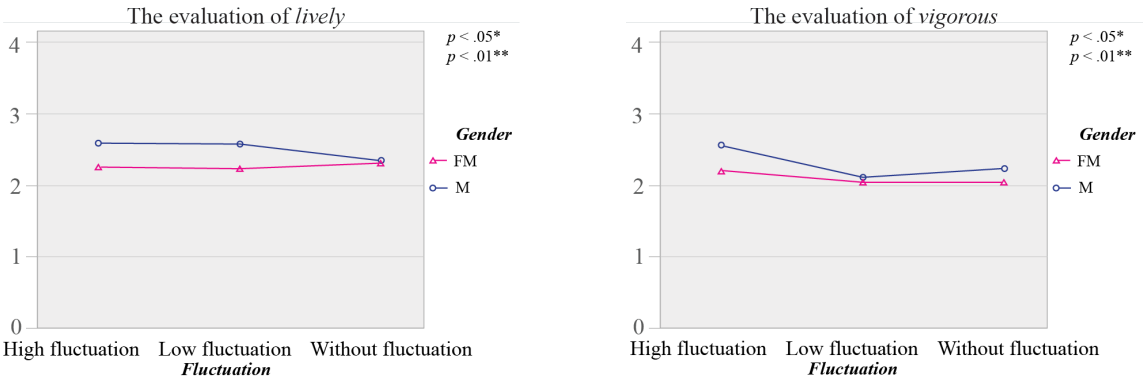

Figure 4.58. Gender Differences in the evaluation of *lively* (left) and *vigorous* (right)

In the evaluation of *cheerful* (Figure 4.59, left) and *uneasy* (Figure 4.59, right), no significant differences were reported.

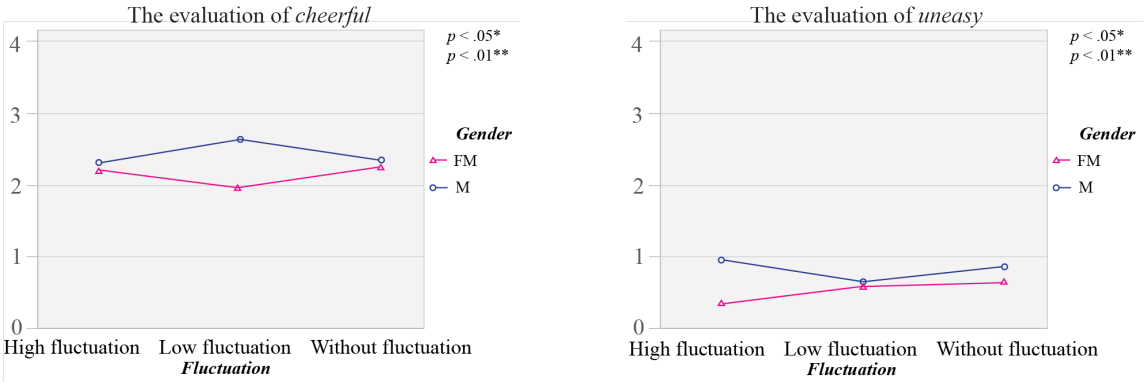

Figure 4.59. Gender Differences in the evaluation of *cheerful* (left) and *uneasy* (right)

In the evaluation of active (Figure 4.60, left), no significant differences were reported.

In the evaluation of alert (Figure 4.60, right), a significant difference was detected at *LF* ($p < .05$).

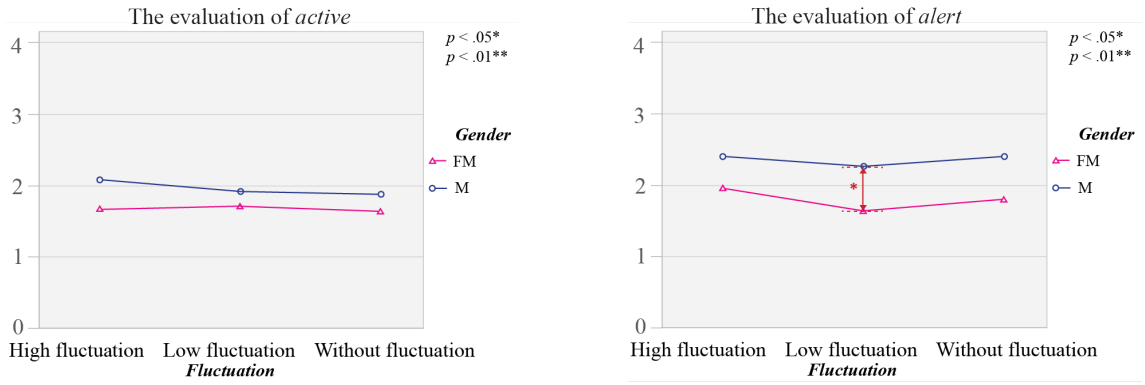

Figure 4.60. Gender Differences in the evaluation of active (left) and alert (right)

In the evaluation of *energetic* (Figure 4.61, left) and *helpful* (Figure 4.61, right), no significant difference was reported.

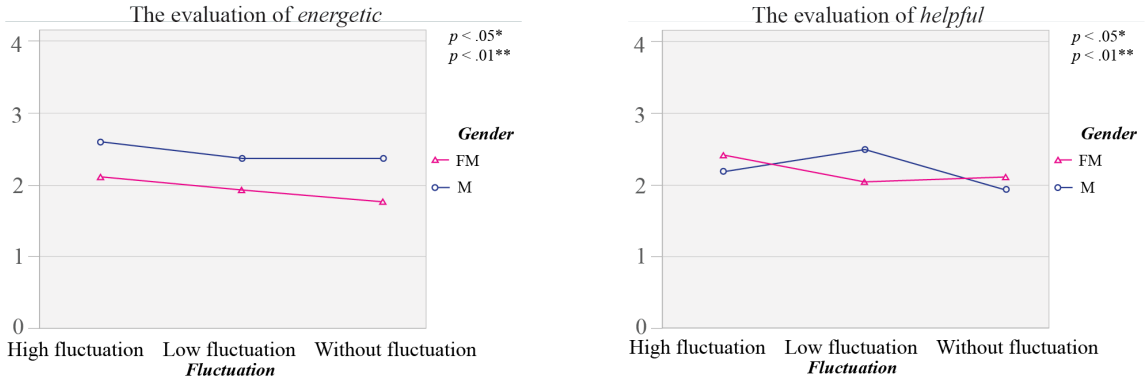

Figure 4.61. Gender Differences in the evaluation of *energetic* (left) and *helpful* (right)

In the evaluation of *full of life* (Figure 4.62, left) and *efficient* (Figure 4.62, right), there were no significant differences reported.

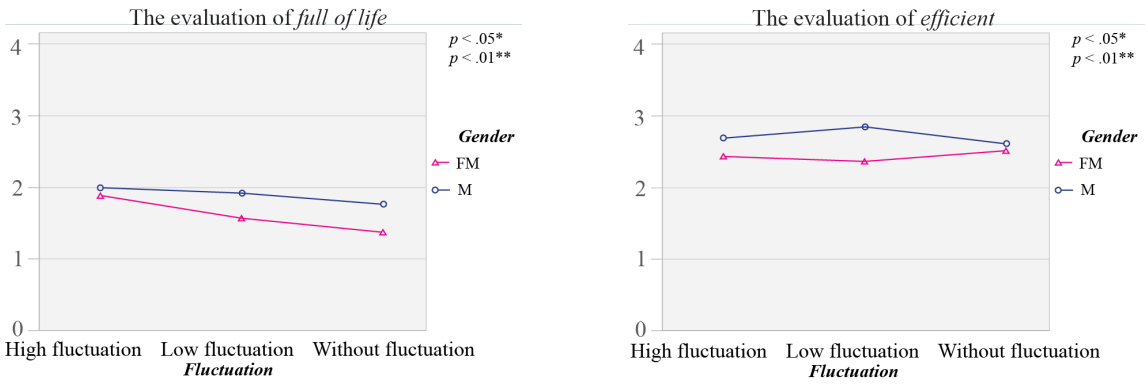

Figure 4.62. Gender Differences in the evaluation of full of life (left) and efficient (right)

4.4.2.3. Conclusion

Regarding the interaction effect between the three factors (*angle*, *acceleration*, and *fluctuation*), the following statements summarize the findings:

***Angle* and *acceleration*:** the study did not find any significant interaction effects on the evaluation.

***Acceleration* and *fluctuation*:** There were no significant differences was reported.

***Angle* and *fluctuation*:** There were no significant differences was reported.

Regarding gender differences in the evaluation, the following statements summarize the findings for each factor:

***Angle*:** There were some significant differences between male and female participants on the evaluation of alert at *60°* ($p < .01$). In terms of the evaluation of *lively*, male participants rated stimuli at *60°* significantly higher than those at *120°* ($p < .05$).

Acceleration: There were no significant differences between the evaluation by male and female participants.

***Fluctuation*:** There were some significant differences between male and female participants on the evaluation of alert at *low fluctuation* ($p < .05$).

4.4.3. Results of 10 evaluation phrases positively associated with a sense of being alive: A study on comparison between Japanese and Thai participants

The results of the analysis comparing Thai and Japanese participants in the evaluation of the three factors and three levels (*angle, acceleration,* and *fluctuation*), the results are as follows:

In the evaluation of *lively*

In the evaluation of *lively* with the *angle* factor (Figure 4.63), the results revealed a significant difference between Thai and Japanese participants in the evaluation of *angle* ($p < .01$). The mean evaluation for the three levels of *angle* (*60°*, *90°*, and *120°*) were significantly different between the two groups ($p < .01$). The findings indicated that Thai participants rated the evaluations higher compared to Japanese participants. For Thai participants, there was a significant difference between *60°* and *90°* ($p < .05$) as well as between *60°* and *120°* ($p < .01$). Similarly, for Japanese participants, there was a significant difference between *60°* and *120°* ($p < .01$).

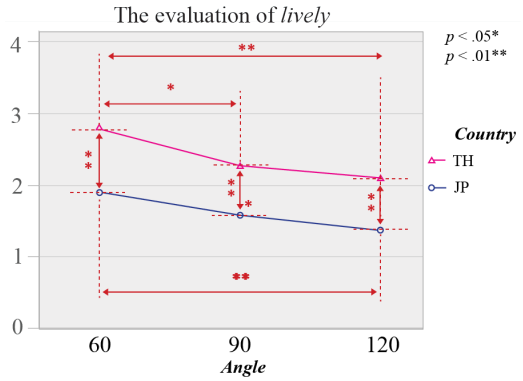

Figure 4.63. Evaluating the *angle* factor in the assessment of *lively* among Thai and Japanese participants

In the evaluation of *lively* with the *acceleration* factor (Figure 4.64), The findings reported a significant difference between Thai and Japanese participants in the evaluation of *acceleration* ($p < .01$). The mean evaluation for the three levels of *acceleration* were significantly different between the two groups: *FTS* ($p < .05$), *STF*, and *WA* ($p < .01$). The findings indicated that Thai participants rated the evaluations higher compared to Japanese participants. For Japanese participants, there was a significant difference between *FTS* and *STF* ($p < .01$).

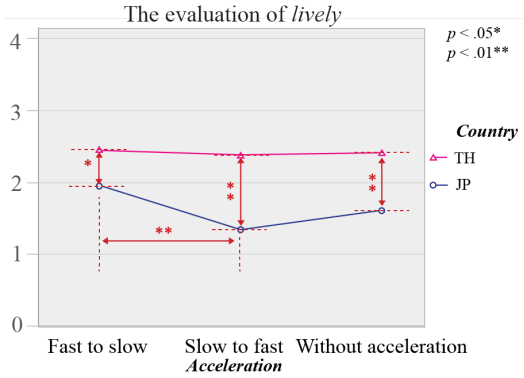

Figure 4.64. Evaluating the *acceleration* factor in the assessment of *lively* among Thai and Japanese participants

In the evaluation of *lively* with the *fluctuation* factor **(**Figure 4.65), The differences between Thai and Japanese participants in the evaluation of *fluctuation* were reported *(*$p < .01$). The mean evaluation for the three levels of *fluctuation* (*HF*, *LF*, and *WF*) were significantly different between the two groups ($p < .01$). Furthermore, Thai participants rated the evaluations higher than Japanese participants.

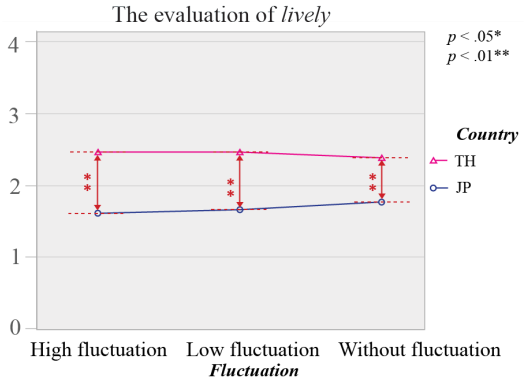

Figure 4.65. Evaluating the *fluctuation* factor in the assessment of *lively* among Thai and Japanese participants

In the evaluation of vigorous

In the evaluation of *vigorous* with the *angle* factor **(**Figure 4.66), The findings revealed a significant difference between Thai and Japanese participants in the evaluation of *angle* ($p < .01$). The mean evaluation for the three levels of *angle* were significantly different between the two groups ($p < .01$). Thai participants rated the evaluations higher than Japanese participants. The

findings also showed that, for Japanese participants, there was a significant difference between *60°* and *90°* ($p < .05$).

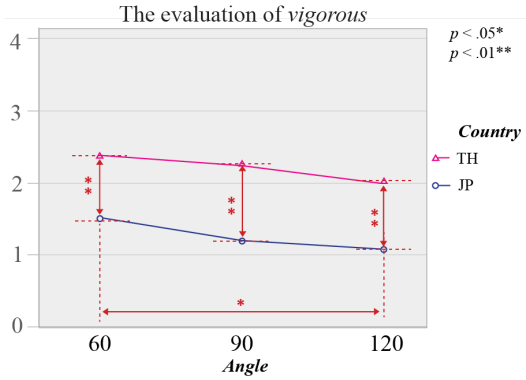

Figure 4.66. Evaluating the *angle* factor in the assessment of *vigorous* among Thai and Japanese participants

In the evaluation of *vigorous* with the *acceleration* factor, according to the results (Figure 4.67), a significant difference was reported between Thai and Japanese participants in the evaluation of *acceleration* ($p < .01$). The mean evaluations of the three levels of *acceleration* (*STF, FTS*, and *WA*) were significantly different between the two groups of participants ($p < .01$). Thai participants rated the evaluations higher than Japanese participants. For the Japanese participants, a significant difference was found, with *STF* receiving significantly higher evaluations than *STF* ($p < .05$).

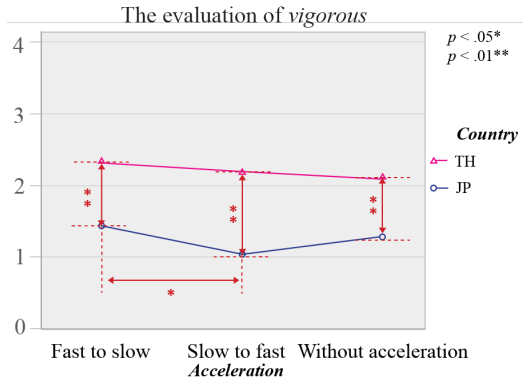

Figure 4.67. Evaluating the *acceleration* factor in the assessment of *vigorous* among Thai and Japanese participants

In the evaluation of *vigorous* with the *fluctuation* factor **(**Figure 4.68), the findings revealed significant differences between Thai and Japanese participants in the evaluation of fluctuation ($p < .01$). The mean evaluations for the three levels of fluctuation (*HF, LF*, and *WF*) were significantly different between the two groups ($p < .01$). Additionally, Thai participants rated the evaluations higher than Japanese participants. Although Thai participants rated *HF* more than both *LF* and *WF*, Japanese participants rated *WF* higher than *LF* and *HF*.

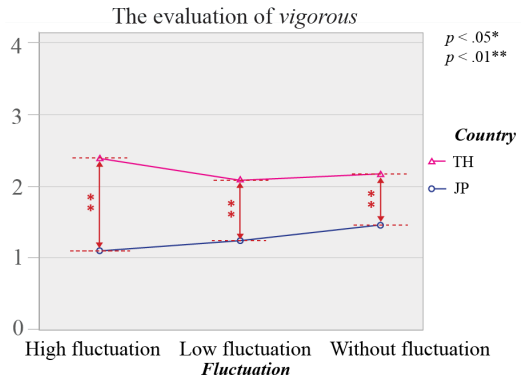

Figure 4.68. Evaluating the *fluctuation* factor in the assessment of *vigorous* among Thai and Japanese participants

In the evaluation of *cheerful*

In the evaluation of *cheerful* with the *angle* factor **(**Figure 4.69), the results showed a significant difference between Thai and Japanese participants in the evaluation of *angle* ($p < .01$). The evaluations of the three levels of *angle* (*60°*, *90°*, and *120°*) were significantly different between Thai and Japanese participants ($p < .01$). For Japanese participants, the evaluation of *60°* was significantly higher than that of *120°* ($p < .05$).

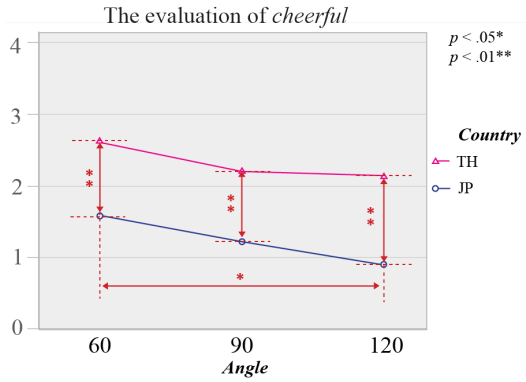

Figure 4.69. Evaluating the *angle* factor in the assessment of *cheerful* among Thai and Japanese participants

In the evaluation of *cheerful* with the *acceleration* factor (Figure 4.70), The findings revealed a significant difference between Thai and Japanese participants in the evaluation of *acceleration* ($p < .01$). The mean evaluations for the three levels of *acceleration* (*FTS, STF,* and *WF*) were significantly different between Japanese and Thai participants ($p < .01$). The results showed that Thai participants rated the evaluations higher than Japanese participants. For the evaluation by Japanese participants, *FTS* received higher ratings compared to *STF* ($p < .05$).

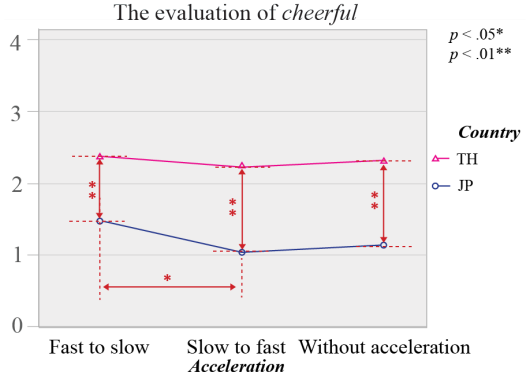

Figure 4.70. Evaluating the *acceleration* factor in the assessment of *cheerful* among Thai and Japanese participants

In the evaluation of *cheerful* with the *fluctuation* factor (Figure 4.71), Significant differences between Thai and Japanese participants in the evaluation of *fluctuation* were reported ($p < .01$). The mean evaluations for the three levels of *fluctuation* (*HF, LF,* and *WF*) were

significantly different between the two groups ($p < .01$). Thai participants rated the evaluations higher compared to Japanese participants.

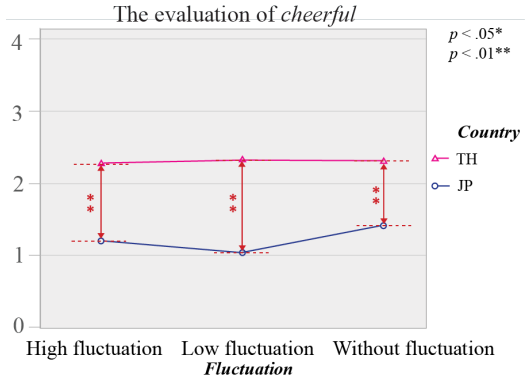

Figure 4.71. Evaluating the *fluctuation* factor in the assessment of *cheerful* among Thai and Japanese participants

In the evaluation of *uneasy*

In the evaluation of *uneasy* with the *angle* factor (Figure 4.72), the findings revealed a significant difference between Thai and Japanese participants in the evaluation of *angle* at *60°* ($p < .01$). However, there were no significant differences reported for *90°* and *120°*. For Japanese participants, the evaluation at *60°* was higher than at *120°* ($p < .05$).

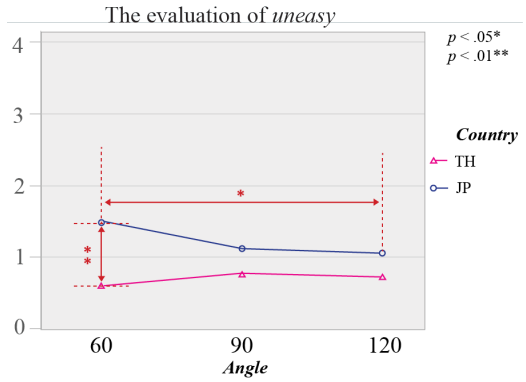

Figure 4.72. Evaluating the *angle* factor in the assessment of *uneasy* among Thai and Japanese participants

In the evaluation of *uneasy* with the *acceleration* factor (Figure 4.73), according to the results, a significant difference was reported between Thai and Japanese participants in the evaluation of *acceleration* at *FTS* ($p < .01$) and *STF* ($p < .05$). Japanese participants rated the evaluations higher than Thai participants. For the Japanese participants, a significant difference was found, with *FTS* receiving significantly higher evaluations compared to *STF* ($p < .05$).

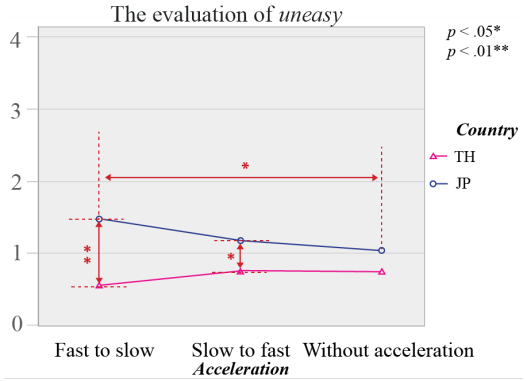

Figure 4.73. Evaluating the *acceleration* factor in the assessment of *uneasy* among Thai and Japanese participants

In the evaluation of *uneasy* with the *fluctuation* factor (Figure 4.74), there were significant differences between Thai and Japanese participants in the evaluation of *fluctuation* at *HF* and *LF* ($p < .01$). Japanese participants rated the evaluations higher compared to Thai participants at *HF* and *LF*.

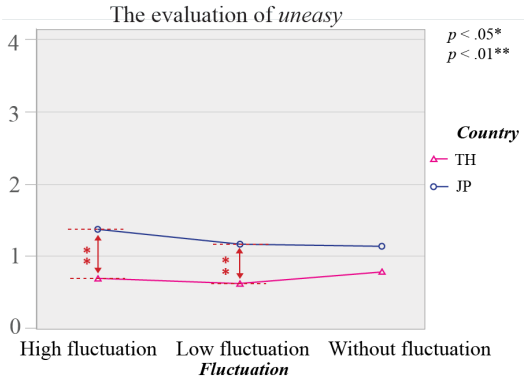

Figure 4.74. Evaluating the fluctuation factor in the assessment of uneasy among Thai and Japanese participants

In the evaluation of *active*

In the evaluation of *active* with the *angle* factor (Figure 4.75), the findings demonstrated a significant difference between Thai and Japanese participants in the evaluation of *angle* ($p < .01$). The mean evaluations for the three levels of *angle* (*60°, 90°,* and *120°*) were significantly different between the two groups of participants ($p < .01$). Thai participants rated the evaluations higher compared to Japanese participants.

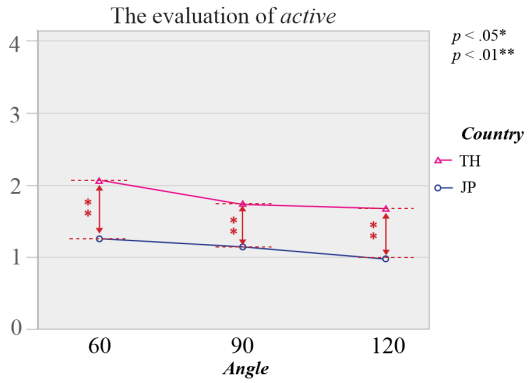

Figure 4.75. Evaluating the *angle* factor in the assessment of *active* among Thai and Japanese participants

In the evaluation of *active* with the *acceleration* factor (Figure 4.76), the findings indicated a significant difference between Thai and Japanese participants in the evaluation of *acceleration* ($p < .01$). The mean evaluations for the three levels of *acceleration* (*FTS, STF,* and *WF*) were significantly different between Japanese and Thai participants ($p < .01$). Specifically, Thai participants rated higher evaluations compared to Japanese participants. Additionally, among Japanese participants, *FTS* received higher ratings in comparison to *STF* ($p < .05$).

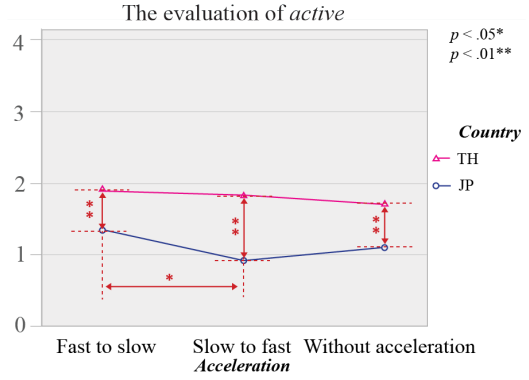

Figure 4.76. Evaluating the *acceleration* factor in the assessment of *active* among Thai and Japanese participants

In the evaluation of *active* with the *fluctuation* factor (Figure 4.77), significant differences were observed between Thai and Japanese participants in the evaluation of *fluctuation* ($p < .01$). The mean evaluations for the three levels of *fluctuation* (*HF, LF,* and *WF*) were significantly different between the two groups of participants ($p < .01$). The results indicated that Thai participants rated the evaluations higher compared to Japanese participants.

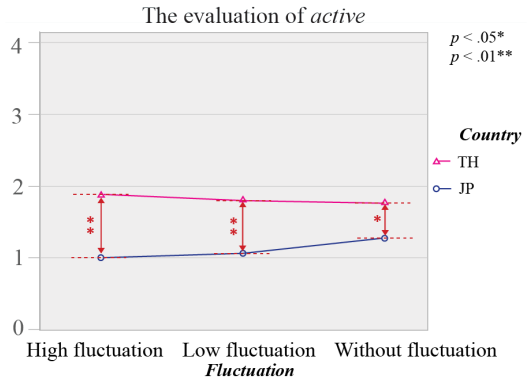

Figure 4.77. Evaluating the *fluctuation* factor in the assessment of *active* among Thai and Japanese participants

In the evaluation of *alert*

In the evaluation of *alert* with the *angle* factor (Figure 4.78), the findings demonstrated a significant difference between Thai and Japanese participants in the evaluation of *angle* ($p < .01$). The evaluations of the three levels of *angle* (*60°, 90°,* and *120°)* were significantly different between Thai and Japanese participants ($p < .01$). Specifically, for Japanese participants, the evaluation of *60°* was significantly higher than *120°*.

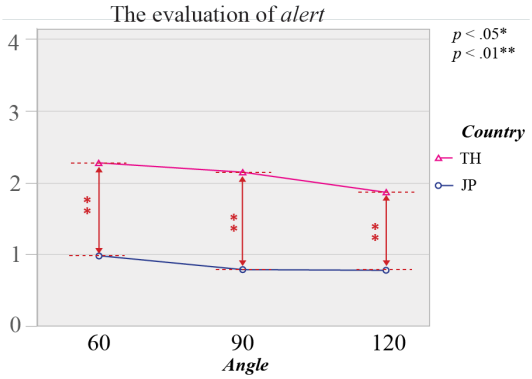

Figure 4.78. Evaluating the *angle* factor in the assessment of *alert* among Thai and Japanese participants

In the evaluation of *alert* with the *acceleration* factor (Figure 4.79), according to the results, a significant difference was reported between Thai and Japanese participants in the evaluation of *acceleration* ($p < .01$). The mean evaluations for the three levels of *acceleration* (*FTS, STF,* and *WF*) were significantly different between Japanese and Thai participants ($p < .01$).

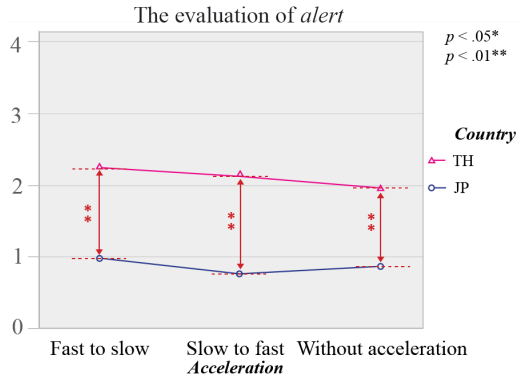

Figure 4.79. Evaluating the *acceleration* factor in the assessment of *alert* among Thai and Japanese participants

In the evaluation of *alert* with the *fluctuation* factor (Figure 4.80), the differences between Thai and Japanese participants in the evaluation of *fluctuation* were reported ($p < .01$). The mean evaluations for the three levels of fluctuation (*HF, LF,* and *WF*) were significantly different between the two groups of participants ($p < .01$). Additionally, Thai participants rated the evaluations higher than Japanese participants.

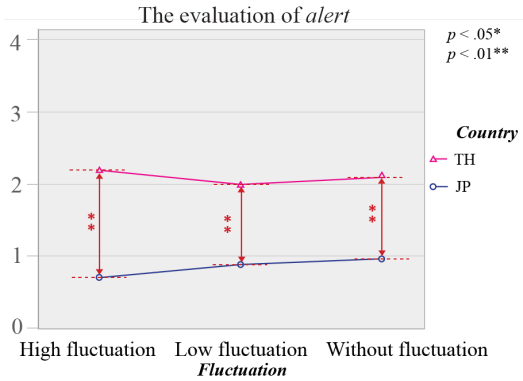

Figure 4.80. Evaluating the fluctuation factor in the assessment of alert among Thai and Japanese participants

In the evaluation of *energetic*

In the evaluation of *energetic* with the *angle* factor (Figure 4.81), the results showed a significant difference between Thai and Japanese participants in the evaluation of *angle* ($p < .01$). The mean evaluation for the three levels of *angle* (*60°, 90°,* and *120°*) was significantly different between Thai and Japanese participants *(*$p < .01$). Thai participants rated the evaluations higher compared to Japanese participants. Additionally, the findings also indicated that, for Japanese participants, there was a significant difference between *60°* and *120°* ($p < .05$).

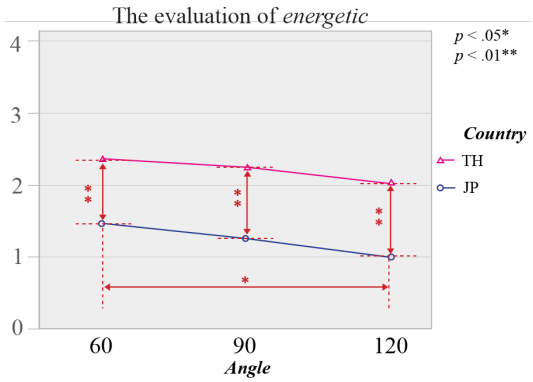

Figure 4.81. Evaluating the *angle* factor in the assessment of *energetic* among Thai and Japanese participants

In the evaluation of *energetic* with the *acceleration* factor (Figure 4.82), a significant difference was reported between Thai and Japanese participants in the evaluation of *acceleration* ($p < .01$). Additionally, the mean evaluations for the three levels of *acceleration* (*FTS, STF,* and *WF*) were found to be significantly different between Japanese and Thai participants ($p < .01$). Specifically, among Japanese participants, there was a significant difference between *FTS* and *STF* ($p < .05$).

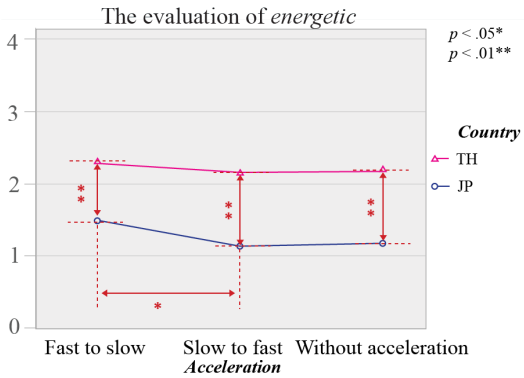

Figure 4.82. Evaluating the *acceleration* factor in the assessment of *energetic* among Thai and Japanese participants

In the evaluation of *energetic* with the *fluctuation* factor (Figure 4.83), the findings revealed significant differences between Thai and Japanese participants in the evaluation of *fluctuation* ($p < .01$). The mean evaluations for the three levels of *fluctuation* (*HF, LF,* and *WF*) were significantly different between the two groups of participants ($p < .01$). Thai participants rated the evaluations higher compared to Japanese participants.

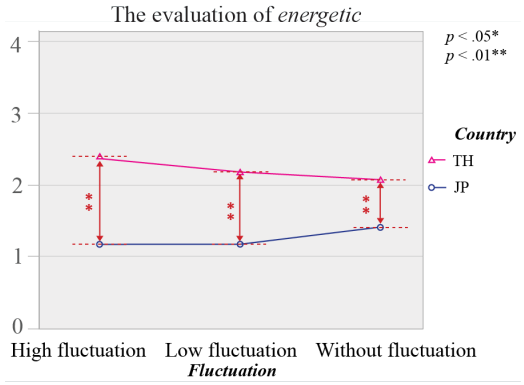

Figure 4.83. Evaluating the *fluctuation* factor in the assessment of *energetic* among Thai and Japanese participants

In the evaluation of *helpful*

In the evaluation of *helpful* with the *angle* factor (Figure 4.84), the findings indicated a significant difference between Thai and Japanese participants in the evaluation of *angle* ($p < 0.01$). The mean evaluations for the three levels of *angle* (*60°, 90°,* and *120°*) were

significantly different between Thai and Japanese participants ($p < .01$). Thai participants provide higher ratings compared to Japanese participants in the evaluations.

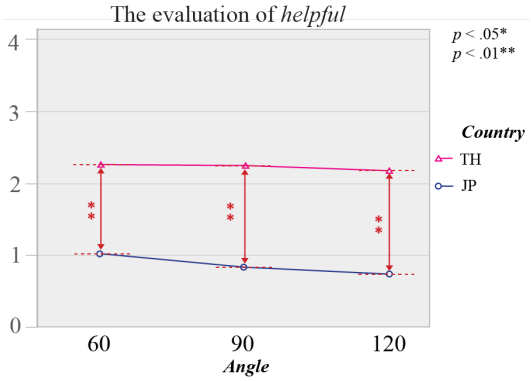

Figure 4.84. Evaluating the angle factor in the assessment of *helpful* among Thai and Japanese participants

In the evaluation of *helpful* with the *acceleration* factor (Figure 4.85), according to the finding, a significant difference was reported between Thai and Japanese participants in the evaluation of *acceleration* ($p < .01$). The average ratings for the three levels of *acceleration* (*FTS, STF*, and *WF*) showed a significant difference between Japanese and Thai participants ($p < .01$).

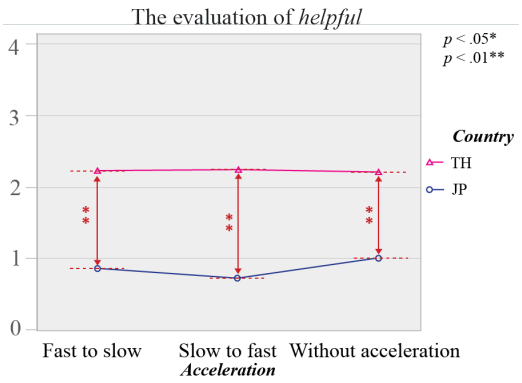

Figure 4.85. Evaluating the *acceleration* factor in the assessment of *helpful* among Thai and Japanese participants

In the evaluation of *helpful* with the *fluctuation* factor (Figure 4.86), There were significant differences observed between Thai and Japanese participants in the evaluation of *fluctuation* ($p < .01$). The mean evaluations for the three levels of *fluctuation* (*HF, LF,* and *WF*) showed

significant variations between the two participant groups ($p < .01$). The findings suggest that Thai participants rated the evaluations higher compared to Japanese participants. Furthermore, for Japanese participants, there was a significant difference, with *WF* receiving higher evaluations compared to *LF* ($p < .05$).

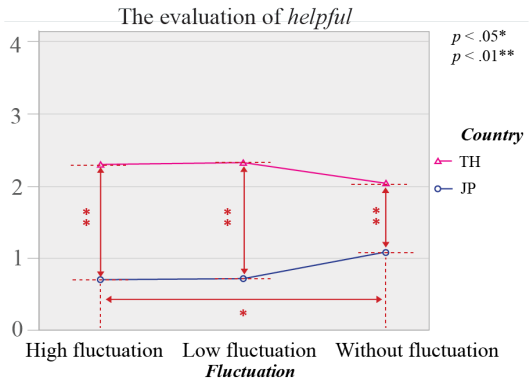

Figure 4.86. Evaluating the *fluctuation* factor in the assessment of *helpful* among Thai and Japanese participants

In the evaluation of *full of life*

In the evaluation of *full of life* with the *angle* factor (Figure 4.87), there were no significant differences reported between Thai and Japanese participants in the evaluation of the *angle* factor. However, for Japanese participants, the evaluation of *60°* received a higher rating compared to *90°* ($p < .05$) and *120°* ($p < .01$).

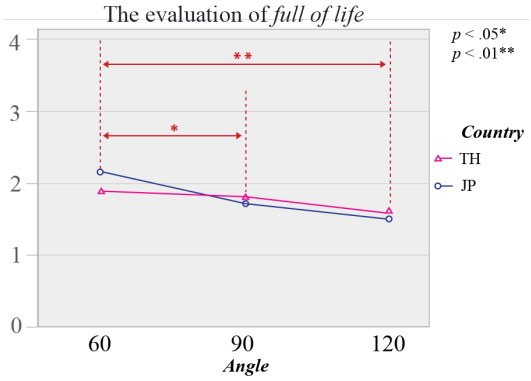

Figure 4.87. Evaluating the *angle* factor in the assessment of *full of life* among Thai and Japanese participants

In the evaluation of *full of life* with the *acceleration* factor (Figure 4.88), a significant difference was reported between Thai and Japanese participants in the evaluation of *acceleration* at *FTS* ($p < .05$), but there were no significant differences reported for *STF* and *WA*. For Japanese participants, *FTS* received higher ratings than *STF* ($p < .05$) and *WA* ($p < .01$).

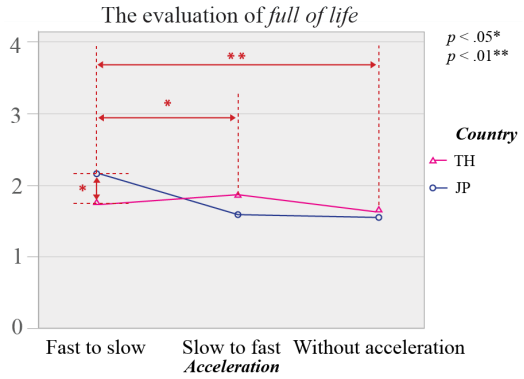

Figure 4.88. Evaluating the *acceleration* factor in the assessment of *full of life* among Thai and Japanese participants

In the evaluation of *full of life* with the *fluctuation* factor (Figure 4.89), no significant differences were reported.

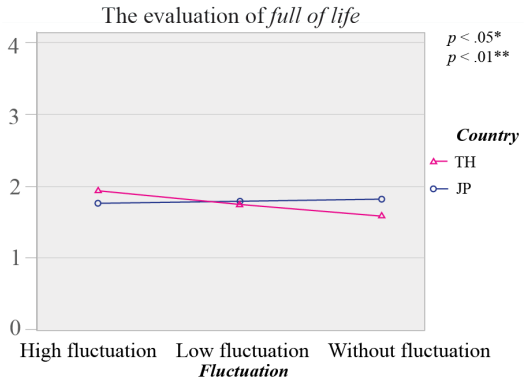

Figure 4.89. Evaluating the *acceleration* factor in the assessment of *full of life* among Thai and Japanese participants

In the evaluation of *efficient*

In the evaluation of *efficient* with the *angle* factor (Figure 4.90), the results revealed a significant difference between Thai and Japanese participants in the evaluation of *angles*

(p < 0.01). The average ratings for the three *angle* levels (*60°, 90°,* and *120°*) showed a significant difference between Thai and Japanese participants ($p < .01$). Thai participants tended to provide higher ratings in the evaluations compared to Japanese participants.

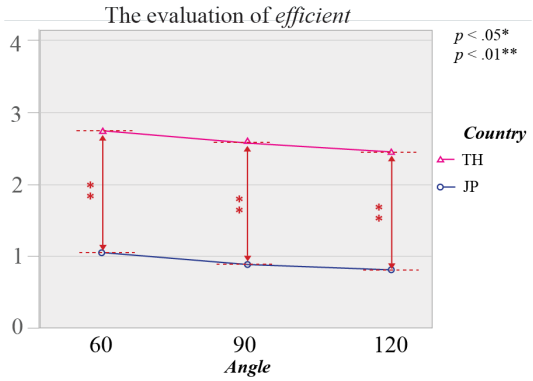

Figure 4.90. Evaluating the *angle* factor in the assessment of *efficient* among Thai and Japanese participants

In the evaluation of *efficient* with the *acceleration* factor (Figure 4.91), the findings demonstrated a significant difference between Thai and Japanese participants in the evaluation of *acceleration* ($p < .01$). The mean evaluations for the three levels of *acceleration* (*FTS, STF,* and *WF*) were significantly different between Japanese and Thai participants ($p < .01$).

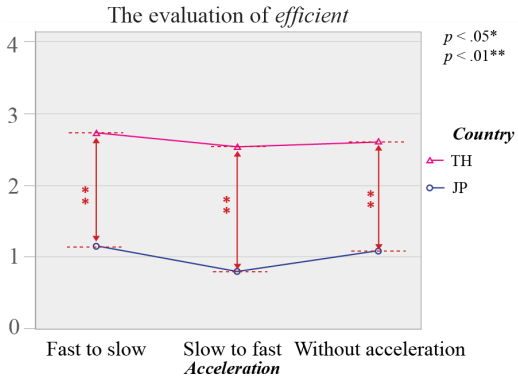

Figure 4.91. Evaluating the *acceleration* factor in the assessment of *efficient* among Thai and Japanese participants

In the evaluation of *efficient* with the *fluctuation* factor (Figure 4.92), significant differences were observed between Thai and Japanese participants in the evaluation of *fluctuation*

(p < 0.01). The mean evaluations for the three levels of *fluctuation* (*HF, LF,* and *WF*) were significantly different between the Japanese and Thai participants (p < .01). Furthermore, the results indicated that Japanese participants rated *WF* significantly higher than *HF* (p < .05).

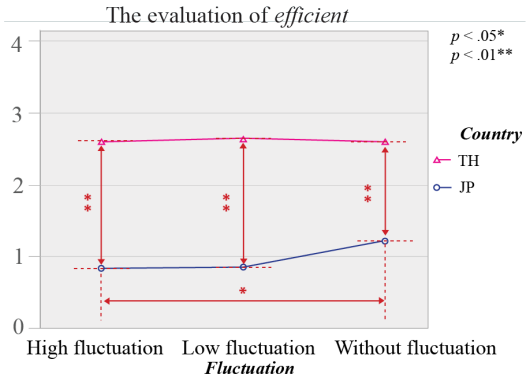

Figure 4.92. Evaluating the *fluctuation* factor in the assessment of *efficient* among Thai and Japanese participants

4.4.3.1. Evaluation of the tendency to evaluate based on gender differences combining the results of both Thai and Japanese male and female participants

The study employed a two-way ANOVA to analyze the interaction effect of three levels of three factors (*angle, acceleration*, *fluctuation*) and evaluation on the evaluation tendency based on gender differences of Japanese and Thai participants. The data was reported as statistically significant at $p < .05$ and highly statistically significant at $p < .01$. The results that were obtained are as follows:

In the evaluation of *lively*

In the evaluation of *lively* with the *angle* factor (Figure 4.93, left), no significant differences between males and females were reported. For female participants, the evaluation at *60°* was significantly higher than at both *90°* ($p < .05$) and *120°* ($p < .01$).

In the evaluation of *lively* with the acceleration factor (Figure 4.93, right), there were significant differences between males and females reported at *STF* ($p < .05$). For male participants, *FTS* was significantly higher than *STF* ($p < .01$).

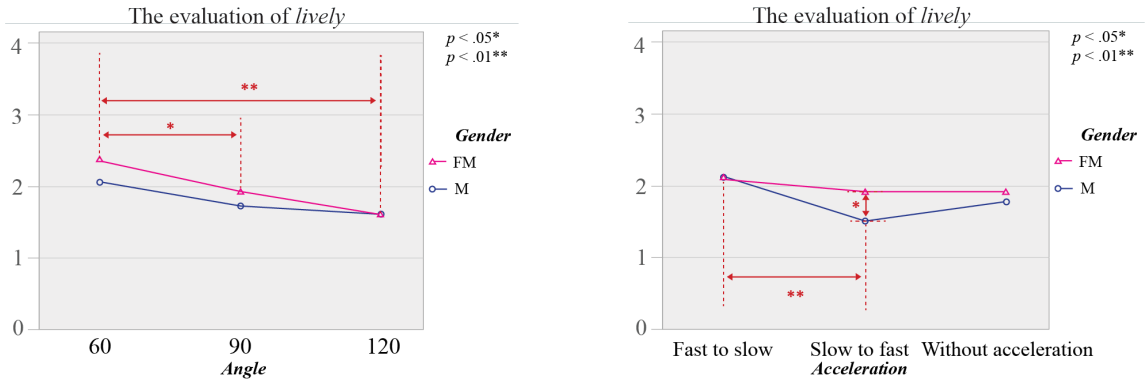

Figure 4.93. Gender differences in the evaluation of *lively* with the *angle* factor (left) and the *acceleration* factor (right)

In the evaluation of *lively* with the *fluctuation* factor (Figure 4.94), no significant differences were reported between male and female participants.

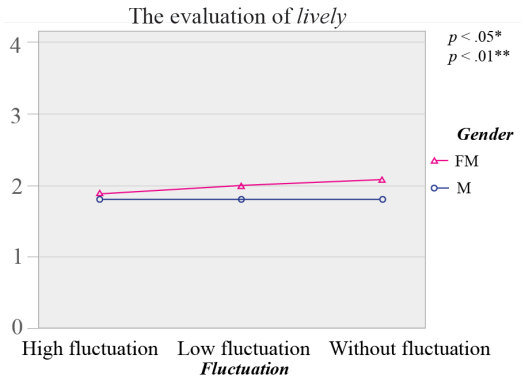

Figure 4.94. Gender differences in the evaluation of *lively* with the *fluctuation* factor

In the evaluation of *vigorous*

In the evaluation of *vigorous* with the *angle* factor (Figure 4.95, left), no significant differences were observed between male and female participants.

