T.C.

ANTALYA BILIM UNIVERSITY

INSTITUTE OF POSTGRADUATE EDUCATION

ELECTRICAL AND COMPUTER ENGINEERING

MASTER'S THESIS

ANALYSIS OF BRAIN SIGNALS BY EEG BASED EMOTION RECOGNITION METHODS

Ertuğrul ÇELİK

DECEMBER 2023

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This thesis was accepted by the jury (with unanimous vote / majority vote) on the date …./……/2023 in Electrical and Computer Engineering

Assoc. Prof. Dr. Sevgi ŞENGÜL AYAN (Supervisor)

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Thesis Submission Date:

DECLARATION

MSc Thesis of this study named “Analysis of Brain Signals by EEG Based Emotion Recognition Methods”, which I presented, I declare that scientific moral principles were followed in the preparation of this study, in case of benefiting from the works of others, reference is made in accordance with scientific norms, no falsification has been made in the data used, and that any part of this study is not presented as another academic study.

.... / .... / 2023

Ertuğrul ÇELİK

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ABSTRACT

ANALYSIS OF BRAIN SIGNALS BY EEG BASED EMOTION RECOGNITION METHODS

Ertuğrul ÇELİK

MSc Thesis in Electrical and Computer Engineering

Supervisor: Assoc. Prof. Dr. Sevgi ŞENGÜL AYAN

December 2023 ; 145 pages

This study examines an experiment conducted at Akdeniz University and Antalya Bilim University, aiming to evaluate students' responses to different drawing methods. The experiment was carried out using neurophysiological tools, such as EEG (electroencephalography).

EEG, as a technique for measuring electrical activity in the brain, was employed to assess the emotional states experienced by participants during drawing. These neurophysiological data helped in understanding how students reacted while using different drawing methods and how these methods influenced their emotional states.

The results particularly highlight the positive impact of the drawing experiment using a 3D program. This suggests that technological tools and new software can enhance students' motivation.

The findings of this study provide valuable insights for the selection of drawing tools and the design of educational programs for students in the field of interior architecture. Additionally, it sheds light on the potential use of neurophysiological tools in evaluating emotional states.

KEYWORDS: Brain-Computer Interface, Design Process Evaluation, Educational Methods, Emotion State Analysis

COMMITTEE: Assoc. Prof. Dr. Sevgi ŞENGÜL AYAN (Supervisor)

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ÖZET

EEG TEMELLİ DUYGU TANIMA YÖNTEMLERİ İLE BEYİN SİNYALLERİNİN ANALİZİ

Ertuğrul ÇELİK

Yüksek Lisans Tezi, Elektrik ve Bilgisayar Mühendisliği Anabilim Dalı

Danışman: Doç. Dr. Sevgi ŞENGÜL AYAN

Aralık 2023; 145 sayfa

Bu çalışma, Akdeniz Üniversitesi ve Antalya Bilim Üniversitesi'nde gerçekleştirilen bir deneyi incelemektedir. Deney, öğrencilerin farklı çizim yöntemlerine verdikleri tepkileri değerlendirmeyi amaçlamıştır. Deney, EEG (elektroensefalografi) gibi nörofizyolojik araçlar kullanılarak gerçekleştirilmiştir.

EEG, beyindeki elektriksel aktiviteyi ölçen bir teknik olarak, katılımcıların çizim sırasında yaşadığı duygusal durumları incelemek için kullanılmıştır. Bu nörofizyolojik veriler, öğrencilerin farklı çizim yöntemlerini kullanırken nasıl tepki verdiklerini ve hangi yöntemlerin duygusal durumlarını nasıl etkilediğini anlamamıza yardımcı olmuştur.

Sonuçlar, özellikle 3D program kullanılarak yapılan çizim deneyinin öğrenciler üzerinde olumlu bir etki yarattığını göstermektedir. Bu durum, teknolojik araçların ve yeni yazılımların öğrencilerin motivasyonunu artırabileceğini işaret etmektedir.

Bu çalışmanın bulguları, iç mimarlık eğitimi alan öğrenciler için çizim araçlarının seçiminde ve eğitim programlarının tasarlanmasında dikkate alınabilecek önemli bilgiler sunmaktadır. Ayrıca, nörofizyolojik araçların duygusal durumların değerlendirilmesinde nasıl kullanılabileceği konusunda da aydınlatıcıdır.