In the evaluation of *vigorous* with the *acceleration* factor (Figure 4.95, right), the evaluation results showed a significant difference between males and females at STF ($p < .05$).

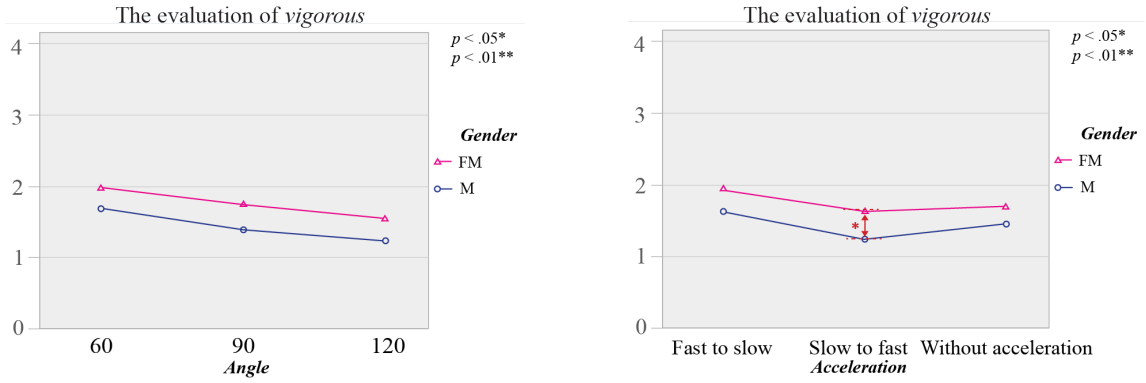

Figure 4.95. Gender differences in the evaluation of *vigorous* with the *angle* factor (left) and the *acceleration* factor (right)

In the evaluation of *vigorous* with the *fluctuation* factor (Figure 4.96), a significant difference between males and females was observed at *LF* ($p < .05$).

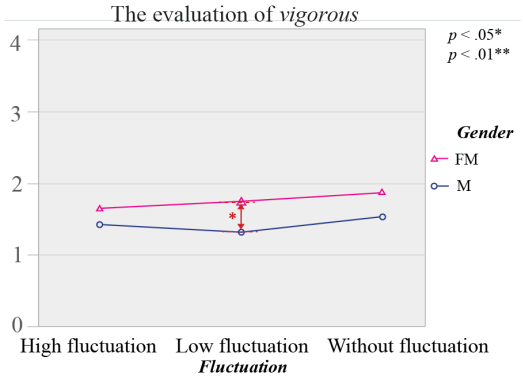

Figure 4.96. Gender differences in the evaluation of *vigorous* with the *fluctuation* factor

In the evaluation of *cheerful*

In the evaluation of *cheerful* with the *angle* factor (Figure 4.97, left), no significant differences were found between males and females. For female participants, the evaluation at *60°* was significantly higher than at *120°* ($p < .01$). Similarly, for male participants, there was a significant difference ($p < .05$).

In the evaluation of *cheerful* with the *acceleration* factor (Figure 4.97, right), no significant differences were reported between male and female participants.

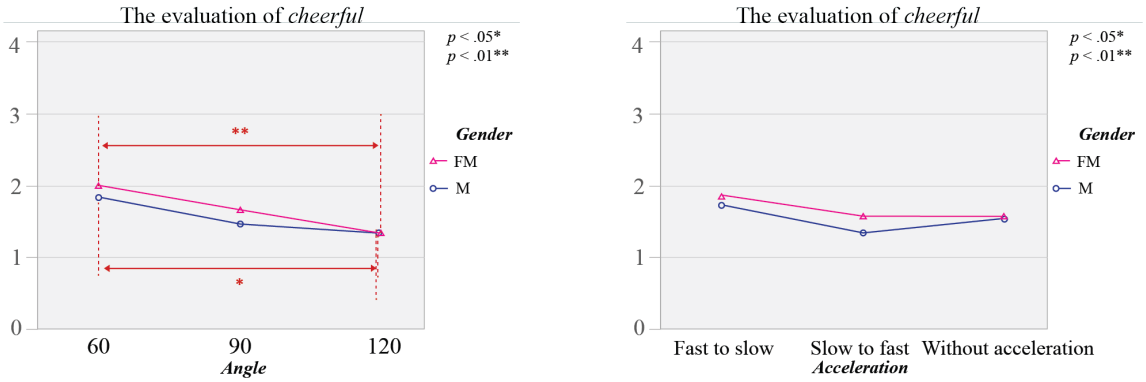

Figure 4.97. Gender differences in the evaluation of *cheerful* with the *angle* factor (left) and the *acceleration* factor (right)

In the evaluation of *cheerful* with the *fluctuation* factor (Figure 4.98), there were no significant differences reported between males and females.

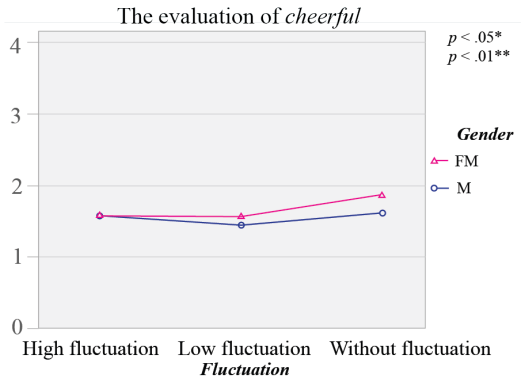

Figure 4.98. Gender differences in the evaluation of cheerful with the *fluctuation* factor

In the evaluation of *uneasy*

In the evaluation of *uneasy* with the *angle* factor (Figure 4.99, left), a significant difference between males and females was observed at *60°* ($p < .05$).

In the evaluation of *uneasy* with the *acceleration* factor (Figure 4.99, right), no significant differences were reported between male and female participants.

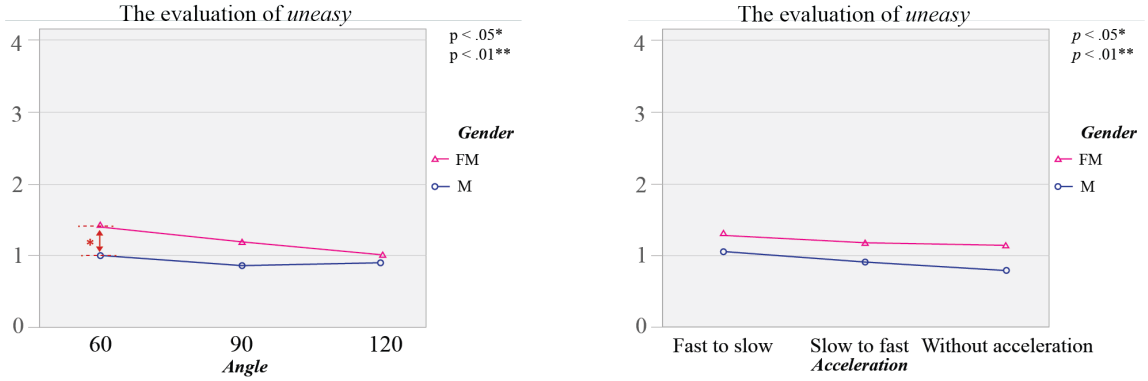

Figure 4.99. Gender differences in the evaluation of *uneasy* with the *angle* factor (left) and the *acceleration* factor (right)

In the evaluation of *uneasy* with the *fluctuation* factor (Figure 4.100), there was a significant difference reported between males and females at *LF* and *WF* ($p < .05$).

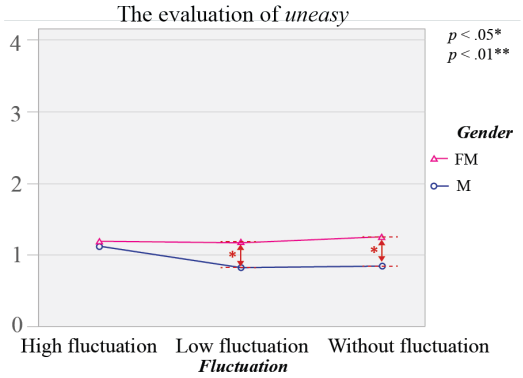

Figure 4.100. Gender differences in the evaluation of *uneasy* with the *fluctuation* factor

In the evaluation of *active*

In the evaluation of *active* with the *angle* factor (Figure 4.101, left), a significant difference between males and females were reported at *60°* ($p < .05$).

In the evaluation of *active* with the *acceleration* factor (Figure 4.101, right), there was a significant difference reported between males and females at *STF* ($p < .05$). For male participants, *FTS* was significantly higher than *STF* ($p < .05$).

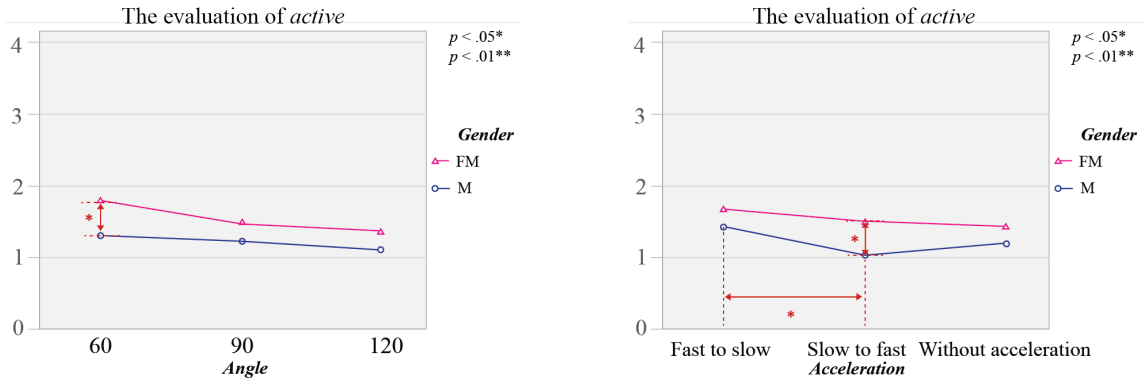

Figure 4.101. Gender differences in the evaluation of *active* with the *angle* factor (left) and the *acceleration* factor (right)

In the evaluation of *active* with the *fluctuation* factor (Figure 4.102), there was a significant difference reported between males and *females* at LF ($p < .05$).

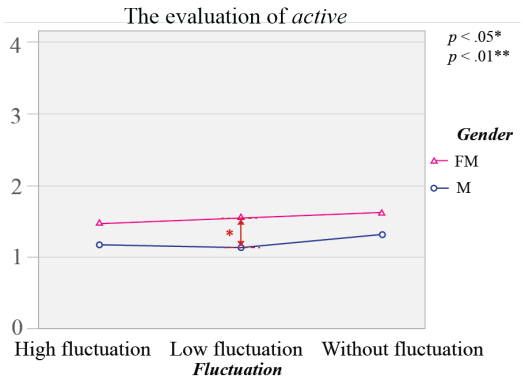

Figure 4.102. Gender differences in the evaluation of *active* with the *fluctuation* factor

In the evaluation of alert

In the evaluation of *alert* with the *angle* factor (Figure 4.103, left), no significant differences were reported between male and female participants.

In the evaluation of *alert* with the *acceleration* factor (Figure 4.103, right), there was a significant difference reported between males and females at *STF* ($p < .05$).

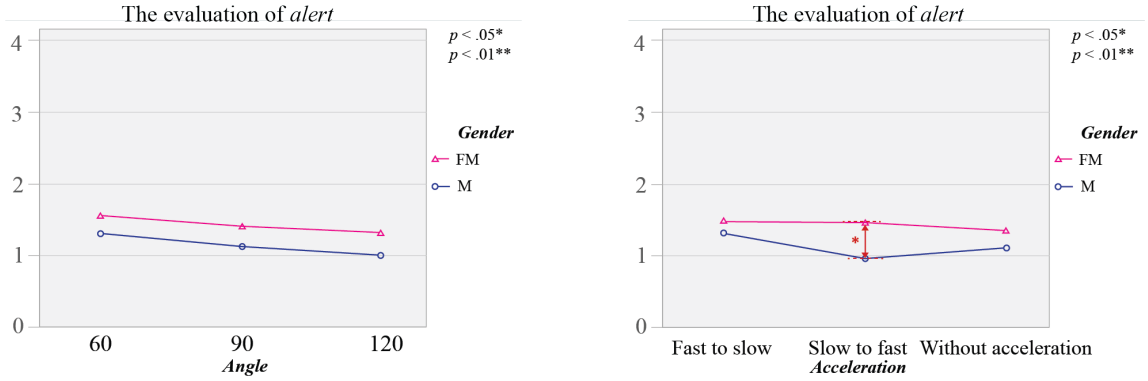

Figure 4.103. Gender differences in the evaluation of *alert* with the *angle* factor (left) and the *acceleration* factor (right)

In the evaluation of *alert* with the *fluctuation* factor (Figure 4.104), no significant differences were observed between male and female participants.

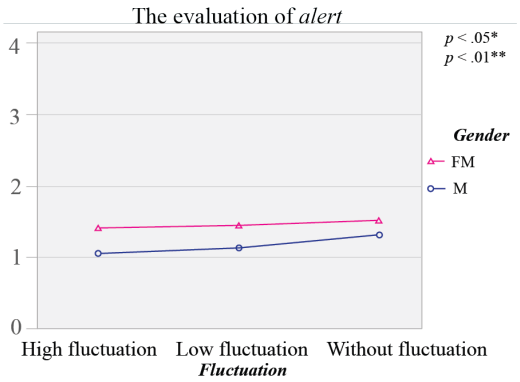

Figure 4.104. Gender differences in the evaluation of *alert* with the *fluctuation* factor

In the evaluation of *energetic*

In the evaluation of energetic with the *angle* factor (Figure 4.105, left), no significant differences were reported between male and female participants. For female participants, *60°* obtained significantly higher scores than *120°* ($p < .05$).

In the evaluation of *energetic* with the *acceleration* factor (Figure 4.105, right), there was no significant difference reported between males and females.

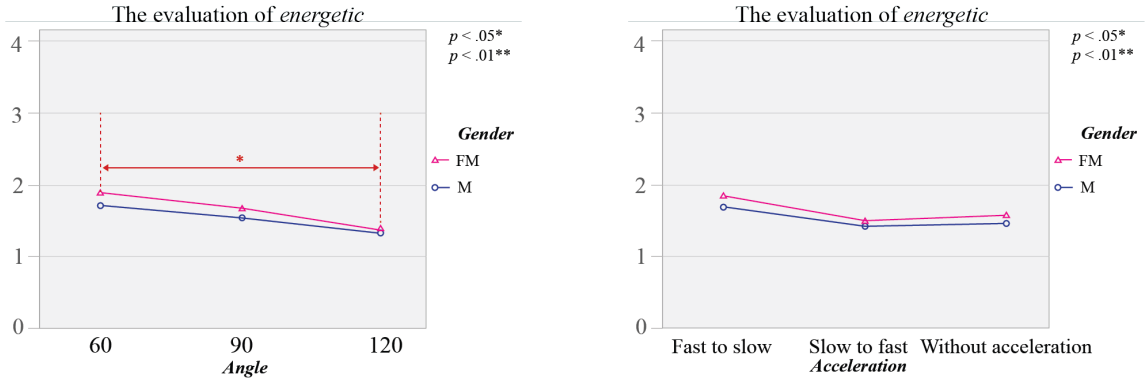

Figure 4.105. Gender differences in the evaluation of *energetic* with the *angle* factor (left) and the *acceleration* factor (right)

In the evaluation of *energetic* with the *fluctuation* factor (Figure 4.106), no significant differences were reported between male and female participants.

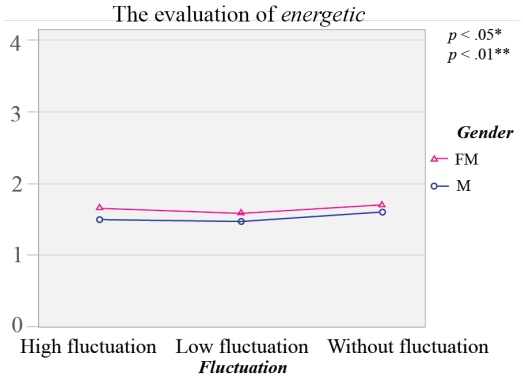

Figure 4.106. Gender differences in the evaluation of *energetic* with the *fluctuation* factor

In the evaluation of *helpful*

In the evaluation of *helpful* with the *angle* factor (Figure 4.107, left), a significant difference between males and females were reported at *90°* and *120°* ($p < .05$).

In the evaluation of *helpful* with the *acceleration* factor (Figure 4.107, right), a statistically significant difference was observed between male and female participants in the evaluation at *FTS* and *STF* ($p < .05$).

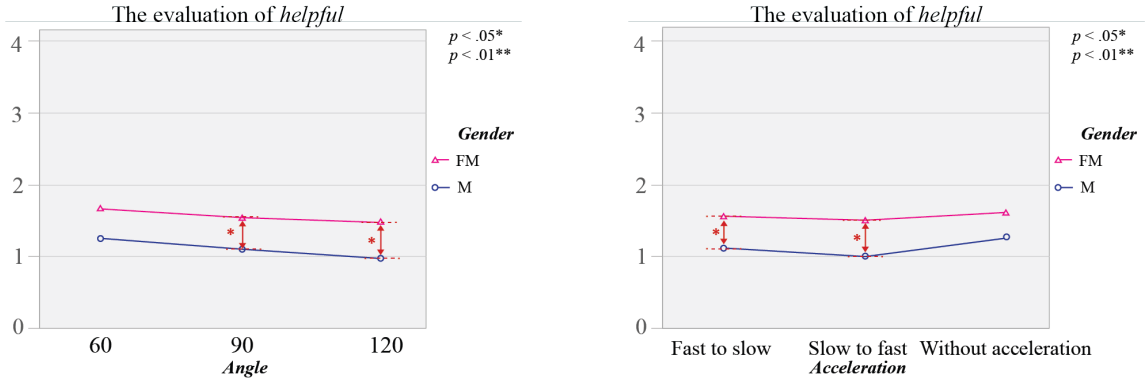

Figure 4.107. Gender differences in the evaluation of *helpful* with the *angle* factor (left) and the *acceleration* factor (right)

In the evaluation of *helpful* with the *fluctuation* factor (Figure 4.108), there was a significant difference between males and females at *WF* ($p < .01$).

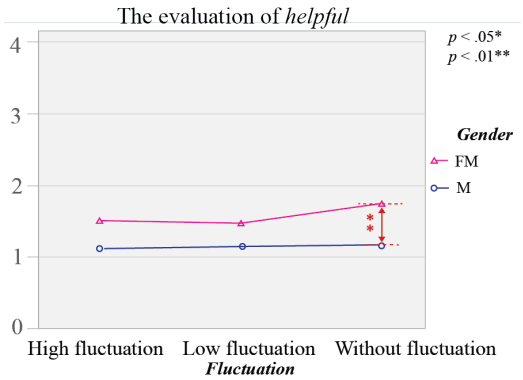

Figure 4.108. Gender differences in the evaluation of *fluctuation* with the *helpful* factor

In the evaluation of *full of life*

In the evaluation of *full of life* with the *angle* factor (Figure 4.109, left), no statistically significant difference was reported between male and female participants. Female participants rated *60°* significantly higher than *120°* ($p < .01$).

In the evaluation of *full of life* with the *acceleration* factor (Figure 4.109, right), there were no significant differences found between male and female participants. For male participants, *FTS* received significantly higher ratings compared to *WA* ($p < .05$).

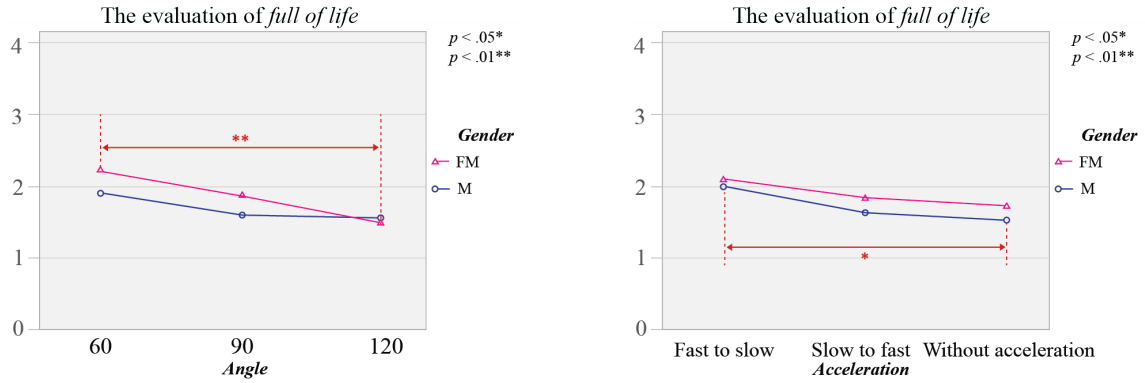

Figure 4.109. Gender differences in the evaluation of *full of life* with the *angle* factor (left) and the *acceleration* factor (right)

In the evaluation of *full of life* with the *fluctuation* factor (Figure 4.110), no significant difference was observed between male and female participants.

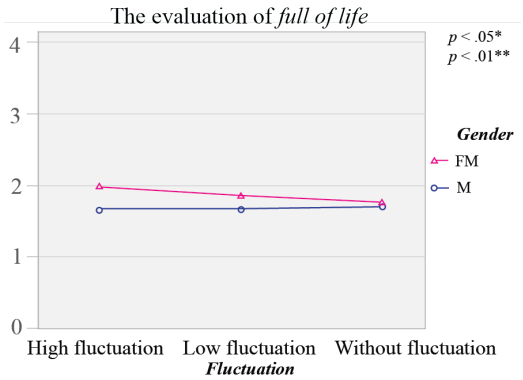

Figure 4.110. Gender differences in the evaluation of *full of life* with the *fluctuation* factor

In the evaluation of *efficient*

In the evaluation of *efficient* with the *angle* factor (Figure 4.111, left), no statistically significant differences were observed between male and female participants.

In the evaluation of *efficient* with the *acceleration* factor (Figure 4.111, right), a statistically significant difference was found between male and female participants in the evaluation of *STF* ($p < .05$).

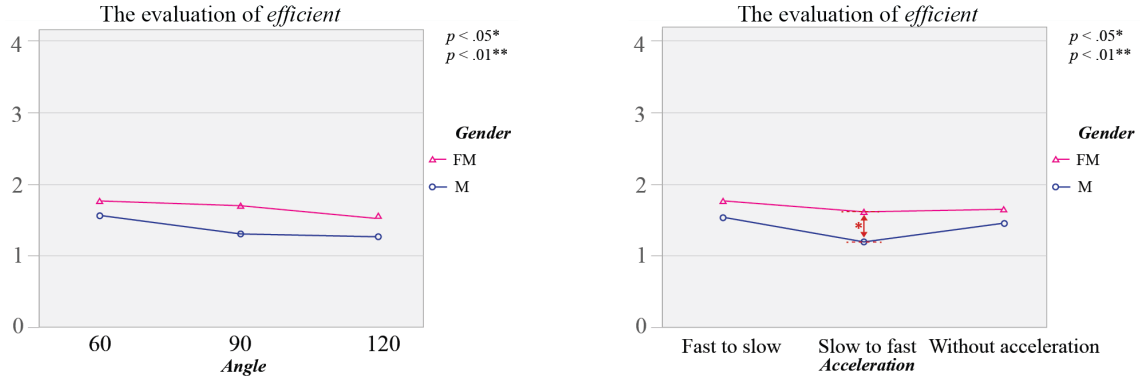

Figure 4.111. Gender differences in the evaluation of *efficient* with the *angle* factor (left) and the *acceleration* factor (right)

In the evaluation of *efficient* with the *fluctuation* factor (Figure 4.112), no statistically significant difference was reported between male and female participants.

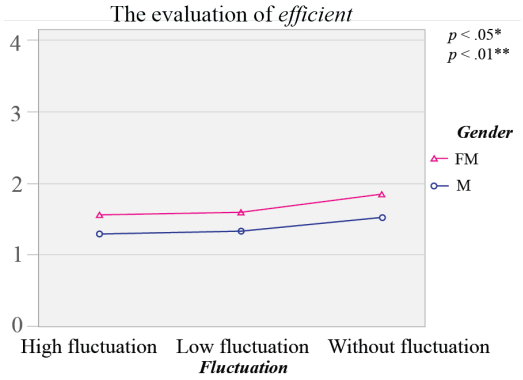

Figure 4.112. Gender differences in the evaluation of *efficient* with the *fluctuation* factor

4.4.3.2. Conclusion

Regarding the differences in evaluation based on the country background of participants, the results are as follows:

Thai participants rated higher on the evaluation of traits such as *lively, vigorous, cheerful, active, alert, energetic, helpful,* and *efficient* compared to Japanese participants ($p < .01$). Conversely, Japanese participants rated higher on the evaluation of uneasiness compared to Thai participants at angle factor: *60°* ($p < .01$), *acceleration* factor: *FTS* ($p < .01$) and *STF* ($p < .05$), and *fluctuation* factor: *HF* and *LF* ($p < .01$).

Regarding the evaluation of *full of life*, there were no significant differences between Thai and Japanese participants in terms of *angle* and *fluctuation* factors. However, at *acceleration* level *FTS*, Thai participants rated higher ($p <. 05$).

Regarding gender differences in the evaluation, the results are as follows:

Angle: Significant differences were found between males and females in the evaluation of *uneasy* and *active*. Females rated the evaluation higher than males at *60°* ($p < .05$). Additionally, in the evaluation of *helpful*, females rated the evaluation higher than males at *90°* and *120°* ($p < .05$).

Acceleration: Females rated the evaluation higher than males at *STF* ($p < .05$) in the evaluation of *lively, vigorous, active, alert, efficient*, and in the evaluation of *helpful* at *FTS* and *STF* ($p < .05$).

***Fluctuation*:** Females rated higher than males at *LF* ($p < .05$) in the evaluation of *vigorous* and *active*. Females also rated higher than males at LF and WF ($p < .05$) in the evaluation of *uneasy*. Furthermore, in the evaluation of helpful, females rated the evaluation higher than males at *WF* ($p < .01$).

4.4.4. Results of 10 evaluation phrases negatively associated with a sense of being alive: A study with Japanese participants

4.4.4.1. The interaction effect of the three factors on the evaluation of the sense of being alive

An ANOVA was conducted to assess the nine different stimuli on the evaluation of the sense of being alive by Japanese participants. The findings revealed significant differences among the stimuli. The reported data demonstrates statistical significance at $p < .05$ and high statistical significance at $p < 01$. The results are presented as follow:

(1) *Angle* and *acceleration*:

In the evaluation of *carefree*

In the evaluation of *carefree* (Figure 4.113, left), the obtained results revealed a significant interaction effect between *angle* and *acceleration* ($p < .01$) and a main effect of *acceleration* ($p < .01$). At *60°*, *WA* received a higher evaluation compared to both *STF* and *FTS* ($p < .01$). At *90°*, *FTS* received a higher evaluation than *WA* ($p < .05$) and *STF* ($p < .01$). At *WA*, *60°* received a higher evaluation compared to *90°* and *120°*. At *FTS*, *60°* obtained a higher evaluation than *90°* ($p < .01$).

In the evaluation of *rebellious*

In the evaluation of *rebellious* (Figure 4.113, right), the obtained results showed a significant interaction effect between *angle* and *acceleration* ($p < .01$). At *60°*, *FTS* received a higher evaluation compared to *WA* ($p < .05$). Additionally, at *FTS*, *60°* had a significantly higher evaluation than *90°* ($p < .05$).

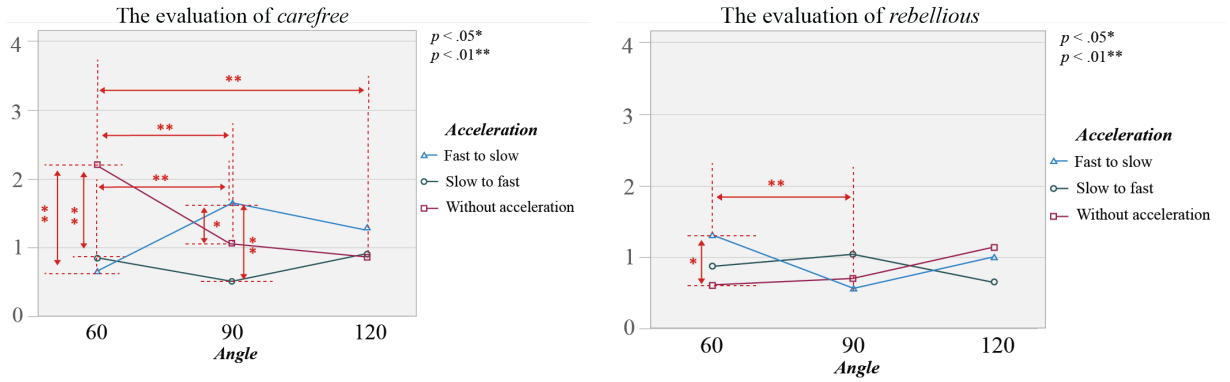

Figure 4.113. Interaction effect between *angle* and *acceleration* in the evaluation of *carefree* (left) and *rebellious* (right)

In the evaluation of *angry*

In the evaluation of *angry* (Figure 4.114, left), the finding showed a significant interaction effect between *angle* and *acceleration* ($p < .01$). At *60°*, *FTS* received a higher evaluation compared to *WA* ($p < .01$). At *90°*, *STF* obtained a higher evaluation than *WA* ($p < .05$) and *FTS* ($p < .01$). At *FTS*, *60°* obtained a higher evaluation than *90°* ($p < .01$). At *STF*, *90°* received a higher evaluation than *120°* ($p < .01$). At *WA*, *90°* received a higher evaluation than *120°* ($p < .01$).

In the evaluation of *spiteful*

In the evaluation of *spiteful* (Figure 4.114, right), the results revealed that a significant interaction effect between *angle* and *acceleration* ($p < .01$). At *60°*, *FTS* received a higher evaluation compared to *WA* ($p < .01$). At *90°*, *STF* obtained a higher evaluation than *FTS* ($p < .05$). At *FTS*, *60°* obtained a higher evaluation than *90°* ($p < .01$).

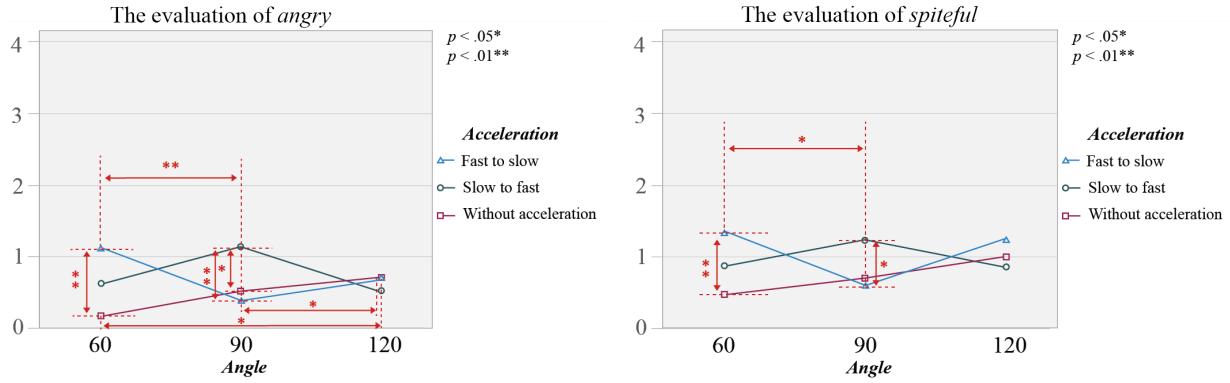

Figure 4.114. Interaction effect between *angle* and *acceleration* in the evaluation of *angry* (left) and *spiteful* (right)

In the evaluation of *bad tempered*

In the evaluation of *bad tempered* (Figure 4.115, left), the finding showed a significant interaction effect between *angle* and *acceleration* ($p < .01$) and a main effect of *acceleration* ($p < .05$). At *60°*, both *FTS* and *STF* received a higher evaluation compared to *WA* ($p < .01$). At *90°*, *STF* received a higher evaluation than *WA* ($p < .05$) and *FTS* ($p < .01$). At *FTS*, *90°* obtained a lower evaluation than *60°* ($p < .01$) and *120°* ($p < .05$). At *STW*, *90°* received higher evaluation than *120°* ($p < .05$). At *WA*, *60°* received lower evaluation than both of *90°* and *120°* ($p < .01$).

In the evaluation of *resentful*

In the evaluation of *resentful* (Figure 4.115, right), the result revealed a significant interaction effect between *angle* and *acceleration* ($p < .01$). At *60°*, *FTS* received a higher evaluation compared to *WA* ($p < .01$). At *90°*, *STF* received a higher evaluation than both *WA* and *FTS* ($p < .01$). At *FTS*, *60°* received a higher evaluation than *90°* ($p < .01$) and *120°* ($p < .05$). At *WA*, *120°* received higher evaluation than *60°* ($p < .05$).

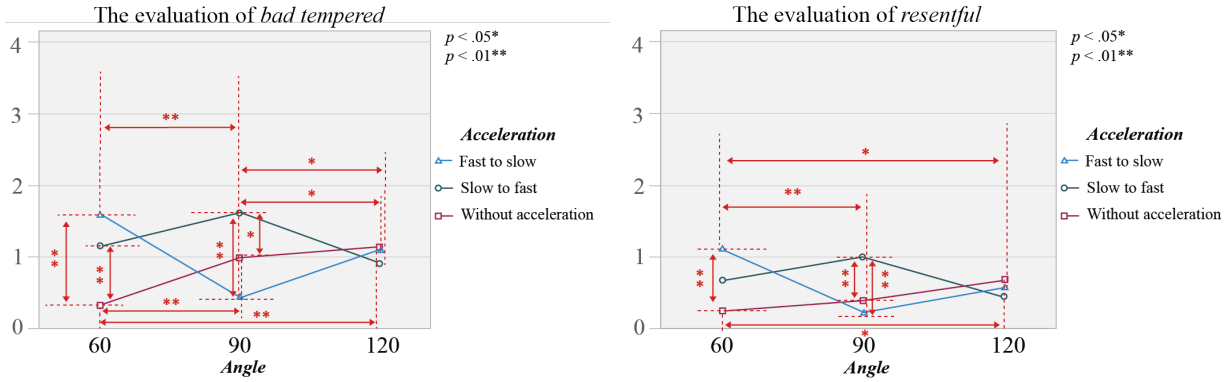

Figure 4.115. Interaction effect between *angle* and *acceleration* in the evaluation of *bad tempered* (left) and *resentful* (right)

In the evaluation of *furious*

In the evaluation of *furious* (Figure 4.116, left), the result showed a significant interaction effect between *angle* and *acceleration* ($p < .01$). At *60°*, *FTS* received a higher evaluation than *WA* ($p < .01$). At *90°*, *STF* received a higher evaluation than both *WA* and *FTS* ($p < .01$). At *FTS*, *60°* received a higher evaluation than *90°* ($p < .01$). At *STF*, *90°* received higher evaluation than both *60°* and *120°* ($p < .05$).

In the evaluation of *peeved*

In the evaluation of *peeved* (Figure 4.116, right), the result showed a significant interaction effect between *angle* and *acceleration* ($p < .01$) and a main effect of *acceleration* ($p < .05$). At *60°*, *WA* received a lower evaluation than both *FTS* ($p < .01$) and *STF* ($p < .05$). At *90°*, *STF* received a higher evaluation compared to *FTS* ($p < .01$). At *FTS*, *60°* received a higher evaluation than *90°* ($p < .05$).

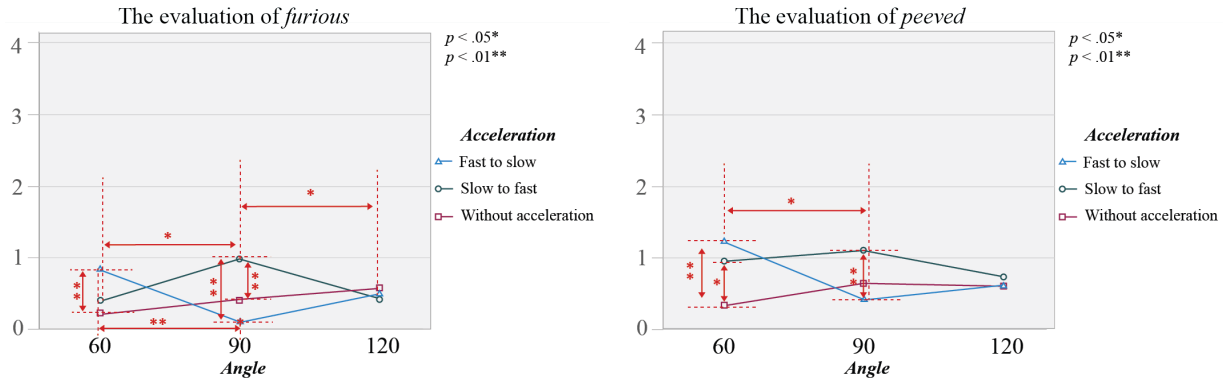

Figure 4.116. Interaction effect between *angle* and *acceleration* in the evaluation of *furious* (left) and *peeved* (right)

In the evaluation of *grouchy*

In the evaluation of *grouchy* (Figure 4.117, left), the obtained results showed a significant interaction effect between *angle* and *acceleration* ($p < .01$) and a main effect of acceleration ($p < .05$). At *60°*, *FTS* received a higher evaluation compared to both *STF* ($p < .05$) and *WA* ($p < .01$). At *90°*, *STF* received a higher evaluation than both *WA* ($p < .05$) and *FTS* ($p < .01$). At *FTS*, *60°* received a higher evaluation compared to *90°* ($p < .05$). At *STF*, *90°* received a higher evaluation compared to *60°* ($p < .05$). At *WA*, *120°* received a higher evaluation compared to *60°* ($p < .01$).

In the evaluation of *ready to fight*

In the evaluation of *ready to fight* (Figure 4.117, right), the obtained results revealed a significant interaction effect between *angle* and *acceleration* ($p < .01$). At *60°*, *FTS* received a

higher evaluation compared to and *WA* ($p < .05$). At *90°*, *STF* received a higher evaluation than *WA* ($p < .05$). Additionally, at *FTS*, *60°* received a higher evaluation than *90°* ($p < .01$).

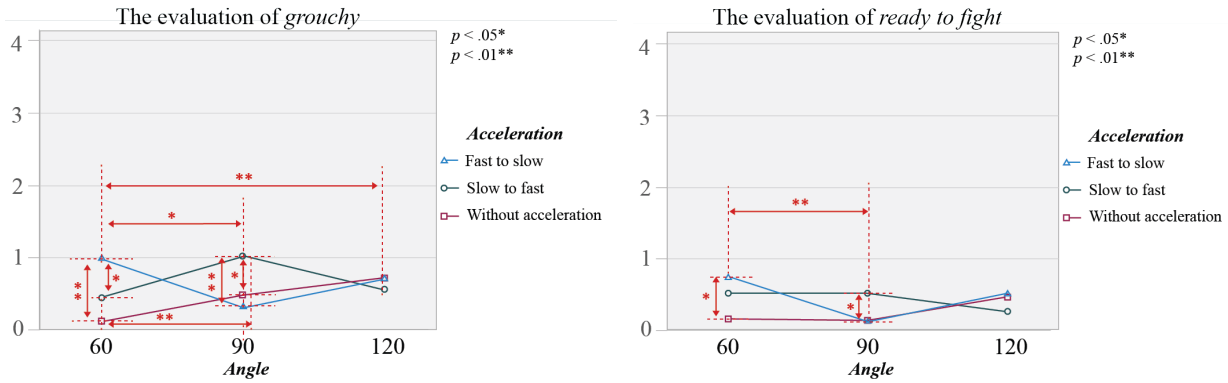

Figure 4.117. Interaction effect between *angle* and *acceleration* in the evaluation of *grouchy* (left) and *ready to fight* (right)

(2) *Acceleration* and *fluctuation*:

In the evaluation of *carefree*

In the evaluation of *carefree* (Figure 4.118, left), the results revealed a significant interaction effect between *acceleration* and *fluctuation* ($p < .01$) and a main effect of both *acceleration* and *fluctuation* ($p < .01$). At *FTS*, *WF* received a higher evaluation compared to *HF* ($p < .01$). At *WA*, *WF* received a higher evaluation than both *LF* and *HF* ($p < .01$). At *WF*, *WA* received a higher evaluation compared to both *STF* and *FTS* ($p < .01$).

In the evaluation of *rebellious*

In the evaluation of *rebellious* (Figure 4.118, right), the results revealed a main effect of *fluctuation* ($p < .01$). At *FTS*, *HF* received a higher evaluation compared to *WF* ($p < .01$).

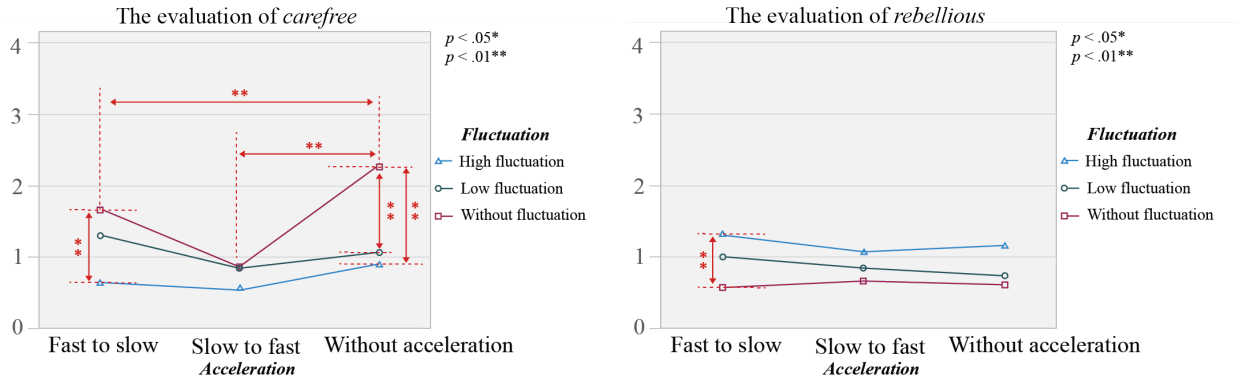

Figure 4.118. Interaction effect between a*cceleration* and *fluctuation* in the evaluation of *carefree* (left) and *rebellious* (right)

In the evaluation of *angry*

In the evaluation of *angry* (Figure 4.119, left), the finding revealed a main effect of both *acceleration* ($p < .05$) and *fluctuation* ($p < .01$). At *FTS*, *HF* received a higher evaluation compared to *WF* ($p < .01$). At *STF*, *HF* received a higher evaluation compared to *WF* ($p < .05$). At *WA*, *HF* received a higher evaluation compared to *WF* ($p < .05$).

In the evaluation of *spiteful*

In the evaluation of *spiteful* (Figure 4.119, right), the results showed a main effect of *fluctuation* ($p < .01$). At *FTS*, *HF* received a significantly higher evaluation than to *WF* ($p < .01$).

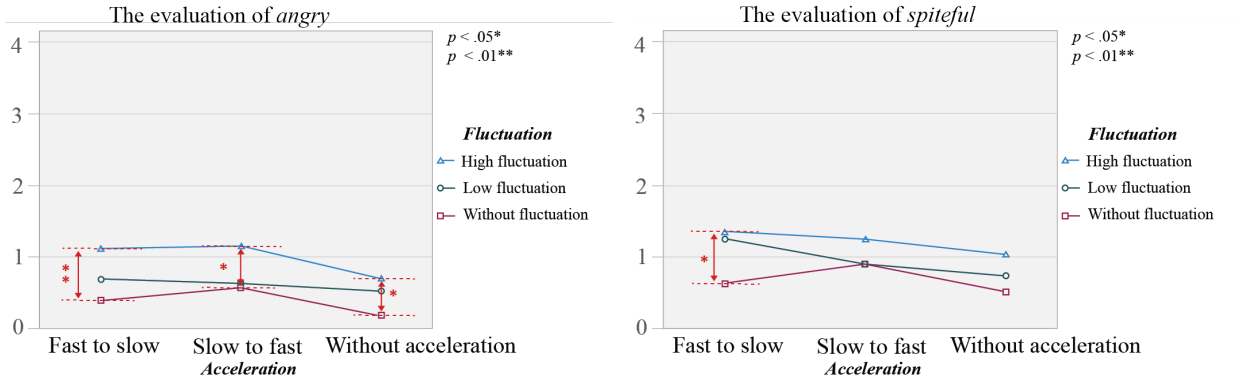

Figure 4.119. Interaction effect between *acceleration* and *fluctuation* in the evaluation of *angry* (left) and *spiteful* (right)

In the evaluation of *bad tempered*

In the evaluation of *bad tempered* (Figure 4.120, left), the results revealed and a main effect of both *acceleration* ($p < .05$) and *fluctuation* ($p < .01$). At *FTS*, *WF* received a lower evaluation compared to both *HF* ($p < .01$) and *LF* ($p < .05$). At *STF*, *HF* received a higher evaluation than *WF* ($p < .05$). At *WA*, *WF* received a lower evaluation compared to both *HF* and *LF* ($p < .01$). Additionally, *STF* received higher evaluation than *WA* ($p < .05$).

In the evaluation of *resentful*

In the evaluation of *resentful* (Figure 4.120, right), a main effect of fluctuation was reported ($p < .01$). At *FTS*, *WF* received a lower evaluation compared to both *HF* ($p < .01$) and *LF* ($p < .05$). At *WA*, *HF* received a higher evaluation compared to *WF* ($p < .05$).