ANAHTAR KELİMELER: Arousal-valence, Beyin bilgisayar ara yüzü, Dizayn süreci değerlendirmesi, Duygu durum analizi, Eğitim metotları. Arousal-Valence

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SYMBOLS AND ABBREVIATIONS

Symbols

δ	*: Delta*
θ	*: Theta*
α	*: Alpha*
β	*: Beta*
γ	*: Gamma*
m	*: meter*
m^2	*: meter square*
arctan	*: arctangent*
mV	*: millivolts*
Hz	*: Hertz*

Abbreviations

EEG	: Electroencephalography
BCI	: Brain-Computer Interface
2D	: Two-dimensional
3D	: Three-dimensional
ERP	: Event Related Potential
TP	: Temporal Lob
AF	: Anterior-Frontal
CSV	: Comma-Separated Values
PCA	: Principal Component Analysis
Y	: Objects
V	: Attributes
X_k	: Attribute Domains
T1	: Type-1
T2	: Type-2
Q	: Quantifier
S	: Summarizing Statements
TD	: Truth Degree

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PREFACE

In this study, which we prepared as an electrical and computer master thesis of Antalya Bilim University, we delved into the impact of architectural education on the brain by conducting experiments using EEG measurements on architecture students. Our main objective was to understand the neural responses of students during different design processes and to identify potential areas of improvement in architectural pedagogy. By integrating both the technological and educational aspects, we aimed to bridge the gap between traditional architectural education and modern neuroscientific insights. This comprehensive approach has provided valuable data on how students react cognitively to architectural tasks and has laid the groundwork for future studies aiming to enhance the learning experience in architectural education.

Throughout this thesis process, I extend my profound gratitude to my advisor, Assoc. Prof. Dr. Sevgi ŞENGÜL AYAN, who guided me in experiencing a multidisciplinary approach and never hesitated to answer any of my questions. Additionally, I'd like to express heartfelt thanks to my wife, Olgu YILMAZ ÇELİK, who consistently supported me in maintaining my focus during my work and has always been there for me, contributing to both my personal and academic growth. I'd also like to thank my son, Yiğit Alp ÇELİK, who made his presence felt with kicks from the womb and has never made us feel his absence.

.... / .... / 2023

Ertuğrul ÇELİK

1. INTRODUCTION

Computational neuroscience is an interdisciplinary field, aiming to decode the intricate processes and operations of the brain. By leveraging disciplines like computer science, mathematics, and physics, this field examines the brain's functionalities through mathematical models and computer simulations. These endeavors grant us insights into the neural dynamics, information coding, processing, and complex cognitive functions. Furthermore, advances in computational neuroscience significantly influence technological domains such as artificial intelligence and machine learning (Sarishma et al., 2021).

Brain-Computer Interface (BCI) epitomizes one such advance. This innovative technology facilitates direct communication between the brain and digital apparatuses. Methods like electroencephalography (EEG) are utilized to capture, interpret, and translate brain signals into actionable commands for computers. Initially designed as an alternative communicative conduit for individuals with motor impairments, BCIs have transcended their medical roots, finding relevance in virtual reality, gaming, and more (Mendes Vasiljevic and Cunha de Miranda, 2019).

EEG, a cornerstone of BCI, measures the brain's electrical activity through electrodes placed on the scalp. Reflecting the synchronized activities of millions of neurons, EEG signals offer a non-invasive glimpse into the brain's multifarious regions. They've garnered substantial popularity, finding applications from diagnosing sleep disorders to monitoring epilepsy, and underpinning the evolution of BCI technology (Nikam et al., 2023).

Emotion recognition, determining human emotional states, has become a research epicenter in technology and science. Neurophysiological tools like EEG have shown promising results in this realm. Emotions, being intricately intertwined with specific brain activity patterns, can be discerned more precisely through EEG. Harnessing this capability can lead to more intuitive human-machine interactions, which is pivotal in domains such as automotive, education, gaming, and healthcare.

The overarching influence of emotions on human behavior, social dynamics, decision-making, and psychological health has long been acknowledged. Emotions impact diverse facets of life, from education to marketing. Within the context of interior architecture, understanding the emotional repercussions of design decisions is pivotal. Even as digital design tools gain traction, many professionals remain anchored to manual tools for their perceived aesthetic or technical advantages. For students, a comprehensive curriculum covers design fundamentals, history, communication, presentation techniques, construction intricacies, material science, and more. Yet, the emotional ramifications of these tools, especially when juxtaposed against evolving professional norms, remain an open question.

In this intricate tapestry of emotions, technology, and design, neurophysiological markers such as EEG play an invaluable role. The advent of wearable EEG devices has democratized access, offering cost-effective and accurate avenues for emotion recognition. Studies have showcased the efficacy of EEG in determining mental and

emotional states, with devices like the Emotive EPOC Neuroheadset and Muse headband emerging as frontrunners. Given the vast applications ranging from advancing brain-computer interfaces to enhancing neurological care, marketing research, and pedagogical techniques, EEG's potential is only starting to be realized (Alsuradi et al., 2020).

Leveraging EEG, this study seeks to unravel the emotional tapestry woven by interior architecture students during their design processes, be it 2D, 3D, manual, or digital. This research is twofold: the initial phase focuses on eliciting emotional states, serving as the foundational raw data. The subsequent phase employs a fuzzy set-based linguistic summarization technique, distilling this information into an accessible format. This innovative approach, a pioneering application for EEG data, strives to translate the intricacies of the data into daily natural language, enhancing comprehensibility.