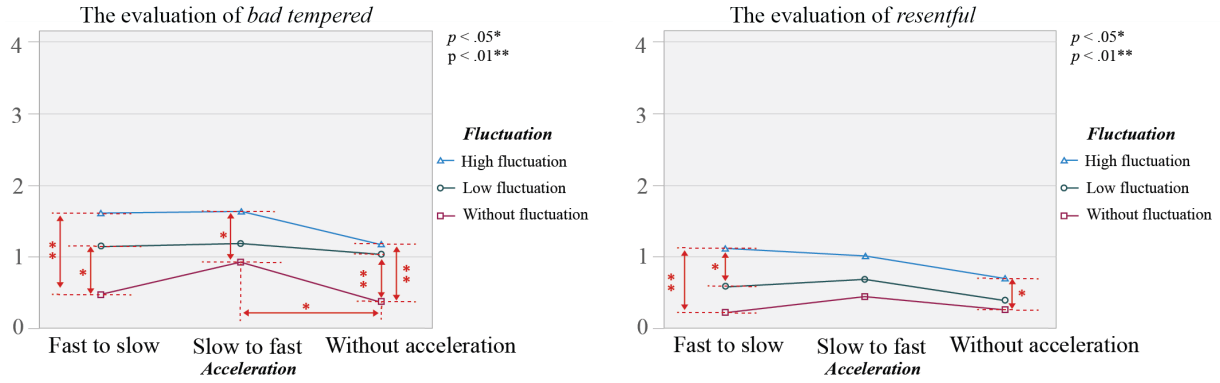

Figure 4.120. Interaction effect between *acceleration* and *fluctuation* in the evaluation of *bad tempered* (left) and *resentful* (right)

In the evaluation of *furious*

In the evaluation of *furious* (Figure 4.121, left), a main effect of *fluctuation* was report ($p < .01$). At *FTS*, *HF* received a higher evaluation than *WF* ($p < .01$). At *STF*, *HF* received a higher evaluation than *STF* ($p < .01$). At *WF*, *STF* received a higher evaluation than *FTS* ($p < .05$).

In the evaluation of *peeved*

In the evaluation of *peeved* (Figure 4.121, right), the results revealed a main effect of both *acceleration* ($p < .05$) and *fluctuation* ($p < .01$). At *FTS*, *HF* received a higher evaluation compared to *WF* ($p < .01$).

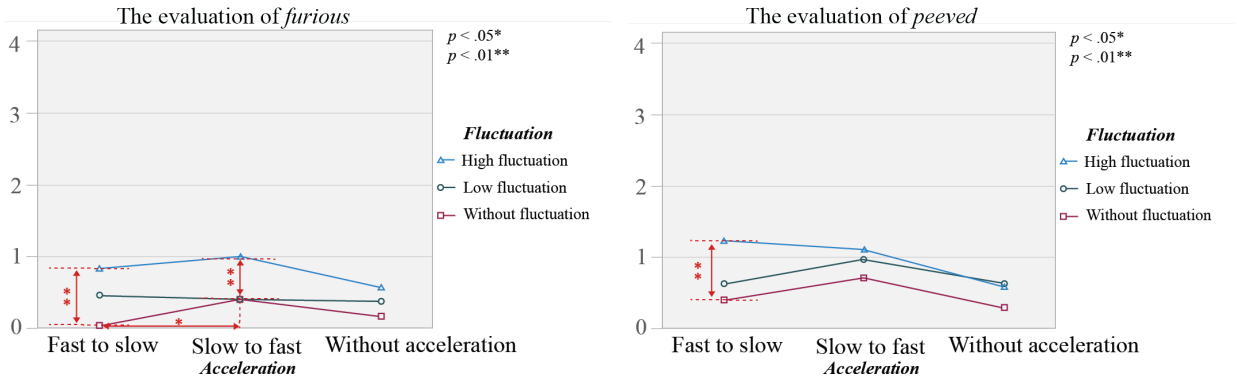

Figure 4.121. Interaction effect between *acceleration* and *fluctuation* in the evaluation of *furious* (left) and *peeved* (right)

In the evaluation of *grouchy*

In the evaluation of *grouchy* (Figure 4.122, left), the results revealed a main effect of *fluctuation* (p < .01). At *FTS*, *HF* received a higher evaluation than *WF* ($p < .05$). At *STF*, *HF* received a higher evaluation than *STF* ($p < .05$). At *WF*, *HF* received a higher evaluation than *WA* ($p < .01$). At *WF*, *STF* received a higher evaluation than *WA* ($p < .05$).

In the evaluation of *ready to fight*

In the evaluation of *ready to fight* (Figure 4.122, right), the results showed a main effect of *fluctuation* ($p < .01$). At *FTS*, *HF* received a higher evaluation than *WF* ($p < .01$).

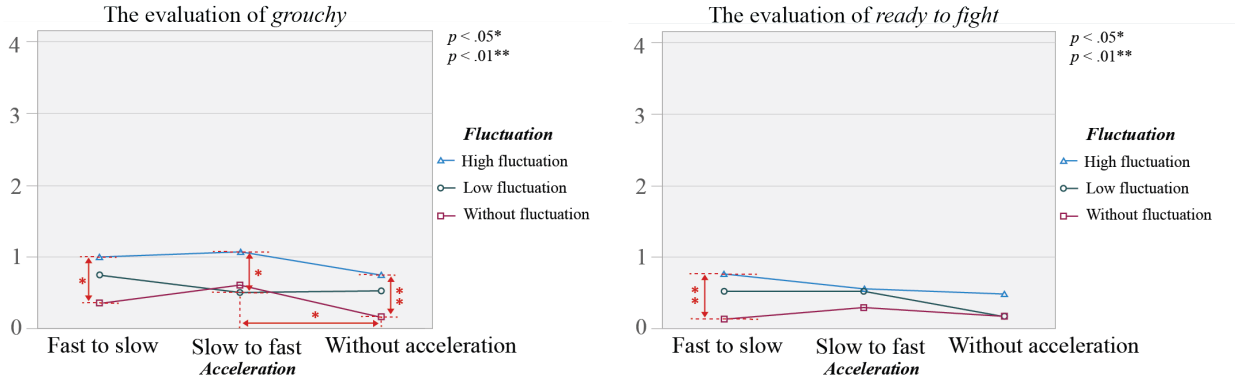

Figure 4.122. Interaction effect between *acceleration* and *fluctuation* in the evaluation of *grouchy* (left) and *ready to fight* (right)

(3) *Angle* and *fluctuation*

In the evaluation of *carefree*

In the evaluation of *carefree* (Figure 4.123, left), the results revealed the interaction effect of *angle* and *fluctuation* ($p < .01$) and a main effect of *fluctuation* ($p < .01$). At *60°*, *WF* received a higher evaluation than *LF* and *HF* ($p < .01$). At *90°*, *WF* received a higher evaluation than *LF* ($p < .05$) and *HF* ($p < .01$). At *WF*, *60°* received a higher evaluation than *120°* ($p < .01$).

In the evaluation of *rebellious*

In the evaluation of *rebellious* (Figure 4.123, right), the finding showed a main effect of *fluctuation* (p < .01). At *60°*, *HF* received a higher evaluation than *WF* ($p < .01$).

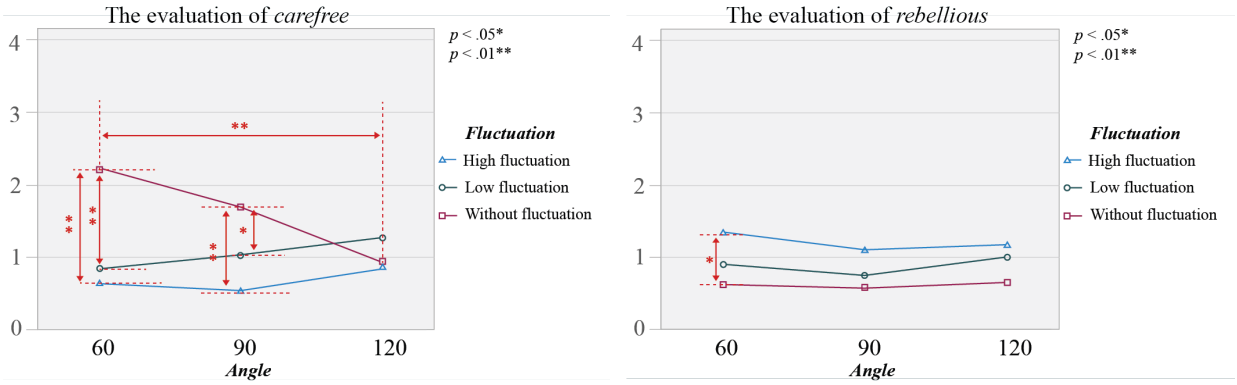

Figure 4.123. Interaction effect between *acceleration* and *fluctuation* in the evaluation of *carefree* (left) and *rebellious* (right)

In the evaluation of *angry*

In the evaluation of *angry* (Figure 4.124, left), the obtain results revealed a main effect of *fluctuation* ($p < .01$). At *60°*, *HF* received a higher evaluation than *WF* ($p < .01$). At *90°*, *HF* received a higher evaluation than both *LF* ($p < .05$) and *WF* ($p < .01$).

In the evaluation of *spiteful*

In the evaluation of *spiteful* (Figure 4.124, right), the finding revealed a main effect of *fluctuation* ($p < .01$). At *60°*, *HF* received a higher evaluation than *WF* ($p < .01$). At *90°*, *HF* received a higher evaluation than *WF* ($p < .05$).

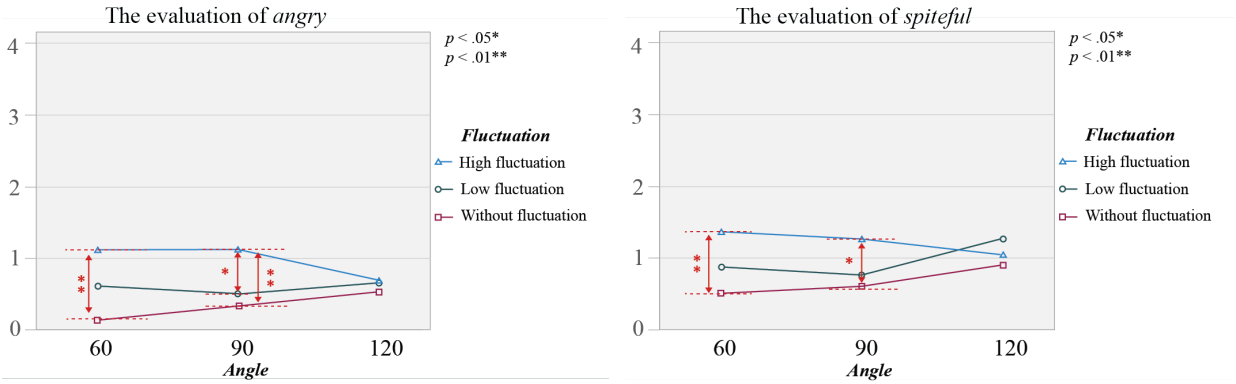

Figure 4.124. Interaction effect between *acceleration* and *fluctuation* in the evaluation of *angry* (left) and *spiteful* (right)

In the evaluation of *bad tempered*

In the evaluation of *bad tempered* (Figure 4.125, left), the obtained results revealed an interaction effect of *angle* and *fluctuation* ($p < .05$) and a main effect of *fluctuation* ($p < .01$). At *60°*, *WF* received a significantly lower evaluation than both *LF* and *HF* ($p < .01$). At *90°*, *HF* received a significantly higher evaluation than both *LF* ($p < .05$) and *WF* ($p < .01$). Moreover, at *WF*, *120°* obtained a significantly higher evaluation than *60°* ($p < .05$).

In the evaluation of *resentful*

In the evaluation of *resentful* (Figure 4.125, right), the finding showed a main effect of *fluctuation* ($p < .01$). At *60°*, *HF* received a significantly higher evaluation than both *WF* ($p < .01$). At *90°*, *HF* received a significantly higher evaluation than both *LF* and *WF* ($p < .01$).

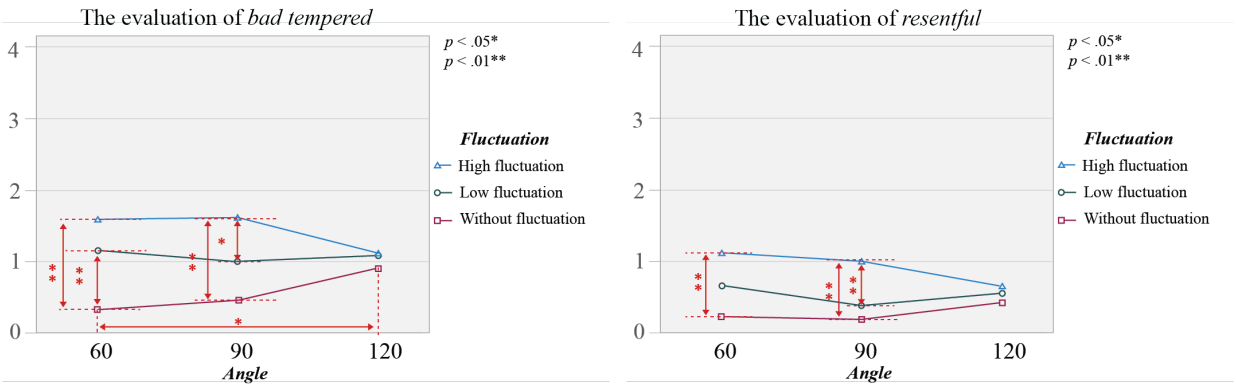

Figure 4.125. Interaction effect between *acceleration* and *fluctuation* in the evaluation of *bad tempered* (left) and *resentful* (right)

In the evaluation of *furious*

In the evaluation of *furious* (Figure 4.126, left), the results revealed a main effect of *fluctuation* ($p < .01$). At *60°*, HF received a significantly higher evaluation compared to *WF* ($p < .01$). At *90°*, *HF* received a significantly higher evaluation than both *LF* and *WF* ($p < .01$). At *WF*, *120°* received a significantly higher evaluation than *60°* ($p < .05$).

In the evaluation of *peeved*

In the evaluation of *peeved* (Figure 4.126, right), the results revealed the interaction effect of *angle* and *fluctuation* ($p < .05$) and a main effect of *fluctuation* ($p < .01$). At *60°*, *WF* received a significantly lower evaluation than both *LF* ($p < .05$) and *HF* ($p < .01$). At *90°*, *HF* received a significantly higher evaluation than *WF* ($p < .01$). At *HF*, *60°* received a significantly higher evaluation than *120°* ($p < .05$).

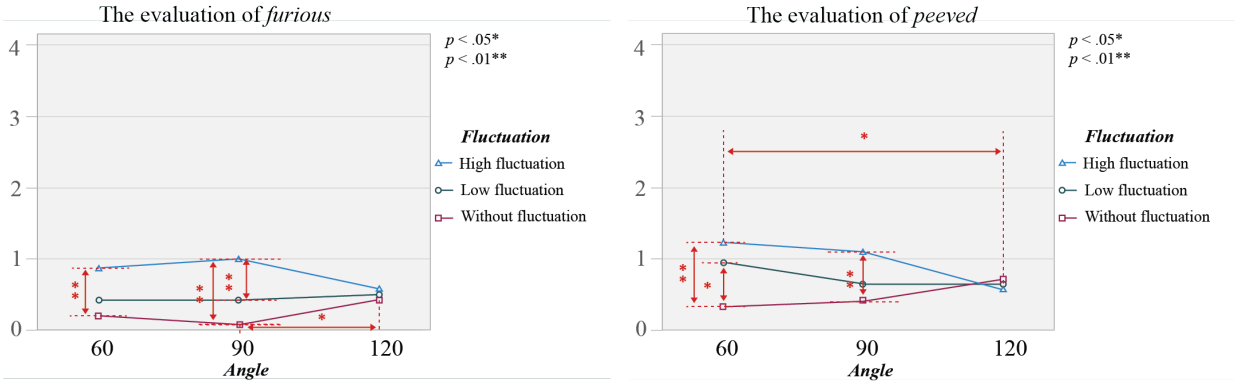

Figure 4.126. Interaction effect between acceleration and fluctuation in the evaluation of *furious* (left) and *peeved* (right)

In the evaluation of *grouchy*

In the evaluation of *grouchy* (Figure 4.127, left), the obtain results revealed a main effect of *fluctuation* ($p < .01$). At *60°*, *HF* received a significantly higher evaluation than both *LF* ($p < .05$) and *WF* ($p < .01$). At *90°*, *HF* received a significantly higher evaluation than both *LF* ($p < .05$) and *WF* ($p < .01$). At *WF*, *120°* received a significantly higher evaluation compared to *60°* ($p < .05$).

In the evaluation of *ready to fight*

In the evaluation of *ready to fight* (Figure 4.127, right), the results revealed a main effect of *fluctuation* ($p < .01$). At *60°*, *HF* received a significantly higher evaluation compared to *WF* ($p < .05$). At *90°*, *HF* received a significantly higher evaluation than *WF* ($p < .05$).

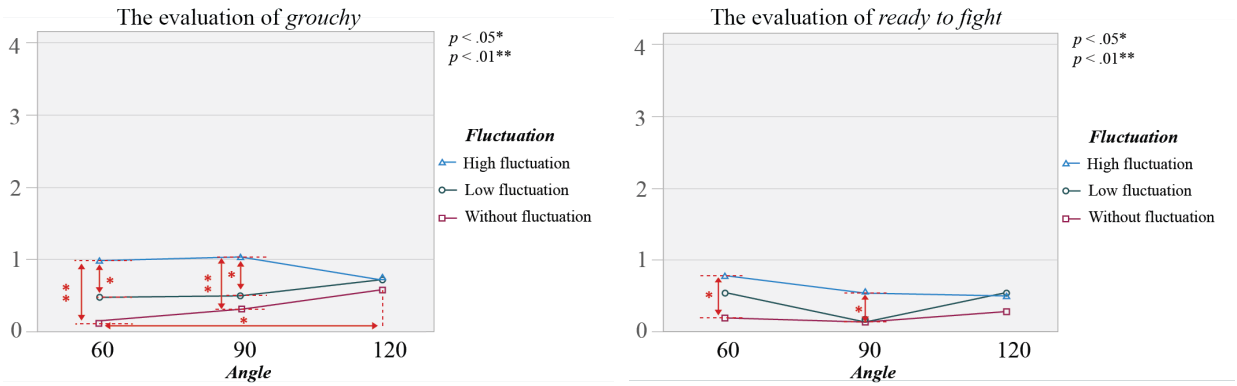

Figure 4.127. Interaction effect between *acceleration* and *fluctuation* in the evaluation of *grouchy* (left) and *ready to fight* (right)

4.4.4.2. Evaluation on the evaluation tendency based on gender differences

The study employed a two-way ANOVA to analyze the interaction effect of three levels of three factors (*angle, acceleration,* and *fluctuation*) and evaluation on the evaluation tendency based on gender differences of Japanese participants. The data was reported as statistically significant at $p < .05$ and highly statistically significant at $p < .01$. The results that were obtained are as follows:

1) *Angle*:

In the evaluation of c*arefree* (Figure 4.128, left), significant differences were observed at *120°* ($p < .01$), while no significant differences were found at *60°* and *90°*.

In the evaluation of *rebellious* (Figure 4.128, right), no significant differences were found.

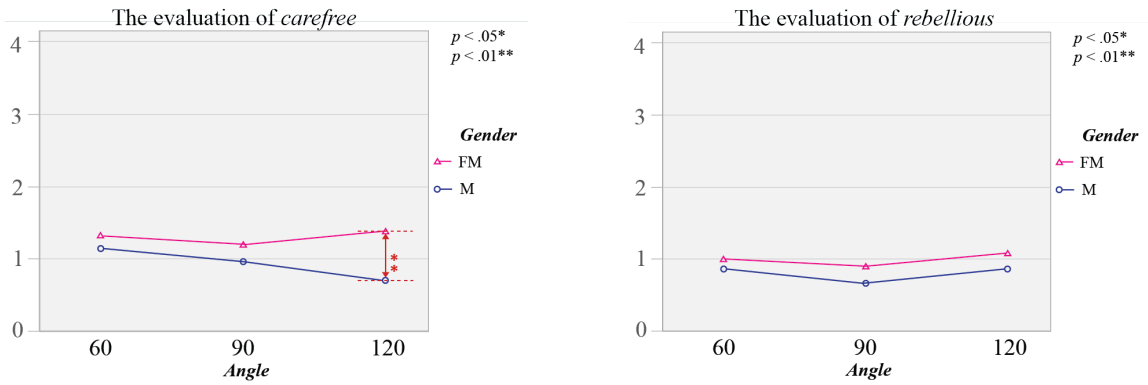

Figure 4.128. Gender differences in the evaluation of *carefree* (left) and *rebellious* (right) with the *angle* factor

In the evaluation of *angry* (Figure 4.129, left), and *spiteful* (Figure 4.129, right), no significant differences were observed.

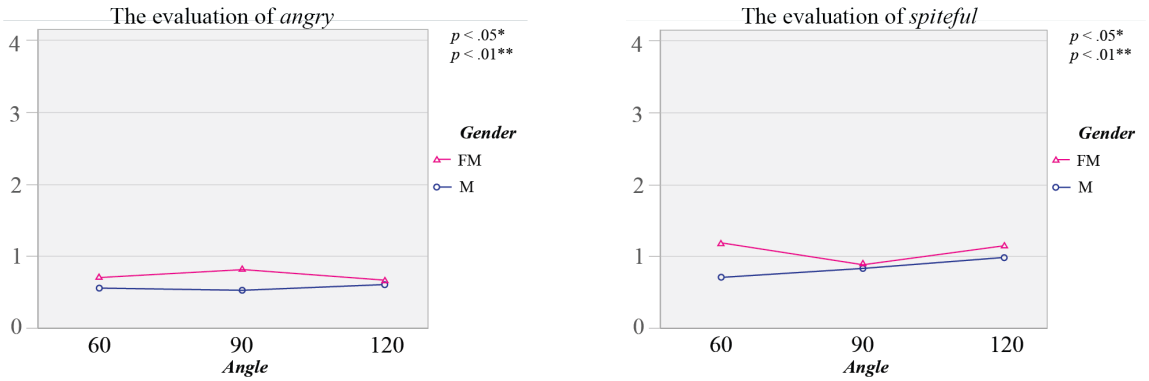

Figure 4.129. Gender differences in the evaluation of *angry* (left) and *spiteful* (right) with the *angle* factor

In the evaluation of *bad tempered* (Figure 4.130, left) and *resentful* (Figure 4.130, right), no significant differences were reported.

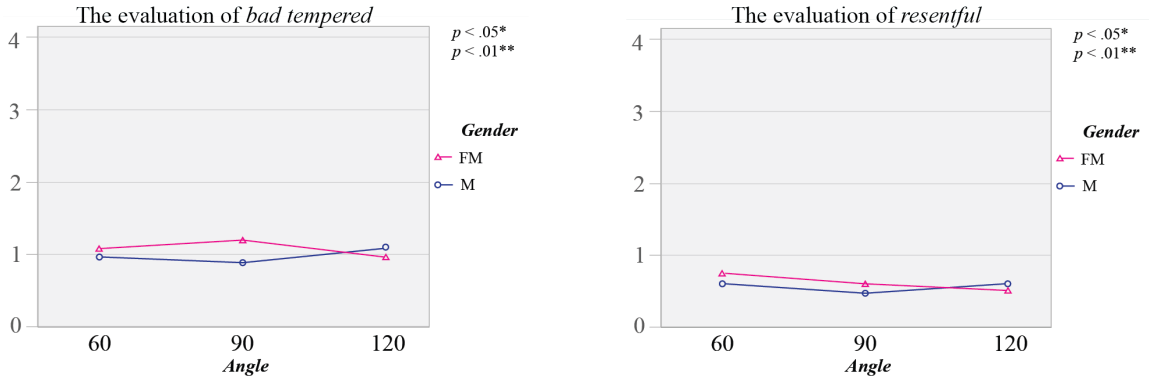

Figure 4.130. Gender differences in the evaluation of *bad tempered* (left) and *resentful* (right) with the *angle* factor

In the evaluation of *furious* (Figure 4.131, left) and *peeved* (Figure 4.131, right), no significant differences were reported.

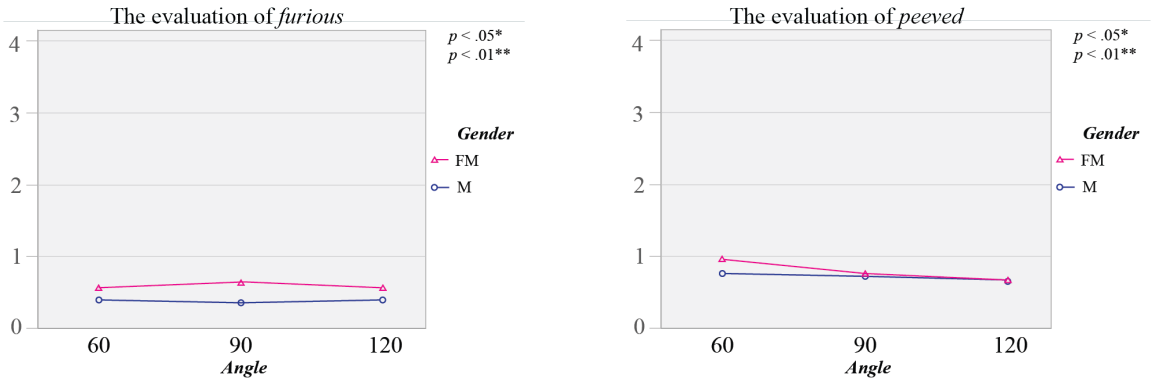

Figure 4.131. Gender differences in the evaluation of *furious* (left) and *peeved* (right) with the *angle* factor

In the evaluation of *grouchy* (Figure 4.132, left) and *ready to fight* (Figure 4.132, right), no significant difference was reported between genders.

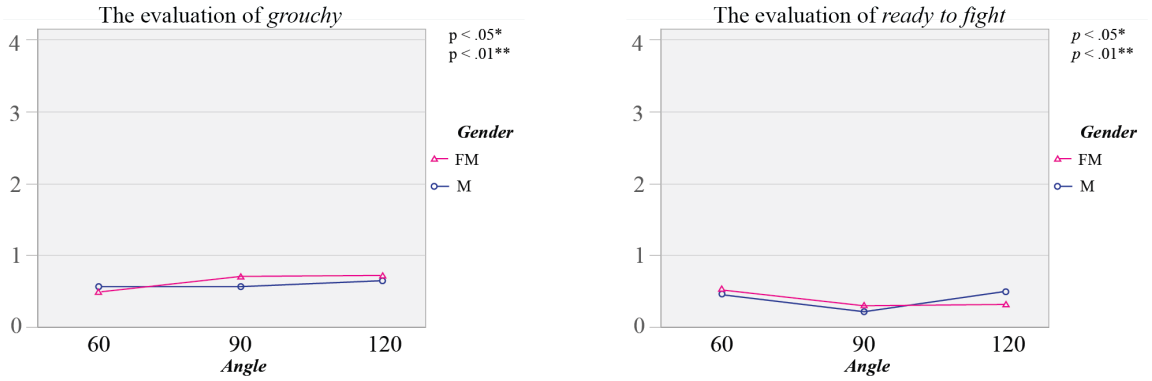

Figure 4.132. Gender differences in the evaluation of *grouchy* (left) and *ready to fight* (right) with the *angle* factor

2) *Acceleration*:

In the evaluation of *carefree* (Figure 4.133, left), a significant difference was reported at *STF* ($p < .01$). The results indicated that female participants rated the evaluations higher than male participants. For male participant, *STF* received significantly lower than *WA* ($p < .01$) and *FTS* ($p < .05$).

In the evaluation of *rebellious* (Figure 4.133, right), no significant difference was observed.

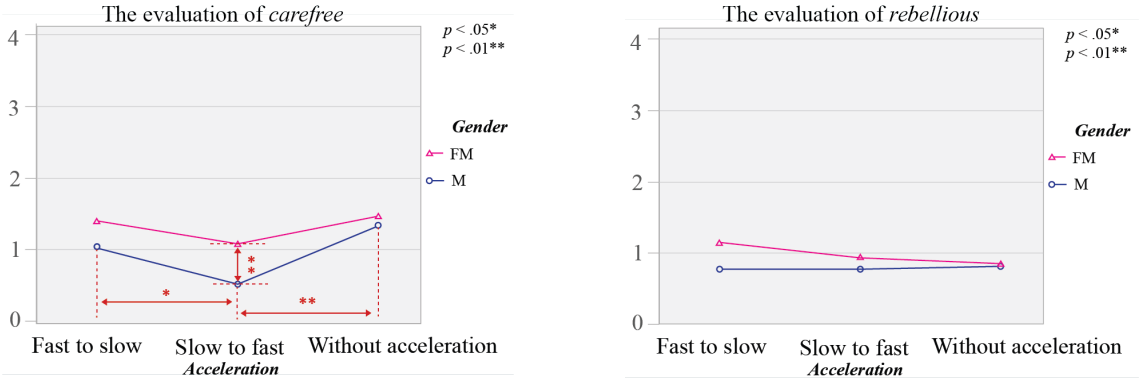

Figure 4.133. Gender differences in the evaluation of *carefree* (left) and *rebellious* (right) with the *acceleration* factor

In the evaluation of *anger* (Figure 4.134, left), no significant gender difference was reported. For male participants, *STF* received a significantly higher rating compared to *WA* ($p < .05$).

In the evaluation of *spiteful* (Figure 4.134, right), no significant difference was reported.

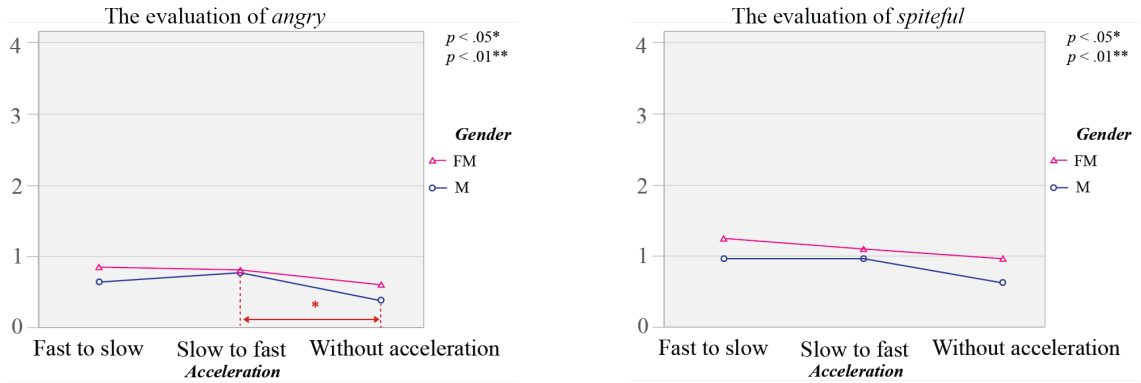

Figure 4.134. Gender differences in the evaluation of *angry* (left) and *spiteful* (right) with the a*cceleration* factor

In the evaluation of *bad tempered* (Figure 4.135, left) and *resentful* (Figure 4.135, right), no significant difference was reported between genders.

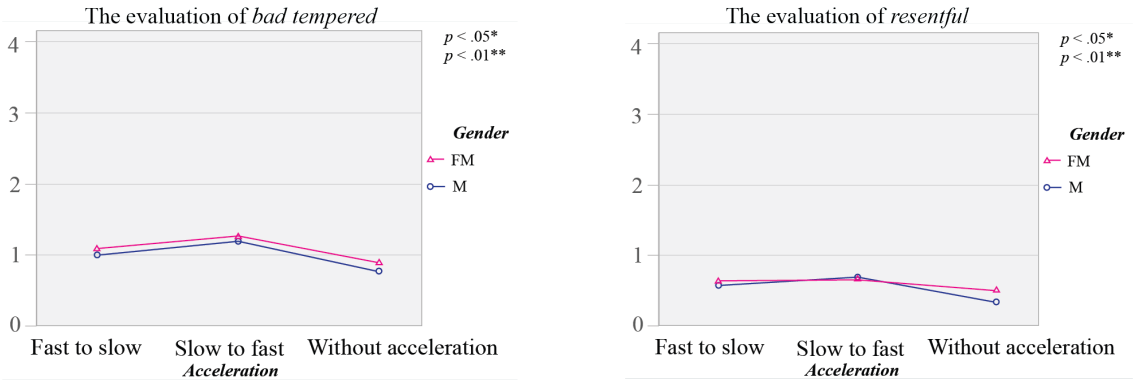

Figure 4.135. Gender differences in the evaluation of *bad tempered* (left) and *resentful* (right) with the *acceleration* factor

In the evaluation of *furious* (Figure 4.136, left), there were no significant difference.

In the evaluation of peeved (Figure 4.136, right), there were no significant differences between male and female participants. Male participants rated *STF* significantly higher than *WA* ($p < .01$).

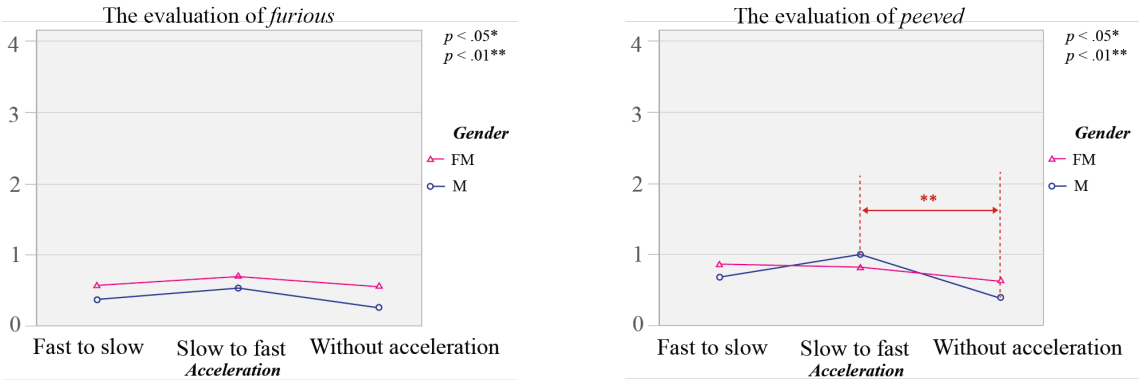

Figure 4.136. Gender differences in the evaluation of furious (left) and peeved (right) with the acceleration factor

In the evaluation of *grouchy* (Figure 4.137, left) and *ready to fight* (Figure 4.136, right), there were no significant differences.

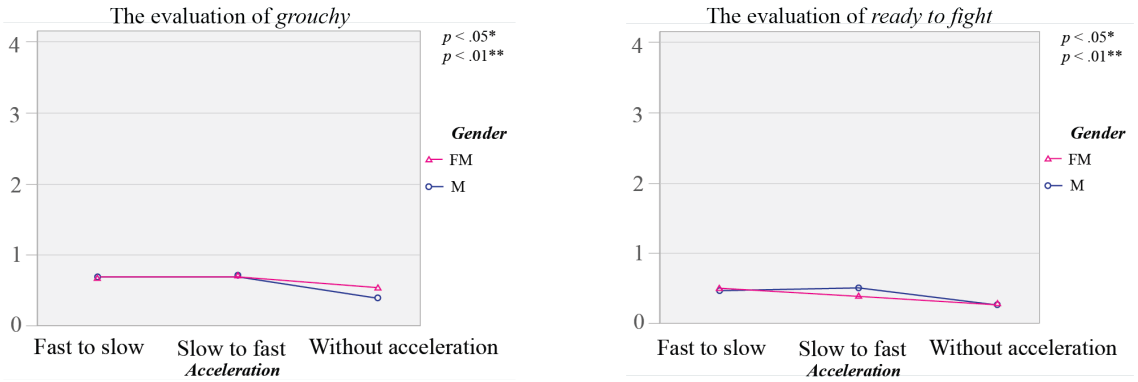

Figure 4.137. Gender differences in the evaluation of *grouchy* (left) and *ready to fight* (right) with the *acceleration* factor

3) *Fluctuation*:

In the evaluation of *carefree* (Figure 4.138, left), no significant difference between female and male participants was reported. However, for female participants, *WF* received significantly higher ratings than *LF* ($p < .05$) and *HF* ($p < .01$). Similarly, for male participants, *WF* received significantly higher ratings than *LF* ($p < .05$) and *HF* ($p < .01$).

In the evaluation of *rebellious* (Figure 4.138, right), a significant difference between female and male participants was reported at *HF* ($p < .05$). For female participants, *HF* received significantly higher ratings than *WF* ($p < .01$).

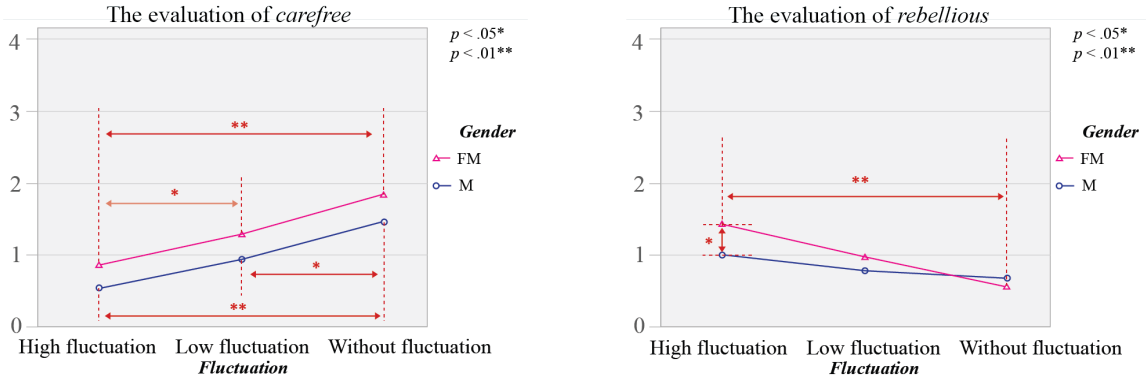

Figure 4.138. Gender differences in the evaluation of *carefree* (left) and *rebellious* (right) with the *fluctuation* factor

In the evaluation of *angry* (Figure 4.139, left), no significant difference between female and male participants was reported. However, both female participants and male participants rated *HF* significantly higher than *WF* ($p < .01$).

In the evaluation of *spiteful* (Figure 4.139, right), no significant difference between female and male participants was observed. However, male participants rated *HF* significantly higher than *WF* ($p < .05$).

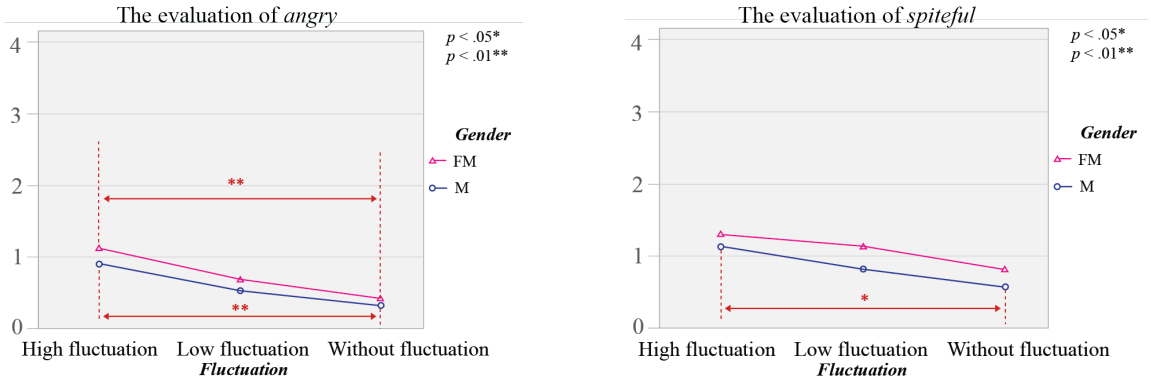

Figure 4.139. Gender differences in the evaluation of *angry* (left) and *spiteful* (right) with the *fluctuation* factor

In the evaluation of *bad tempered* (Figure 4.140, left), no significant difference between female and male participants was reported. However, female participants rated *HF* significantly higher than *LF* and *WF* ($p < .01$), while male participants rated *WF* significantly lower compared to *LF* and *HF* ($p < .01$).

In the evaluation of *resentful* (Figure 4.140, right), no significant difference between female and male participants was reported.

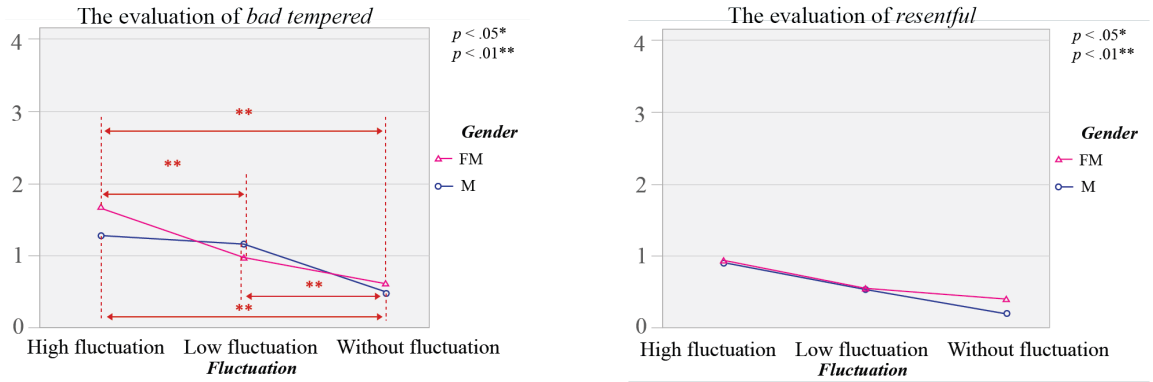

Figure 4.140. Gender differences in the evaluation of *bad tempered* (left) and *resentful* (right) with the *fluctuation* factor

In the evaluation of *furious* (Figure 4.141, left), a significant difference between female and male participants was reported at *WF* ($p < .05$). Female participants rated *HF* significantly higher than *WF* ($p < .01$) and *LF* ($p < .05$). Similarly, male participants rated *HF* significantly higher than *WF* ($p < .01$).

In the evaluation of *peeved* (Figure 4.141, right), no significant difference was reported between female and male participants. Both groups rated *HF* significantly higher than *WF* ($p < .05$).

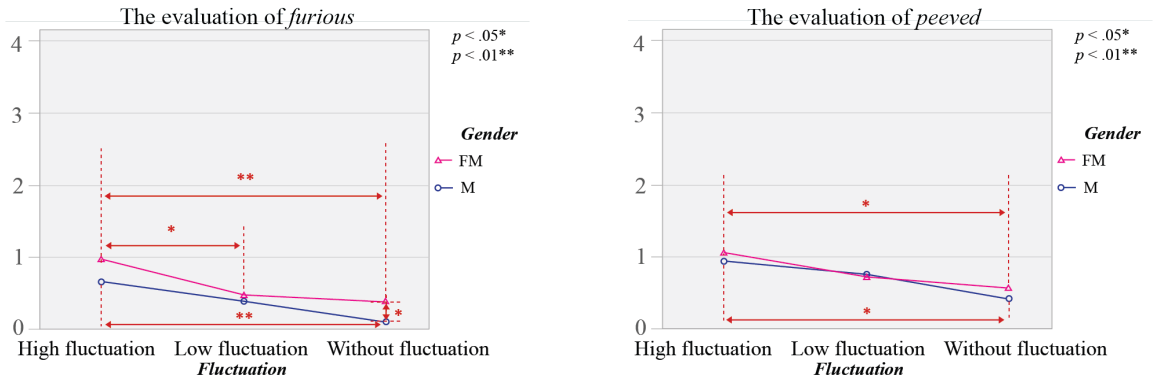

Figure 4.141. Gender differences in the evaluation of f*urious* (left) and *peeved* (right) with the *fluctuation* factor

In the evaluation of *grouchy* (Figure 4.142, left), no significant difference was reported between female and male participants. Female participants rated *HF* significantly higher than *LF*

($p < .05$) and *WF* ($p < .01$). Likewise, male participants rated *HF* significantly higher than *WF* ($p < .05$).

In the evaluation of *ready to fight* (Figure 4.142, right), no significant difference was reported between female and male participants. Both groups rated *HF* significantly higher than *WF* ($p < .05$).

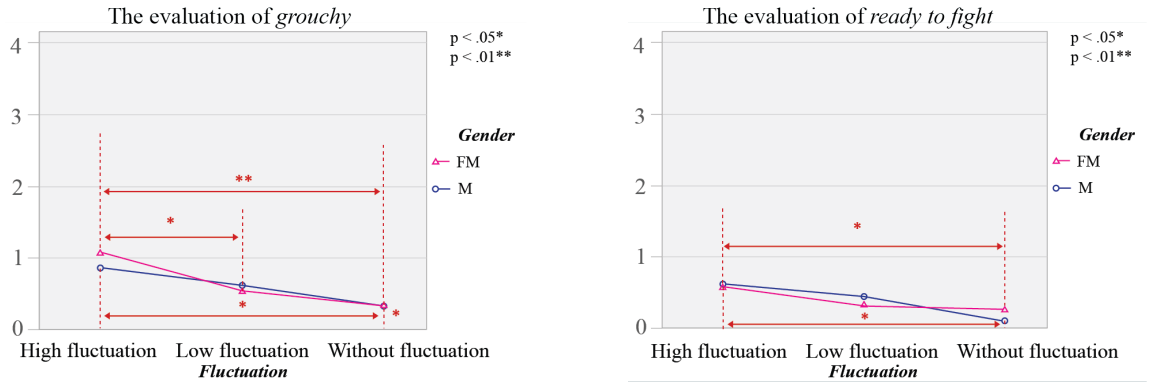

Figure 4.142. Gender differences in the evaluation of *grouchy* (left) and *ready to fight* (right) with the *fluctuation* factor

4.4.4.3. Conclusion

Regarding the interaction effect between the three factors (*angle*, *acceleration*, and *fluctuation*), the results are as follows:

***Angle* and *acceleration*:** At *60°*, *FTS* received higher evaluations compared to *WA* in the evaluation of *rebellious* ($p < .05$), *angry* ($p < .01$), *spiteful* ($p < .01$), *bad tempered* ($p < .01$), *resentful* ($p < .01$), *furious* ($p < .01$), *peeved* ($p < .01$), *grouchy* ($p < .01$) and *ready to fight* ($p < .05$). At *90°*, *STF* tends to receive higher evaluations compared to *FTS* and *WA* in the evaluation of *angry* ($p < .01$), *spiteful* ($p < .05$), *bad tempered* ($p < .01$), *resentful* ($p < .01$), *furious* ($p < .01$), *peeved* ($p < .01$), *grouchy* ($p < .01$) and *ready to fight* ($p < .05$). While, in the evaluation of *carefree*, *WA* received higher evaluation than *FTS* and *STF* ($p < .01$).

***Acceleration* and *fluctuation*:** At *FTS, HF* is more highly evaluation than *WF* in the evaluation of *rebellious* ($p < .01$), *angry* ($p < .01$), *spiteful* ($p < .05$), *bad tempered* ($p < .01$), r*esentful* ($p < .01$), *furious* ($p < .01$), *peeved* ($p < .01$), *grouchy* ($p < .05$) and *ready to flight* ($p < .01$). At *WA*, *WF* is more likely to be rated in the evaluation of *carefree* than *HF* or *LF* ($p < .01$). while *WA*, *HF* is obtained the high evaluation than *HF* or *LF* in the evaluation of *angry* ($p < .05$), *bad tempered* ($p < .05$), *resentful* ($p < .05$), *grouchy* ($p < .01$). At *STF*, *HF* is more highly rated than *WF* in the evaluation of angry ($p < .05$), *bad tempered* ($p < .05$), *furious* ($p < .01$), *grouchy* ($p < .05$). The results suggest that *HF* is more likely to be rated as having negative emotions, such as *anger, spite*, and *bad tempered*, than *WF*. *HF* is also more likely to be rated as *ready to fight* than *WF*.

Angle and fluctuation: At *60°*, *HF* rated higher than *WF* ($p < .01$) for *rebellious, angry, spiteful, bad tempered, resentful, furious, peeved, grouchy*, and *ready to fight*. At *90°*, *HF* rated higher than *WF* ($p < .01$) for *rebellious, angry, spiteful, bad tempered, resentful, furious, peeved, grouchy*, and *ready to fight*. At *WF*, *120°* rated higher than *60°* ($p < .05$) for *bad tempered, furious, peeved,* and *grouchy*. These results suggest that *HF* is generally associated with more negative emotions, while at *60°*, and *90°*, *WF* is associated with more positive emotions such as in the evaluation of *carefree*.

Regarding gender differences in the evaluation, the results are as follows:

***Angle*:** A significant differences between male and female was reported at *120°* in the evaluation of *carefree* ($p < .01$).

***Acceleration*:** Female rate higher than male at *STW* in the evaluation of *carefree* ($p < .01$).

***Fluctuation*:** A significant difference between female and male participants was reported at *HF* In the evaluation of *rebellious* ($p < .05$), and at *WF* in the evaluation of *furious* ($p < .05$).

4.4.5. Results of 10 evaluation phrases negatively associated with a sense of being alive: A study with Thai participants

An ANOVA was conducted to assess the nine different stimuli on the evaluation of the sense of being alive by Thai participants. The findings revealed significant differences among the stimuli. The reported data demonstrates statistical significance at $p < .05$ and high statistical significance at $p < .01$. The results are presented as follow:

(1) *Angle* and *acceleration*:

In the evaluation of *carefree* (Figure 4.143, left) and *rebellious* (Figure 4.143, right), no significant difference was found.

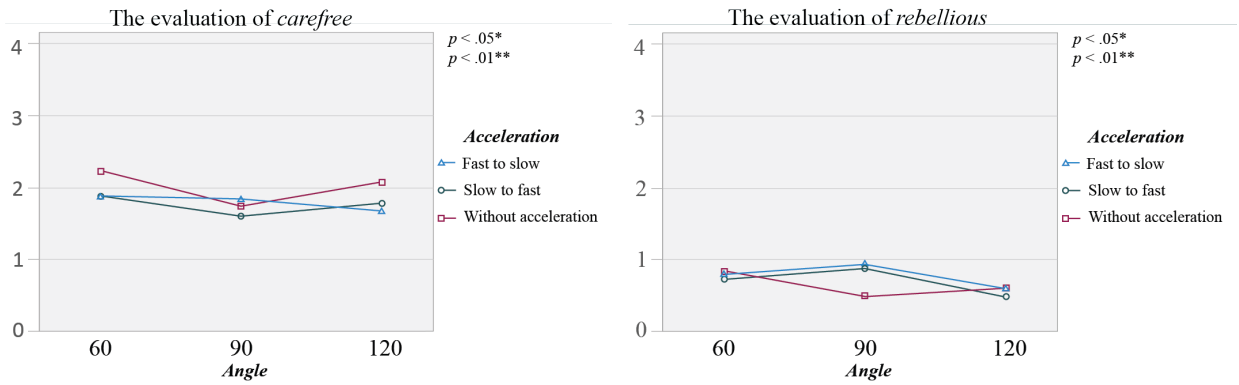

Figure 4.143. Interaction effect between angle and acceleration in the evaluation of *carefree* (left), and *rebellious* (right)

In the evaluation of *angry* (Figure 4.144, left) and *spiteful* (Figure 4.144, right), no significant differences were reported.

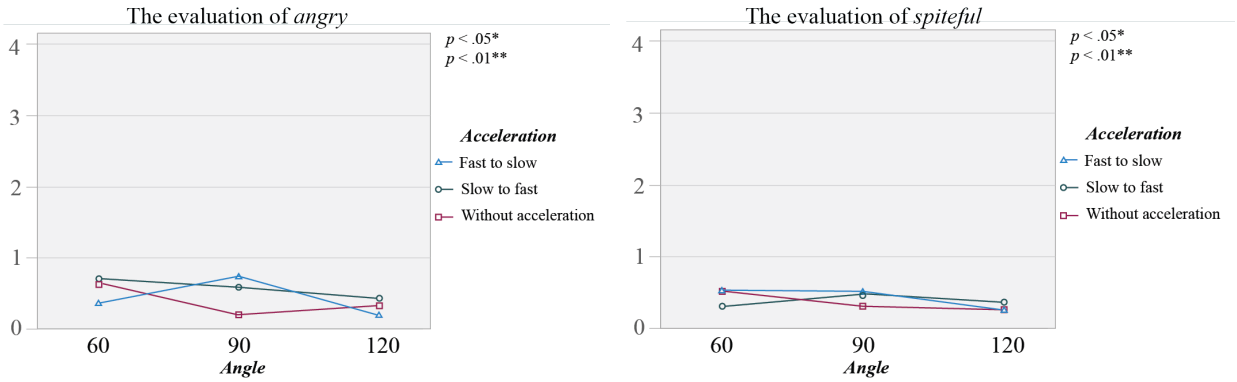

Figure 4.144. Interaction effect between angle and acceleration in the evaluation of *angry* (left), and *spiteful* (right)

In the evaluation of bad tempered (Figure 4.145, left) and resentful (Figure 4.145, right), no significant differences were reported.

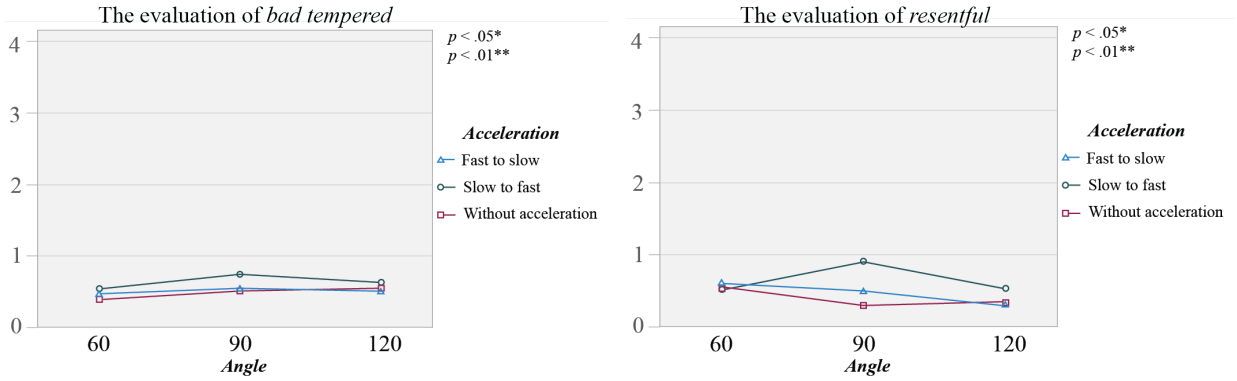

Figure 4.145. Interaction effect between angle and acceleration in the evaluation of *bad tempered* (left), and *resentful* (right)

In the evaluation of *furious* (Figure 4.146, left) and *peeved* (Figure 4.146, right), no significant differences were observed.

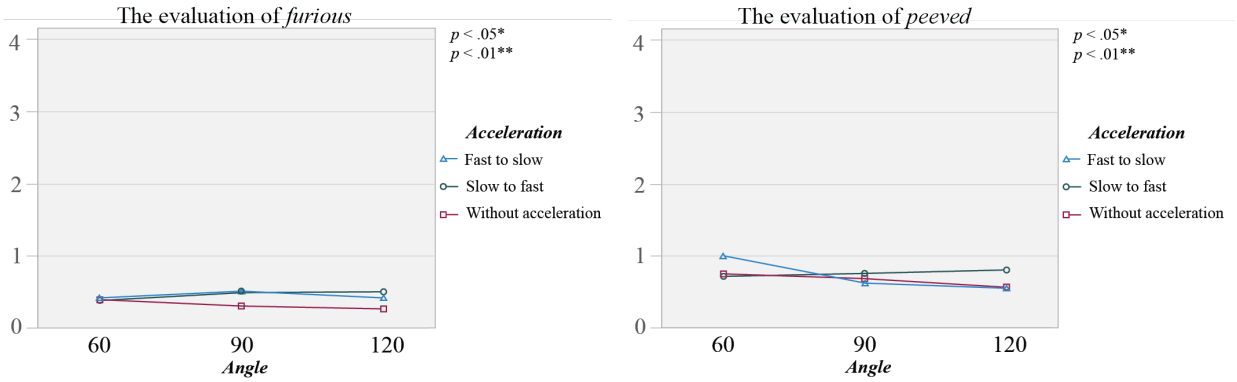

Figure 4.146. Interaction effect between angle and acceleration in the evaluation of *furious* (left), and *peeved* (right)

In the evaluation of *grouchy* (Figure 4.147, left) and *ready to fight* (Figure 4.147, right), no significant differences were observed.

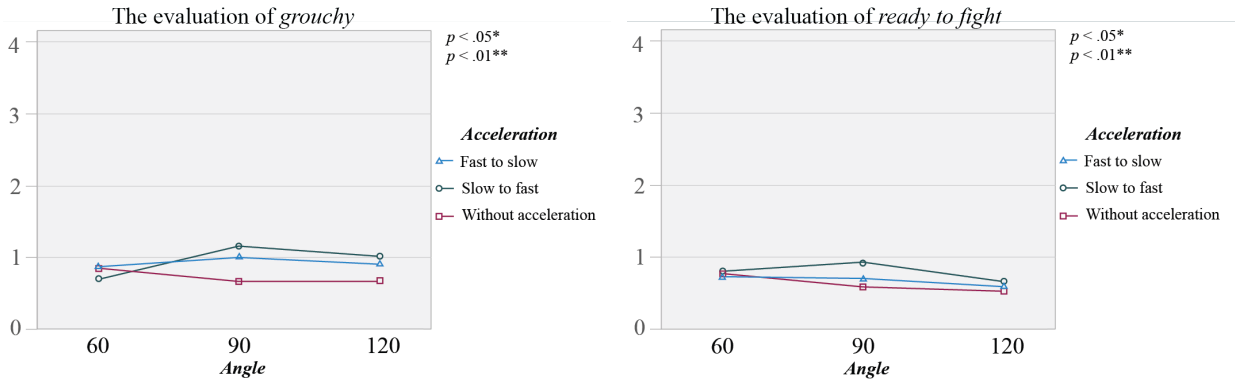

Figure 4.147. Interaction effect between angle and acceleration in the evaluation of *grouchy* (left), and *ready to fight* (right)

(2) *Acceleration* and *fluctuation*:

In the evaluation of carefree (Figure 4.148, left) and rebellious (Figure 4.148, right), no significant differences were reported.

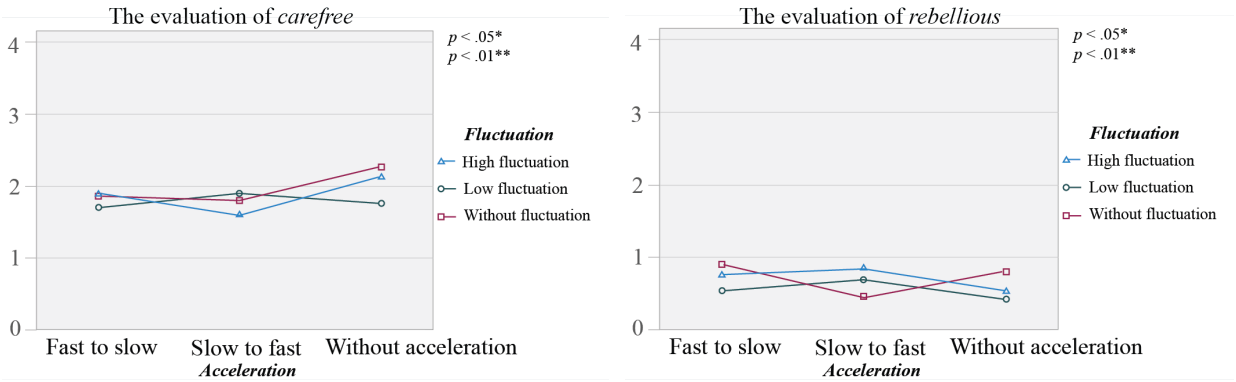

Figure 4.148. Interaction effect between *acceleration* and *fluctuation* in the evaluation of *carefree* (left), and r*ebellious* (right)

In the evaluation of *angry* (Figure 4.149, left) and *spiteful* (Figure 4.149, right), no significant differences were reported.

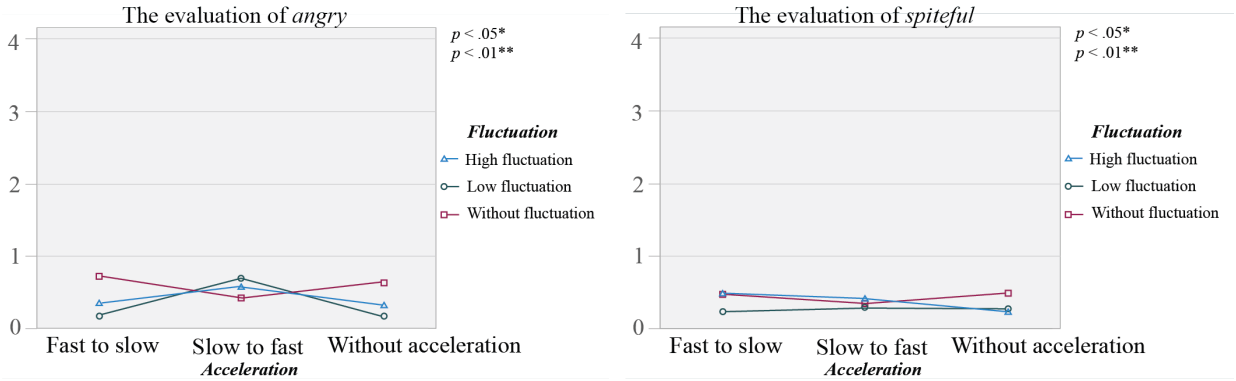

Figure 4.149. Interaction effect between acceleration and fluctuation in the evaluation of *angry* (left), and *spiteful* (right)

In the evaluation of *bad tempered* (Figure 4.150, left) and *resentful* (Figure 4.150, right), no significant differences were observed.

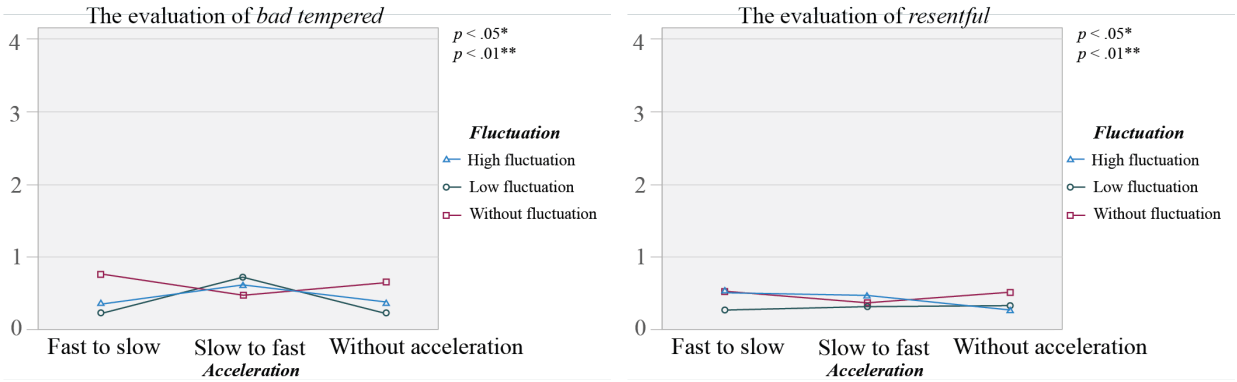

Figure 4.150. Interaction effect between *acceleration* and *fluctuation* in the evaluation of *bad tempered* (left), and *resentful* (right)

In the evaluation of *furious* (Figure 4.151, left) and *peeved* (Figure 4.151, right), no significant differences were reported.

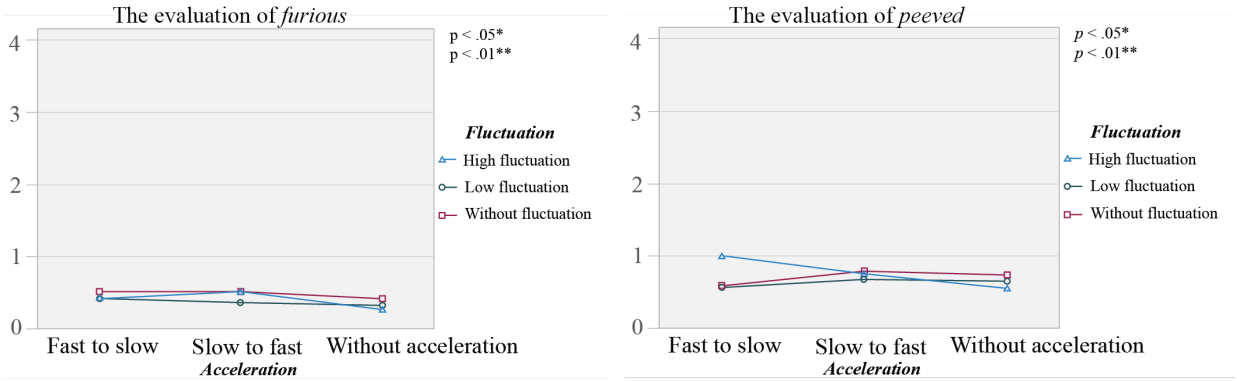

Figure 4.151. Interaction effect between *acceleration* and *fluctuation* in the evaluation of *furious* (left), and *peeved* (right)

In the evaluation of *grouchy* (Figure 4.152, left) and *ready to fight* (Figure 4.152, right), there were no significant differences.

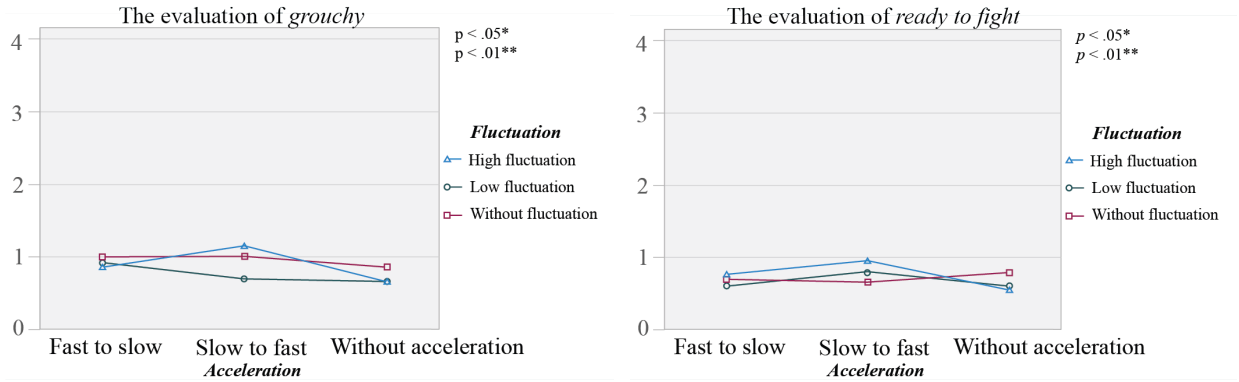

Figure 4.152. Interaction effect between *acceleration* and *fluctuation* in the evaluation of *grouchy* (left), and *ready to fight* (right)

(3) *Angle* and *fluctuation*:

In the evaluation of *carefree* (Figure 4.153, left) and *rebellious* (Figure 4.153, right), no significant differences were observed.

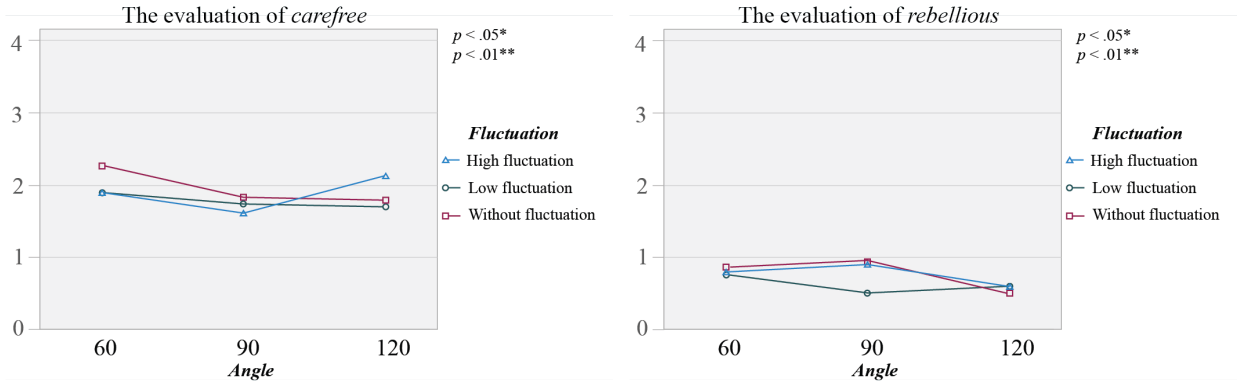

Figure 4.153. Interaction effect between *angle* and *fluctuation* in the evaluation of *carefree* (left), and *rebellious* (right)

In the evaluation of *angry* (Figure 4.154, left) and *spiteful* (Figure 4.154, right), no significant differences were reported.

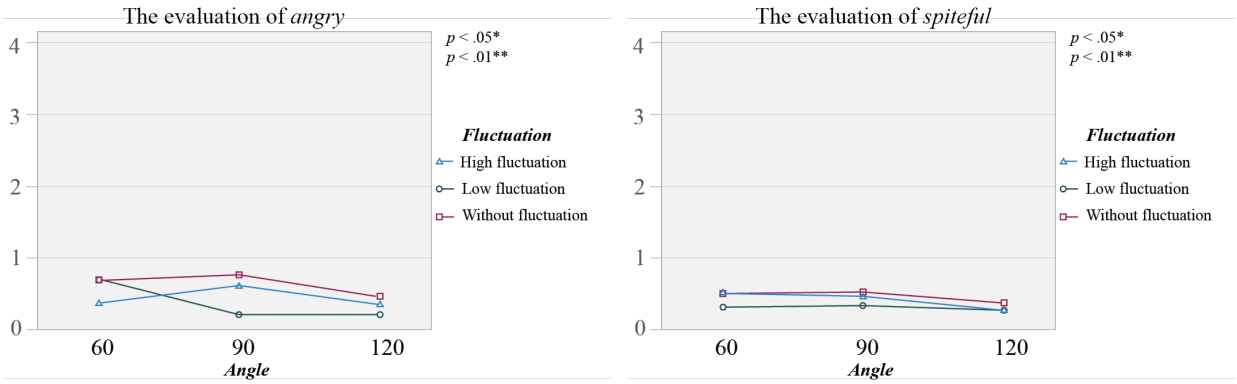

Figure 4.154. Interaction effect between *angle* and *fluctuation* in the evaluation of *angry* (left), and *spiteful* (right)

In the evaluation of *bad tempered* (Figure 4.155, left) and *resentful* (Figure 4.155, right), no significant differences were reported.

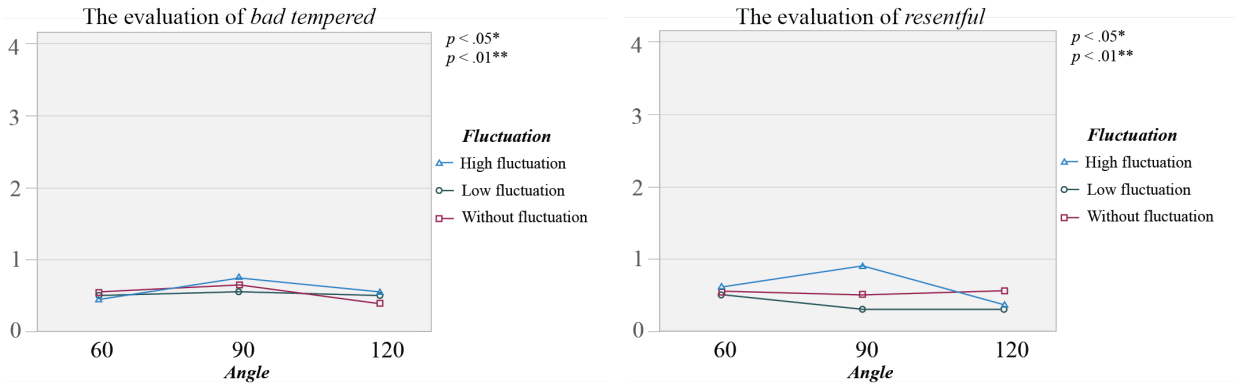

Figure 4.155. Interaction effect between *angle* and *fluctuation* in the evaluation of *bad tempered* (left), and *resentful* (right)

In the evaluation of *furious* (Figure 4.156, left) and *peeved* (Figure 4.156, right), no significant differences were reported.

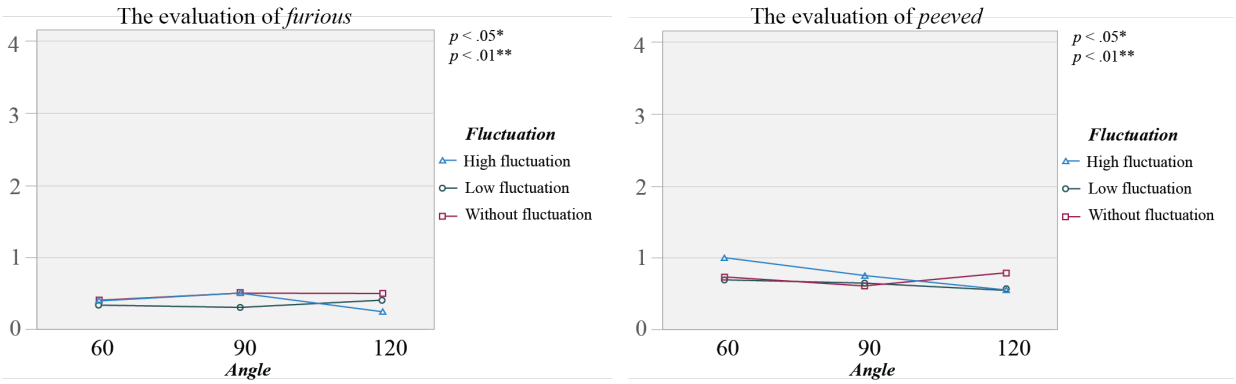

Figure 4.156. Interaction effect between *angle* and *fluctuation* in the evaluation of *furious* (left), and *peeved* (right)

In the evaluation of *grouchy* (Figure 4.157, left) and *ready to fight* (Figure 4.157, right), there were no significant differences.

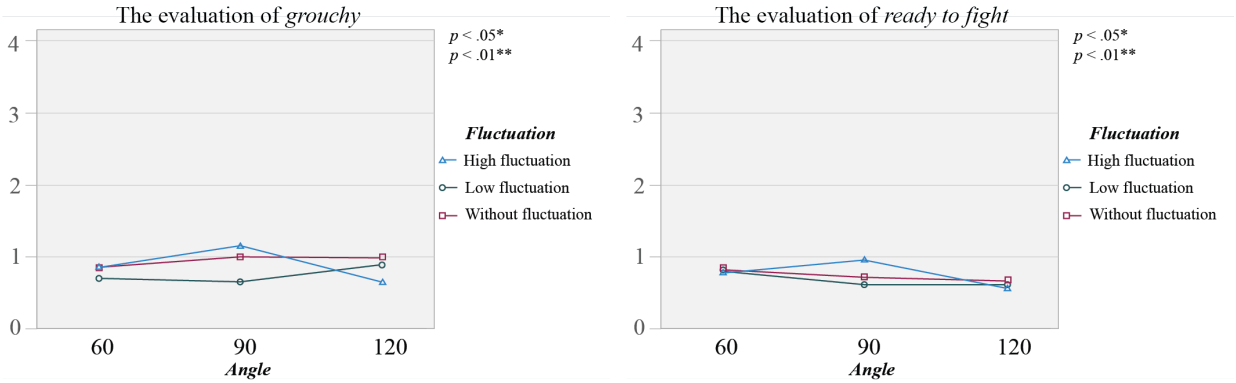

Figure 4.157. Interaction effect between *angle* and *fluctuation* in the evaluation of *grouchy* (left), and *ready to fight* (right)

4.4.5.1. Evaluation on the evaluation tendency based on gender differences

The study employed a two-way ANOVA to analyze the interaction effect of three levels of three factors (*angle, acceleration,* and *fluctuation*) and evaluation on the evaluation tendency based on gender differences of Thai participants. The data was reported as statistically significant at $p < .05$ and highly statistically significant at $p < .01$. The results that were obtained are as follows

(1) *Angle* factor

In the evaluation of *carefree* (Figure 4.158, left) and *rebellious* (Figure 4.158, right), no significant differences were found.

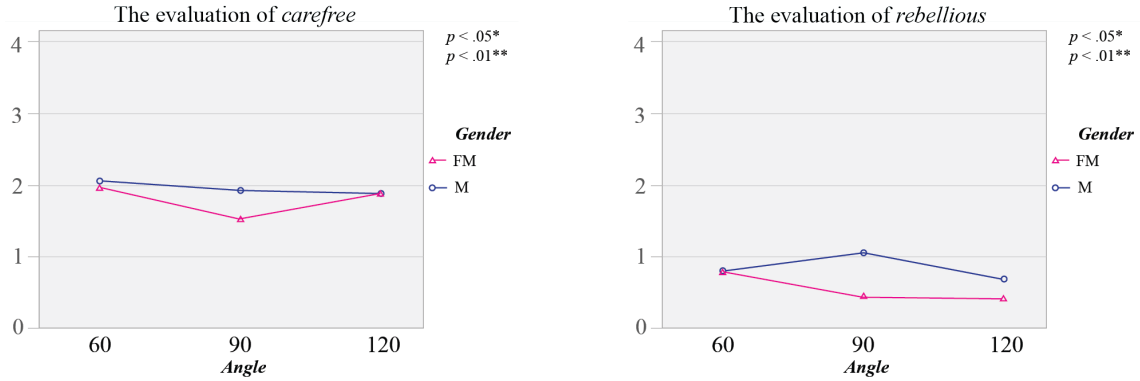

Figure 4.158. Gender differences in the evaluation of *carefree* (left) and *rebellious* (right) with the *angle* factor

In the evaluation of *angry* (Figure 4.159, left), significant differences were found between male and female participants at *90°* and *120°* ($p < .05$).

In the evaluation of *spiteful* (Figure 4.159, right), there were no significant differences between male and female participants.

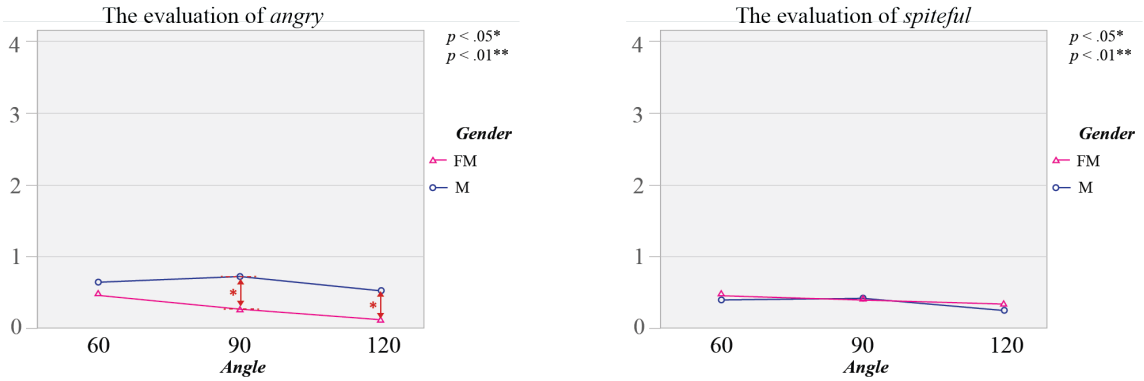

Figure 4.159. Gender differences in the evaluation of *angry* (left) and *spiteful* (right) with the *angle* factor

In the evaluation of *bad tempered* (Figure 4.160, left), significant differences were found between male and female participants at *90°* ($p < .01$).

In the evaluation of *resentful* (Figure 4.160, right), there were no significant differences.

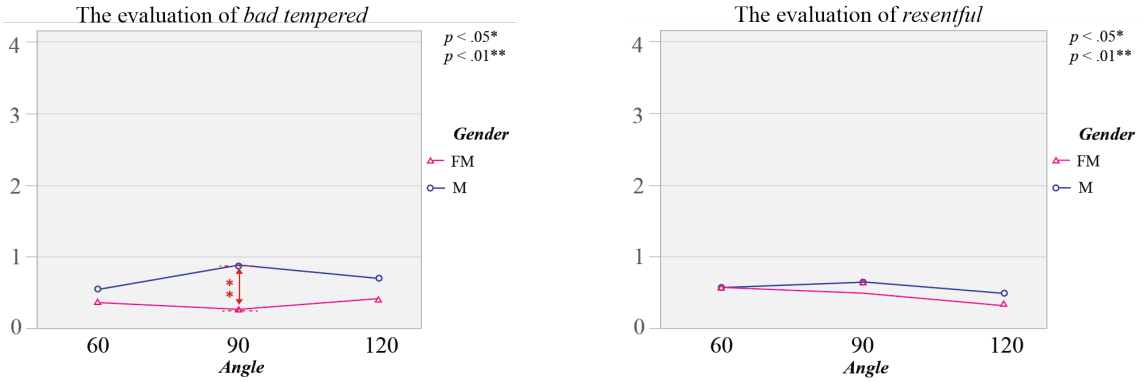

Figure 4.160. Gender differences in the evaluation of *bad tempered* (left) and r*esentful* (right) with the *angle* factor

In the evaluation of *furious* (Figure 4.161, left) and *peeved* (Figure 4.161, right), there were no significant differences.

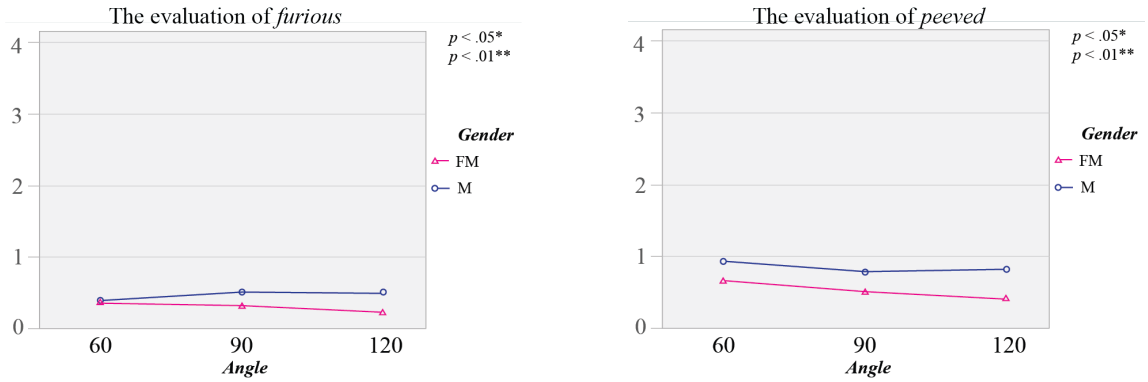

Figure 4.161. Gender differences in the evaluation of *furious* (left) and *peeved* (right) with the *angle* factor

In the evaluation of *grouchy* (figure 4.162, left) and *ready to fight* (figure 4.162, right), no significant differences were reported.

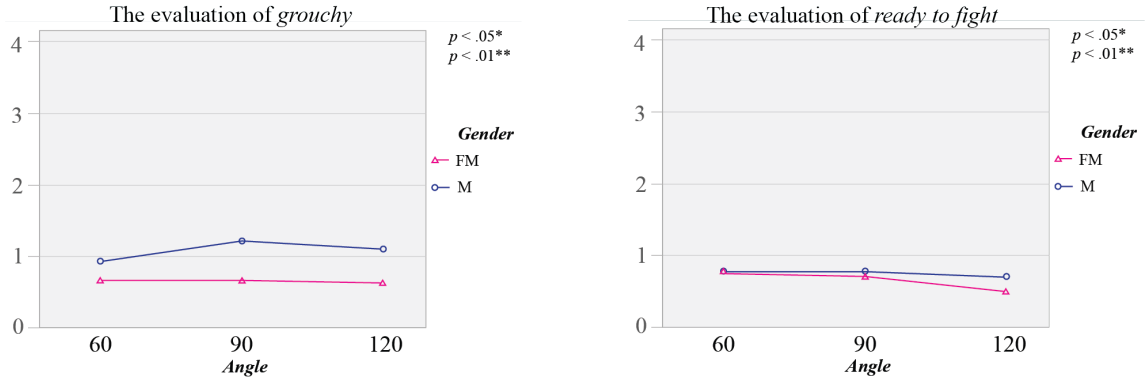

Figure 4.162. Gender differences in the evaluation of *grouchy* (left) and *ready to fight* (right) with the *angle* factor

(2) *Acceleration* factor

In the evaluation of *carefree* (figure 4.163, left) and *rebellious* (figure 4.163, right), no significant differences were found.

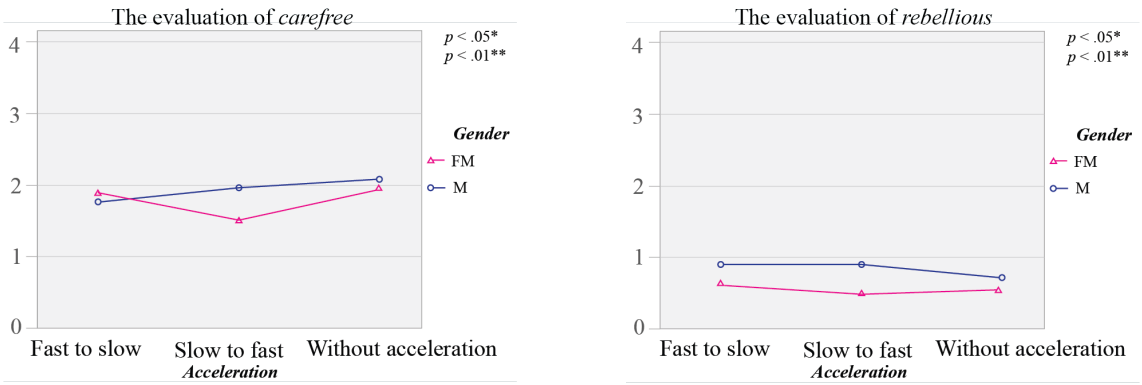

Figure 4.163. Gender differences in the evaluation of *carefree* (left) and *rebellious* (right) with the *acceleration* factor

In the evaluation of *angry* (figure 4.164, left), there were significant differences between male and female participants at *STF (*p < .05).

In the evaluation of *spiteful* (figure 4.164, right), no significant differences were found.

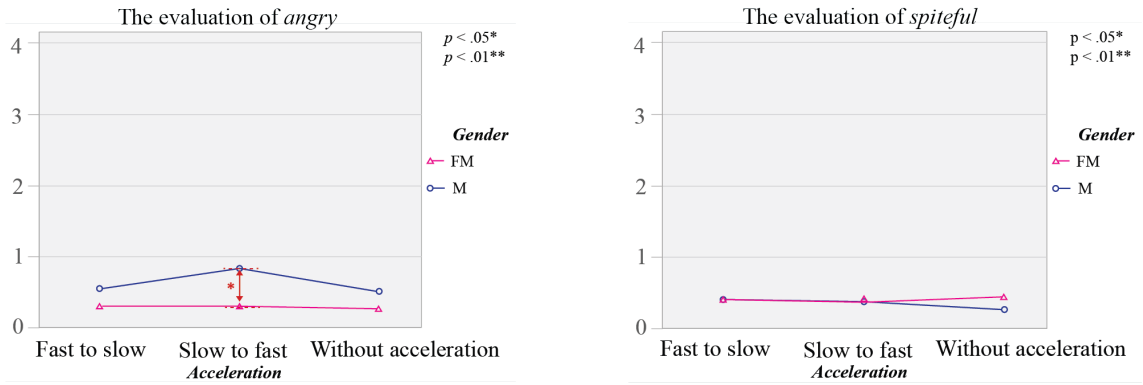

Figure 4.164. Gender differences in the evaluation of *angry* (left) and *spiteful* (right) with the *acceleration* factor

In the evaluation of *bad tempered* (figure 4.165, left), there were significant differences between male and female participants at *FTS* ° ($p < .05$).

In the evaluation of *resentful* (figure 4.165, right), no significant differences were reported between male and female participants.

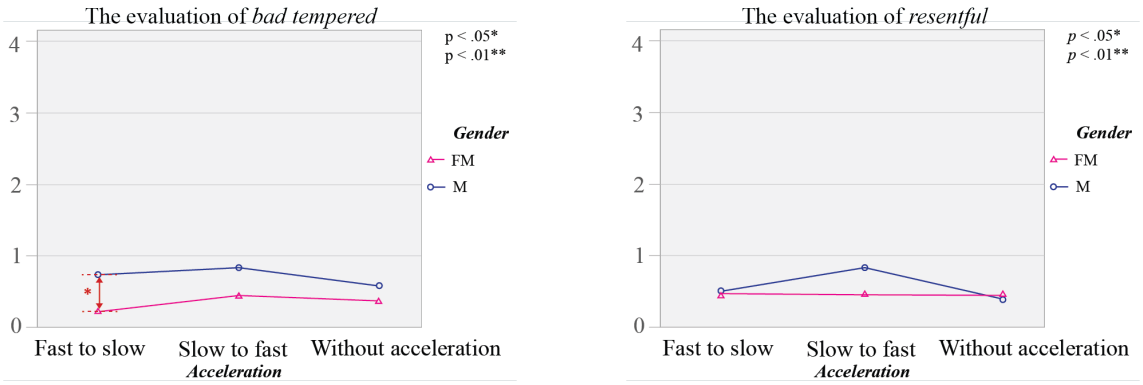

Figure 4.165. Gender differences in the evaluation of *bad tempered* (left) and *resentful* (right) with the *acceleration* factor

In the evaluation of furious (figure 4.166, left) and peeved (figure 4.166, right), no significant differences were found.

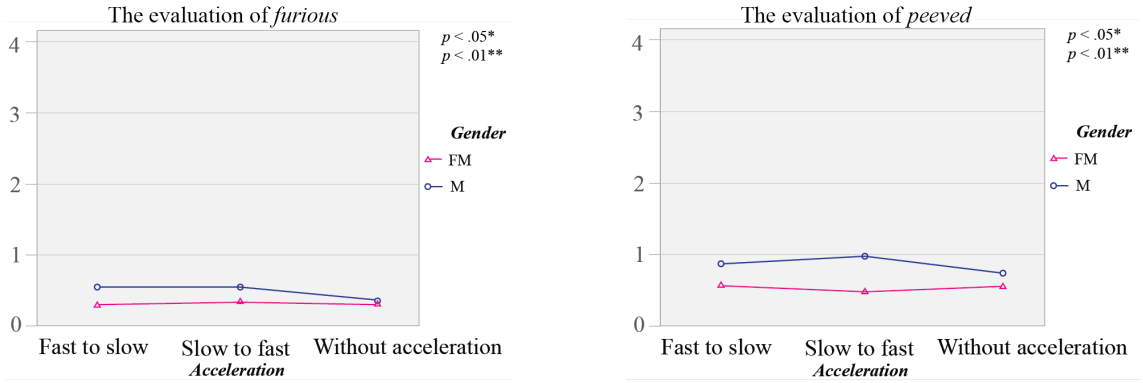

Figure 4.166. Gender differences in the evaluation of *furious* (left) and *peeved* (right) with the *acceleration* factor

In the evaluation of *grouchy* (figure 4.167, left), a significant difference was reported between male and female participants at *FTS* ($p < .05$).

In the evaluation of *ready to fight* (figure 4.167, right), no significant differences were reported.

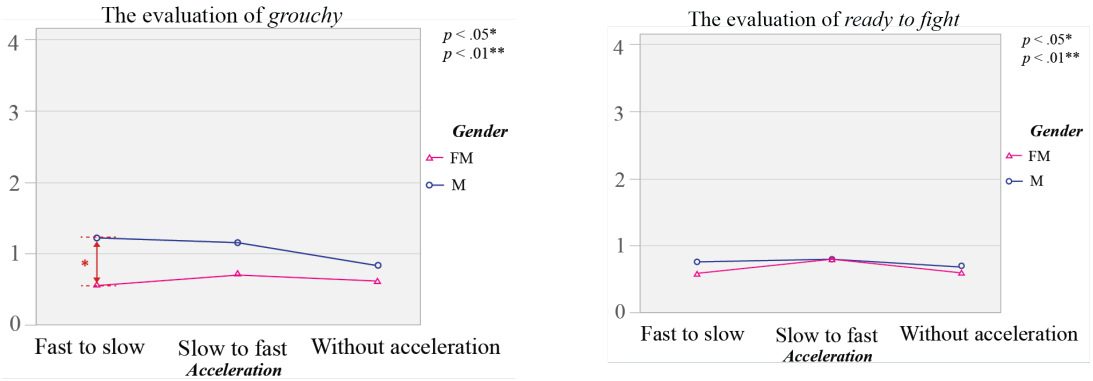

Figure 4.167. Gender differences in the evaluation of *grouchy* (left) and *ready to fight* (right) with the *acceleration* factor

(3) *Fluctuation* factor

In the evaluation of *carefree* (figure 4.168, left) and *rebellious* (figure 4.168, right), no significant differences were reported

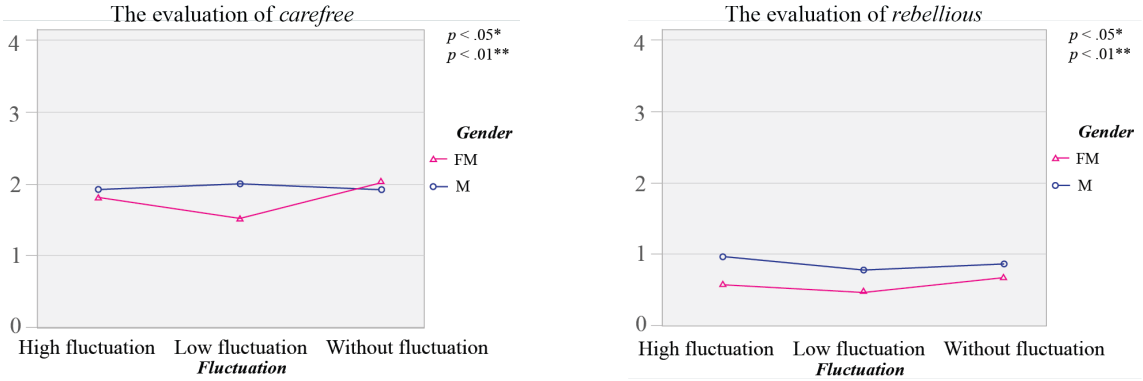

Figure 4.168. Gender differences in the evaluation of *carefree* (left) and *rebellious* (right) with the *fluctuation* factor

In the evaluation of *angry* (figure 4.169, left), a significant difference was reported between male and female participants at *HF* ($p < .01$).