Conclusively, this research endeavors to discern the most impactful design methodologies and tools for students, potentially informing curriculum decisions in interior architecture programs. It also delves into the nuanced differences based on teaching techniques in the realm of design tools and behaviors.

2. LITERATUR REVIEW

In their article titled "Electroencephalography", C. D. Binnie and P. F. Prior emphasized the pivotal role of EEG (Electroencephalography) in brain research. The article underscores the significance of EEG, even in light of recent advances in neuroradiological imaging technologies. Principal applications of EEG, as pointed out in the article, include epilepsy, alterations in states of consciousness such as post-anoxic and traumatic coma, sleep disorders, dementias, toxic confusional states, cerebral infections, and other encephalopathies. As highlighted in the article, abnormalities in EEG can reflect general pathophysiological processes, increased intracranial pressure, cerebral anoxia, edema, and epileptogenesis. However, these abnormalities are not specific to any particular disease, necessitating their interpretation in a clinical context. Binnie and Prior mention that routine EEG examinations for screening purposes are generally not valuable, but when applied to specific problems—like monitoring serial changes in post-anoxic coma or making early predictions after a stroke—EEG becomes highly cost-effective. The article also emphasizes the necessity of high technological standards and an individualized problem-solving approach for an effective and reliable clinical EEG service.

In their paper "Review on Emotion Recognition Based on Electroencephalography," Haoran Liu, Ying Zhang, Yujun Li, and Xiangyi Kong highlight the significance of EEG in accurately detecting human emotions. They note its broad applications in fields like human-computer interaction and medical diagnosis. The authors differentiate emotion recognition models based on physiological signals, such as EEG, from those that don't rely on them, underscoring EEG's non-subjective nature in reflecting genuine emotions. Furthermore, they discuss the development of EEG-based emotion recognition techniques, emphasizing the transition from traditional machine learning methods, where features are manually extracted, to deep learning methods that simplify this process.

In the article titled "Brain–Computer Interface Technology: A Review of the First International Meeting", authored by Jonathan R. Wolpaw (Guest Editor), Niels Birbaumer, William J. Heetderks, Dennis J. McFarland, P. Hunter Peckham, Gerwin Schalk, Emanuel Donchin, Louis A. Quatrano, Charles J. Robinson, and Theresa M. Vaughan (Guest Editor), the potential of brain-computer interface (BCI) technology is examined for individuals with neuromuscular disorders that prevent them from using conventional communication methods. BCI's offer users communication channels that aren't reliant on peripheral nerves and muscles. The article presents the findings of the first international meeting devoted to BCI research and development. A central element in BCI is the translation algorithm that converts the user's electrophysiological input into output to control external devices. Effective BCI operation relies on the interaction between the user, who encodes their commands into the electrophysiological input, and the BCI, which identifies and represents the commands in device control. Current BCI systems have information transfer rates varying between 5-25 b/min. Practical use of BCI technology depends on the development of applications, identifying appropriate user groups, and careful attention to individual needs and desires.

In their article titled "Brain States and Transitions: Insights from Computational Neuroscience," Morten L. Kringelbach and Gustavo Deco present an extensive discussion on the significance of characterizing brain states. The authors highlight general brain states such as wakefulness, sleep, and anesthesia, pointing out that a precise definition of these states has yet to be established. They emphasize the unique framework that computational neuroscience offers in characterizing these states. Furthermore, the authors underscore the critical importance of whole-brain modeling in understanding the brain's dynamics and organization. They suggest that this type of modeling holds significant potential in comprehending and treating clinical conditions like stroke, epilepsy, and brain tumors. The article illuminates the profound impacts of computational neuroscience on understanding brain states and the advancements in this field.

In their paper titled "Emotion Recognition using Brain Activity", authors Robert Horlings, Dragos Datcu, and Leon J. M. Rothkrantz focus on recognizing emotions from human brain activity. They propose a system that utilizes EEG (Electroencephalography) signals to discern human emotions. This system is designed to analyze EEG signals based on two primary emotional dimensions: valence and arousal, which are further classified into five distinct classes. Drawing upon prior research, the authors have curated a dataset comprised of EEG signals collected from individuals stimulated emotionally through images. Their analysis concludes that EEG signals encompass sufficient information to differentiate between five separate classes in both valence and arousal dimensions. However, when using a 3-fold cross-validation method, the recognition rate for the valence dimension stands at 32%, while it's 37% for the arousal dimension. Remarkably, when solely considering the extreme values in both dimensions, the recognition rates soar to 71% and 81% respectively. The authors also touch upon potential applications of this technology, highlighting its utility in assisting therapists, enhancing human-machine interaction, and aiding disabled individuals in conveying emotions.