In the evaluation of *spiteful* (figure 4.169, right), no significant differences were reported.

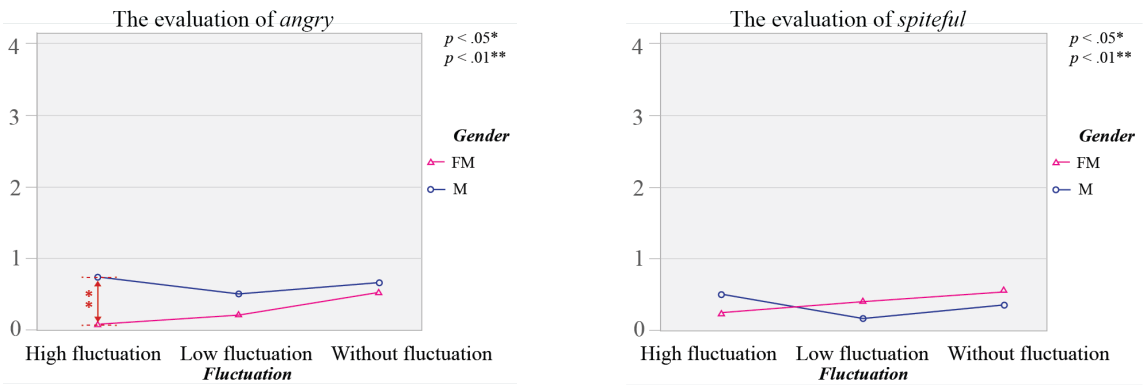

Figure 4.169. Gender differences in the evaluation of *angry* (left) and *spiteful* (right) with the *fluctuation* factor

In the evaluation of *bad tempered* (figure 4.170, left) and resentful (figure 4.170, right), no significant differences were reported.

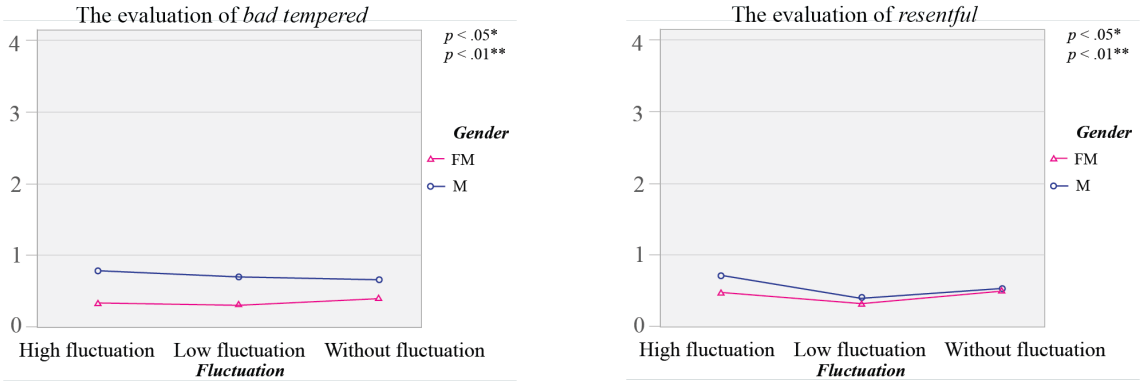

Figure 4.170. Gender differences in the evaluation of *bad tempered* (left) and *resentful* (right) with the *fluctuation* factor

In the evaluation of *furious* (figure 4.171, left), there were no significant difference between male and female participants.

In the evaluation of *peeved* (figure 4.171, right), a significant difference was reported between male and female participants at *LF* ($p < .05$).

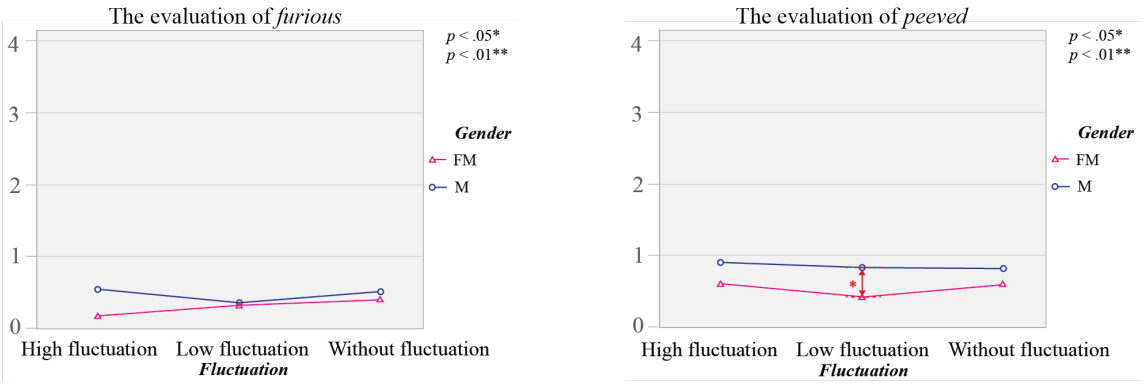

Figure 4.171. Gender differences in the evaluation of *furious* (left) and *peeved* (right) with the *fluctuation* factor

In the evaluation of *grouchy* (figure 4.172, left), there were a significant difference was reported between male and female participants at *HF* ($p < .05$).

In the evaluation of *ready to fight* (figure 4.172, right), there were no significant difference.

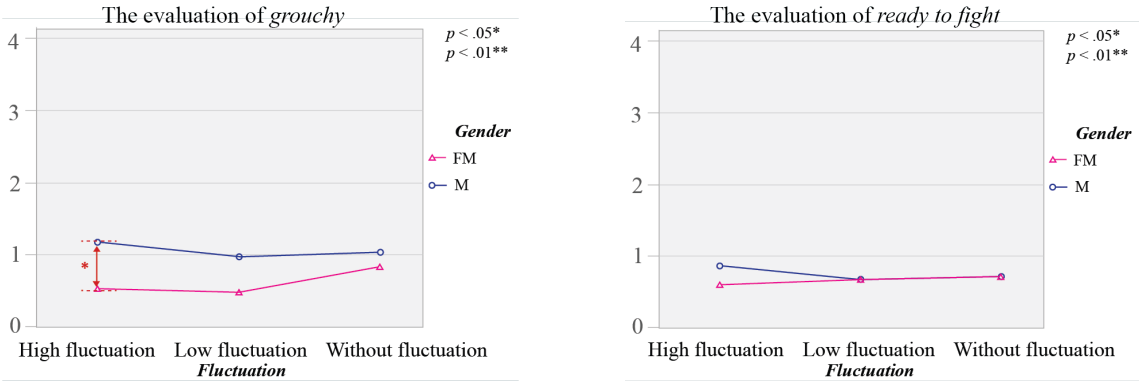

Figure 4.172. Gender differences in the evaluation of *grouchy* (left) and *ready to fight* (right) with the *fluctuation* factor

4.4.5.2. Conclusion

Regarding the interaction effect between the three factors (*angle*, *acceleration*, and *fluctuation*), the results are as follows:

***Angle* and *acceleration*:** No significant differences were reported between these factors.

***Acceleration* and *fluctuation*:** There were no significant differences found in the evaluations.

Angle* and *fluctuation: There were no significant differences found in the evaluations.

Regarding gender differences in the evaluation, the results are as follows:

Angle: There were no significant gender differences in the evaluation of *carefree, rebellious, spiteful, resentful, furious,* and *peeved*. The significant differences were detected between male and female at *90°* and *120°* in the evaluation of *angry* ($p < .05$) and *90°* in the evaluation of *bad tempered* ($p < .01$).

Acceleration: There are no significant differences between male and female in the evaluation of *carefree, rebellious, spiteful, resentful, furious, peeved*, and *ready to fight*. A significant difference was report in the evaluation of *angry* at *STF* ($p < .05$), *bad tempered* at *FTS* ($p < .05$), and *grouchy* at *STF* ($p < .05$).

***Fluctuation*:** There are no significant differences between male and female in the evaluation of *carefree, rebellious, spiteful, bad tempered, furious, peeved*, and *ready to fight*. A significant difference was report in the evaluation of *angry* at *HF* ($p < .01$), *resentful* at *LF* ($p < .05$) and *grouchy* at *HF* ($p < .05$).

4.4.6. Results of 10 evaluation phrases negatively associated with a sense of being alive: A study on comparison between Japanese and Thai participants

The results of the analysis comparing Thai and Japanese participants in the evaluation of the three factors (*angle, acceleration,* and *fluctuation*), which has three levels, are as follows:

In the evaluation of *carefree*

In the evaluation of carefree with the *angle* factor (Figure 4.173), the findings reported a significant difference between Thai and Japanese participants in the evaluation for the three levels of *angle* ($p < .01$). The results showed that Thai participants rated the evaluations higher than Japanese participants.

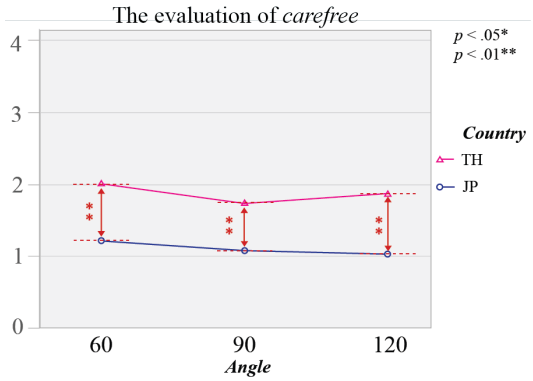

Figure 4.173. Evaluating the *angle* factor in the assessment of *carefree* among Thai and Japanese participants

In the evaluation of *carefree* with the *acceleration* factor (Figure 4.174), according to the results, there was a significant difference between Thai and Japanese participants in the evaluation of the three levels of *acceleration* ($p < .01$). For Japanese participants, *STF* received a significantly lower evaluation compared to both *STF* ($p < .01$) and *FTS* ($p < .05$).

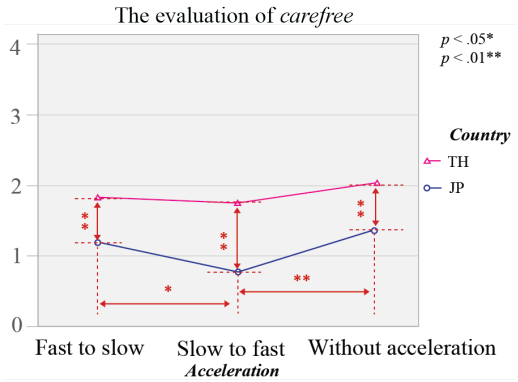

Figure 4.174. Evaluating the *acceleration* factor in the assessment of *carefree* among Thai and Japanese participants

In the evaluation of *carefree* with the *fluctuation* factor (Figure 4.175), The findings revealed a significant difference between Thai and Japanese participants in the evaluation of fluctuation at *HF* and *LF* ($p < .01$). For Japanese participants, *HF* received a significantly lower evaluation compared to both *LF* ($p < .05$) and *WF* ($p < .01$).

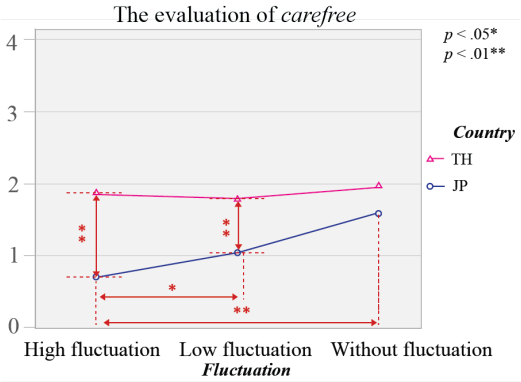

Figure 4.175. Evaluating the *fluctuation* factor in the assessment of *carefree* among Thai and Japanese participants

In the evaluation of *rebellious*

In the evaluation of *rebellious* with the *angle* factor (Figure 4.176, right) and the *acceleration* factor (Figure 4.176, left), there were no significant differences.

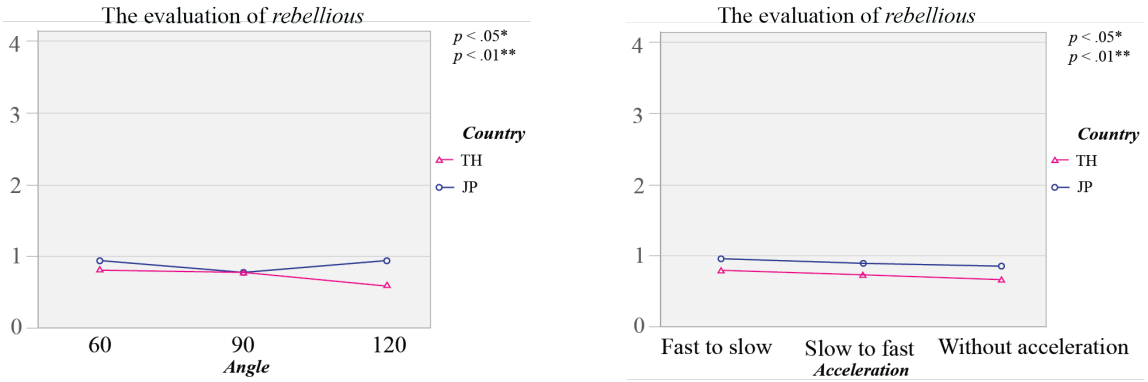

Figure 4.176. Evaluating the *angle* factor (left) and *acceleration* factor (right) in the assessment of *rebellious* among Thai and Japanese participants

In the evaluation of *rebellious* with the *fluctuation* factor (Figure 4.177), the findings revealed a significant difference between Thai and Japanese participants in the evaluation of *fluctuation* at *HF* ($p < .05$). For Japanese participants, *HF* received a significantly higher evaluation compared to *WF* ($p < .01$).

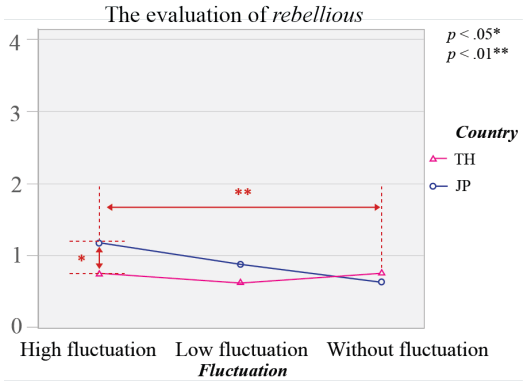

Figure 4.177. Evaluating the *fluctuation* factor in the assessment of *rebellious* among Thai and Japanese participants

In the evaluation of *angry*

In the evaluation of *angry* with the *angle* factor (Figure 4.178), a significant difference was found between Thai and Japanese participants in the evaluation of *fluctuation* at *120°* ($p < .05$).

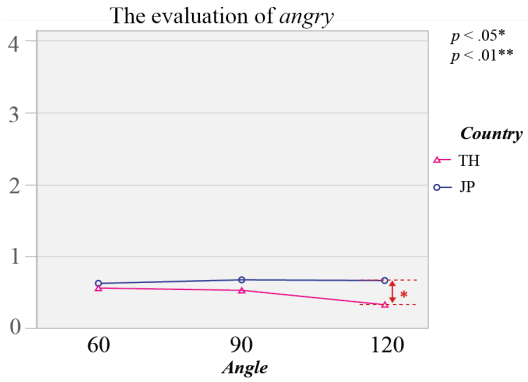

Figure 4.178. Evaluating the *angle* factor in the assessment of *angry* among Thai and Japanese participants

In the evaluation of *angry* with the *acceleration* factor (Figure 4.179), there were no significant differences between Thai and Japanese participants in the evaluation of the three levels of *acceleration* factors. For Japanese participants, *STF* received a significantly higher evaluation compared to *WA* ($p < .05$).

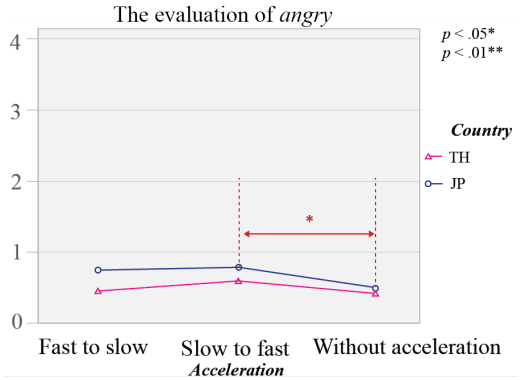

Figure 4.179. Evaluating the *acceleration* factor in the assessment of *angry* among Thai and Japanese participants

In the evaluation of *angry* with the *fluctuation* factor (Figure 4.180), the results revealed a significant difference between Thai and Japanese participants in the evaluation of *fluctuation* at *HF* ($p < .01$). For Japanese participants, *HF* received a significantly higher evaluation compared to *LF* and *WF* ($p < .01$).

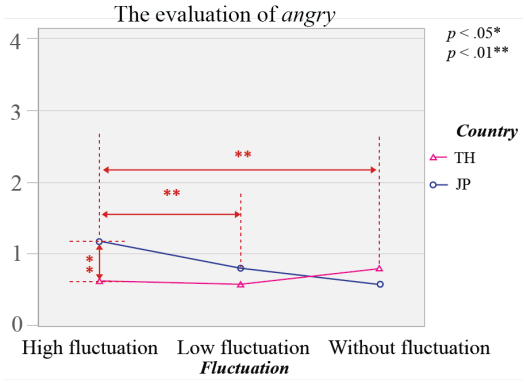

Figure 4.180. Evaluating the *fluctuation* factor in the assessment of *angry* among Thai and Japanese participants

In the evaluation of *spiteful*

In the evaluation of *spiteful* with the *angle* factor (Figure 4.181), according to the results, there was a significant difference between Thai and Japanese participants in the evaluation of the three levels of *angle* ($p < .01$). The results showed that Japanese participants rated the evaluations higher than Thai participants.

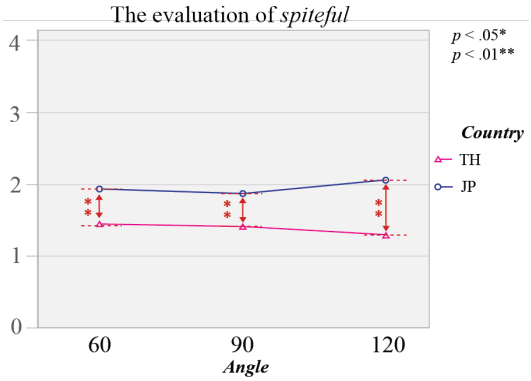

Figure 4.181. Evaluating the *angle* factor in the assessment of *spiteful* among Thai and Japanese participants

In the evaluation of *spiteful* with the *acceleration* factor (Figure 4.182), there was a significant difference between Thai and Japanese participants in the evaluation of the three levels of *acceleration* ($p < .01$). The results indicated that Japanese participants rated the evaluations higher compared to Thai participants.

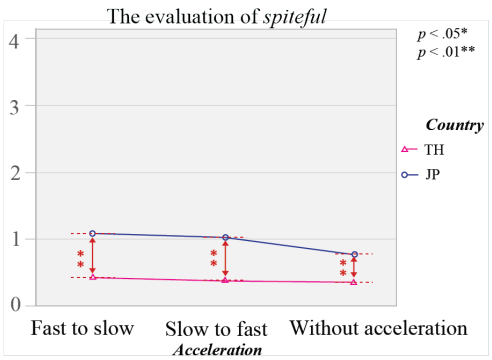

Figure 4.182. Evaluating the acceleration factor in the assessment of spiteful among Thai and Japanese participants

In the evaluation of *spiteful* with the *fluctuation* factor (Figure 4.183), the obtained results revealed a significant difference between Thai and Japanese participants in the evaluation of fluctuation at *HF* and *LF* ($p < .01$). For Japanese participants, *HF* received a significantly higher evaluation than *WF* ($p < .01$).

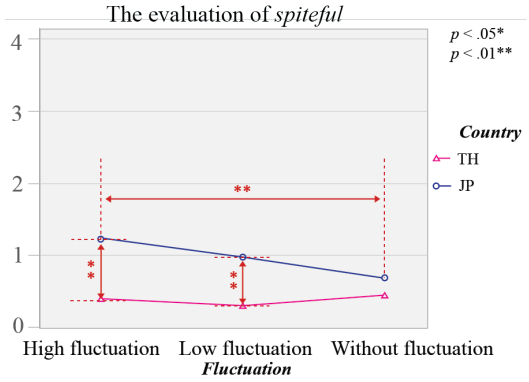

Figure 4.183. Evaluating the fluctuation factor in the assessment of spiteful among Thai and Japanese participants

In the evaluation of *bad tempered*

In the evaluation of *bad tempered* with the *angle* factor (Figure 4.184), the findings showed a significant difference between Thai and Japanese participants in the evaluation of the three levels of *angle* at *60°* and *120°* ($p < .01$), and *90°* ($p < .05$). The results showed that Japanese participants rated the evaluations higher compared to Thai participants.

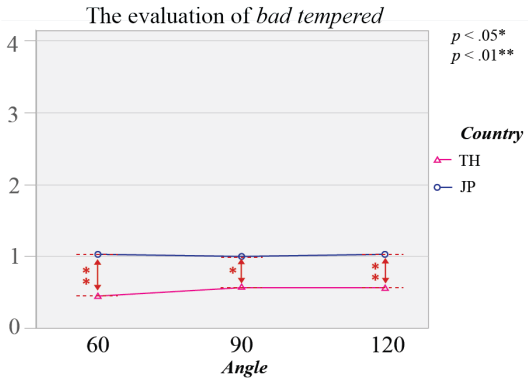

Figure 4.184. Evaluating the *angle* factor in the assessment of *bad tempered* among Thai and Japanese participants

In the evaluation of *bad tempered* with the *acceleration* factor (Figure 4.185), there was a significant difference between Thai and Japanese participants in the evaluation of the three levels of *acceleration* at *FTS* and *STF* ($p < .01$), and *WA* ($p < .05$). The results showed that Japanese participants rated the evaluations higher compared to Thai participants. Moreover, for Japanese participants, *STF* received a significantly higher evaluation than *WA* ($p < .05$).

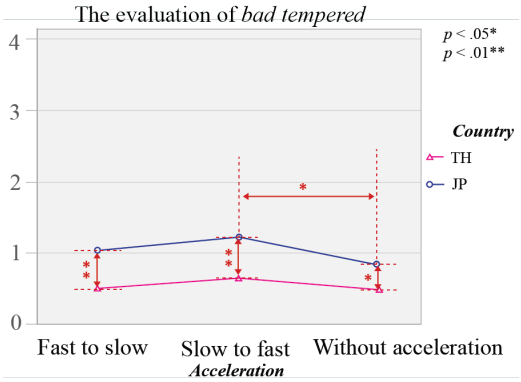

Figure 4.185. Evaluating the *acceleration* factor in the assessment of *bad tempered* among Thai and Japanese participants

In the evaluation of *bad tempered* with the *fluctuation* factor (Figure 4.186), the findings revealed a significant difference between Thai and Japanese participants in the evaluation of fluctuation at *HF* and *LF* ($p < .01$). For Japanese participants, *HF* received a significantly higher evaluation compared to *LF* ($p < .05$) and *WF* ($p < .01$). Additionally, *LF* received a significantly higher evaluation than *WF* ($p < .05$).

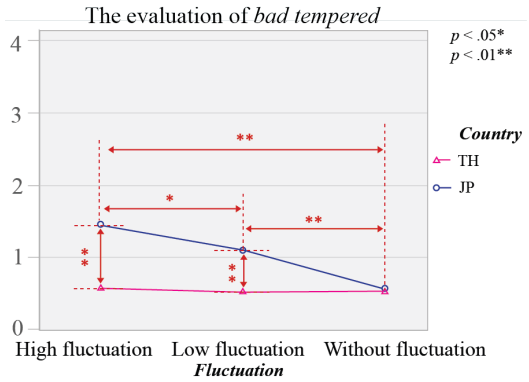

Figure 4.186. Evaluating the *fluctuation* factor in the assessment of *bad tempered* among Thai and Japanese participants

In the evaluation of *resentful*

In the evaluation of *resentful* with the *angle* factor (Figure 4.187), no significant differences were found.

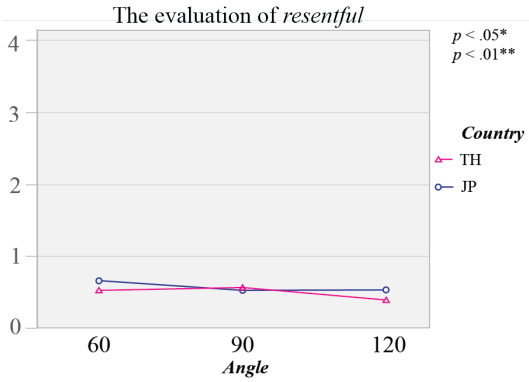

Figure 4.187. Evaluating the *angle* factor in the assessment of *resentful* among Thai and Japanese participants

In the evaluation of *resentful* with the *acceleration* factor (Figure 4.188, left), no significant differences were found. In the evaluation of *resentful* with fluctuation factor (Figure 4.188, right), The results showed that Japanese participants rated *HF* higher than *LF* and *WF* ($p < .01$).

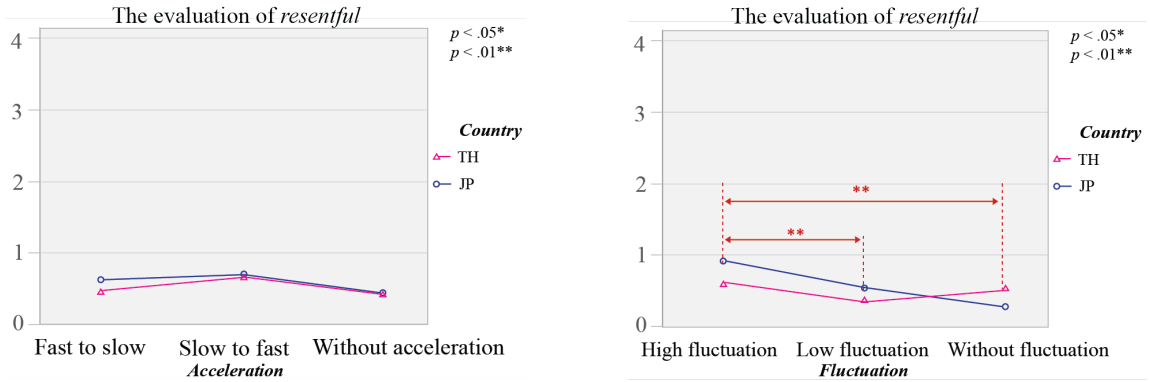

Figure 4.188. Evaluating the *acceleration* factor (Left) and *fluctuation* factor (Right) in the assessment of *resentful* among Thai and Japanese participants

In the evaluation of *furious*

In the evaluation of *furious* with the *angle* factor (Figure 4.189, left) and *acceleration* factor (Figure 4.198, right), no significant differences were observed.

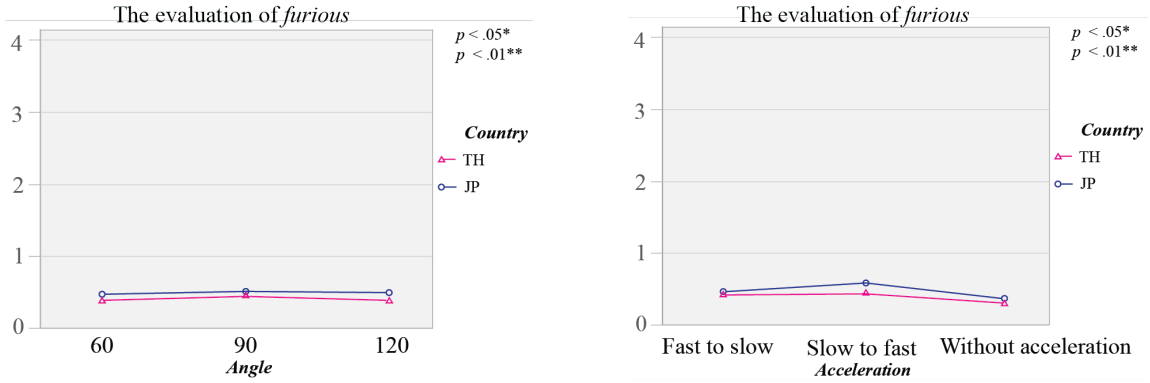

Figure 4.189. Evaluating the *fluctuation* factor (Left) and *acceleration* factor (right) in the assessment of *furious* among Thai and Japanese participants

In the evaluation of *furious* with the *fluctuation* factor (Figure 4.190), no significant differences were observed.

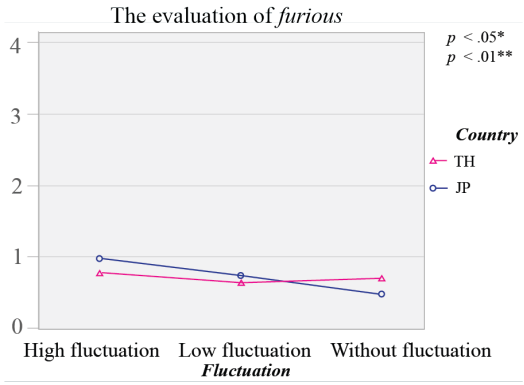

Figure 4.190. Evaluating the *fluctuation* factor in the assessment of *furious* among Thai and Japanese participants

In the evaluation of *peeved*

In the evaluation of *peeved* with the *angle* factor (Figure 4.191, left) and acceleration factor (Figure 4.190, right), no significant differences were reported.

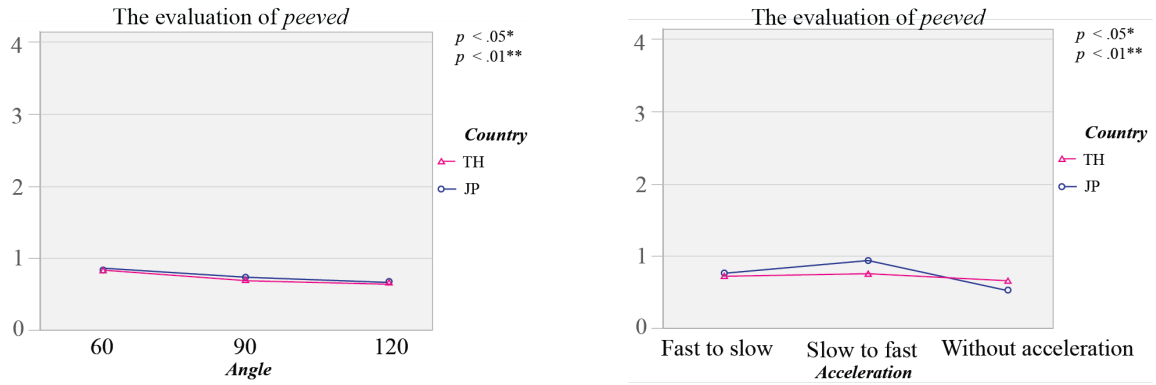

Figure 4.191. Evaluating the *angle* factor (Left) and acceleration factor (Right) in the assessment of *peeved* among Thai and Japanese participants

In the evaluation of *peeved* with the *fluctuation* factor (Figure 4.192), no significant differences were found.

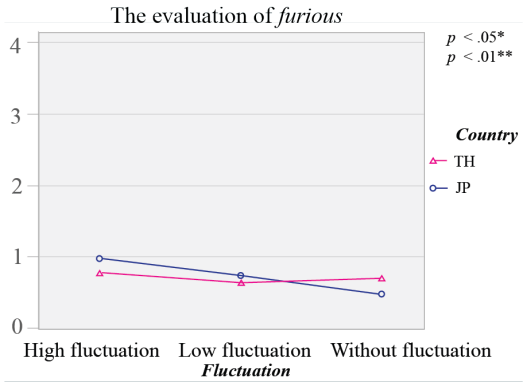

Figure 4.192. Evaluating the *fluctuation* factor in the assessment of *peeved* among Thai and Japanese participants

In the evaluation of *grouchy*

In the evaluation of *grouchy* with the *angle* factor (Figure 4.193, left) and *acceleration* factor (Figure 4.202, right), no significant differences were reported.

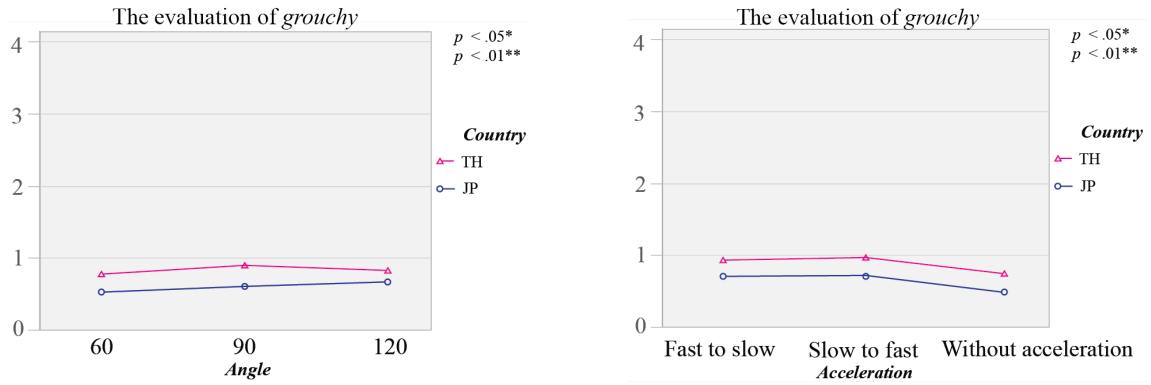

Figure 4.193. Evaluating the *angle* factor (Left) and *acceleration* factor (Right) in the assessment of *grouchy* among Thai and Japanese participants

In the evaluation of *grouchy* with the *fluctuation* factor (Figure 4.194), the findings revealed a significant difference between Thai and Japanese participants in the evaluation of *fluctuation* at *WF* ($p < .01$).

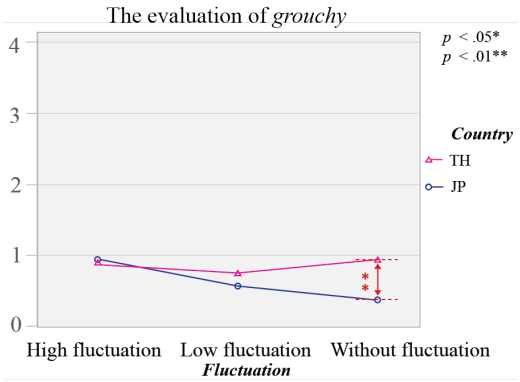

Figure 4.194. Evaluating the *fluctuation* factor in the assessment of *grouchy* among Thai and Japanese participants

In the evaluation of *ready to fight*

In the evaluation of *ready to fight* with the *angle* factor, according to the results (Figure 4.195), there were a significant difference between Thai and Japanese participants in the evaluation of *angle* at *90°* ($p < .01$).

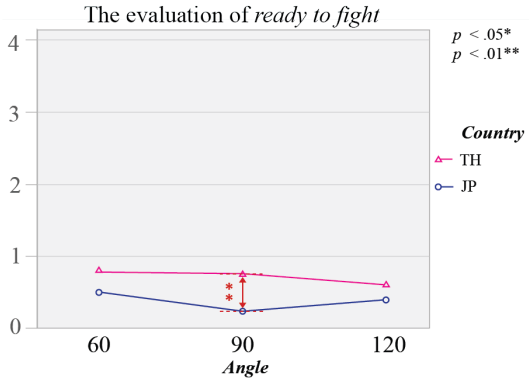

Figure 4.195. Evaluating the *angle* factor in the assessment of *ready to fight* among Thai and Japanese participants

In the evaluation of *ready to fight* with the *acceleration* factor (Figure 4.196), the findings revealed a significant difference between Thai and Japanese participants in the evaluation of *acceleration* at *STF* ($p < .05$) and *WA* ($p < .01$).

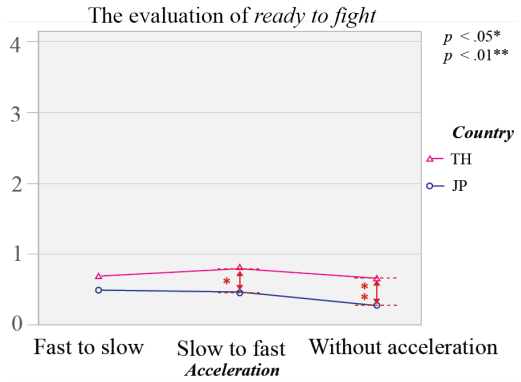

Figure 4.196. Evaluating the acceleration factor in the assessment of ready to fight among Thai and Japanese participants

In the evaluation of *ready to fight* with the *fluctuation* factor (Figure 4.197), The findings showed a significant difference between Thai and Japanese at *WF* ($p < .01$). For Japanese participants, *HF* received a significantly higher evaluation compared to *WF* ($p < .01$).

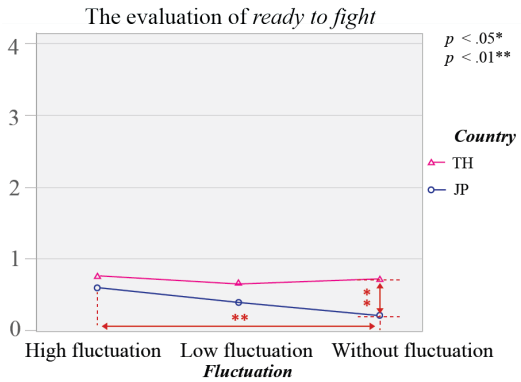

Figure 4.197. Evaluating the *fluctuation* factor in the assessment of *ready to fight* among Thai and Japanese participants

4.4.6.1. Evaluation of the tendency to evaluate based on gender differences combined the results of both Thai and Japanese male and female participants

The study employed a two-way ANOVA to analyze the interaction effect of three levels of three factors (*angle, acceleration,* and *fluctuation*) and evaluation on the evaluation tendency based on gender differences of Japanese and Thai participants. The data was reported as statistically significant at $p < .05$ and highly statistically significant at $p < .01$. The results that were obtained are as follows:

(1) *Angle* factor

In the evaluation of *carefree* (Figure 4.198, left) and *rebellious* (Figure 4.198, right), no significant difference was reported.

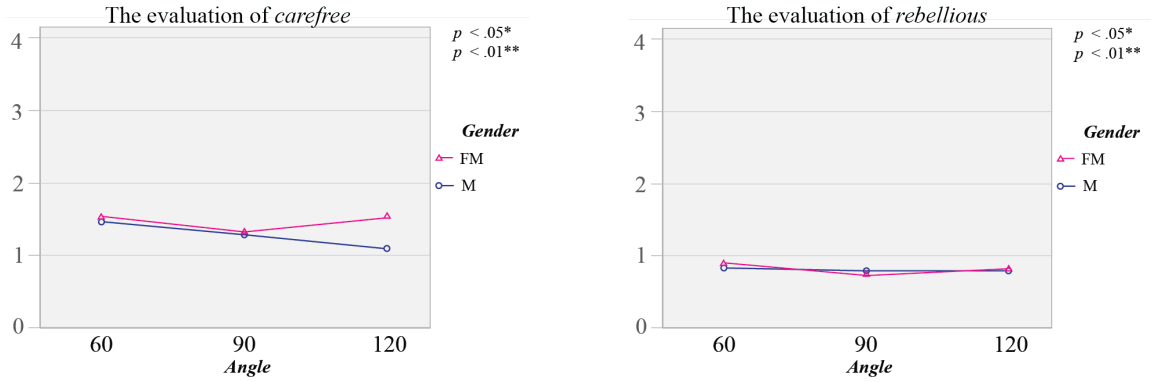

Figure 4.198. Gender differences in the evaluation of *carefree* (left) and *rebellious* (right) with the *angle* factor

In the evaluation of *angry* (Figure 4.199, left) and *spiteful* (Figure 4.199, right), there were no significant differences found.

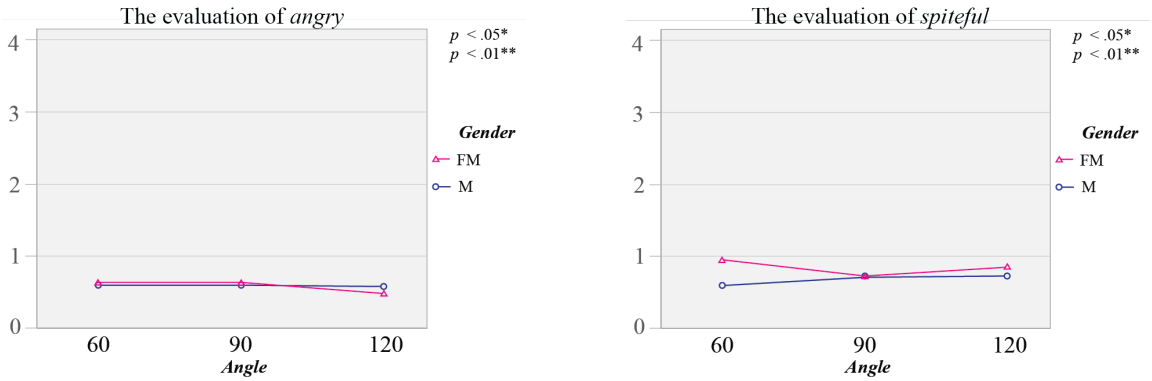

Figure 4.199. Gender differences in the evaluation of *angry* (left) and *spiteful* (right) with the *angle* factor

In the evaluation of *bad tempered* (Figure 4.200, left) and *resentful* (Figure 4.200, right), no significant difference was reported.

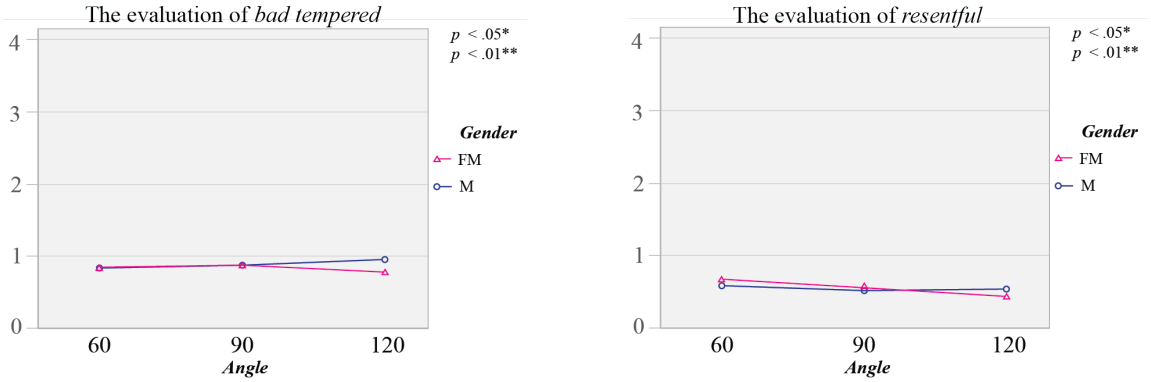

Figure 4.200. Gender differences in the evaluation of *bad tempered* (left) and *resentful* (right) with the *angle* factor

In the evaluation of *furious* (Figure 4.201, left) and *peeved* (Figure 4.201, right), no significant difference was observed.

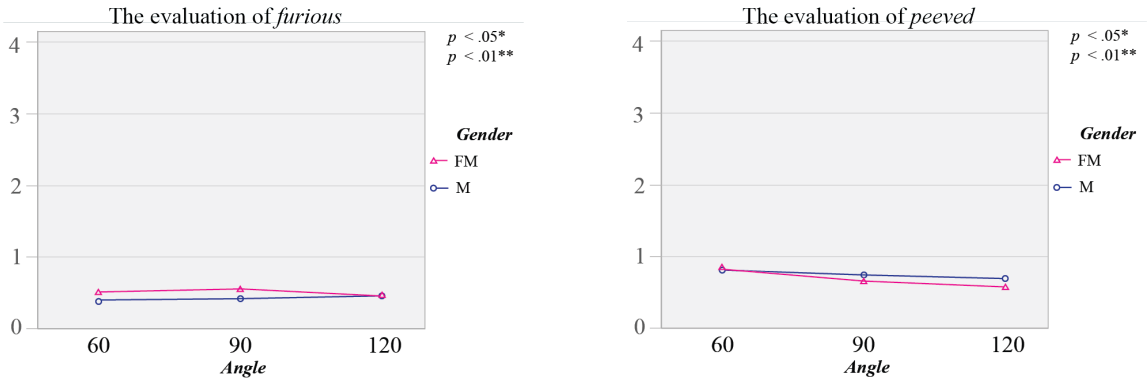

Figure 4.201. Gender differences in the evaluation of *furious* (left) and *peeved* (right) with the *angle* factor

In the evaluation of *grouchy* (Figure 4.202, left) and *ready to fight* (Figure 4.202, right), there were no significant differences found.

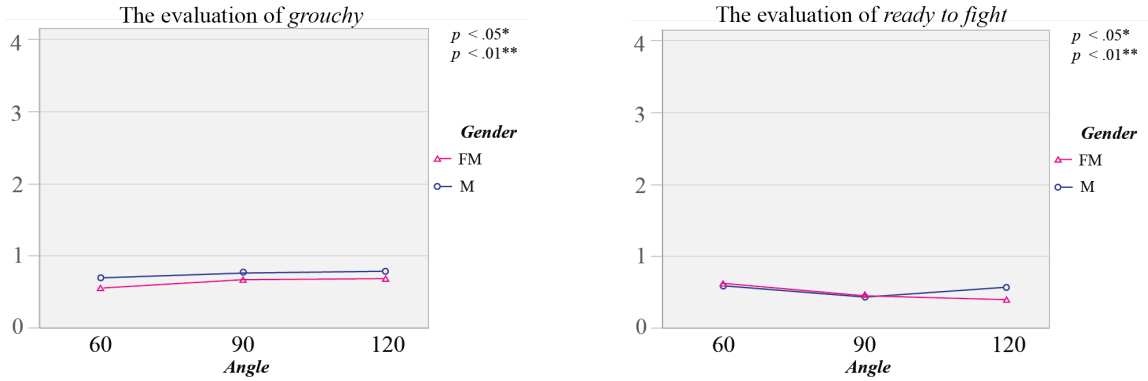

Figure 4.202. Gender differences in the evaluation of *grouchy* (left) and *ready to fight* (right) with the *angle* factor

(2) *Acceleration* factor

In the evaluation of *carefree* (Figure 4.203, left), there were no significant differences between male and female participant. For male participants, *WA* obtained a significantly higher evaluation than *STF* ($p < .01$).

In the evaluation of *rebellious* (Figure 4.203, right), there were no significant differences found.

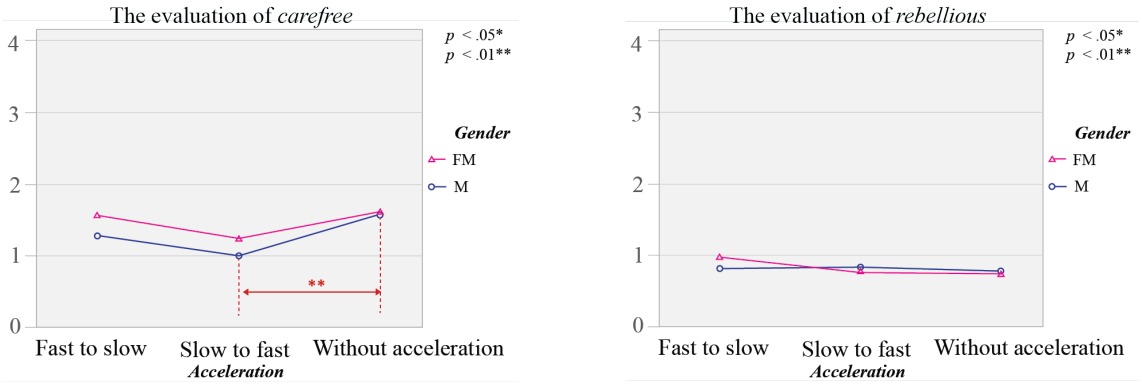

Figure 4.203. Gender differences in the evaluation of carefree (left) and *rebellious* (right) with the *acceleration* factor

In the evaluation of *angry* (Figure 4.204, left), there were no significant differences between male and female. For male participants, *STF* obtained a significantly higher evaluation than *WA* ($p < .05$).

In the evaluation of *spiteful* (Figure 4.204, right), there were no significant differences found.

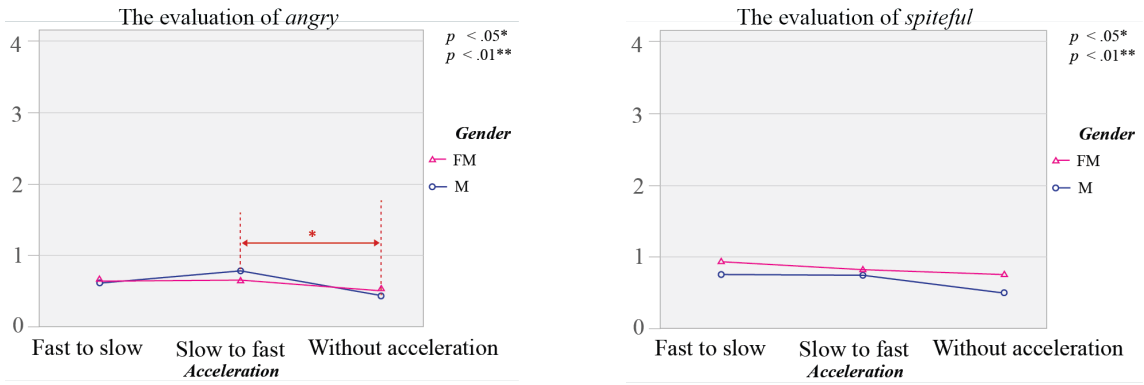

Figure 4.204. Gender differences in the evaluation of *angry* (left) and *spiteful* (right) with the *acceleration* factor

In the evaluation of *bad tempered* (Figure 4.205, left) and *resentful* (Figure 4.205, right), no significant differences were reported.

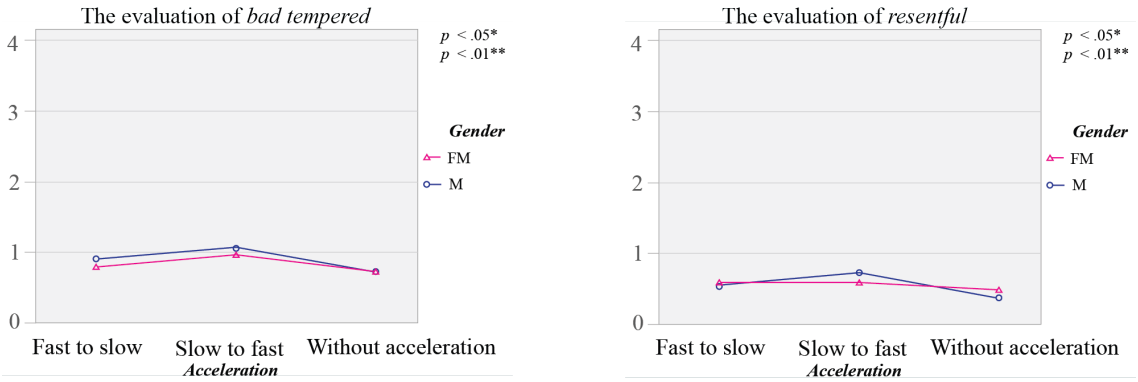

Figure 4.205. Gender differences in the evaluation of *bad tempered* (left) and *resentful* (right) with the *acceleration* factor

In the evaluation of *furious* (Figure 4.206, left), no significant differences were reported.

In the evaluation of *peeved* (Figure 4.206, right), there were no significant differences between male and female. For male participants, *STF* obtained a significantly higher evaluation than *WA* ($p < .01$).

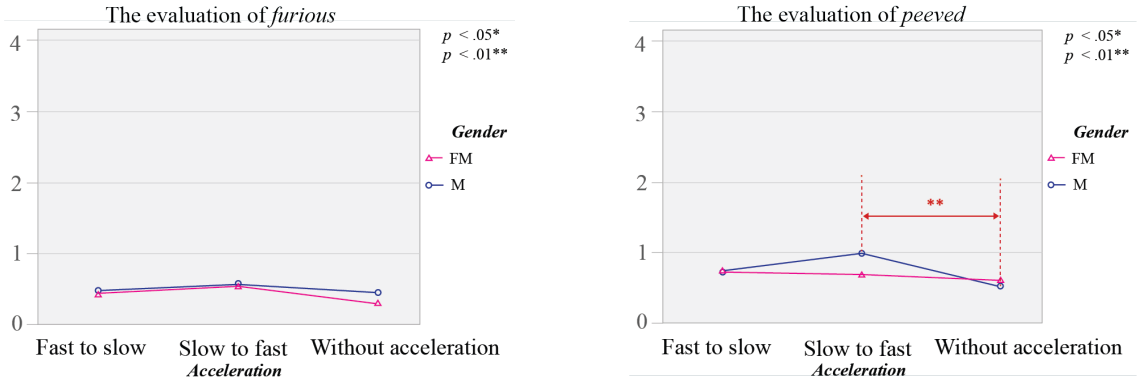

Figure 4.206. Gender differences in the evaluation of *furious* (left) and *peeved* (right) with the *acceleration* factor

In the evaluation of *grouchy* (Figure 4.207, left) and *ready to fight* (Figure 4.207, right), no significant differences were reported.

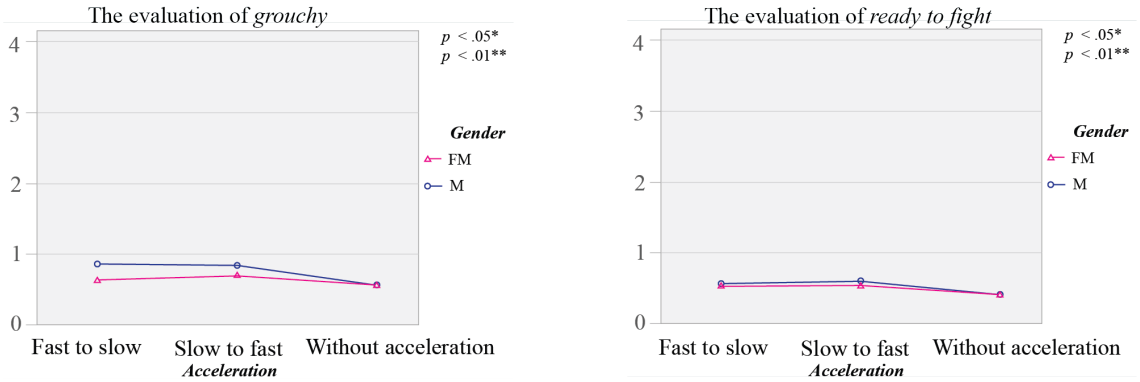

Figure 4.207. Gender differences in the evaluation of *grouchy* (left) and *ready to fight* (right) with the *acceleration* factor

(3) *Fluctuation* factor

In the evaluation of *carefree* (Figure 4.208, left), no significant differences were found between male and female participants. However, for female participants, *WF* received significantly higher evaluations than *LF* ($p < .05$) and *HF* ($p < .01$). Similarly, for male participants, *WF* received significantly higher evaluations than *HF* ($p < .01$).

In the evaluation of *rebellious* (Figure 4.208, right), no significant differences between male and female participants. For female participants, *HF* obtained a significantly higher evaluation than *WF* ($p < .01$).

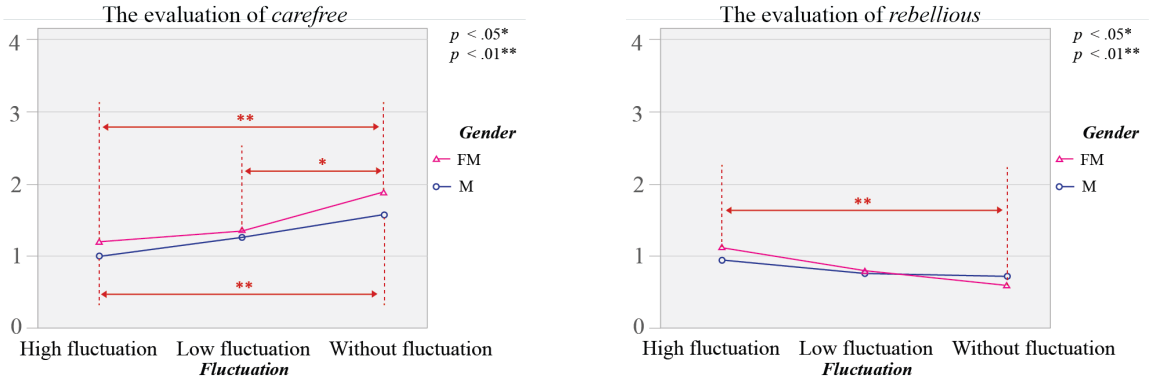

Figure 4.208. Gender differences in the evaluation of *carefree* (left) and *rebellious* (right) with the *fluctuation* factor

In the evaluation of *angry* (Figure 4.209, left), no significant differences were reported between male and female participants. However, for female participants, *WF* received significantly higher evaluations than *LF* ($p < .05$) and *HF* ($p < .01$). Similarly, for male participants, *WF* received significantly higher evaluations than *HF* ($p < .01$).

In the evaluation of *spiteful* (Figure 4.209, right), no significant differences were found between male and female participants. However, for male participants, *HF* received a significantly higher evaluation than *WF* ($p < .05$).

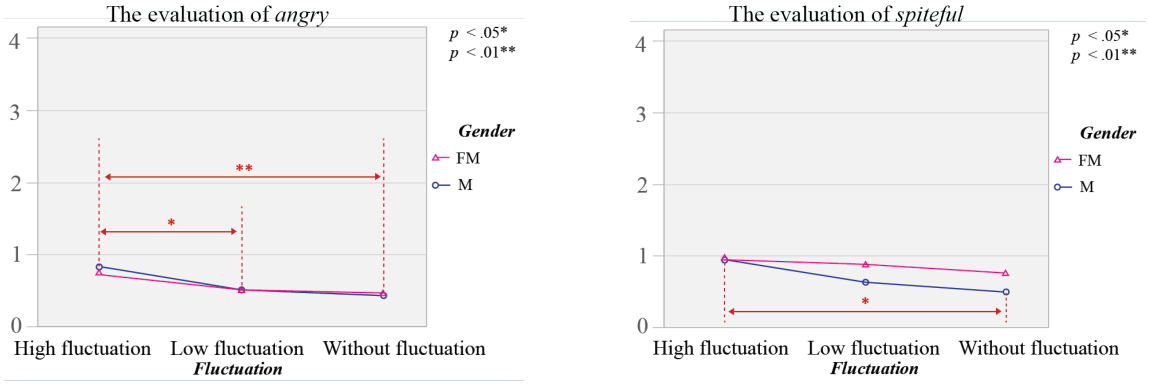

Figure 4.209. Gender differences in the evaluation of *angry* (left) and *spiteful* (right) with the *fluctuation* factor

In the evaluation of *bad tempered* (Figure 4.210, left), no significant differences were reported between male and female participants. For female participants, *HF* received significantly higher evaluations than *LF* ($p < .05$) and *WF* ($p < .01$). For male participants, *WF* received significantly lower evaluations than *LF* ($p < .05$) and *HF* ($p < 0.01$).

In the evaluation of *resentful* (Figure 4.210, right), no significant differences were reported.

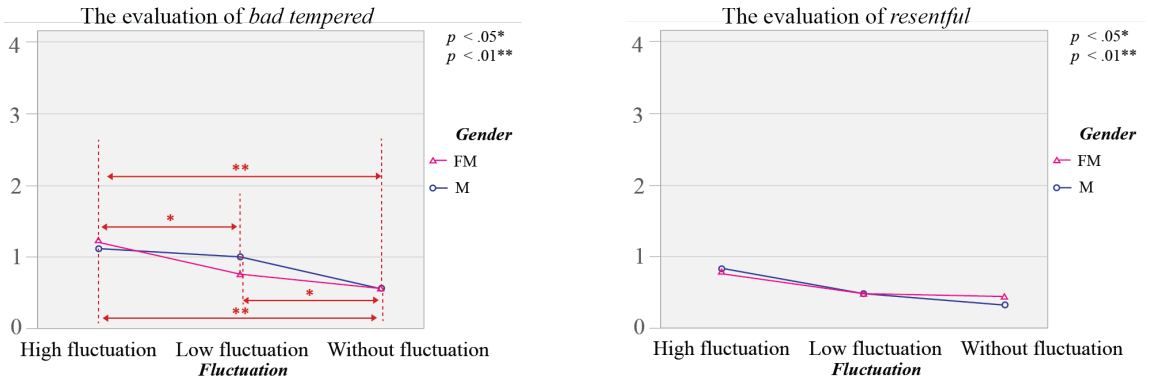

Figure 4.210. Gender differences in the evaluation of *bad tempered* (left) and *resentful* (right) with the *fluctuation* factor

In the evaluation of *furious* (Figure 4.211, left), no significant differences were found between male and female participants. For male participants, *HF* received a significantly higher evaluation than *WF* ($p < .01$).

In the evaluation of *peeved* (Figure 4.211, right), there were no significant differences observed between male and female participant. However, male participants rated *HF* significantly higher than *WF* ($p < .05$).

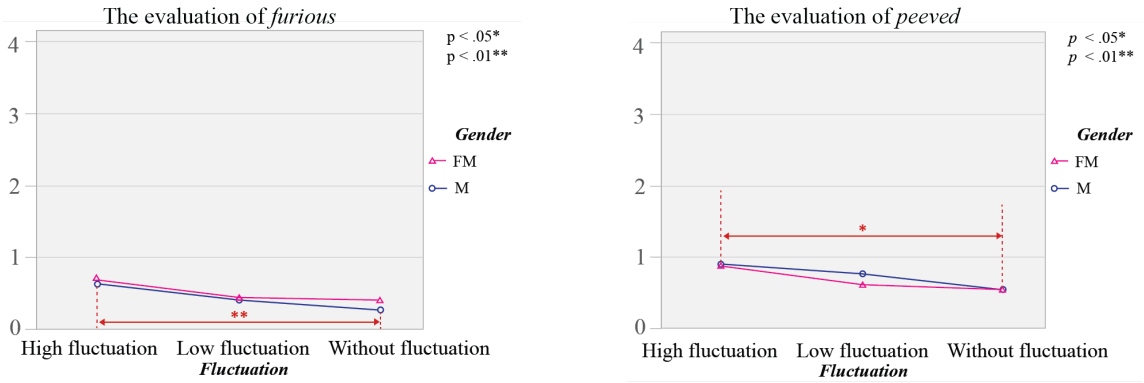

Figure 4.211. Gender differences in the evaluation of *furious* (left) and *peeved* (right) with the *fluctuation* factor

In the evaluation of *grouchy* (Figure 4.212, left), no significant differences were reported between male and female participants. For female participants, *HF* received a significantly higher evaluation than *LF* ($p < .05$).

In the evaluation of *ready to fight* (Figure 4.212, right), no significant differences were reported between male and female participants. For male participants, *HF* received a significantly higher evaluation than *WF* ($p < .05$).

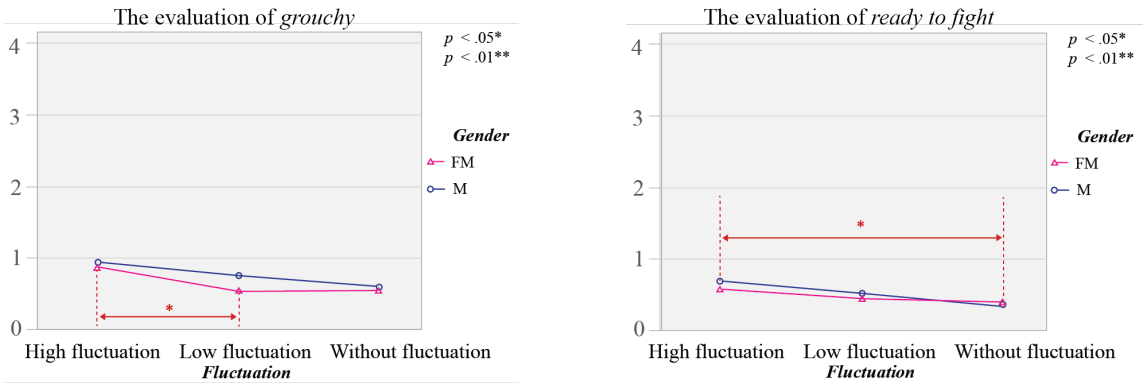

Figure 4.212. Gender differences in the evaluation of *grouchy* (left) and *ready to fight* (right) with the *fluctuation* factor

4.4.6.2. Conclusion

Regarding the differences in evaluation based on the country background of participants, the results are as follows:

Thai participants rated higher than Japanese participants on the evaluation of traits such as *carefree* at all levels of *angle* factors ($p < .01$), all levels of *acceleration* ($p < .01$), and at *HF* and *LF* in the fluctuations factor ($p < .01$). They also rated higher on r*ebellious* at *HF* ($p < .05$), *anger* at *120°* ($p < .05$) and *HF* ($p < .01$), *spiteful* at all levels of *angle* and *acceleration* factors ($p < .01$), and *HF* and *LF* ($p < .01$), *bad tempered* at all levels of *angle* factors ($p < .01$), all levels of *acceleration* ($p < .01$), and *HF* and *LF* fluctuations ($p < .01$), and *grouchy* with *HF* fluctuation ($p < .01$). Furthermore, Thai participants rated higher on *ready to fight* at 90° ($p < .01$), *STF* ($p < .05$) and *WA* ($p < .01$), and *WF* ($p < .01$).

Regarding gender differences in the evaluation, no significant difference was detected between males and females.

4.5. Discussion

According to the results of 10 evaluation phrases positively associated with a sense of being alive by a study of Japanese and Thai participants.

Thai participants rated higher evaluations than Japanese participants in terms of *lively*, *vigorous, cheerful, active, alert, energetic, helpful,* and *efficient* (p <.01). However, Japanese participants rated higher evaluations than Thai participants regarding the feeling of *uneasy* in angle factor at *60°* (p <.01), acceleration factor at FTS (p <.01), and STF (p <.05), and fluctuation factor at HF and LF (p <.01). The findings revealed significant differences between Thai and Japanese participants. Humans acquire knowledge and understanding through their interactions with the environment and personal experiences. Various factors, including the physical environment, individual characteristics, and cultural background, influence this learning process. These factors contribute to individuals' unique responses to motion, as their experiences and backgrounds shape how they perceive, interpret, and emotionally react to it. According to another study, cultural factors have been shown to play a significant role in shaping the perception and recognition of emotions in the motion of body movements [7].

Angle: Both groups of participants showed that a narrow *angle* of *60°* had a significantly greater impact on the evaluation of a sense of being alive compared to a wider angle of *120°*. This result was observed in the evaluation of *lively* (p <.01). For the Japanese participant, *60°* received higher evaluation than *120°* in the evaluation of vigorous (p <.05), *cheerful* (p <.05), *uneasy* (p <.05), *energetic* (p <.05) and *full of life* (p <.01). It highlights the importance of the narrow *angle* in influencing the perception of a sense of being alive.The reason why the narrow degree of *60°* highly affects the evaluation of a sense of being alive more than the wide degree of *120°* can be explained as follows: The stimulus with a *60°* angle provides more frequent changes in direction, resulting in a more complex movement compared to the stimulus with a *120°* angle, where changes in direction are less frequent. The movement at *60°* leads to the perception of frequency patterns, characterized by a narrow degree, which can create a sense of dynamism, vitality, and liveliness. According to Muehsam and Ventura [8], the feeling of frequency can be associated with the biological vibrations present in physiological processes. Our lives are filled with an abundance of

rhythms, including vibrations at the atomic and molecular levels, as well as within biochemical reaction rates. These rhythms encompass essential functions such as breathing, heartbeats, and brain waves, which are vital for sustaining life. According to the previous study by Boyadzhieva and Kayhan [9] further emphasize the connection between the concepts of "breath" and "life," as they are often represented by a shared term in many ancient cultures and languages.

Acceleration: For Japanese participants, *FTS* appears to have a stronger effect on expressing a sense of being alive. This is evident in the evaluation of qualities such as *lively* ($p < .01$), *vigorous* ($p < .05$), *active* ($p < .05$), *cheerful* ($p < .05$), and *energetic* ($p < .05$). Additionally, in the evaluation of *full of life*, *FTS* is rated higher than both *STF* ($p < .05$) and *WA* ($p < .01$).

Fluctuation: The findings showed that for Japanese participants, *WF* obtained higher evaluations than both *LF* and *HF* in the evaluation of *helpful* (*WF* was rated higher than *HF*, $p < .05$) and *efficient* (*WF* was rated higher than *HF*, $p < .05$).

On the evaluation of the evaluation tendency by gender difference between male and female participants rated by both Japanese and Thai participants.

***Angle*:** Both male and female rated the stimuli with *60°* than a *120°* in the evaluation of *cheerful* (*60°* was rated higher than *90* by male ($p < .05$), and female ($p < .01$)). Female participants rated the stimuli with a *60°* than a *120°* in the evaluation such *lively (60°* was rated higher than *90°* ($p < .05$), and *120°* ($p < .01$)), *energetic* ($p < .05$), *and full of life (*$p < .01$).

Acceleration: Female rated *FTS* higher than *STF* in the evaluation of *lively* ($p < .01$), *active* ($p < .05$), Male rated *FTS* higher than *WA* in the evaluation of *full of life* ($p < .05$),

***Fluctuation*:** No significant differences were reported among the fluctuation factor levels

For the interaction effects between the factors.

For the results of the two-way ANOVA evaluated by Japanese participants, significant interaction effects and main effects were reported. However, in the evaluation conducted by Thai participants, no significant interaction effects or main effects were observed. Culture emerges when a group shares common ways of thinking, feeling, and living. It encompasses shared mental models, behaviors, emotions, aesthetics, rules, norms, and values [10]. The influence of media, such as motion, can vary across cultures, as evidenced by the significant interaction effects between motion factors observed in the study. This finding showed the significant interaction effects and main effects of the motion factors found on the evaluation of the sense of being alive by Japanese participants, potentially influenced by their media exposure, compared to Thai participants. Furthermore, even within the same country, there may be significant differences between participants residing in large cities versus small cities.

Angle and acceleration: According to the evaluation by Japanese participants, the findings revealed that the *angle* factor has a greater significance compared to the *acceleration* factor. When examining the interaction effects between *angle* and *acceleration*, it becomes evident that a narrow angle of *60°*, *without acceleration*, is more effective in eliciting sensations than the wide degree in the evaluation of *efficiency*, *vigorous, full of life, cheerful, active, lively,* and *energetic*. Although no significant differences were reported in the case of Thai participants, there was a noticeable trend indicating that *60°* with *acceleration*, such as *FTS*, had a better effect on the evaluation of *lively, vigorous, active, alert, energetic, helpful, full of life,* and *efficient.* Further investigation to clarify the observed differences in the evaluation of Thai and Japanese participants can contribute to a more comprehensive understanding of this factors.

Acceleration and fluctuation: From the finding of Japanese participants, WF obtained high evaluation at the *FTS* or *WA* compared to *STF* in the evaluation of *lively*, *full of life*, *cheerful, active, vigorous*, and *energetic*. At WA, WF got the higher evaluation than both LF and HF in the evaluation of *lively*, *full of life*, *cheerful, active, vigorous*, *efficient* and *energetic*.

Angle and fluctuation: *WF* receiving higher evaluations at narrow degree compared to wide degree in the evaluation of *lively, full of life, vigorous, active, energetic, cheerful, efficient,* and *helpful*. Moreover, *HF* received higher evaluations at narrow degree more than wide degree in the evaluation of *full of life,* and *uneasy*. The presence of *HF* is crucial for movements that convey higher energy or force. The sudden changes in acceleration and fluctuations might lead to the feeling of *uneasy*. The sudden changes in acceleration and fluctuations are likely to contribute to this feeling. Furthermore, as previous study by Wilkins [11], he presence of high spatial frequency patterns can cause discomfort, including headaches. Therefore, the combination of *60°* and HF in the stimuli may contribute to the overall feeling of *uneasy* or *full of life*.

For 10 evaluation phrases negatively associated with a sense of being alive, this phares was study to more deeply understanding about how motion factors effect with the motion by Japanese and Thai participants.

Angle: There were no significant differences was reported.

Acceleration: For Japanese participants, *STF* is significant difference higher than *WA* in the evaluation of *angry* ($p < .05$), and *bad tempered* ($p < .05$).

***Fluctuation*:** For Japanese participants, *HF* is significant difference higher than *WF* in the evaluation of *rebellious* ($p < .01$), *angry* ($p < .05$), *spiteful* ($p < .01$), *bad tempered* ($p < .01$) and *ready to flight* ($p < .01$).

For the interaction effects between the factors.

***Angle* and *acceleration*:** For Japanese participants, at *60°*, *FTS* obtained higher evaluation than *WA* in the evaluation of *angry* ($p < .01$), *spiteful* ($p < .01$), *bad tempered* ($p < .01$), *resentful* ($p < .01$), *furious* ($p < .01$), *peeved* ($p < .01$), *grouchy* ($p < .01$), *and ready to flight* ($p < .05$). In addition, FTS at 60° received higher evaluations compared to the 90, as evidenced by the evaluation of angry ($p < .01$), *spiteful* ($p < .05$), *bad tempered* ($p < .01$), *resentful* ($p < .01$),

furious ($p < .05$), *peeved* ($p < .05$), *grouchy* ($p < .05$), and *ready to flight* ($p < .01$). For Thai participants there were no significant differences was reported.

***Acceleration* and *fluctuation*:** For Japanese participants, at *FTS*, *HF* obtained higher evaluation in the evaluation of angry ($p < .01$), *spiteful* ($p < .05$), *bad tempered* ($p < .01$), *resentful* ($p < .01$), *furious* ($p < .01$), *peeved* ($p < .01$), *grouchy* ($p < .05$), and *ready to flight* ($p < .01$). At *WA*, *HF* obtained higher evaluation than *WF* in the evaluation of angry ($p < .05$), *bad tempered* ($p < .01$), *resentful* ($p < .05$), and *grouchy* ($p < .01$). For Thai participants there were no significant differences was reported.

***Angle* and *fluctuation*:** For Japanese participants, at 60°, HF received higher evaluations compared to WF in the evaluation of rebellious ($p < .05$), angry ($p < .01$), spiteful ($p < .01$), bad tempered ($p < .01$), resentful ($p < .01$), furious ($p < .01$), peeved ($p < .01$), grouchy ($p < .01$), and ready to fight ($p < .05$). For Thai participants there were no significant differences was reported.

On the evaluation of the evaluation tendency by gender difference between male and female participants rated by both Japanese and Thai participants.

***Angle*:** There were no significant differences between male and female was reported.

***Acceleration*:** There were no significant differences between male and female was reported. For male participants, WA obtained higher evaluation than STF in the evaluation of *carefree* ($p < .01$). While *STF* obtained higher evaluation than *WA* in the evaluation of angry ($p < .05$), and peeved ($p < .01$).

***Fluctuation*:** There were no significant differences between male and female was reported. For both male and female participants, *WF* obtained higher evaluation than *HF* in the evaluation of *carefree* ($p < .01$). While *HF* received higher evaluation than *WF* in the evaluation of *bad tempered* ($p < .01$). In addition, for male participants, *HF* received higher evaluation than *WF* in the evaluation of *rebellious* ($p < .01$), *angry* ($p < .01$), *spiteful* ($p < .05$), *furious* ($p < .01$), *peeved*

($p < .05$) and *ready to fight* ($p < .05$). For female male participants, *HF* received higher evaluation than *WF* in the evaluation of *grouchy* ($p < .05$).

These results suggest that acceleration and fluctuation factor is generally associated with evaluation phrases negatively associated with a sense of being alive.

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CHAPTER 5

Concluding Remarks and Discussion

5.1. Concluding remarks and discussion

This research aimed to 1) To verify the characteristics to elicit the feeling of being alive in the artifacts. 2) To clarify the differences in evaluation between motion graphics stimuli based on artifacts and those based on natural creatures. 3) To clarify the motion graphic factors that influence the expression of a sense of being alive and the interaction effects between these factors. Additionally, to examine whether participants' attributes (e.g., gender or cultural background) affect the evaluation of a sense of being alive through motion graphics.

This experiment I aimed to verify the characteristics to elicit the feeling of being alive in the artifacts. There were three experiments were conducted in this study. (1) Experiment for by the rhythms of light, (2) the rhythms of sound, and (3) the changing form of the artifacts. The results reveal the characteristics associated with expressing a sense of being alive in the artifact, which include: 1) fluctuations, 2) sine curve waveforms, and 3) unstable waveforms. The understanding of these characteristics provides valuable insights when applied to creating motion graphic stimuli.

This experiment II aimed to clarify the differences in evaluation between motion graphics stimuli based on artifacts and those based on natural creatures, to clarify influenced factors of expressing a sense of being alive of the motion graphic of the motion graphic based on the artifacts. There were two sets of motion stimuli, which were 1) the motion graphic based on the artifacts 2) the motion graphic based on the natural creature. For the motion graphic based on the artifacts, there was composed of the three levels which were *displacement* (*linear*), *sine curve* and *fluctuation* factors. These factors were produced according to the results of experiment I. The results showed f*luctuation* significantly impacted the evaluation of the sense of being alive in the stimuli. Stimuli with varying levels of *fluctuation* received different evaluations compared to those without fluctuation. *High* and *low fluctuation* were associated with a more positive perception of

being alive, while stimuli *without fluctuation* received lower ratings. The *displacement* and *sine curve* factors did not show significant differences in their influence on the evaluations. When comparing stimuli based on artifacts and natural creatures, significant differences were observed. Stimuli based on natural creatures received higher evaluations than artifact-based stimuli. Gender was not found to be related to the evaluation of the expression of being alive in the stimuli.

The experiment III was to clarify the motion graphic factors that influence the expression of a sense of being alive and the interaction effects between these factors. Additionally, to examine whether participants' attributes (e.g., gender or cultural background) affect the evaluation of a sense of being alive through motion graphics. Three motion factors consisted of *fluctuation*, *acceleration*, and *angle*. The selection of the *fluctuation* factor was based on previous data obtained from experiment II, which revealed that *fluctuation* had the most significant impact on expressing a sense of being alive. To determine the evaluation phrases that best captured the sense of being alive, a questionnaire was designed using 65 affective phrases from the Profile of Mood States 2nd edition (POMS 2). There were 20 evaluation phrases were selected for use in the questionnaires (10 phrases tend to be related to a positive expression of a sense of being alive, while another 10 phrases tend to be negatively related to expressing a sense of being alive). The experiment was conducted using a head-mounted display (HMD) to ensure consistent experimental conditions for all participants. This study used the three-dimensional representation beyond traditional two-dimensional representations. The findings of this research provide valuable insights for enhancing visualization.

The results of 10 phrases, which tend to be related to a positive expression of a sense of being alive, are as follows:

1) The important of *angle* factors: This study pointed out the important of *angle* factors especially narrow *angle 60°* was rated higher than *120°* in expressed a sense of being alive. Both Japanese and Thai participants showed that a narrow angle of *60°* had a significantly greater impact on the evaluation of a sense of being alive compared to a wider *angle* of *120°*. This result was observed in the evaluation of *lively* (p <.01). The movement at *60°* leads to the perception of frequency patterns compared to *120°*. This feeling of frequency often observed by the biological

vibrations represent in physiological processed such as breathing, heartbeats, and brain waves [1]. Furthermore, the concept of “breath” and “life” seems to connection in many ancient cultures and languages [2].

2) The important of changing level of *acceleration* factors: The transition from *fast to slow*, tends to affect the evaluation of *lively* ($p < .01$), *vigorous* ($p < .05$), *active* ($p < .05$), *cheerful* ($p < .05$), and *energetic* ($p < .05$), according to the evaluation by Japanese participants. When objects change their speed in motion, it can make them appear more like living organisms [3]. However, constant movement rhythms affect the feeling of a mechanical feeling, which refers to non-living things [4]. The stimuli with *fast-to-slow* movement can create a heightened sense of liveliness and dynamic quality. This can capture attention and make the motion more engaging.

3) There are the differences between the evaluation of Thai participants and Japanese participants: The differences of the participants background were discussed as follows: Human learning and knowledge acquisition depend on interactions with the environment and personal experiences, which are influenced by factors such as the physical surrounding, individual traits, and cultural background. These factors shape individuals’ perception, interpretation, and emotional responses to motion [5]. Cultural differences, for example, can impact how individuals evaluate products and express preferences [6]. Varied experiences lead to different outcomes, with individuals with high expertise in a specific field, such as designers, demonstrating greater potential than those with less experience [7]. Additionally, the level of education can significantly shape people's perceptions of products and services [8].

In the interaction effect between the factors which were found in the evaluation by Japanese participants was discussed as follow; 1) *Angle* and *acceleration*: *Angle* is important more than *acceleration* factors in the evaluation of a sense of being alive. At the narrow degree *60°*, *WA* (*without acceleration*) obtained higher evaluation compared to *STF* (*slow to fast*) and *FTS* (*fast to slow*). While at the wide degree *120°*, the *acceleration* appears to be necessary for represent of a sense of being alive. 2) *Acceleration* and *fluctuation*: At *WA* (*without acceleration*), *WF* (*without fluctuation*) was higher rated as expressing a sense of being alive. 3) *Angle* and *fluctuation*: At *60°*

and *90°*, *WF* (*Without fluctuation*) receiving the higher evaluations in the evaluation of a sense of being alive.

The results of 10 phrases, which tend to be related to a negative expression of a sense of being alive, are as follows:

A significant interaction effect and main effect were reported in the evaluation by Japanese participants. However, no significant interaction effects or main effects were reported in the evaluation by Thai participants.

1) *Angle* and *acceleration*: The results revealed the importance of *acceleration* in terms of *FTS* (*Fast to slow*) and *STF* (*Slow to fast*). At *60°* and *90° angles*, *FTS* and *STF* tend to receive higher evaluations. 2) *Acceleration* and fluctuation: At *FTS* and *STF*, *HF* tend to represent in the in terms of negative emotions such *angry, bad tempered, furious, resentful, grouchy,* and *ready to flight* than *WF* compared to *LF* and *WF*. 3) *Angle* and *fluctuation*: At *60°* and *90°*, *HF* was highly rated affected in this evaluation than *LF* or *WF*.

5.2. Limitation and future study

1) In terms of studying motion factors affecting a sense of being alive for enhancing visualization, the results from Chapter 4 of the research highlight the significance of the *angle*, particularly a narrow degree of *60°*, among the three factors analyzed (*angle, acceleration,* and *fluctuation*). This *angle* has been found to be closely related to expressing a sense of being alive in motion. To gain a deeper understanding of motion associated with a sense of being alive, further investigation should clarify the narrow degree angle across various levels.

2) Although no significant differences were reported in the evaluation of Thai participants to gain a comprehensive understanding of evaluation, future studies should focus on investigating groups of participants from the same nationality but varying living areas. This approach would provide a broader perspective on evaluation by considering the potential impact of different

environments. Furthermore, delving into participants' experiences would offer valuable insights into how motion is assessed.

3) In the context of studying motion factors that influence the sense of being alive and enhance visualization in education, visualization refers to the act of representing objects, situations, or information through charts or images, as defined by the Oxford Languages dictionary (2023). It is increasingly popular across various fields, recognized by experts as a highly effective tool [9]. In education, visualization simplifies complex subjects, facilitating better understanding and knowledge acquisition for students [10]. Additionally, previous research has shown that the combination of audio and visuals significantly improves perception, engagement, and effectiveness, particularly in E-Learning contexts [11]. The study of enhancing visualization in motion can have an impact on students' engagement by improving their perception. Furthermore, investigating the factors of motion that influence the sensation of being alive can lead to the development of effective educational tools. Students can enhance their understanding by utilizing media that is specifically designed to evoke positive emotions [12]. This emphasizes the importance of studying the motion graphic factors that influence the sense of being alive, enhancing visualization in educational contexts.

4) The aim of this study was to gain a better understanding of human perception and mechanisms. However, the result of this study relied on participants' evaluations of a sense of being alive, which may have limitations in comprehending deeper mechanisms, especially physiological responses linked to specific emotions. Previous studies showed a consistent relationship between the evaluation of emotion and physiological responses [13]. Furthermore, for a deeper understanding of human perception and mechanisms, future research may study cognitive processes that could potentially influence the evaluation. For instance, another previous study suggests that even though the same stimulus is perceived, individuals may interpret the data differently due to their unique filters influenced by their experiences [14], and [15].

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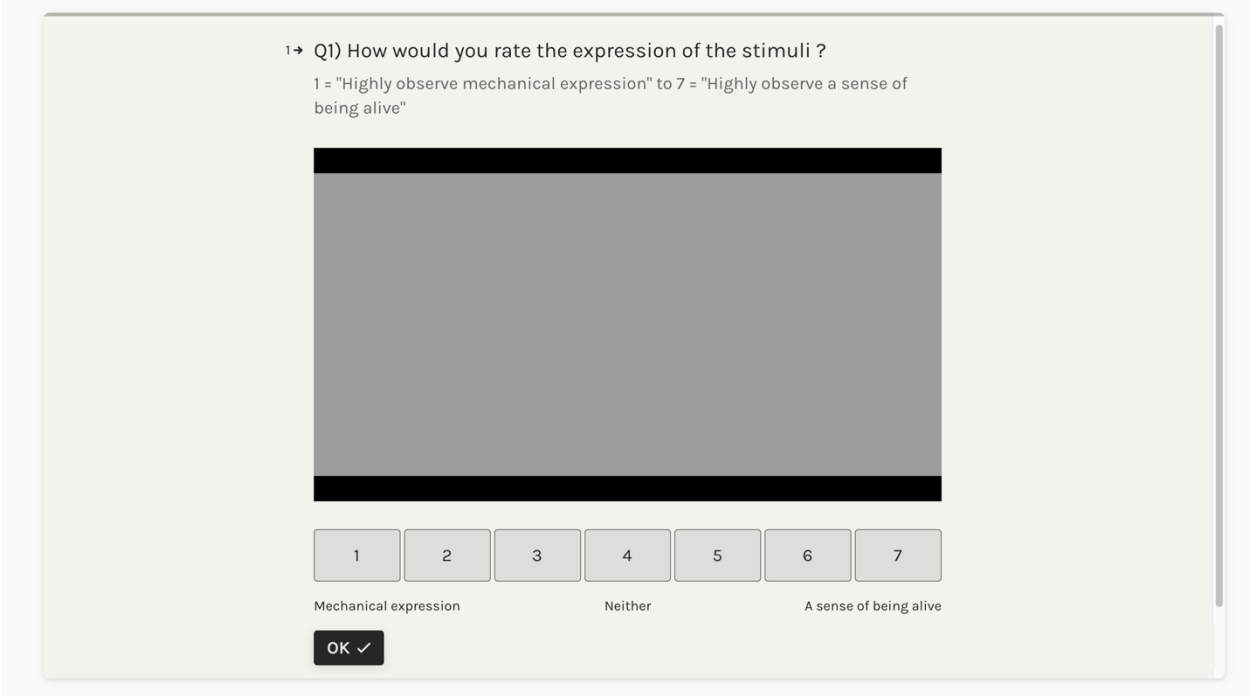
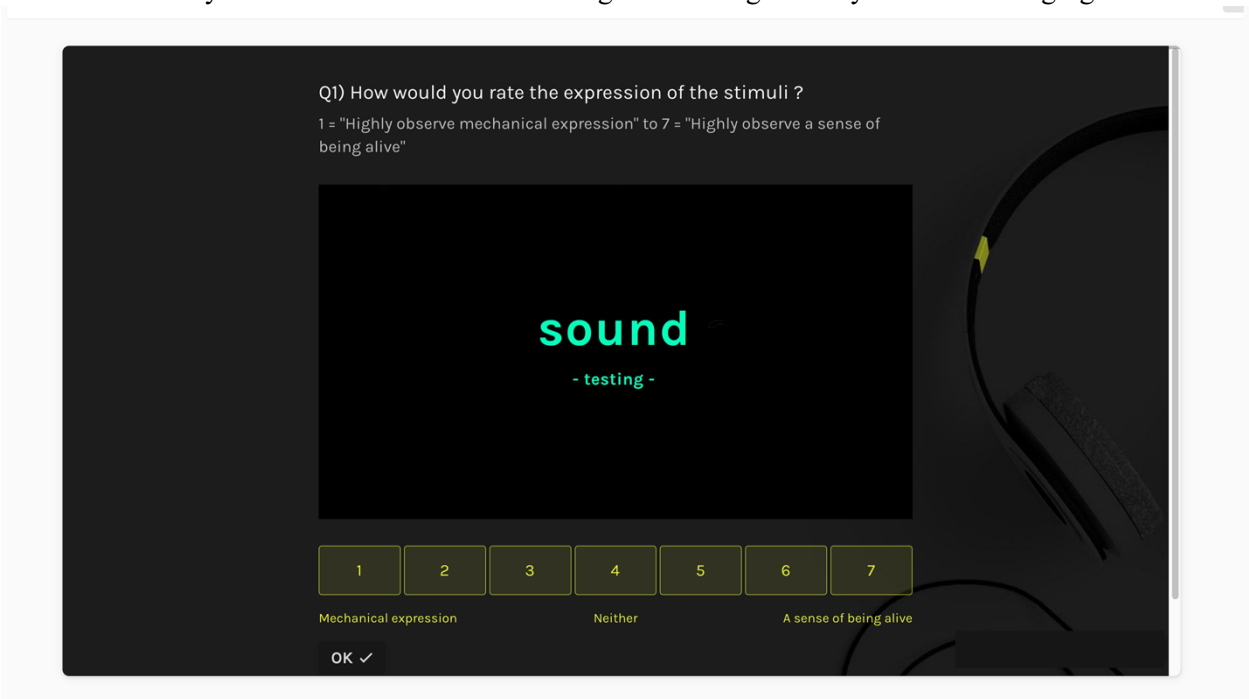
APPENDICES

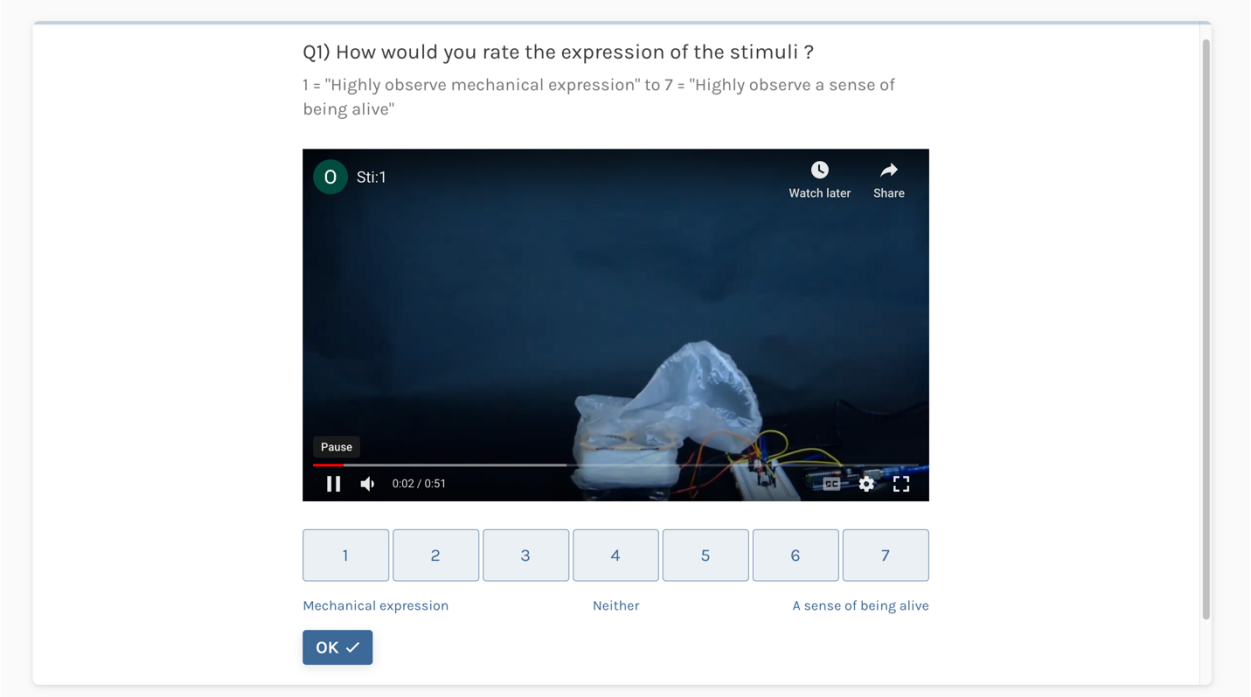
Chapter 2: Appendices



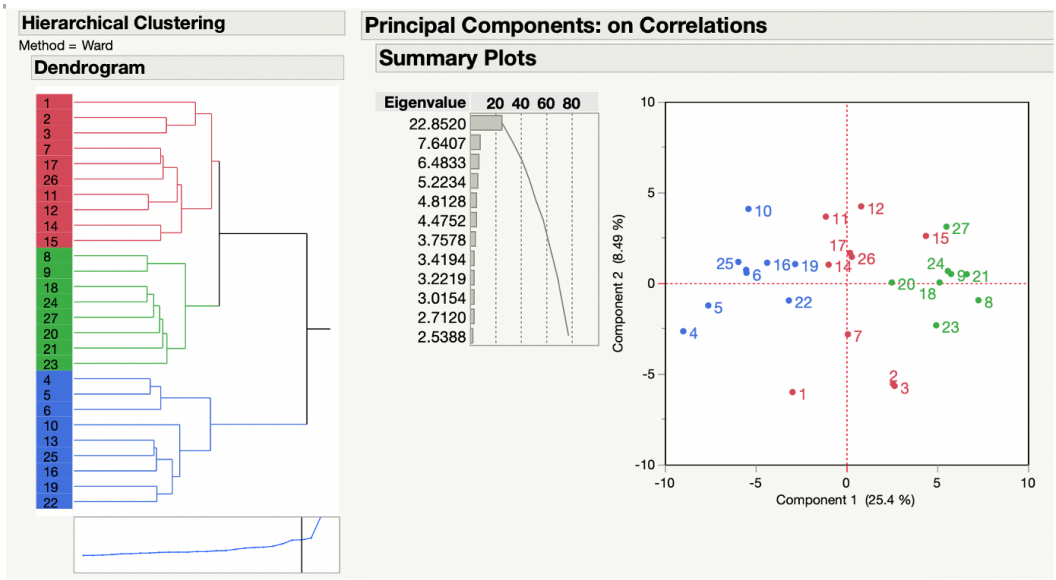
Appendix 1: The example of questionnaire used in experiment I:
A study on evaluation of a sense of being alive through the rhythms of flashing light