In the article titled "Status of deep learning for EEG-based brain–computer interface applications", penned by Khondoker Murad Hossain, Md. Ariful Islam, Shahera Hossain, Anton Nijholt, and Md Atiqur Rahman Ahad, the current state of deep learning in EEG-based brain-computer interface (BCI) applications is explored. The authors highlight significant advancements in the field of BCI over the past decade and underscore the increasing role of deep learning. They draw attention to how BCI facilitates neurorehabilitation strategies, particularly for physically disabled patients and individuals with brain injuries. The article notes that while earlier methods like matrix factorization and machine learning were popular, there has been a shift towards deep learning-based BCI applications with the public release of large, high-quality EEG datasets. The authors indicate that deep learning shows great potential in tackling complex tasks such as motor imagery classification, epileptic seizure detection, and driver attention recognition using EEG data. They emphasize the rising research on deep learning-based approaches in the BCI domain. The article's objective is to introduce deep learning approaches proposed for EEG-based BCI between 2017 and 2022. Additionally, the authors provide insights into the advantages, disadvantages, and applications of these methods while pointing out current challenges and directions for future studies.

3. METHOD

3.1 The Emergence and Historical Development of EEG

Brain-computer interfaces, and especially EEG technology, have become quite popular in recent years. However, the historical origins of EEG date back to the early 20th century. With Hans Berger recording the first human EEG in the 1920s, research in this field has rapidly progressed. Since then, EEG has become an indispensable tool for various applications in neuroscience, medicine, and psychology (Collura, 1993).

3.2. Technical Features of EEG

3.2.1. The Basic Functioning of EEG

EEG (Electroencephalography) measures the electrical activity of neurons in the brain. Neurons produce and transmit electrical signals, generating tiny electrical currents in the process. EEG is an extremely sensitive measurement device capable of accurately capturing these signals.

3.2.2. The Importance of Electrodes and Placement

EEG electrodes are typically made of silver, gold, or tin. The placement of electrodes is crucial, especially for measuring activity in specific brain regions. The 10-20 international electrode placement system is the most commonly used system, involving the placement of electrodes on the scalp at specific intervals. This system ensures a uniform measurement across the entire skull (Teplan, 2002).

3.2.3. Signal Amplification and Filtering

Amplifiers not only amplify the signals but also filter out noise and unwanted frequencies. This is critical, especially in situations with high environmental electrical noise. EEG signals are typically measured in millivolts (mV), and they are quite weak, requiring amplification.

3.2.4. Data Transmission and Processing

EEG devices convert collected data from analog to digital and transmit it to computers. Modern devices can transmit data wirelessly. This data is then processed through various software tools. The analysis of this data is particularly important when studying specific brain responses like event-related potentials (ERPs) (Tyner and Knott, 1983).

3.2.5 Multi-Channel Measurement and Advanced Devices

Multi-channel EEG devices allow for data collection from multiple regions simultaneously. This is crucial for understanding which areas of the brain are activated in response to a particular stimulus. Some advanced EEG devices can have up to 4 channels, enabling the creation of highly detailed brain maps.

3.3 Deep Analysis of Emotional Perception through EEG

EEG measures changes in the amplitude and frequency of brain waves, and these changes can be a direct indicator of an individual's emotional responses. The EEG spectrum ranges from 0.5 to 45 Hz and is divided into different frequency bands. Brain waves of different frequencies (alpha, beta, delta, theta, gamma) have been associated with various emotional and cognitive states of an individual (Alarcao and Fonseca, 2017).

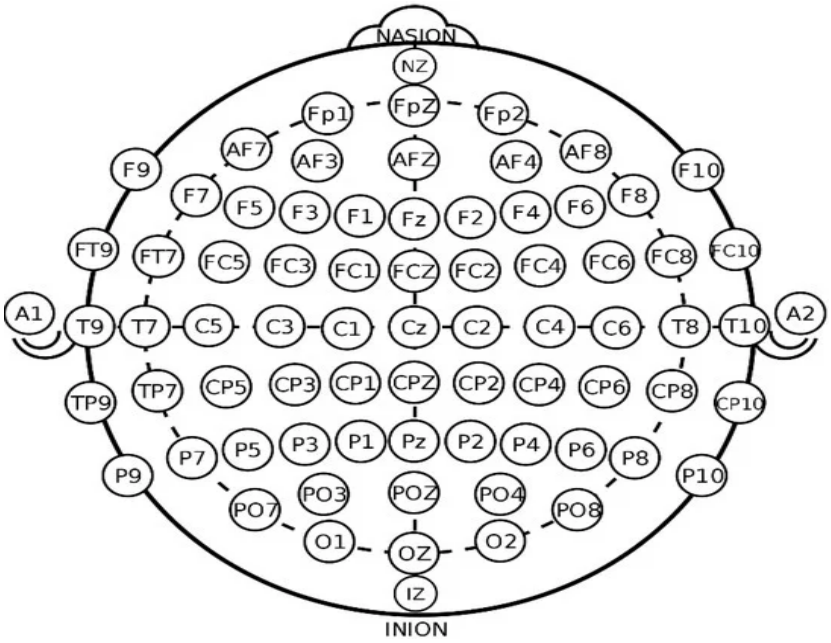


Figure 3.1 EEG Electrode Placement

3.3.1. Emotional Responses and Brain Waves

Delta waves (0,5 - 4 Hz): Most active during deep sleep, these waves can also be active during meditation or dreaming. This indicates a state of relaxation and calm in the individual.