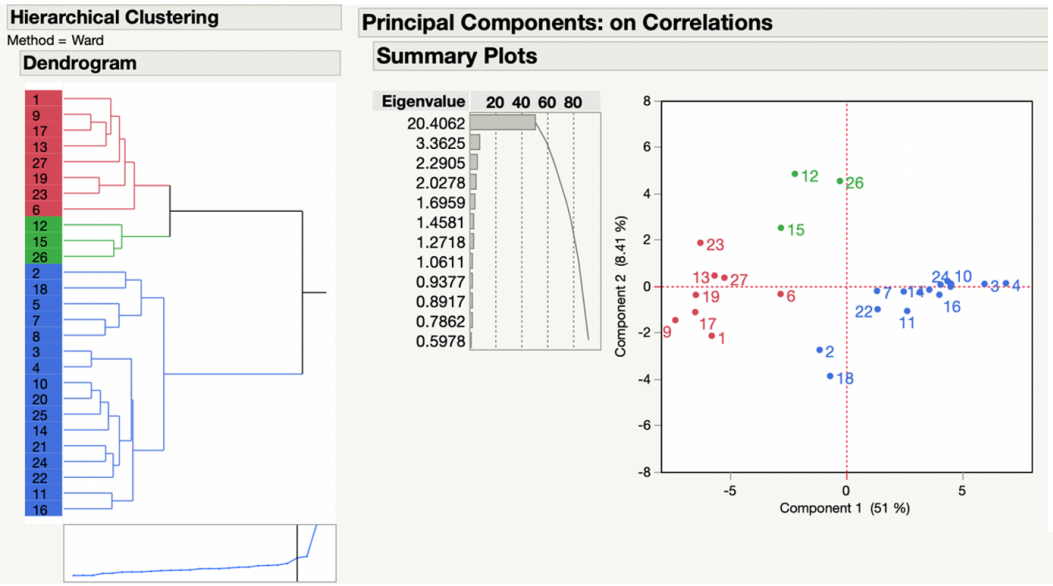
Appendix 2: The example of questionnaire used in experiment I:
A study on evaluation of a sense of being alive through the rhythms of sound



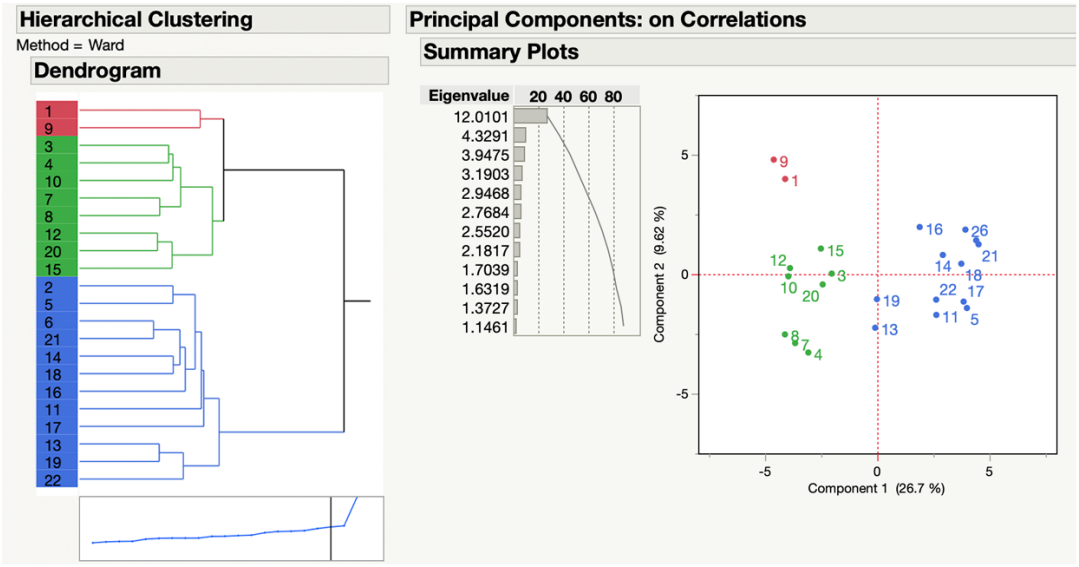
Appendix 3: The example of questionnaire used in experiment I:
A study on evaluation of a sense of being alive through changing forms of the artifact



Appendix 4: The first and second principle components of the experimentation for the rhythm of lights and classified by cluster analysis

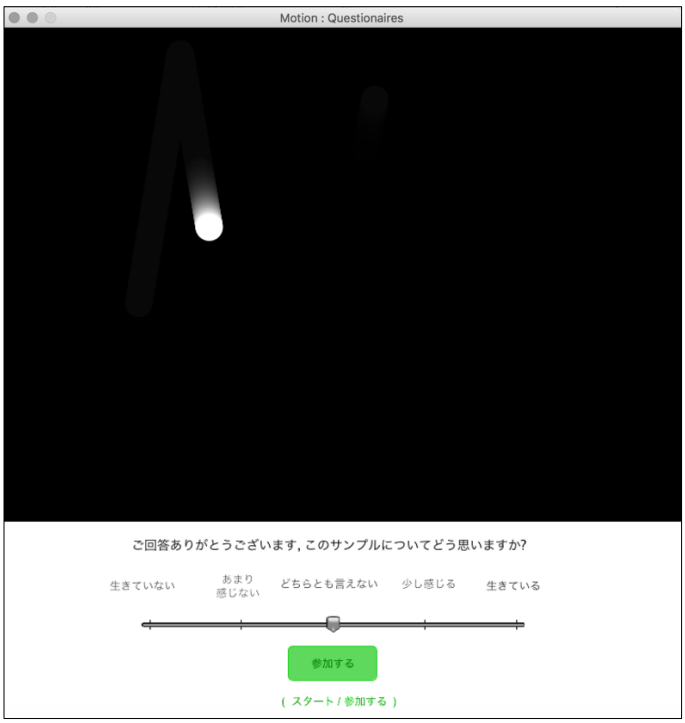


Appendix 5:The first and second principle components of the experimentation for the rhythm of sound and classified by cluster analysis



Appendix 6:The first and second principle components of the experimentation for the changing form and classified by cluster analysis

Chapter 3: Appendices

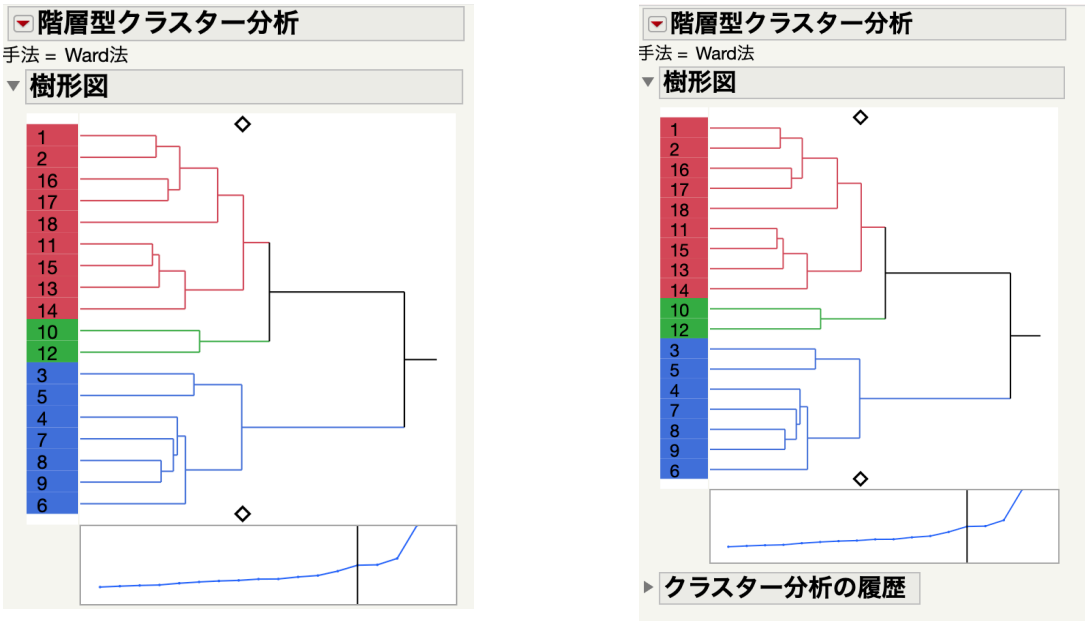


Appendix 7: The example of stimulus and questionnaire used in experiment II

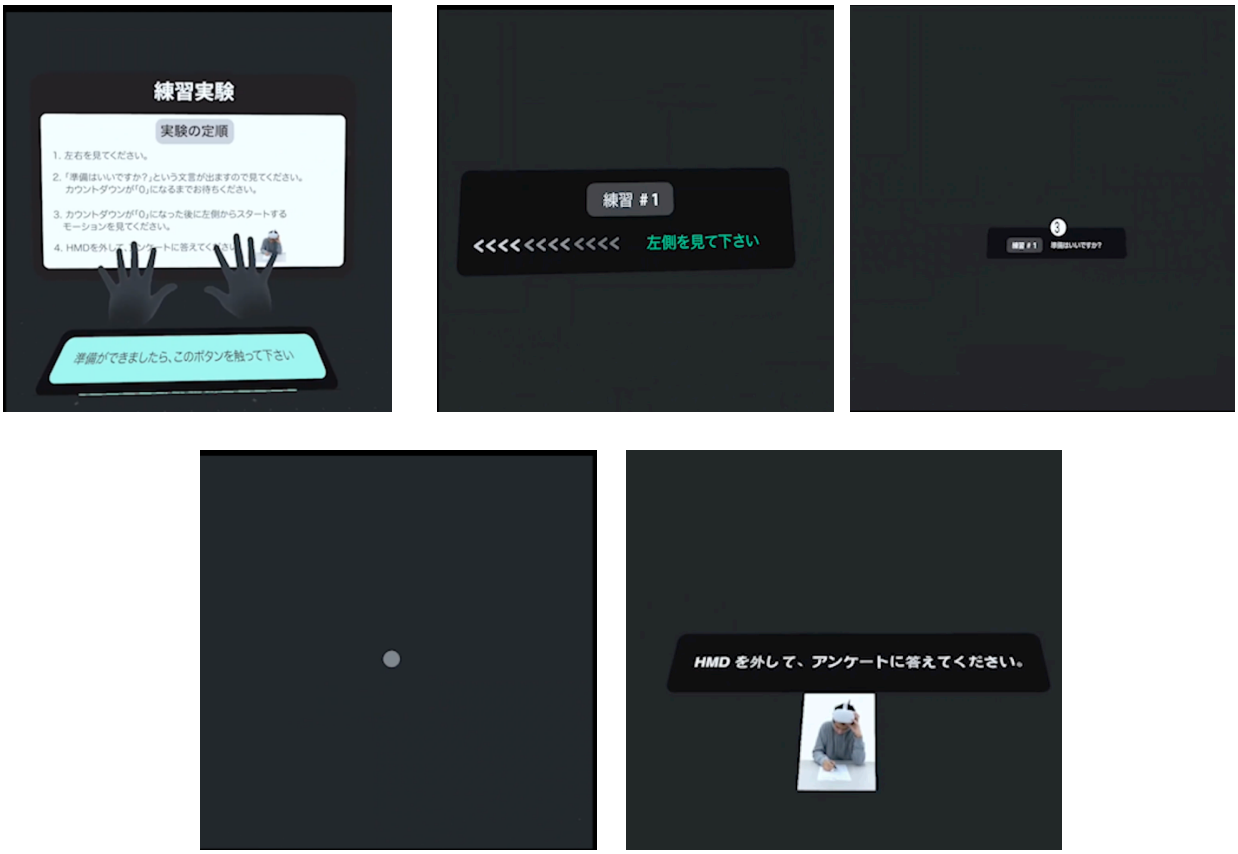
Appendix 8: Result of ANOVA

Table 1: Comparison of evaluation of stimuli based on the artifact and natural creature

Stimuli	Mean	SD	*P Value*
Stimuli based on the artifact	2.86	1.28	< .01
Stimuli based on the natural creature	3.98	1.15	



Appendix 9: Result of the cluster analysis generated the motion graphics based on the artifact in three groups (Left), and result of the cluster analysis generated all motion graphics in two group (Right)



Appendix 10: The example of stimulus used in experiment III

意識調査

博士後期課程：オンオーン　ウィッタヤタダー　指導教員：趙　領逸

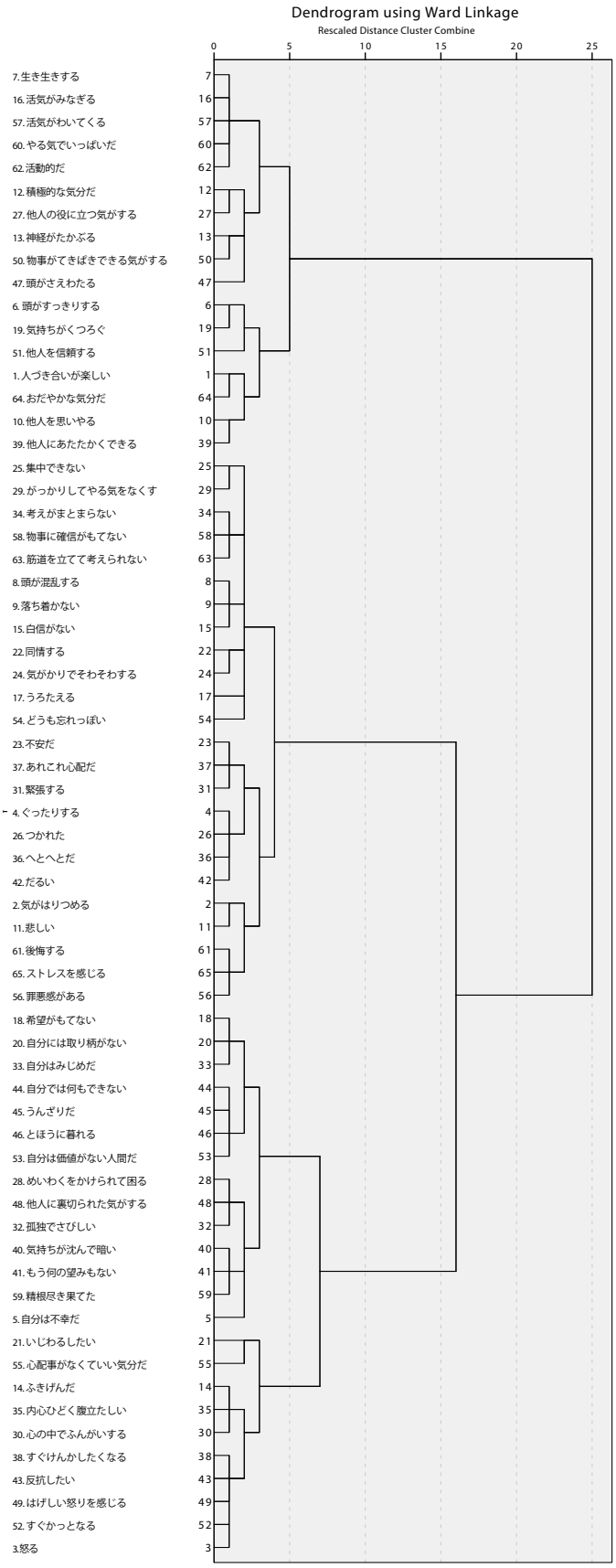
年齢 _____ 歳　　性別 男 ・ 女　　専攻 _____

下記の言葉と「 生命感 」の関連性の程度について、あなたに最もあてはまる番号に ◯ で囲んでください

	まったくなかった	少しあった	まあまああった	かなりあった	非常に多くあった
1. 人づき合いが楽しい	0	1	2	3	4
2. 気がはりつめる	0	1	2	3	4
3. 怒る	0	1	2	3	4
4. ぐったりする	0	1	2	3	4
5. 自分は不幸だ	0	1	2	3	4
6. 頭がすっきりする	0	1	2	3	4
7. 生き生きする	0	1	2	3	4
8. 頭が混乱する	0	1	2	3	4
9. 落ち着かない	0	1	2	3	4
10. 他人を思いやる	0	1	2	3	4
11. 悲しい	0	1	2	3	4
12. 積極的な気分だ	0	1	2	3	4
13. 神経がたかぶる	0	1	2	3	4
14. ふきげんだ	0	1	2	3	4
15. 自信がない	0	1	2	3	4
16. 活気がみなぎる	0	1	2	3	4
17. うろたえる	0	1	2	3	4
18. 希望がもてない	0	1	2	3	4
19. 気持ちがくつろぐ	0	1	2	3	4
20. 自分には取り柄がない	0	1	2	3	4
21. いじわるしたい	0	1	2	3	4
22. 同情する	0	1	2	3	4
23. 不安だ	0	1	2	3	4
24. 気がかりでそわそわする	0	1	2	3	4
25. 集中できない	0	1	2	3	4
26. つかれた	0	1	2	3	4
27. 他人の役に立つ気がする	0	1	2	3	4
28. めいわくをかけられて困る	0	1	2	3	4
29. がっかりしてやる気をなくす	0	1	2	3	4
30. 心の中でふんがいする	0	1	2	3	4
31. 緊張する	0	1	2	3	4
32. 孤独でさびしい	0	1	2	3	4

	まったくなかった	少しあった	まあまああった	かなりあった	非常に多くあった
33. 自分はみじめだ	0	1	2	3	4
34. 考えがまとまらない	0	1	2	3	4
35. 内心ひどく腹立たしい	0	1	2	3	4
36. へとへとだ	0	1	2	3	4
37. あれこれ心配だ	0	1	2	3	4
38. すぐけんかしたくなる	0	1	2	3	4
39. 他人にあたたかくできる	0	1	2	3	4
40. 気持ちが沈んで暗い	0	1	2	3	4
41. もう何の望みもない	0	1	2	3	4
42. だるい	0	1	2	3	4
43. 反抗したい	0	1	2	3	4
44. 自分では何もできない	0	1	2	3	4
45. うんざりだ	0	1	2	3	4
46. とほうに暮れる	0	1	2	3	4
47. 頭がさえわたる	0	1	2	3	4
48. 他人に裏切られた気がする	0	1	2	3	4
49. はげしい怒りを感じる	0	1	2	3	4
50. 物事がてきぱきできる気がする	0	1	2	3	4
51. 他人を信頼する	0	1	2	3	4
52. すぐかっとなる	0	1	2	3	4
53. 自分は価値がない人間だ	0	1	2	3	4
54. どうも忘れっぽい	0	1	2	3	4
55. 心配事がなくていい気分だ	0	1	2	3	4
56. 罪悪感がある	0	1	2	3	4
57. 活気がわいてくる	0	1	2	3	4
58. 物事に確信がもてない	0	1	2	3	4
59. 精根尽き果てた	0	1	2	3	4
60. やる気でいっぱいだ	0	1	2	3	4
61. 後悔する	0	1	2	3	4
62. 活動的だ	0	1	2	3	4
63. 筋道を立てて考えられない	0	1	2	3	4
64. おだやかな気分だ	0	1	2	3	4
65. ストレスを感じる	0	1	2	3	4

Appendix 11: This questionnaire is being used to gather evaluation phrases that best capture the sense of being alive.



Appendix12:
A cluster analysis was used to select the appropriate evaluation phrases for use in the questionnaires.

意識調査

研究名：
A study on evaluation of a sense of being alive

責任者：
福井工業大学　社会システム学専攻　デザイン学コース
博士後期課程　ウィッタヤタダー　オンオーン
指導教員：福井工業大学 環境情報学部デザイン学科・趙領逸

一般的な情報

年齢 _____ 歳　性別 男 ・ 女　専攻 _____ 学年 _____

あなたはVirtual Reality（仮想現実）を体験したことありますか？　☐ 体験したことがある　☐ 体験したことがない

下記の言葉と「 動き 」の関連性の有無について、あなたに最もあてはまる番号に ◯ で囲んでください

（例）

	まったくなかった	少しあった	まあまああった	かなりあった	非常に多くあった
	0	1	②	3	4

	まったくなかった	少しあった	まあまああった	かなりあった	非常に多くあった
1. 生き生きする	0	1	2	3	4
2. 心配事がなくていい気分だ	0	1	2	3	4
3. 反抗したい	0	1	2	3	4
4. 活気がわいてくる	0	1	2	3	4
5. やる気でいっぱいだ	0	1	2	3	4
6. 怒る	0	1	2	3	4
7. 神経がたかぶる	0	1	2	3	4
8. いじわるしたい	0	1	2	3	4
9. 積極的な気分だ	0	1	2	3	4
10. 頭がさえわたる	0	1	2	3	4
11. ふきげんだ	0	1	2	3	4
12. 活気がみなぎる	0	1	2	3	4
13. はげしい怒りを感じる	0	1	2	3	4
14. 心の中でふんがいする	0	1	2	3	4
15. 他人の役に立つ気がする	0	1	2	3	4
16. すぐかっとなる	0	1	2	3	4
17. 活動的だ	0	1	2	3	4
18. 内心ひどく腹立たしい	0	1	2	3	4
19. すぐけんかしたくなる	0	1	2	3	4
20. 物事がてきぱきできる気がする	0	1	2	3	4

ご協力いただきありがとうございます

Appendix 13: The questionnaire used in experiment III:
A Study to Clarify the Motion Graphics that Express a Sense of Being Alive
(Japanese version)

แบบประเมินความรู้สึก

No. _____

หัวข้อวิจัย :
A study on evaluation of a sense of being alive

ผู้รับผิดชอบ :
Fukui university of technology,
Department of Social System Engineering,
Design Course, Doctoral Course
Ongon Witthayathada

ผู้ควบคุม :
Fukui university of technology,
Faculty of Environmental and
Information Sciences
Prof. Cho Youngil

ข้อมูลทั่วไป

อายุ _____ ปี เพศ ชาย • หญิง คณะ _____ ชั้นปี _____

คุณเคยมีประสบการณ์ในการใช้เทคโนโลยีความเป็นจริงเสมือน (Virtual Reality) หรือไม่ ☐ มีประสบการณ์ ☐ ไม่เคยมีประสบการณ์

แบบสอบถามเกี่ยวกับความเชื่อมโยงของคำต่อไปนี้กับ “การเคลื่อนไหว” กรุณาวงกลม ◯ ข้อที่ตรงกับคุณที่สุด

(ตัวอย่าง)	ไม่เลย	เล็กน้อย	ปานกลาง	ค่อนข้างมาก	มากที่สุด
	0	1	②	3	4

	ไม่เลย	เล็กน้อย	ปานกลาง	ค่อนข้างมาก	มากที่สุด		ไม่เลย	เล็กน้อย	ปานกลาง	ค่อนข้างมาก	มากที่สุด
1. มีชีวิตชีวา	0	1	2	3	4	11. อารมณ์ไม่ดี	0	1	2	3	4
2. อารมณ์ดีไม่มีความกังวล	0	1	2	3	4	12. เต็มไปด้วยพลังงาน	0	1	2	3	4
3. อึดอัดคับข้องใจ	0	1	2	3	4	13. โมโหอย่างรุนแรง	0	1	2	3	4
4. มีพละกำลังกระฉับกระเฉง	0	1	2	3	4	14. โกรธจัด	0	1	2	3	4
5. ร่าเริง	0	1	2	3	4	15. มีคุณค่า	0	1	2	3	4
6. โกรธ	0	1	2	3	4	16. โมโหง่าย	0	1	2	3	4
7. มีความเครียด	0	1	2	3	4	17. กระปรี้กระเปร่า	0	1	2	3	4
8. มีเจตนามุ่งร้าย	0	1	2	3	4	18. ขัดใจ	0	1	2	3	4
9. กระตือรือร้น	0	1	2	3	4	19. หงุดหงิดมาก	0	1	2	3	4
10. ตื่นตัว	0	1	2	3	4	20. มีประสิทธิภาพ	0	1	2	3	4

ขอขอบคุณในความร่วมมือ

Appendix 14: The questionnaire used in experiment III:
A Study to Clarify the Motion Graphics that Express a Sense of Being Alive
(Thai version)

Appendix 15: Result of the experiment III

Table 2: Results of 10 evaluation phrases positively associated with a sense of being alive:
A study with Japanese participants: The interaction effect between factors (Tukey HSD method)

The evaluation	The interaction effect	Factor	(I) Factor	(J) Factor	Mean Differences (I-J)	Std. Error	Sig
Lively	Angle and acceleration	Without acceleration	60	90	.87	.242	.001
				120	.95	.242	<.001
			90	60	-.87	.242	.001
			120	60	-.95	.242	<.001
		90	Fast to slow	Without acceleration	.67	.280	.049
			Without acceleration	Fast to slow	-.67	.280	.049
		120	Fast to slow	Slow to fast	.95	.252	<.001
				Without acceleration	.67	.252	.025
			Slow to fast	Fast to slow	-.95	.252	<.001
			Without acceleration	Fast to slow	-.67	.252	.025
	Acceleration and fluctuation	Without fluctuation	Fast to slow	Slow to fast	1.03	.268	<.001
			Slow to fast	Fast to slow	-1.03	.268	<.001
				Without acceleration	-1.23	.268	<.001
			Without acceleration	Slow to fast	1.23	.268	<.001
	Angle and fluctuation	Without fluctuation	60	120	1.23	.268	<.001
			90	120	1.03	.268	<.001
			120	60	-1.23	.268	<.001
				90	-1.03	.268	<.001
		90	Low fluctuation	Without fluctuation	-67	.280	.049
			Without fluctuation	Low fluctuation	.67	.280	.049
		120	High fluctuation	Low fluctuation	-67	.252	.025
			Low fluctuation	High fluctuation	.67	.252	.025
				Without fluctuation	.95	.252	<.001
			Without fluctuation	Low fluctuation	-95	.252	<.001
Vigorous	Angle and acceleration	90	Fast to slow	Without acceleration	.67	.268	.037
			Without acceleration	Fast to slow	-67	.268	.037
		120	Fast to slow	Slow to fast	.67	.232	.013
			Slow to fast	Fast to slow	-.67	.232	.013
		Without acceleration	60	90	.97	.250	<.001
				120	.97	.250	<.001

			90	60	-.97	.250	.250
			120	60	-.97	.250	.250
	Acceleration and fluctuation	Without acceleration	High fluctuation	Without fluctuation	-.97	250	<.001
			Low fluctuation	Without fluctuation	-.97	250	<.001
			Without fluctuation	High fluctuation	.97	250	<.001
				Low fluctuation	.97	250	<.001
		Without fluctuation	Fast to slow	Slow to fast	.82	.269	.008
			Slow to fast	Fast to slow	-.82	.269	.008
				Without acceleration	-1.13	.269	<.001
			Without acceleration	Slow to fast	1.13	.269	<.001
	Angle and fluctuation	90	Low fluctuation	Without fluctuation	-.67	.268	.037
			Without fluctuation	Low fluctuation	.67	.268	.037
		120	Low fluctuation	Without fluctuation	.67	.232	.013
			Without fluctuation	Low fluctuation	-.67	.232	.013
		Without fluctuation	60	120	1.13	.269	<.001
			90	120	.82	.269	.008
			120	60	-1.13	.269	<.001
				90	-.82	.269	.008
Cheerful	Angle and acceleration	90	Fast to slow	Without acceleration	.95	.270	.002
			Without acceleration	Fast to slow	-.95	.270	.002
		Without acceleration	60	90	.97	.265	.001
				120	.90	.265	.003
			90	60	-.97	.265	.001
			120	60	.90	.265	.003
	Acceleration and fluctuation	High fluctuation	Fast to slow	Without acceleration	.77	.281	.020
			Without acceleration	Fast to slow	-.77	.281	.020
		Without fluctuation	Fast to slow	Slow to fast	1.00	.276	.001
			Slow to fast	Fast to slow	-1.00	.276	.001
				Without acceleration	-1.03	.276	<.001
			Without acceleration	Slow to fast	1.03	.276	<.001
	Acceleration and fluctuation	Without acceleration	High fluctuation	Without fluctuation	-.90	.265	.003
			Low fluctuation	Without fluctuation	-.97	.265	.001
			Without fluctuation	High fluctuation	.90	.265	.003
				Low fluctuation	.97	.265	.001

	Angle and fluctuation	90	Low fluctuation	Without fluctuation	-.96	.270	.002
			Without fluctuation	Low fluctuation	-.96	.270	.002
		High fluctuation	60	120	.77	.281	.020
			120	60	-.77	.281	.020
		Without fluctuation	60	120	1.03	.276	<.001
			90	120	1.00	.276	.001
			120	60	-1.03	.276	<.001
				90	-1.00	.276	.001
Uneasy	Angle and acceleration	Without acceleration	60	90	.64	.261	.041
			90	60	-.64	.261	.041
	Acceleration and fluctuation	High fluctuation	Without acceleration	Fast to slow	-.92	.279	.004
		Low fluctuation	Fast to slow	Without acceleration	.64	.262	.042
			Without acceleration	Fast to slow	-.64	.262	.042
	Angle and fluctuation	High fluctuation	60	120	.92	.279	.004
			120	60	-.92	.279	.004
		Low fluctuation	90	120	-.64	.262	.042
			120	90	.64	.262	.042
Active	Angle and acceleration	Without acceleration	60	90	.72	.249	.013
				120	.67	.249	0.23
			90	60	-.72	.249	0.13
			120	60	-.67	.249	0.23
		90	Fast to slow	Without acceleration	.77	.276	.017
			Without acceleration	Fast to slow	-.77	.276	.017
	Acceleration and fluctuation	Without acceleration	High fluctuation	Without fluctuation	-.67	.249	.023
			Low fluctuation	Without fluctuation	-.72	.249	0.13
	Acceleration and fluctuation	Without acceleration	Without fluctuation	High fluctuation	.67	.249	.023
	Acceleration and fluctuation	Without acceleration Without fluctuation	Without fluctuation	Low fluctuation	.72	.249	0.13
			Fast to slow	Slow to fast	.85	.286	0.10
			Slow to fast	Fast to slow	-.85	.286	0.10
				Without acceleration	-.79	.286	0.17
			Without acceleration	Slow to fast	.79	.286	0.17
	Angle and fluctuation	90	Low fluctuation	Without fluctuation	-.77	.276	0.17
			Without fluctuation	Low fluctuation	.77	.276	0.17
		Without fluctuation	60	120	.79	.286	0.17
			90	120	.85	.286	0.10
			120	60	-.79	.286	0.17
				90	-.85	.286	0.10
Energetic	Angle and		60	90	.74	.242	.007

	acceleration	Without acceleration		120	.87	.242	.001
			90	60	-.74	.242	.007
			120	60	-.87	.242	.001
		90	Fast to slow	Without acceleration	.69	.263	.026
			Without acceleration	Fast to slow	-.69	.263	.026
	Acceleration and fluctuation	Without acceleration	High fluctuation	Without fluctuation	-.87	.242	.001
			Low fluctuation	Without fluctuation	-.74	.242	.007
			Without fluctuation	High fluctuation	.87	.242	.001
				Low fluctuation	.74	.242	.007
		Without fluctuation	Fast to slow	Slow to fast	.77	.272	0.15
			Slow to fast	Fast to slow	-.77	.272	0.15
				Without acceleration	-.82	.272	.009
			Without acceleration	Slow to fast	.82	.272	.009
	Angle and fluctuation	90	Low fluctuation	Without fluctuation	-.69	.263	.026
			Without fluctuation	Low fluctuation	.69	.263	.026
		Without fluctuation	60	120	.82	.272	.009
			90	120	.77	.272	.015
			120	60	-.82	.272	.009
				90	-.77	.272	.015
Helpful	Angle and acceleration	Without acceleration	60	90	.72	.287	.037
			90	60	-.72	.287	.037
		60	Fast to slow	Without acceleration	-.69	.277	.037
			Slow to fast	Without acceleration	-.67	.277	.047
			Without acceleration	Fast to slow	.69	.277	.037
				Slow to fast	.67	.277	.047
	Acceleration and fluctuation	Without acceleration	Low fluctuation	Without fluctuation	-.72	.287	.037
			Without fluctuation	Low fluctuation	.72	.287	.037
		Without fluctuation	Slow to fast	Without acceleration	-.77	.293	.026
			Without acceleration	Slow to fast	.77	.293	.026
	Angle and fluctuation	60	High fluctuation	Without fluctuation	-.69	.277	.037
			Low fluctuation	Without fluctuation	-.67	.277	.047
			Without fluctuation	High fluctuation	.69	.277	.037
				Low fluctuation	.67	.277	.047
			60	120	.77	.293	.026

		Without fluctuation	120	60	-.77	.293	.026
Full of life	Angle and acceleration	Without acceleration	60	90	.82	.265	.007
				120	.92	.265	.002
			90	60	-.82	.265	.007
			120	60	-.92	.265	.002
		90	Fast to slow	Without acceleration	.74	.275	.021
			Without acceleration	Fast to slow	-.74	.275	.021
		120	Fast to slow	Slow to fast	.82	.261	.006
				Without acceleration	.85	.261	.004
			Slow to fast	Fast to slow	-.82	.261	.006
			Without acceleration	Fast to slow	-.85	.261	.004
	Acceleration and fluctuation	Without acceleration	High fluctuation	Without fluctuation	-.92	.265	.002
			Low fluctuation	Without fluctuation	-.82	.265	.007
			Without fluctuation	High fluctuation	.92	.265	.002
				Low fluctuation	.82	.265	.007
		High fluctuation	Fast to slow	Without acceleration	1.13	.296	<.001
			Without acceleration	Fast to slow	-1.13	.296	<.001
		Low fluctuation	Fast to slow	Without acceleration	.74	.277	.022
			Without acceleration	Fast to slow	-.74	.277	.022
		Without fluctuation	Fast to slow	Slow to fast	.82	.257	.005
			Slow to fast	Fast to slow	-.82	.257	.005
				Without acceleration	-.90	.257	.002
			Without acceleration	Slow to fast	.90	.257	.002
	Angle and fluctuation	90	Low fluctuation	Without fluctuation	-.74	.275	.021
			Without fluctuation	Low fluctuation	.74	.275	.021
		120	High fluctuation	Low fluctuation	-.85	.261	.004
			Low fluctuation	High fluctuation	.85	.261	.004
				Without fluctuation	.82	.261	.006
			Without fluctuation	Low fluctuation	-.82	.261	.006
		High fluctuation	60	120	1.13	.296	<.001
			120	60	-1.13	.296	<.001
		Low fluctuation	90	120	-.74	.277	.022
			120	90	.74	.277	.022

		Without fluctuation	60	120	.90	.257	.002
			90	120	.82	.257	.005
			120	60	-.90	.257	.002
				90	-.82	.257	.005
Efficient	Angle and acceleration	Without acceleration	60	90	.95	.270	.002
				120	.77	.270	.014
			90	60	-.95	.270	.002
			120	60	-.77	.270	.014
		60	Fast to slow	Without acceleration	-.72	.280	.031
			Slow to Fast	Without acceleration	-.74	.280	.025
			Without acceleration	Fast to slow	.72	.280	.031
				Slow to Fast	.74	.280	.025
		90	Fast to slow	Without acceleration	.67	.267	.037
			Without acceleration	Fast to slow	-.67	.267	.037
	Acceleration and fluctuation	Without acceleration	High fluctuation	Without fluctuation	-.77	.270	.014
			Low fluctuation	Without fluctuation	-.95	.270	.002
			Without fluctuation	High fluctuation	.77	.270	.014
				Low fluctuation	.95	.270	.002
		Without fluctuation	Slow to Fast	Without acceleration	-.90	.285	.006
			Without acceleration	Fast to slow	.90	.285	.006
	Angle and fluctuation	Without fluctuation	60	120	.90	.285	.006
			120	60	-.90	.285	.006
		60	High fluctuation	Without fluctuation	-.72	.280	.031
			Low fluctuation	Without fluctuation	-.74	.280	.025
			Without fluctuation	High fluctuation	.72	.280	.031
				Low fluctuation	.74	.280	.025
		90	Low fluctuation	Without fluctuation	-.67	.267	.037
			Without fluctuation	Low fluctuation	.67	.267	.037

Table 3: Evaluation on the evaluation tendency based on gender differences:
A study with Japanese participants

(I) Gender differences (Pairwise Comparison method)

The evaluation	Factor	Levels of factor	(I) Gender	(J) Gender	Mean Differences (I-J)	Std. Error	Sig
Lively	Angle	60	Female	Male	.603	.229	.009
			Male	Female	-.603	.229	.009
	Acceleration	Slow to fast	Female	Male	.665	.228	.004
			Male	Female	-.665	.228	.004
Vigorous	Angle	60	Female	Male	.601	.218	.006
			Male	Female	-.601	.218	.006
		90	Female	Male	.640	.218	.003
			Male	Female	-.640	.218	.003
		120	Female	Male	.470	.218	.032
			Male	Female	.470	.218	.032
	Acceleration	Fast to slow	Female	Male	.557	.217	.011
			Male	Female	-.557	.217	.011
		Slow to fast	Female	Male	.769	.217	<.001
			Male	Female	-.769	.217	<.001
	Fluctuation	High fluctuation	Female	Male	.459	.219	.037
			Male	Female	-.459	.219	.037
		Low fluctuation	Female	Male	.649	.219	.003
			Male	Female	-.649	.219	.003
		Without fluctuation	Female	Male	.602	.219	.006
			Male	Female	-.602	.219	.006
Cheerful	Angle	60	Female	Male	.495	.228	.031
			Male	Female	-.495	.228	.031
	Fluctuation	Low fluctuation	Female	Male	.485	.232	.037
			Male	Female	-.485	.232	.037
Uneasy	Angle	60	Female	Male	.720	.224	.001
			Male	Female	-.720	.224	.001
		90	Female	Male	.676	.224	.003
			Male	Female	-.676	.224	.003
	Acceleration	Fast to slow	Female	Male	.577	.224	.011
			Male	Female	-.577	.224	.011
		Slow to fast	Female	Male	.601	.224	.008
			Male	Female	-.601	.224	.008
		Without acceleration	Female	Male	.550	.224	.015
			Male	Female	-.550	.224	.015
	Fluctuation	High fluctuation	Female	Male	.446	.226	.049
			Male	Female	-.446	.226	.049
		Low fluctuation	Female	Male	.561	.226	.013
			Male	Female	-.561	.226	.013
		Without fluctuation	Female	Male	.720	.226	.002
			Male	Female	-.720	.226	.002
Active	Angle	60	Female	Male	.693	.218	.002
			Male	Female	-.693	.218	.002
		90	Female	Male	.616	.218	.005
			Male	Female	-.616	.218	.005
		120	Female	Male	.591	.218	.007

			Male	Female	-.591	.218	.007
	Acceleration	Fast to slow	Female	Male	.496	.216	.022
			Male	Female	-.496	.216	.022
		Slow to fast	Female	Male	.890	.216	<.001
			Male	Female	-.890	.216	<.001
		Without acceleration	Female	Male	.513	.216	.018
			Male	Female	-.513	.216	.018
	Fluctuation	High fluctuation	Female	Male	.615	.218	.005
			Male	Female	-.615	.218	.005
		Low fluctuation	Female	Male	.698	.218	.001
			Male	Female	-.698	.218	.001
		Without fluctuation	Female	Male	.586	.218	.007
			Male	Female	-.586	.218	.007
Alert	Angle	60	Female	Male	.830	.208	<.001
			Male	Female	.830	.208	<.001
		90	Female	Male	.577	.208	.006
			Male	Female	-.577	.208	.006
		120	Female	Male	.722	.208	<.001
			Male	Female	-.722	.208	<.001
	Acceleration	Fast to slow	Female	Male	.547	.208	.009
			Male	Female	-.547	.208	.009
		Slow to fast	Female	Male	.941	.208	<.001
			Male	Female	-.941	.208	<.001
		Without acceleration	Female	Male	.640	.208	.002
			Male	Female	-.640	.208	.002
	Fluctuation	High fluctuation	Female	Male	.704	.208	<.001
			Male	Female	-.704	.208	<.001
		Low fluctuation	Female	Male	.838	.208	<.001
			Male	Female	-.838	.208	<.001
		Without fluctuation	Female	Male	.586	.208	.005
			Male	Female	-.586	.208	.005
Energetic	Angle	60	Female	Male	.557	.207	.008
			Male	Female	-.557	.207	.008
	Acceleration	Fast to slow	Female	Male	.557	.208	.006
			Male	Female	-.557	.208	.006
	Fluctuation	High fluctuation	Female	Male	.492	.209	.019
			Male	Female	-.492	.209	.019
		Without fluctuation	Female	Male	.459	.209	.029
			Male	Female	-.459	.209	.029
Helpful	Angle	60	Female	Male	.645	.209	.002
			Male	Female	-.645	.209	.002
		90	Female	Male	.635	.209	.003
			Male	Female	-.635	.209	.003
		120	Female	Male	.624	.209	.003
			Male	Female	-.624	.209	.003
	Acceleration	Fast to slow	Female	Male	.660	.209	.002
			Male	Female	-.660	.209	.002
		Slow to fast	Female	Male	.689	.209	.001
			Male	Female	-.689	.209	.001
		Without acceleration	Female	Male	.556	.209	.008
			Male	Female	-.556	.209	.008
	Fluctuation	High fluctuation	Female	Male	.435	.208	.037
			Male	Female	-.435	.208	.037

		Low fluctuation	Female	Male	.698	.208	<.001
			Male	Female	-.698	.208	<.001
		Without fluctuation	Female	Male	.772	.208	<.001
			Male	Female	-.772	.208	<.001
Full of life	Angle	60	Female	Male	.646	.230	.005
			Male	Female	-.646	.230	.005
		90	Female	Male	.461	.230	.046
			Male	Female	-.461	.230	.046
	Acceleration	Without acceleration	Female	Male	.480	.231	.038
			Male	Female	-.480	.231	.038
Efficient	Angle	60	Female	Male	.479	.219	.030
			Male	Female	-.479	.219	.030
		90	Female	Male	.653	.219	.003
			Male	Female	-.653	.219	.003
		120	Female	Male	.496	.219	.024
			Male	Female	-.496	.219	.024
	Acceleration	Slow to fast	Female	Male	.757	.218	<.001
			Male	Female	-.757	.218	<.001
		Without acceleration	Female	Male	.491	.218	.025
			Male	Female	-.491	.218	.025
	Fluctuation	High fluctuation	Female	Male	.527	.218	.016
			Male	Female	-.527	.218	.016
		Low fluctuation	Female	Male	.651	.218	.003
			Male	Female	-.651	.218	.003
		Without fluctuation	Female	Male	.451	.218	.039
			Male	Female	.451	.218	.039

(II) The interaction effect (Tukey HSD method)

The evaluation	**Factor**	**Gender**	**(I) Factor**	**(J) Factor**	**Mean Differences (I-J)**	**Std. Error**	**Sig**
Lively	Angle	Female	60	120	-.82	.233	.002
			120	60	.82	.233	.002
	Acceleration	Male	Fast to slow	Slow to fast	.83	.214	<.001
			Slow to fast	Fast to slow	-.83	.214	<.001
Vigorous	Acceleration	Male	Slow to fast	Fast to slow	-.55	.187	.011
			Fast to slow	Slow to fast	.55	.187	.011
Cheerful	Angle	Female	60	120	.90	.244	<.001
			120	60	-.90	.244	<.001
Uneasy	Angle	Female	60	120	.65	.257	.034
			120	60	-.65	.257	.034
Alert	Acceleration	Male	Fast to slow	Slow to fast	.39	.162	.041
			Slow to fast	Fast to slow	-.39	.162	.041
Energetic	Angle	Female	60	120	.55	.228	.045
			120	60	-.55	.228	.045
Full of life	Angle	Female	60	120	.94	.251	<.001
			120	60	-.94	.251	<.001
	Acceleration	Male	Fast to slow	Slow to fast	.52	.207	.036
				Without acceleration	.64	.207	.007
			Slow to fast	Fast to slow	-.52	.207	.036

			Without acceleration	Fast to slow	-.64	.207	.007
Efficient	Acceleration	Male	Fast to slow	Slow to fast	.45	.189	.044
			Slow to fast	Fast to slow	-.45	.189	.044
	Fluctuation	Male	Low fluctuation	Without fluctuation	-.45	.188	.044
			Without fluctuation	Low fluctuation	.45	.188	0.44

Table 4: Results of 10 evaluation phrases positively associated with a sense of being alive: A study with Thai participants: The interaction effect between factors (Tukey HSD method)

The evaluation	**The interaction effect**	**Factor**	**(I) Angle**	**(J) Angle**	**Mean Differences (I-J)**	**Std. Error**	**Sig**
Lively	Acceleration and fluctuation	High fluctuation	Fast to slow	Without acceleration	.90	.356	.037
			Without acceleration	Fast to slow	-.90	.356	.037
	Angle and fluctuation	High fluctuation	60	120	.90	.356	.037
			120	60	-.90	.356	.037

Table 5: Evaluation on the evaluation tendency based on gender differences: A study with Thai participants

(I) Gender differences (Pairwise Comparison method)

The evaluation	**Factor**	**Levels of factor**	**(I) Gender**	**(J) Gender**	**Mean Differences (I-J)**	**Std. Error**	**Sig**
Alert	Angle	60	Female	Male	-.852	.315	.009
			Male	Female	.852	.315	.009
	Acceleration	Fast to slow	Female	Male	-.657	.306	.036
			Male	Female	.657	.306	.036
	Fluctuation	Low fluctuation	Female	Male	-.643	.295	.033
			Male	Female	.643	.295	.033

(II) The interaction effect (Tukey HSD method)

The evaluation	**Factor**	**Gender**	**(I) Factor**	**(J) Factor**	**Mean Differences (I-J)**	**Std. Error**	**Sig**
Lively	Angle	Male	60	120	.70	.284	.042
			120	60	-.70	.284	.042

Table 6: Results of 10 evaluation phrases positively associated with a sense of being alive: A study with both Japanese and Thai participants:

(I) The differences between Japanese and Thai participants (Pairwise Comparison method)

The evaluation	Factor	Levels of factor	(I) Participant	(J) Participant	Mean Differences (I-J)	Std. Error	Sig
Lively	Angle	60	Japanese	Thai	-.885	.197	<.001
			Thai	Japanese	.885	.197	<.001
		90	Japanese	Thai	-.685	.191	<.001
			Thai	Japanese	.685	.191	<.001
		120	Japanese	Thai	-.715	.189	<.001
			Thai	Japanese	.715	.189	<.001
	Acceleration	Fast to slow	Japanese	Thai	-.501	.195	.011
			Thai	Japanese	.501	.195	.011
		Slow to fast	Japanese	Thai	-1.000	.201	<.001
			Thai	Japanese	1.000	.201	<.001
		Without acceleration	Japanese	Thai	-.785	.185	<.001
			Thai	Japanese	.785	.185	<.001
	Fluctuation	High fluctuation	Japanese	Thai	-.886	.201	<.001
			Thai	Japanese	.886	.201	<.001
		Low fluctuation	Japanese	Thai	-.793	.201	<.001
			Thai	Japanese	.793	.201	<.001
Vigorous	Angle	60	Japanese	Thai	-.896	.208	<.001
			Thai	Japanese	.896	.208	<.001
		90	Japanese	Thai	-1.062	.198	<.001
			Thai	Japanese	1.062	.198	<.001
		120	Japanese	Thai	-.932	.179	<.001
			Thai	Japanese	.932	.179	<.001
	Acceleration	Fast to slow	Japanese	Thai	-.863	.200	<.001
			Thai	Japanese	.863	.200	<.001
		Slow to fast	Japanese	Thai	-1.183	.191	<.001
			Thai	Japanese	1.183	.191	<.001
		Without acceleration	Japanese	Thai	-.843	.196	<.001
			Thai	Japanese	.843	.196	<.001
	Fluctuation	High fluctuation	Japanese	Thai	-1.323	.200	<.001
			Thai	Japanese	1.323	.200	<.001
		Low fluctuation	Japanese	Thai	-.861	.184	<.001
			Thai	Japanese	.861	.184	<.001
		Without fluctuation	Japanese	Thai	-.706	.203	<.001
			Thai	Japanese	.706	.203	<.001
Cheerful	Angle	60	Japanese	Thai	-1.036	.203	<.001
			Thai	Japanese	1.036	.203	<.001
		90	Japanese	Thai	-.978	.199	<.001
			Thai	Japanese	.978	.199	<.001
		120	Japanese	Thai	-1.227	.203	<.001
			Thai	Japanese	1.227	.203	<.001
	Acceleration	Fast to slow	Japanese	Thai	-.888	.198	<.001
			Thai	Japanese	.888	.198	<.001
		Slow to fast	Japanese	Thai	-1.165	.195	<.001
			Thai	Japanese	1.165	.195	<.001
			Japanese	Thai	-1.188	.198	<.001

		Without acceleration	Thai	Japanese	1.188	.198	<.001
	Fluctuation	High fluctuation	Japanese	Thai	-1.070	.199	<.001
			Thai	Japanese	1.070	.199	<.001
		Low fluctuation	Japanese	Thai	-1.274	.193	<.001
			Thai	Japanese	1.274	.193	<.001
		Without fluctuation	Japanese	Thai	-.898	.202	<.001
			Thai	Japanese	.898	.202	<.001
Uneasy	Angle	60	Japanese	Thai	-.896	.187	<.001
			Thai	Japanese	.896	.187	<.001
	Acceleration	Fast to slow	Japanese	Thai	.929	.192	<.001
			Thai	Japanese	-.929	.192	<.001
		Slow to fast	Japanese	Thai	.388	.178	.031
			Thai	Japanese	-.388	.178	.031
	Fluctuation	High fluctuation	Japanese	Thai	.676	.190	<.001
			Thai	Japanese	-.676	.190	<.001
		Low fluctuation	Japanese	Thai	.521	.173	.003
			Thai	Japanese	-.521	.173	.003
Active	Angle	60	Japanese	Thai	-.810	.198	<.001
			Thai	Japanese	.810	.198	<.001
		90	Japanese	Thai	-.571	.202	.005
			Thai	Japanese	.571	.202	.005
		120	Japanese	Thai	-.667	.179	<.001
			Thai	Japanese	.667	.179	<.001
	Acceleration	Fast to slow	Japanese	Thai	-.549	.201	.007
			Thai	Japanese	.549	.201	.007
		Slow to fast	Japanese	Thai	-.885	.197	<.001
			Thai	Japanese	.885	.197	<.001
		Without acceleration	Japanese	Thai	-.614	.181	<.001
			Thai	Japanese	.614	.181	<.001
	Fluctuation	High fluctuation	Japanese	Thai	-.858	.195	<.001
			Thai	Japanese	.858	.195	<.001
		Low fluctuation	Japanese	Thai	-.740	.180	<.001
			Thai	Japanese	.740	.180	<.001
		Without fluctuation	Japanese	Thai	-.450	.206	.030
			Thai	Japanese	.450	.206	.030
Alert	Angle	60	Japanese	Thai	-1.300	.197	<.001
			Thai	Japanese	1.300	.197	<.001
		90	Japanese	Thai	-1.338	.187	<.001
			Thai	Japanese	1.338	.187	<.001
		120	Japanese	Thai	-1.114	.177	<.001
			Thai	Japanese	1.114	.177	<.001
	Acceleration	Fast to slow	Japanese	Thai	-1.284	.196	<.001
			Thai	Japanese	1.284	.196	<.001
		Slow to fast	Japanese	Thai	-1.373	.183	<.001
			Thai	Japanese	1.373	.183	<.001
		Without acceleration	Japanese	Thai	-1.095	.183	<.001
			Thai	Japanese	1.095	.183	<.001
	Fluctuation	High fluctuation	Japanese	Thai	-1.499	.190	<.001
			Thai	Japanese	1.499	.190	<.001
		Low fluctuation	Japanese	Thai	-1.103	.179	<.001
			Thai	Japanese	1.103	.179	<.001
			Japanese	Thai	-1.150	.192	<.001

		Without fluctuation	Thai	Japanese	1.150	.192	<.001
Energetic	Angle	60	Japanese	Thai	-.897	.198	<.001
			Thai	Japanese	.897	.198	<.001
		90	Japanese	Thai	-.976	.194	<.001
			Thai	Japanese	.976	.194	<.001
		120	Japanese	Thai	-.991	.176	<.001
			Thai	Japanese	.991	.176	<.001
	Acceleration	Fast to slow	Japanese	Thai	-.821	.195	<.001
			Thai	Japanese	.821	.195	<.001
		Slow to fast	Japanese	Thai	-1.039	.183	<.001
			Thai	Japanese	1.039	.183	<.001
		Without acceleration	Japanese	Thai	-1.004	.192	<.001
			Thai	Japanese	1.004	.192	<.001
	Fluctuation	High fluctuation	Japanese	Thai	-1.229	.193	<.001
			Thai	Japanese	1.229	.193	<.001
		Low fluctuation	Japanese	Thai	-.979	.175	<.001
			Thai	Japanese	.979	.175	<.001
		Without fluctuation	Japanese	Thai	-.656	.202	.001
			Thai	Japanese	.656	.202	.001
Helpful	Angle	60	Japanese	Thai	-1.275	.198	<.001
			Thai	Japanese	1.275	.198	<.001
		90	Japanese	Thai	-1.396	.184	<.001
			Thai	Japanese	1.396	.184	<.001
		120	Japanese	Thai	-1.457	.181	<.001
			Thai	Japanese	1.457	.181	<.001
	Acceleration	Fast to slow	Japanese	Thai	-1.370	.177	<.001
			Thai	Japanese	1.370	.177	<.001
		Slow to fast	Japanese	Thai	-1.541	.179	<.001
			Thai	Japanese	1.541	.179	<.001
		Without acceleration	Japanese	Thai	-1.217	.205	<.001
			Thai	Japanese	1.217	.205	<.001
	Fluctuation	High fluctuation	Japanese	Thai	-1.582	.183	<.001
			Thai	Japanese	1.582	.183	<.001
		Low fluctuation	Japanese	Thai	-1.590	.173	<.001
			Thai	Japanese	1.590	.173	<.001
		Without fluctuation	Japanese	Thai	-.956	.203	<.001
			Thai	Japanese	.956	.203	<.001
Full of life	Acceleration	Fast to slow	Japanese	Thai	.421	.199	.036
			Thai	Japanese	-.421	.199	.036
Efficient	Angle	60	Japanese	Thai	-1.647	.201	<.001
			Thai	Japanese	1.647	.201	<.001
		90	Japanese	Thai	-1.677	.191	<.001
			Thai	Japanese	1.677	.191	<.001
		120	Japanese	Thai	-1.612	.187	<.001
			Thai	Japanese	1.612	.187	<.001
	Acceleration	Fast to slow	Japanese	Thai	-1.640	.195	<.001
			Thai	Japanese	1.640	.195	<.001
		Slow to fast	Japanese	Thai	-1.747	.183	<.001
			Thai	Japanese	1.747	.183	<.001
		Without acceleration	Japanese	Thai	-1.550	.201	<.001
			Thai	Japanese	1.550	.201	<.001
	Fluctuation		Japanese	Thai	-1.763	.187	<.001

		High fluctuation	Thai	Japanese	1.763	.187	<.001
		Low fluctuation	Japanese	Thai	-1.804	.185	<.001
			Thai	Japanese	1.804	.185	<.001
		Without fluctuation	Japanese	Thai	-1.370	.206	<.001
			Thai	Japanese	1.370	.206	<.001

(II) The interaction effect (Tukey HSD method)

The evaluation	**Factor**	**Participant**	**(I) Factor**	**(J) Factor**	**Mean Differences (I-J)**	**Std. Error**	**Sig**
Lively	Angle	Japanese	60	120	.53	.162	.003
			120	60	-.53	.162	.003
		Thai	60	90	.52	.210	.039
			60	120	.70	.210	.003
			90	60	-.52	.210	.039
			120	60	-.70	.210	.003
	Acceleration	Japanese	Fast to slow	Slow to fast	.60	.162	<.001
			Slow to fast	Fast to slow	-.60	.162	<.001
Vigorous	Angle	Japanese	60	120	.44	.156	.016
			120	60	-.44	.156	.016
	Acceleration	Japanese	Fast to slow	Slow to fast	.45	.156	.011
			Slow to fast	Fast to slow	-.45	.156	.011
Cheerful	Angle	Japanese	60	120	.66	.161	<.001
			120	60	-.66	.161	<.001
	Acceleration	Japanese	Fast to slow	Slow to fast	-.44	.163	.018
			Slow to fast	Fast to slow	.44	.163	.018
Uneasy	Angle	Japanese	60	120	.43	.161	.023
			120	60	-.43	.161	.023
	Acceleration	Japanese	Fast to slow	Without acceleration	.44	.161	.020
			Without acceleration	Fast to slow	-.44	.161	.020
Active	Acceleration	Japanese	Fast to slow	Slow to fast	.42	.157	.021
			Slow to fast	Fast to slow	-.42	.157	.021
Energetic	Angle	Japanese	60	120	.44	.148	.008
			120	60	-.44	.148	.008
	Acceleration	Japanese	Fast to slow	Slow to fast	.37	.148	.036
			Slow to fast	Fast to slow	-.37	.148	.036
Helpful	Fluctuation	Japanese	High fluctuation	Without fluctuation	-.36	.151	.047
			Without fluctuation	High fluctuation	.36	.151	.047
Full of life	Angle	Japanese	60	90	.44	.164	.019
				120	.62	.164	<.001
			90	60	-.44	.164	.019
				120	-.62	.164	<.001
	Acceleration	Japanese	Fast to slow	Slow to fast	.55	.163	.003
				Without acceleration	.60	.163	<.001
			Slow to fast	Fast to slow	-.55	.163	.003

			Without acceleration	Fast to slow	-.60	.163	<.001
Efficient	Fluctuation	Japanese	High fluctuation	Without fluctuation	-.38	.156	.044
			Without fluctuation	High fluctuation	.38	.156	.044

Table 7: Evaluation on the evaluation tendency based on gender differences:
The differences between Japanese and Thai participants

(I) Gender differences (Pairwise Comparison method)

The evaluation	Factor	Levels of factor	(I) Gender	(J) Gender	Mean Differences (I-J)	Std. Error	Sig
Lively	Acceleration	Slow to fast	Female	Male	.418	.202	.040
			Male	Female	-.418	.202	.040
Vigorous	Acceleration	Slow to fast	Female	Male	.399	.199	.047
			Male	Female	-.399	.199	.047
	Fluctuation	Low fluctuation	Female	Male	.410	.183	.027
			Male	Female	.410	.183	.027
Uneasy	Angle	60	Female	Male	.413	.187	.028
			Male	Female	-.413	.187	.028
	Fluctuation	Low fluctuation	Female	Male	.338	.167	.044
			Male	Female	-.338	.167	.044
		Without fluctuation	Female	Male	.398	.183	.031
			Male	Female	-.398	.183	.031
Active	Angle	60	Female	Male	.472	.194	.016
			Male	Female	-.472	.194	.016
	Acceleration	Slow to fast	Female	Male	.495	.194	.012
			Male	Female	-.495	.194	.012
	Fluctuation	Low fluctuation	Female	Male	.400	.177	.025
			Male	Female	-.400	.177	.025
Alert	Acceleration	Slow to fast	Female	Male	.497	.197	.013
			Male	Female	-.497	.197	.013
Helpful	Angle	90	Female	Male	.453	.199	.024
			Male	Female	-.453	.199	.024
		120	Female	Male	.431	.199	.032
			Male	Female	-.431	.199	.032
	Acceleration	Fast to slow	Female	Male	.423	.193	.030
			Male	Female	-.423	.193	.030
		Slow to fast	Female	Male	.503	.200	.013
			Male	Female	-.503	.200	.013
	Fluctuation	Without fluctuation	Female	Male	.582	.200	.004
			Male	Female	-.582	.200	.004
Efficient	Acceleration	Slow to fast	Female	Male	.431	.213	.044
			Male	Female	-.431	.213	.044

(II) The interaction effect (Tukey HSD method)

The evaluation	Factor	Gender	(I) Factor	(J) Factor	Mean Differences (I-J)	Std. Error	Sig
Lively	Angle	Female	60	90	.45	.188	.047
			60	120	.78	.188	<.001
			90	60	-.45	.188	.047
			120	60	-.78	.188	<.001
	Acceleration	Male	Fast to slow	Slow to fast	.62	.186	.003
			Slow to fast	Fast to slow	-.62	.186	.003
Cheerful	Angle	Female	60	120	.71	.208	.002
			120	60	-.71	.208	.002
		Male	60	120	.51	.192	.025
			120	60	-.51	.192	.025
Active	Acceleration	Male	Fast to slow	Slow to fast	.41	.172	.044
			Slow to fast	Fast to slow	-.41	.172	.044
Energetic	Angle	Female	60	120	.50	.194	.028
			120	60	-.50	.194	.028
Full of life	Angle	Female	60	120	.73	.204	.001
			120	60	-.73	.204	.001
	Acceleration	Male	Fast to slow	Without acceleration	.46	.179	.027
			Without acceleration	Fast to slow	-.46	.179	.027

Table 8: Results of 10 evaluation phrases negatively associated with a sense of being alive:
A study with Japanese participants: The interaction effect between factors (Tukey HSD method)

The evaluation	The interaction effect	Factor	(I) Factor	(J) Factor	Mean Differences (I-J)	Std. Error	Sig
Carefree	Angle and acceleration	Fast to slow	60	90	-1.03	.287	.002
			90	60	1.03	.287	.002
		Without acceleration	60	90	1.18	.266	<.001
				120	1.36	.266	<.001
			90	60	-1.18	.266	<.001
			120	60	-1.36	.266	<.001
		60	Fast to slow	Without acceleration	-1.59	.252	<.001
			Slow to fast	Without acceleration	-1.38	.252	<.001
			Without acceleration	Fast to Slow	1.59	.252	<.001
				Slow to fast	1.38	.252	<.001
		90	Fast to slow	Slow to fast	1.13	.253	<.001
				Without acceleration	.62	.253	.043
			Slow to fast	Fast to Slow	-1.13	.253	<.001
			Without acceleration	Fast to slow	-.62	.253	.043

	Acceleration and fluctuation	Fast to slow	High fluctuation	Without fluctuation	-1.03	.287	.002
			Without fluctuation	High fluctuation	1.03	.287	.002
		Without acceleration	High fluctuation	Without fluctuation	-1.36	.266	<.001
			Low fluctuation	Without fluctuation	-1.18	.266	<.001
			Without fluctuation	High fluctuation	1.36	.266	<.001
				Low fluctuation	1.18	.266	<.001
	Angle and fluctuation	60	High fluctuation	Without fluctuation	-1.59	.252	<.001
			Low fluctuation	Without fluctuation	-1.38	.252	<.001
			Without fluctuation	High fluctuation	1.59	.252	<.001
				Low fluctuation	1.38	.252	<.001
		90	High fluctuation	Without fluctuation	-1.13	.253	<.001
			Low fluctuation	Without fluctuation	-.62	.253	.043
			Without fluctuation	High fluctuation	1.13	.253	<.001
				Low fluctuation	.62	.253	.043
		Without fluctuation	60	120	1.33	.287	<.001
			120	60	-1.33	.287	<.001
Rebellious	Angle and acceleration	60	Fast to slow	Without acceleration	.69	.253	.019
			Without acceleration	Fast to slow	-.69	.253	.019
		Fast to slow	60	90	.74	.244	.008
			90	60	-.74	.244	.008
	Acceleration and fluctuation	Fast to slow	High fluctuation	Without fluctuation	.74	.244	.008
			Without fluctuation	High fluctuation	-.74	.244	.008
	Angle and Fluctuation	60	High fluctuation	Without fluctuation	.69	.253	.019
			Without fluctuation	High fluctuation	-.69	.253	.019
Angry	Angle and acceleration	60	Fast to slow	Without acceleration	.95	.213	<.001
			Without acceleration	Fast to slow	-.95	.213	<.001
		90	Fast to slow	Slow to fast	-.77	.222	.002
			Slow to fast	Fast to slow	-.77	.222	.002
				Without acceleration	.64	.222	.013

			Without acceleration	Slow to fast	-.64	.222	.013
		Fast to slow	60	90	.74	.222	.003
			90	60	-.74	.222	.003
		Slow to fast	90	120	.59	.247	.048
			120	90	-.59	.247	.048
		Without acceleration	60	120	-.54	.196	.019
			120	60	.54	.196	.019
	Acceleration and fluctuation	Fast to slow	High fluctuation	Without fluctuation	.74	.222	.003
			Without fluctuation	High fluctuation	-.74	.222	.003
		Slow to fast	High fluctuation	Without fluctuation	.59	.247	.048
			Without fluctuation	High fluctuation	-.59	.247	.048
		Without acceleration	High fluctuation	Without fluctuation	.54	.196	.019
			Without fluctuation	High fluctuation	-.54	.196	.019
	Angle and Fluctuation	60	High fluctuation	Without fluctuation	.95	.213	<.001
			Without fluctuation	High fluctuation	-.95	.213	<.001
		90	High fluctuation	Low Fluctuation	.64	.222	.013
				Without fluctuation	.77	.222	.002
			Low Fluctuation	High fluctuation	-.64	.222	.013
			Without fluctuation	Low Fluctuation	-.77	.222	.002
Spiteful	Angle and acceleration	60	Fast to slow	Without acceleration	.85	.253	.003
			Without acceleration	Fast to slow	-.85	.253	.003
		90	Fast to slow	Slow to fast	-.64	.236	.021
			Slow to fast	Fast to slow	.64	.236	.021
		Fast to slow	60	90	.74	.291	.031
			90	60	-.74	.291	.031
	Acceleration and fluctuation	Fast to slow	High fluctuation	Without fluctuation	.74	.291	.031
			Without fluctuation	High fluctuation	-.74	.291	.031
	Angle and Fluctuation	60	High fluctuation	Without fluctuation	.85	.253	.003
			Without fluctuation	High fluctuation	-.85	.253	.003
		90	High fluctuation	Without fluctuation	.64	.236	.021
			Without fluctuation	High fluctuation	-.64	.236	.021

Bad tempered	Angle and acceleration	60	Fast to slow	Without acceleration	1.26	.257	<.001
			Slow to fast	Without acceleration	.82	.257	.005
			Without acceleration	Fast to slow	-1.26	.257	<.001
				Slow to fast	-.82	.257	.005
		90	Fast to slow	Slow to fast	-1.18	.244	<.001
			Slow to fast	Fast to slow	1.18	.244	<.001
				Without acceleration	.62	.244	.035
			Without acceleration	Slow to fast	-.62	.244	.035
		Fast to slow	60	90	1.15	.270	<.001
			90	60	-1.15	.270	<.001
				120	-.67	.270	.040
			120	90	.67	.270	.040
		Slow to fast	90	120	.72	.283	.033
			120	90	-.72	.283	.033
		Without acceleration	60	90	-.67	.221	.009
				120	-.79	.221	.001
			90	60	.67	.221	.009
			120	60	.79	.221	.001
	Acceleration and fluctuation	Fast to slow	High fluctuation	Without fluctuation	1.15	.270	<.001
			Low Fluctuation	Without fluctuation	.67	.270	.040
			Without fluctuation	High fluctuation	-1.15	.270	<.001
				Low Fluctuation	-.67	.270	.040
		Slow to fast	High fluctuation	Without fluctuation	.72	.283	.033
			Without fluctuation	High fluctuation	-.72	.283	.033
		Without acceleration	High fluctuation	Without fluctuation	.79	.221	.001
			Low Fluctuation	Without fluctuation	.67	.221	.009
			Without fluctuation	High fluctuation	-.79	.221	.001
				Low Fluctuation	-.67	.221	.009
		Without fluctuation	Slow to fast	Without acceleration	.56	.203	.018
			Without acceleration	Slow to fast	-.56	.203	.018
	Angle and Fluctuation	60	High fluctuation	Without fluctuation	1.26	.257	<.001
			Low Fluctuation	Without fluctuation	.82	.257	.005

			Without fluctuation	High fluctuation	-1.26	.257	<.001
				Low Fluctuation	-.82	.257	.005
		90	High fluctuation	Low Fluctuation	.62	.244	.035
				Without fluctuation	1.18	.244	<.001
			Low Fluctuation	High fluctuation	-.62	.244	.035
			Without fluctuation	High fluctuation	-1.18	.244	<.001
		Without fluctuation	60	120	-.56	.203	.018
			120	60	.56	.203	.018
Resentful	Angle and acceleration	60	Fast to slow	Without acceleration	.87	.241	.001
			Without acceleration	Fast to slow	-.87	.241	.001
		90	Fast to slow	Slow to fast	-.79	.194	<.001
			Slow to fast	Fast to slow	.79	.194	<.001
				Without acceleration	.62	.194	.005
			Without acceleration	Slow to fast	-.62	.194	.005
		Fast to slow	60	90	.90	.226	<.001
				120	.54	.226	.049
			90	60	-.90	.226	<.001
			120	60	-.54	.226	.049
		Without acceleration	60	120	-.44	.168	.029
			120	60	.44	.168	.029
	Acceleration and fluctuation	Fast to slow	High fluctuation	Low Fluctuation	.54	.226	.049
				Without fluctuation	.90	.226	<.001
			Low Fluctuation	High fluctuation	-.54	.226	.049
			Without fluctuation	High fluctuation	-.90	.226	<.001
		Without acceleration	High fluctuation	Without fluctuation	.44	.168	.029
			Without fluctuation	High fluctuation	-.44	.168	.029
	Angle and Fluctuation	60	High fluctuation	Without fluctuation	.87	.241	.001
			Without fluctuation	High fluctuation	-.87	.241	.001
		90	High fluctuation	Low Fluctuation	.62	.194	.005
				Without fluctuation	.79	.194	<.001
			Low Fluctuation	High fluctuation	-.62	.194	.005

			Without fluctuation	High fluctuation	-.79	.194	<.001
Furious	Angle and acceleration	60	Fast to slow	Without acceleration	.64	.198	.004
			Without acceleration	Fast to slow	-.64	.198	.004
		90	Fast to slow	Slow to fast	-.92	.180	<.001
			Slow to fast	Fast to slow	.92	.180	<.001
				Without acceleration	.59	.180	.004
			Without acceleration	Slow to fast	-.59	.180	.004
		Fast to slow	60	90	.77	.189	<.001
			90	60	-.77	.189	<.001
		Slow to fast	60	90	-.59	.205	.013
			90	60	.59	.205	.013
				120	.56	.205	.018
			120	90	-.56	.205	.018
	Acceleration and fluctuation	Fast to slow	High fluctuation	Without fluctuation	.77	.189	<.001
			Without fluctuation	High fluctuation	-.77	.189	<.001
		Slow to fast	High fluctuation	Low Fluctuation	.59	.205	.013
				Without fluctuation	.56	.205	.018
			Low Fluctuation	High fluctuation	-.59	.205	.013
			Without fluctuation	High fluctuation	-.56	.205	.018
		Without fluctuation	Fast to slow	Slow to fast	-.36	.145	.039
			Slow to fast	Fast to slow	.36	.145	.039
	Angle and Fluctuation	60	High fluctuation	Without fluctuation	.64	.198	.004
			Without fluctuation	High fluctuation	-.64	.198	.004
		90	High fluctuation	Low fluctuation	.59	.180	.004
				Without fluctuation	.92	.180	<.001
			Low fluctuation	High fluctuation	-.59	.180	.004
			Without fluctuation	High fluctuation	-.92	.180	<.001
Peeved	Angle and acceleration	60	Fast to slow	Without acceleration	.92	.262	.002
			Slow to fast	Without acceleration	.64	.262	.042
			Without acceleration	Fast to slow	-.92	.262	.002

				Slow to fast	-.64	.262	.042
		90	Fast to slow	Slow to fast	-.69	.230	.009
			Slow to fast	Fast to slow	.69	.230	.009
		Fast to slow	60	90	.82	.250	.004
			90	60	-.82	.250	.004
	Acceleration and fluctuation	Fast to slow	High fluctuation	Without fluctuation	.82	.250	.004
			Without fluctuation	High fluctuation	-.82	.250	.004
	Angle and Fluctuation	60	High fluctuation	Without fluctuation	.92	.262	.002
			Low fluctuation	Without fluctuation	.64	.262	.042
			Without fluctuation	High fluctuation	-.92	.262	.002
				Low fluctuation	-.64	.262	.042
		90	High fluctuation	Without fluctuation	.69	.230	.009
			Without fluctuation	High fluctuation	-.69	.230	.009
		High fluctuation	60	120	.64	.265	.045
			120	60	-.64	.265	.045
Grouchy	Angle and acceleration	60	Fast to slow	Slow to fast	.51	.207	.038
				Without acceleration	.85	.207	<.001
			Slow to fast	Fast to slow	-.51	.207	.038
			Without acceleration	Fast to slow	-.85	.207	<.001
		90	Fast to slow	Slow to fast	-.72	.221	.004
			Slow to fast	Fast to slow	.72	.221	.004
				Without acceleration	.54	.221	.043
			Without acceleration	Slow to fast	-.54	.221	.043
	Acceleration and fluctuation	Without fluctuation	Slow to fast	Without acceleration	.44	.179	.043
			Without acceleration	Slow to fast	-.44	.179	.043
		Fast to slow	High fluctuation	Without fluctuation	.67	.240	.017
			Without fluctuation	High fluctuation	-.67	.240	.017
		Slow to fast	High fluctuation	Low fluctuation	.56	.233	.045
			Low fluctuation	High fluctuation	-.56	.233	.045
		Without acceleration	High fluctuation	Without fluctuation	.59	.190	.007

			Without fluctuation	High fluctuation	-.59	.190	.007
	Angle and Fluctuation	60	High fluctuation	Low fluctuation	.51	.207	.038
				Without fluctuation	.85	.207	<.001
			Low fluctuation	High fluctuation	-.51	.207	.038
			Without fluctuation	High fluctuation	-.85	.207	<.001
		90	High fluctuation	Low fluctuation	.54	.221	.043
				Without fluctuation	.72	.221	.004
			Low fluctuation	High fluctuation	-.54	.221	.043
			Without fluctuation	High fluctuation	-.72	.221	.004
		Without fluctuation	60	120	-.44	.179	.043
			120	60	.44	.179	.043
Ready to fight	Angle and acceleration	60	Fast to slow	Without acceleration	.59	.204	.013
			Without acceleration	Fast to slow	-.59	.204	.013
		90	Fast to slow	Slow to fast	-.41	.142	.013
			Slow to fast	Fast to slow	.41	.142	.013
		Fast to slow	60	90	.64	.196	.004
			90	60	-.64	.196	.004
	Acceleration and fluctuation	Fast to slow	High fluctuation	Without fluctuation	.64	.196	.004
			Without fluctuation	High fluctuation	-.64	.196	.004
	Angle and Fluctuation	60	High fluctuation	Without fluctuation	.59	.204	.013
			Without fluctuation	High fluctuation	-.59	.204	.013
		90	High fluctuation	Without fluctuation	.41	.142	.013
			Without fluctuation	High fluctuation	-.41	.142	.013

Table 9: Evaluation on the evaluation tendency based on gender differences:
A study with Japanese participants:

(I) Gender differences (Pairwise Comparison method)

The evaluation	Factor	Levels of factor	(I) Gender	(J) Gender	Mean Differences (I-J)	Std. Error	Sig
Carefree	Angle	120	Female	Male	.665	.219	.003
			Male	Female	-.665	.219	.003
	Acceleration	Slow to fast	Female	Male	.563	.177	.002
			Male	Female	-.563	.177	.002
Rebellious	Fluctuation	High fluctuation	Female	Male	.462	.213	.032
			Male	Female	-.462	.213	.032
Furious	Fluctuation	Without fluctuation	Female	Male	.271	.119	.025
			Male	Female	-.271	.119	.025

(II) The interaction effect (Tukey HSD method)

The evaluation	Factor	Gender	(I) Factor	(J) Factor	Mean Differences (I-J)	Std. Error	Sig
Carefree	Acceleration	Male	Fast to slow	Slow to fast	.53	.206	.029
			Slow to fast	Fast to slow	-.53	.206	.029
				Without acceleration	-.80	.206	<.001
			Without acceleration	Slow to fast	.80	.206	<.001
		Female	High fluctuation	Without fluctuation	-.96	.235	<.001
			Low fluctuation	Without fluctuation	-.57	.235	.044
			Without fluctuation	High fluctuation	.96	.235	<.001
				Low fluctuation	.57	.235	.044
		Male	High fluctuation	Without fluctuation	-.88	.205	<.001
			Low fluctuation	Without fluctuation	-.52	.205	.034
			Without fluctuation	High fluctuation	.88	.205	<.001
				Low fluctuation	.52	.205	.034
Rebellious	Fluctuation	Female	High fluctuation	Without fluctuation	.88	.198	<.001
			Without fluctuation	High fluctuation	-.88	.198	<.001
Angry	Acceleration	Male	Slow to fast	Without acceleration	.41	.171	.046
			Without acceleration	Slow to fast	-.41	.171	.046

	Fluctuation	Female	High fluctuation	Without fluctuation	.69	.201	.002
			Without fluctuation	High fluctuation	-.69	.201	.002
		Male	High fluctuation	Without fluctuation	.58	.168	.002
			Without fluctuation	High fluctuation	-.58	.168	.002
Spiteful	Fluctuation	Male	High fluctuation	Without fluctuation	.56	.194	.012
			Without fluctuation	High fluctuation	-.56	.194	.012
Bad tempered	Fluctuation	Female	High fluctuation	Low fluctuation	.69	.210	.004
				Without fluctuation	1.06	.210	<.001
			Low fluctuation	High fluctuation	-.69	.210	.004
			Without fluctuation	High fluctuation	-1.06	.210	<.001
		Male	High fluctuation	Without fluctuation	.76	.212	.001
			Low fluctuation	Without fluctuation	.65	.212	.007
			Without fluctuation	High fluctuation	-.76	.212	.001
				Low fluctuation	-.65	.212	.007
Furious	Fluctuation	Female	High fluctuation	Low fluctuation	.51	.176	.012
				Without fluctuation	.59	.176	.003
			Low fluctuation	High fluctuation	-.51	.176	.012
			Without fluctuation	High fluctuation	-.59	.176	.003
		Male	High fluctuation	Without fluctuation	.55	.137	<.001
			Without fluctuation	High fluctuation	-.55	.137	<.001
Peeved	Acceleration	Male	Slow to fast	Without acceleration	.58	.191	.008
			Without acceleration	Slow to fast	-.58	.191	.008
	Fluctuation	Female	High fluctuation	Without fluctuation	.49	.204	.045
			Without fluctuation	High fluctuation	-.49	.204	.045
		Male	High fluctuation	Without fluctuation	.50	.192	.027
			Without fluctuation	High fluctuation	-.50	.192	.027
Grouchy	Fluctuation	Female	High fluctuation	Low fluctuation	.53	.182	.012

				Without fluctuation	.71	.182	<.001
			Low fluctuation	High fluctuation	-.53	.182	.012
			Without fluctuation	High fluctuation	-.71	.182	<.001
		Male	High fluctuation	Without fluctuation	.47	.180	.026
			Without fluctuation	High fluctuation	-.47	.180	.026
Ready to fight	Fluctuation	Female	High fluctuation	Without fluctuation	.33	.131	.031
			Without fluctuation	High fluctuation	-.33	.131	.031
		Male	High fluctuation	Without fluctuation	.45	.160	.014
			Without fluctuation	High fluctuation	-.45	.160	.014

Table 10: Evaluation on the evaluation tendency based on gender differences:
A study with Thai participants:

Gender differences (Pairwise Comparison method)

The evaluation	**Factor**	**Levels of factor**	**(I) Gender**	**(J) Gender**	**Mean Differences (I-J)**	**Std. Error**	**Sig**
Angry	Angle	90	Female	Male	-.468	.225	.042
			Male	Female	.468	.225	.042
		120	Female	Male	-.404	.163	.016
			Male	Female	.404	.163	.016
	Acceleration	Slow to fast	Female	Male	-.522	.242	.035
			Male	Female	.522	.242	.035
	Fluctuation	High fluctuation	Female	Male	-.653	.182	<.001
			Male	Female	.653	.182	<.001
Bad tempered	Angle	90	Female	Male	-.620	.206	.004
			Male	Female	.620	.206	.004
	Acceleration	Fast to slow	Female	Male	-.505	.213	.021
			Male	Female	.505	.213	.021
Peeved	Fluctuation	Low fluctuation	Female	Male	-.411	.197	.041
			Male	Female	.411	.197	.041
Grouchy	Acceleration	Fast to slow	Female	Male	-.657	.293	.029
			Male	Female	.657	.293	.029
	Fluctuation	High fluctuation	Female	Male	-.663	.319	.042
			Male	Female	.663	.319	.042

Table 11: Results of 10 evaluation phrases negatively associated with a sense of being alive: A study with both Japanese and Thai participants:

(I) The differences between Japanese and Thai participants (Pairwise Comparison method)

The evaluation	Factor	Levels of factor	(I) Participant	(J) Participant	Mean Differences (I-J)	Std. Error	Sig
Carefree	Angle	60	Japanese	Thai	-.777	.217	<.001
			Thai	Japanese	.777	.217	<.001
		90	Japanese	Thai	-.648	.207	.002
			Thai	Japanese	.648	.207	.002
		120	Japanese	Thai	-.850	.206	<.001
			Thai	Japanese	.850	.206	<.001
	Acceleration	Fast to slow	Japanese	Thai	-.620	.219	.005
			Thai	Japanese	.620	.219	.005
		Slow to fast	Japanese	Thai	-1.006	.186	<.001
			Thai	Japanese	1.006	.186	<.001
		Without acceleration	Japanese	Thai	-.649	.217	.003
			Thai	Japanese	.649	.217	.003
	Fluctuation	High fluctuation	Japanese	Thai	-1.183	.184	<.001
			Thai	Japanese	1.183	.184	<.001
		Low fluctuation	Japanese	Thai	-.724	.203	<.001
			Thai	Japanese	.724	.203	<.001
Rebellious	Fluctuation	High fluctuation	Japanese	Thai	.404	.182	.027
			Thai	Japanese	-.404	.182	.027
Angry	Angle	120	Japanese	Thai	.325	.145	.026
			Thai	Japanese	-.325	.145	.026
	Fluctuation	High fluctuation	Japanese	Thai	.567	.172	.001
			Thai	Japanese	-.567	.172	.001
Spiteful	Angle	60	Japanese	Thai	.490	.168	.004
			Thai	Japanese	-.490	.168	.004
		90	Japanese	Thai	.455	.160	.005
			Thai	Japanese	-.455	.160	.005
		120	Japanese	Thai	.776	.168	<.001
			Thai	Japanese	-.776	.168	<.001
	Acceleration	Fast to slow	Japanese	Thai	.660	.190	<.001
			Thai	Japanese	-.660	.190	<.001
		Slow to fast	Japanese	Thai	.650	.152	<.001
			Thai	Japanese	-.650	.152	<.001
		Without acceleration	Japanese	Thai	.411	.148	.006
			Thai	Japanese	-.411	.148	.006
	Fluctuation	High fluctuation	Japanese	Thai	.814	.171	<.001
			Thai	Japanese	-.814	.171	<.001
		Low fluctuation	Japanese	Thai	.682	.167	<.001
			Thai	Japanese	-.682	.167	<.001
Bad tempered	Angle	60	Japanese	Thai	.559	.177	.002
			Thai	Japanese	-.559	.177	.002
		90	Japanese	Thai	.417	.171	.016
			Thai	Japanese	-.417	.171	.016
		120	Japanese	Thai	.476	.179	.009
			Thai	Japanese	-.476	.179	.009

	Acceleration	Fast to slow	Japanese	Thai	.543	.183	.003
			Thai	Japanese	-.543	.183	.003
		Slow to fast	Japanese	Thai	.572	.189	.003
			Thai	Japanese	-.572	.189	.003
		Without acceleration	Japanese	Thai	.337	.149	.025
			Thai	Japanese	-.337	.149	.025
	Fluctuation	High fluctuation	Japanese	Thai	.861	.191	<.001
			Thai	Japanese	-.861	.191	<.001
		Low fluctuation	Japanese	Thai	.569	.171	.001
			Thai	Japanese	-.569	.171	.001
Furious	Fluctuation	High fluctuation	Japanese	Thai	.420	.149	.005
			Thai	Japanese	-.420	.149	.005
Grouchy	Fluctuation	Without fluctuation	Japanese	Thai	-.591	.142	<.001
			Thai	Japanese	.591	.142	<.001
Ready to fight	Angle	90	Japanese	Thai	-.476	.137	<.001
			Thai	Japanese	.476	.137	<.001
	Acceleration	Slow to fast	Japanese	Thai	-.347	.159	.030
			Thai	Japanese	.347	.159	.030
		Without acceleration	Japanese	Thai	-.376	.159	.004
			Thai	Japanese	.376	.159	.004
	Fluctuation	Without fluctuation	Japanese	Thai	-.520	.122	<.001
			Thai	Japanese	.520	.122	<.001

(II) The interaction effect (Tukey HSD method)

The evaluation	**Factor**	**Participant**	**(I) Factor**	**(J) Factor**	**Mean Differences (I-J)**	**Std. Error**	**Sig**
Carefree	Acceleration	Japanese	Fast to slow	Slow to fast	.44	.159	.018
			Slow to fast	Fast to slow	-.44	.159	.018
			Slow to fast	Without acceleration	-.62	.159	<.001
			Without acceleration	Slow to fast	.62	.159	<.001
	Fluctuation	Japanese	High fluctuation	Low fluctuation	-.38	.155	.042
				Without fluctuation	-.91	.155	<.001
			Low fluctuation	High fluctuation	.38	.155	.042
				Without fluctuation	-.54	.155	.002
			Without fluctuation	High fluctuation	.91	.155	<.001
				Low fluctuation	.54	.155	.002
Rebellious	Fluctuation	Japanese	High fluctuation	Without fluctuation	.56	.138	<.001
			Without fluctuation	High fluctuation	-.56	.138	<.001
Angry	Acceleration	Japanese	Slow to fast	Without acceleration	.32	.132	.045

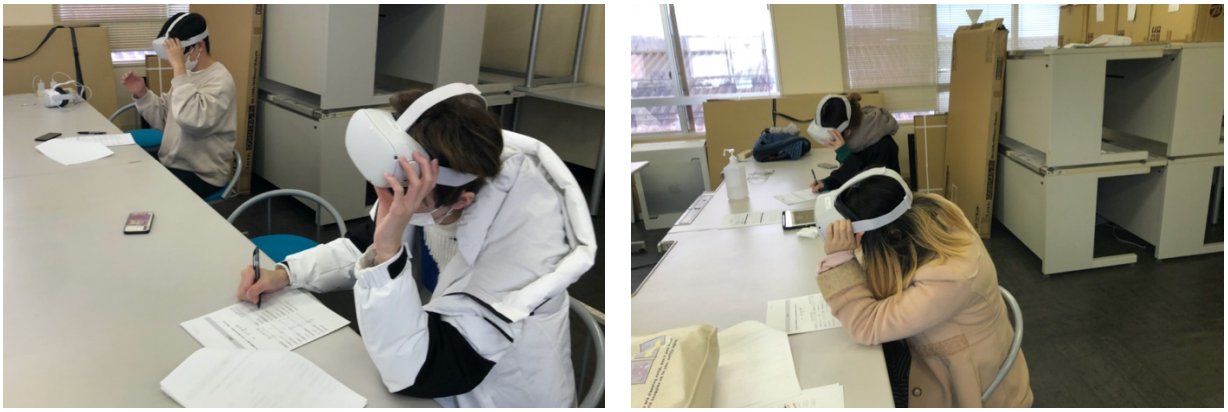
			Without acceleration	Slow to fast	-.32	.132	.045
	Fluctuation	Japanese	High fluctuation	Low fluctuation	.38	.129	.009
				Without fluctuation	.62	.129	<.001
			Low fluctuation	High fluctuation	-.38	.129	.009
			Without fluctuation	High fluctuation	-.62	.129	<.001
Spiteful	Fluctuation	Japanese	High fluctuation	Without fluctuation	.54	.148	<.001
			Without fluctuation	High fluctuation	-.54	.148	<.001
Bad tempered	Acceleration	Japanese	Slow to fast	Without acceleration	.40	.157	.029
			Without acceleration	Slow to fast	-.40	.157	.029
	Fluctuation	Japanese	High fluctuation	Low fluctuation	.36	.151	.047
				Without fluctuation	.89	.151	<.001
			Low fluctuation	High fluctuation	-.36	.151	.047
				Without fluctuation	.53	.151	.001
			Without fluctuation	High fluctuation	-.89	.151	<.001
				Low fluctuation	-.53	.151	.001
Resentful	Fluctuation	Japanese	High fluctuation	Low fluctuation	.38	.125	.007
				Without fluctuation	.63	.125	<.001
			Low fluctuation	High fluctuation	-.38	.125	.007
			Without fluctuation	High fluctuation	-.63	.125	<.001
Furious	Fluctuation	Japanese	High fluctuation	Low fluctuation	.37	.110	.003
				Without fluctuation	.56	.110	<.001
			Low fluctuation	High fluctuation	-.37	.110	.003
			Without fluctuation	High fluctuation	-.56	.110	<.001
Ready to fight	Fluctuation	Japanese	High fluctuation	Without fluctuation	.40	.107	<.001
			Without fluctuation	High fluctuation	-.40	.107	<.001

Table 12: Results of 10 evaluation phrases negatively associated with a sense of being alive: A study with both Japanese and Thai participants:

(I) The interaction effect (Tukey HSD method)

The evaluation	Factor	Gender	(I) Factor	(J) Factor	Mean Differences (I-J)	Std. Error	Sig
Carefree	Acceleration	Male	Slow to fast	Without acceleration	-.58	.189	.007
			Without acceleration	Slow to fast	.58	.189	.007
	Fluctuation	Female	High fluctuation	Without fluctuation	-.71	.218	.004
			Low fluctuation	Without fluctuation	-.55	.218	.033
			Without fluctuation	High fluctuation	.71	.218	.004
				Low fluctuation	.55	.218	.033
		Male	High fluctuation	Without fluctuation	-.59	.189	.006
			Without fluctuation	High fluctuation	.59	.189	.006
Rebellious	Fluctuation	Female	High fluctuation	Without fluctuation	.54	.167	.004
			Without fluctuation	High fluctuation	-.54	.167	.004
Angry	Acceleration	Male	Slow to fast	Without acceleration	.37	.132	.013
			Without acceleration	Slow to fast	-.37	.132	.013
	Fluctuation	Male	High fluctuation	Low fluctuation	.32	.131	.038
				Without fluctuation	.40	.131	.006
			Low fluctuation	High fluctuation	-.32	.131	.038
			Without fluctuation	High fluctuation	-.40	.131	.006
Spiteful	Fluctuation	Male	High fluctuation	Without fluctuation	.42	.146	.011
			Without fluctuation	High fluctuation	-.42	.146	.011
Bad tempered	Fluctuation	Female	High fluctuation	Low fluctuation	.46	.168	.018
				Without fluctuation	.67	.168	<.001
			Low fluctuation	High fluctuation	-.46	.168	.018
			Without fluctuation	High fluctuation	-.67	.168	<.001
		Male	High fluctuation	Without fluctuation	.56	.162	.002

			Low fluctuation	Without fluctuation	.45	.162	.015
			Without fluctuation	High fluctuation	-.56	.162	.002
				Low fluctuation	-.45	.162	.015
Resentful	Fluctuation	Male	High fluctuation	Low fluctuation	.35	.137	.028
				Without fluctuation	.53	.137	<.001
			Low fluctuation	High fluctuation	-.35	.137	.028
				Without fluctuation	-.53	.137	<.001
Furious	Fluctuation	Male	High fluctuation	Without fluctuation	.37	.112	.003
			Without fluctuation	High fluctuation	-.37	.112	.003
Peeved	Acceleration	Male	Slow to fast	Without acceleration	.46	.150	.006
			Without acceleration	Slow to fast	-.46	.150	.006
	Fluctuation	Male	High fluctuation	Without fluctuation	.36	.151	.044
			Without fluctuation	High fluctuation	-.36	.151	.044
Grouchy	Fluctuation	Female	High fluctuation	Low fluctuation	.36	.152	.049
			Low fluctuation	High fluctuation	-.36	.152	.049
Ready to fight	Fluctuation	Male	High fluctuation	Without fluctuation	.35	.139	.030
			Without fluctuation	High fluctuation	-.35	.139	.030



Appendix 16: Japanese participants participated in the experiment

Appendix 17: Thai participants participated in the experiment

論文及び口頭発表

査読付学会論文掲載数： 1 編

① Ongon Witthayathada, Koichi Nishio
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② Ongon Witthayathada, Koichi Nishio
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※優秀論文賞受賞

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Milan, Italy, 18p, 2023.10. ※採用決定