Theta waves (4 - 7,5 Hz): These waves emerge during light sleep or deep meditation. They can also be activated during moments of creativity and intuitive thinking.

Alpha waves (8 - 13 Hz): Having a significant influence on mood and emotional state, alpha waves become active during relaxation, meditation, and rapid learning.

Beta waves (14 - 26 Hz): Activated when an individual is awake and alert, these waves are prevalent during focused attention, problem-solving, and conscious thought. However, excessive beta activity has also been associated with anxiety and stress.

Gamma waves (30 - 45 Hz): These waves emerge during learning, memory formation, and information processing. They are also linked to empathy and emotional awareness (Kumar and Bhuvaneswari, 2012).

Table 3.1. Classification of EEG Signal by Frequency

Rhythm	Frequency (Hz)	Brain State	Awareness
Delta (δ)	0,5-4 Hz	Deep sleep pattern	Low
Theta (θ)	4-7,5 Hz	Light sleep pattern	Lower
Alpha (α)	8-13 Hz	Eye closure, relaxation state	Moderate
Beta (β)	14-26 Hz	Active thinking, focus, high alertness, anxiety	High
Gamma (γ)	30-45 Hz	Higher mental activity, including perception and consciousness	Higher

3.4. Analyzing Emotional Responses in Architectural Design: An EEG-Based Approach

3.4.1. Data Processing, Compilation, and Preprocessing

For each student, a total of three different experiments were conducted. The first experiment involved manual hand-drawn sketches. The second experiment encompassed the use of a digital platform, AutoCAD, for creating 2D drawings. The third experiment was executed using 3D design software, where participants engaged in 3D modeling. The details of these experiments are provided in the Figure 3.2.

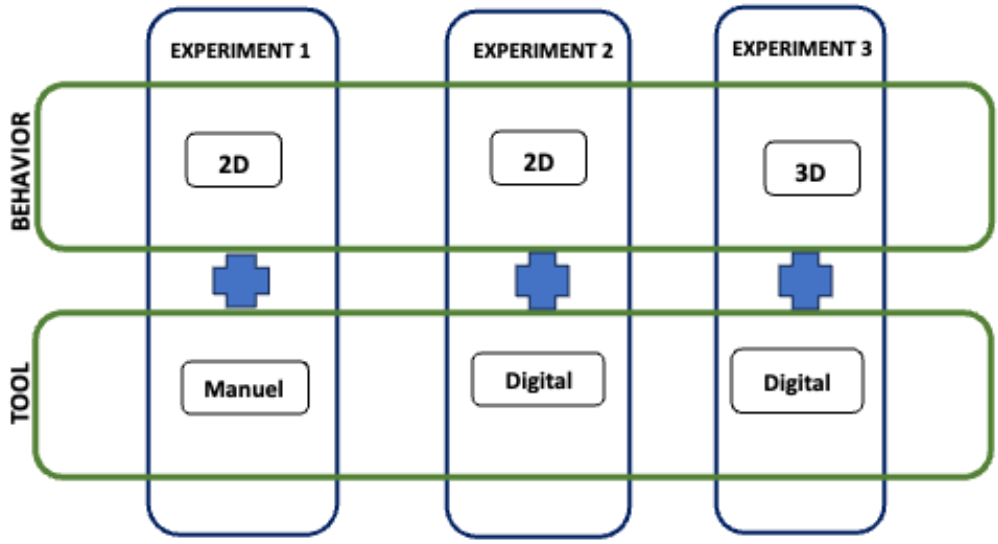


Figure 3.2 Experimental Stages

After reviewing the research stages and the fundamental information about the experiments, the following information provides details about the specific conditions and environments in which each of these experiments was conducted.

Experiment Stages: This research was executed in three distinct phases: the first experiment, the second experiment, and the third experiment.

Space Type and Scale: The experiments were designated as Residential-Bathroom Design, Residential-Bedroom Design, and Residential-Living Room Design respectively. The predetermined scales for each phase were: 1/50, detailed at 1/1 m^2, and the total areas of the spaces were 7 m^2, 24 m^2, and 30 m^2, in sequence.

Design Tools: In the first experiment, students worked with manual tools such as millimeter paper, eraser, pencil, ruler, etc. For the second and third experiments, students employed AutoCAD and a 3D modeling program respectively, on their own computers with settings they were familiar with.

Design Challenges: Specific design challenges were identified for each stage. These challenges incorporated constraints about the room entry, window placement, and other aspects of the design.

Requirements in the Space: Elements that needed to be included in the space were specified for each stage. For instance, in Experiment- 1, elements like a washbasin, a toilet, a shower area, storage, a window/ventilation, and a door were to be incorporated.

Time: A time frame of 10 minutes was allotted for each experimental stage.

In addition to this information, detailed results and findings are provided in the table below.

Table 3.2. The Requirements of the Stages

	Experiment- 1	**Experiment- 2**	**Experiment- 3**
Space Type	Residential-Bathroom Design	Residential-Bedroom Design	Residential-Living Room Design
Scale	1/50	In 1/50 scale detail	1/1
m²	3.5x2 m=7m2	4x6=24 m2	6x5m=30 m2
Design Tool	Millimeter paper, eraser, pencil, ruler etc.	AutoCAD in the students' own computer w/their familiar settings.	One of the 3d Modelling Program in the students' own computer w/their familiar settings.
Design Behavior	Manually design on 2D plan drawing	Digitally design on 2D plan drawing	Digitally design on 3D modelling
Design Problem 1	The room is entered through one of the 3.5 m walls.	The room is entered through one of the 6 m walls.	The room is entered through one of the 5 m walls.
Design Problem 2	The entrance and the washbasin will face each other.	There must be a window opening in one of the 4m walls	There must be a window opening in one of the 5m walls.
Design Problem 3	---	The light will come from the left to the work area.	Window openings cannot come behind the general seating elements.
Design Problem 4	---	---	The general seating elements should be able to see the view through the window, the TV and the fireplace.
Needs in The Space	1 washbasin, 1 toilet, 1 shower area, 1 storage, 1 window/ventilation, 1 door, Floor covering	Double bed, 2 bedside tables, Headboard, Wardrobe, Work area (table, chair, bookcase), Floor covering	Seating elements for at least 5 people (armchairs, sofas, etc.), Window opening (you can determine the amount), Fireplace (view fire area), TV unit, Bookshelves and storage, Coffeemid tables
Task	Not have to finish.	Not have to finish.	Not have to finish.
Time	10 minutes	10 minutes	10 minutes

The experiment was conducted in an environment completely devoid of any ambient noise and free from external influences. If these three steps are applied in the same sequence, all participants may experience a carryover. To prevent the carryover effect, these three phases will be administered to approximately the same number of participants in a different sequence (Çavdaroğlu and Atan, 2022).

Table 3.3 illustrates the order in which participants performed these three steps during the experiment.

Table 3.3. Sequence of Steps Followed by Participants in the Experiment

1. Step	2. Step	3. Step	# of Participants
A	B	C	5 students (1-5)
A	C	B	5 students (6-10)
B	A	C	5 students (11-15)
B	C	A	6 students (16-21)
C	A	B	6 students (22-27)
C	B	A	7 students (28-34)

Throughout each stage, which lasted about ten minutes, the reactions of the thirty participants were recorded by EEG every second **(Figure 2A)**. The electrical activity in the brain was captured using the Muse 2 band (Krigolson et al 2017). These recordings were taken across four channels: TP9, AF7, AF8, and TP10. The EEG data that was gathered was saved in CSV format through the Mind Monitor application (Vekety et al 2022).

When processing EEG data, it's vital to cleanse it of noise and unwanted signals that degrade its quality. Various external sources and physical actions (like eye blinking) are often responsible for this noise. These disturbances were addressed using automated cleaning techniques provided by the Mind Monitor application. The EEG signals were segmented for different frequency bands. When considering various brain waves, these frequencies were categorized within specific ranges (Russell, 1980).

It's observable that the Muse2 device might not fit perfectly on everyone's forehead. This could lead to gaps in the data. These gaps were addressed using MATLAB's missing data filling techniques (Lindner et al 2011).

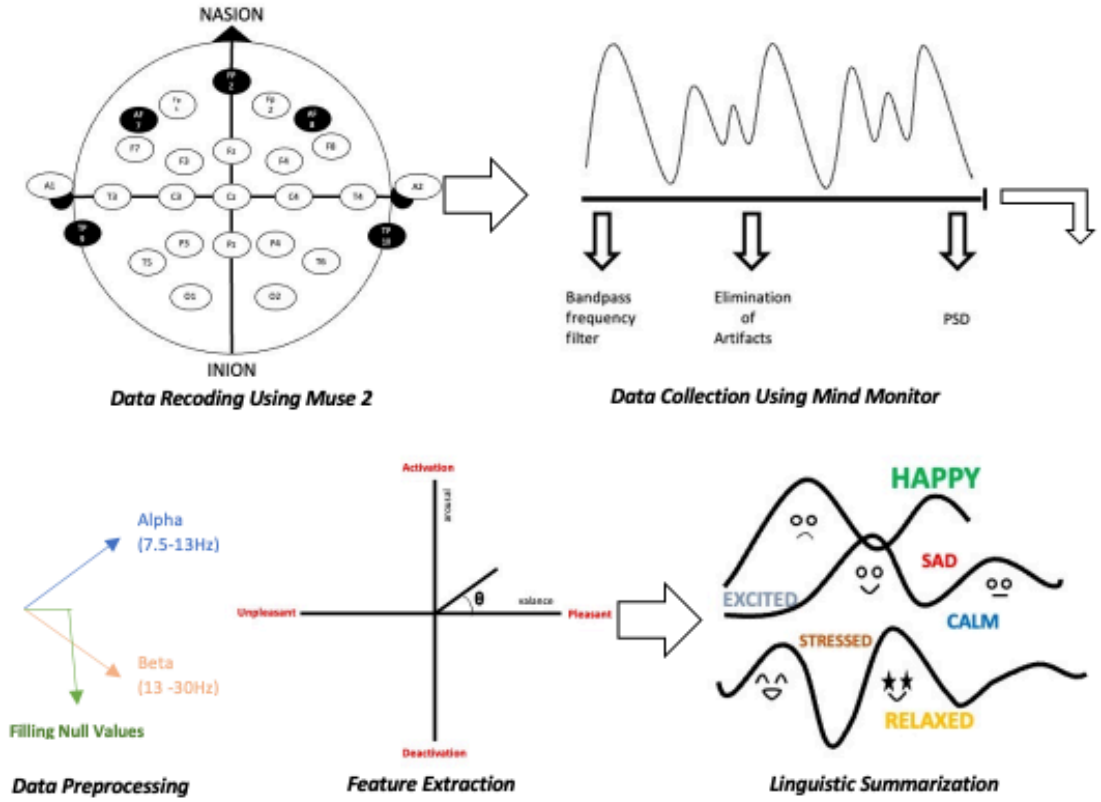


Figure 3.3. Steps of A) data recording, B) data collection and preprocessing, C) Feature extraction and D) linguistic summarization

3.4.2. Feature Extraction

The main goal of this research is to present a broad summary of the emotion's students feel during the design process. To make more accurate emotion identifications, data derived from the alpha and beta frequencies were utilized. (Aldayel et al 2020). Emotional responses were classified using Russell's model as a basis.

In EEG data analysis, a commonly used method is Principal Component Analysis (PCA) (Panigrahi and Mohanty 2022). In this analysis, the Fast Fourier Transform techniques were used to convert data from the time domain to the frequency domain. Consequently, the purified EEG data were divided into specific frequency bands.

In essence, this study seeks to deeply examine the emotional responses of students during the design process. Various design challenges were identified, and the data collected were analyzed to understand these emotional reactions and states. These analyses aim to provide a better understanding of the potential impacts of architectural education on the emotional states of students.

3.5. Concepts of Valence and Arousal

3.5.1 Valence

Valence refers to the evaluation of an experience as positive or negative. Essentially, it indicates whether an emotion or experience is pleasant. This characteristic in emotional experiences is usually evaluated on a spectrum: at one end are positive or pleasant emotions (happiness, satisfaction), and at the other end are negative or unpleasant emotions (sadness, anger) (Karbauskaitė et al 2020).

The valence aspect of emotional responses is critically important in determining overall satisfaction or dissatisfaction with a product or service. For example, the emotional valence formed in response to an advertising campaign can be used to understand the campaign's overall impact on consumers.

$$\text{Valence} = Front_{(\beta)}Front_{(a)} \tag{3.1}$$

3.5.2 Arousal

Arousal refers to the intensity or energy level of an emotional experience. It indicates how stimulating or invigorating an experience is. Arousal is typically evaluated on a spectrum from passive to active. For instance, low arousal states such as calmness or relaxation contrast with high arousal states like excitement, astonishment, or fear (Alonso Dos Santos and Calabuig Moreno, 2018).

The level of arousal is essential in determining how attention-grabbing or memorable a product, advertisement, or service is to consumers. For example, high arousal generated by an advertisement may indicate that the advertisement left a strong impression on the viewer (Bakardjieva and Kimmel, 2017).

$$Arousal = Fronta_{left(a)} - Frontal_{right\,(a)} \tag{3.2}$$

3.5.3. Multidimensional Structure of Emotions

The precision of emotion recognition techniques based on Electroencephalography (EEG) has been explored using various models and emotional states. There exist detailed explanations of both singular emotional responses and complex reactions stemming from a combination of several emotions (Dufour and Tzanetakis, 2018).Various multidimensional models have been designed to understand this intricate structure. Among these models, Russell's circumplex model is most frequently referenced. This model categorizes emotions based on their valence (positivity-negativity) and arousal (activity-passivity) axes within a two-dimensional space (Figure 3.4).

In my thesis research, I synthesized linguistic summaries of emotional responses obtained from EEG signals. In this context, there was a need to translate arousal and valence values into corresponding emotion labels. The ratios of these values were transformed into a specific angle in Russell's circumplex model, pinpointing the location of the emotional response. This transformation depicts where the emotional response, obtained from an individual's EEG signal, is positioned on the model. Furthermore, fuzzy sets were developed to determine to which emotional response the signals belong. These fuzzy sets are defined using an equation that calculates the angle of a specific position on the circular model. (García-Martínez et al 2019).

The foundation for creating these fuzzy sets is the Ruspini condition, which posits a continuous progression of emotions (Novák, et al 2016). Figure 3.4. illustrates the specific angles computed for each sector in this multidimensional model, the constructed fuzzy sets, and the labels designated for these sets (Gobron et al 2010).

$$\theta = arctan\frac{(Arousal)}{(Valence)} \tag{3.3}$$

In my thesis, I aim to delve deeper into this structure from a broader perspective, exploring the relationship between EEG signals and emotional responses. I intend to present my findings on this subject in great detail.

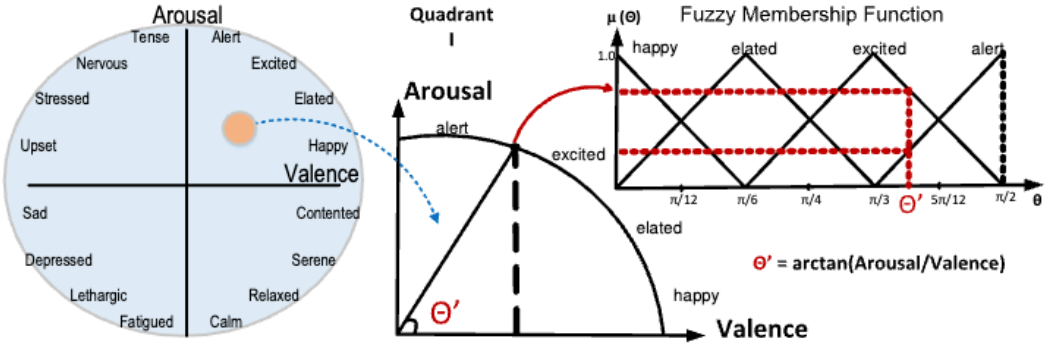


Figure 3.4. Conversion of emotions to fuzzy membership function in Russell's model

3.5.4. Fuzzy Linguistic Summarization

Fuzzy linguistic summarization, pioneered by Yager, is a method used in today's data-driven world to transform extensive numerical data into easily comprehensible natural language expressions. It involves the use of descriptors such as Y, V, and X_k sets to represent objects, attributes, and attribute domains, providing detailed information about the objects in a database (Yager, 1982). Within this approach, protoform structures, categorized as Type-1 and Type-2, play a significant role in formulating summarizing statements. Type-1 quantifier sentences, expressed as "Q Y S" [T1], provide a structured way to convey information, while Type-2 quantifier sentences include qualifiers to add more context. Summarization protoforms are aimed at understanding the impact of data, and multi-variate protoforms evaluate the emotions experienced by participants. This method revolutionizes the summarization of extensive datasets by converting complex data into straightforward language expressions, making it a valuable tool in data analysis and interpretation (Sanchez-Valdes et al 2016).

3.5.5. Emotion Detection with EEG and Russell's Circumplex Model

EEG signals, classified by frequency range, depict different states of the brain. Classes such as delta, theta, alpha, beta, and gamma rhythms have been formulated to display an individual's detailed emotional activities. Beyond these classifications, Russell's circumplex model, one of the most used methods, is utilized to measure and analyze consumers' reactions to a product, service, or advertisement.

Russell's model distributes all emotions according to valence (pleasantness) and arousal (intensity) levels. It can classify emotions more specifically based on the observed lobe of the brain. Especially in neuromarketing applications, this model carries great value for in-depth analysis of consumers' responses and the development of specific marketing strategies.

Valence and arousal values are calculated through EEG signals classified by frequency. Frontal EEG asymmetry is used as an indicator of arousal and emotional valence in these calculations. Specifically, while the arousal value is determined by the ratio of beta to alpha waves, valence is derived from the activation of frontal EEG asymmetry.

3.5.6. The Role of Emotion Detection in Optimizing Interior Architecture Training

Emotions have a significant impact on human behaviors, and the ability to recognize these emotions has practical applications in various fields, especially in education. The focus is on how educational methods and tools can be optimized based on data obtained from electroencephalography (EEG) signals. Determining the ideal design tools to be used in interior architecture education is one of the uncertainties in this field. Measuring the emotional experiences of students when drawing using hand or digital design tools is essential to address this uncertainty.

Brain-computer interface technology offers an opportunity to monitor these emotional experiences effectively and economically. Research on architecture students using EEG-based emotion recognition reveals basic emotional reactions and complex combinations of these reactions. Linguistic summarization is an effective tool to extract information from this extensive data set.

The aim of this research is to deeply examine the commitment and emotional states of interior architecture students when designing in 2D or 3D, either by hand or using digital tools. In this context, three separate experiments were conducted on students: The first is the drawings made by the students by hand; the second is the drawings they made using 3D programs; and the third involves drawings again using 3D programs but under a different scenario. These experiments also aim to investigate the differences brought by the design tools used and their impacts on educational methodologies.

At the end of this study, we will evaluate the role of EEG and emotion detection technologies in preparing educational programs and enhancing teaching processes. In particular, the focus will be on whether emotion detection technology can better understand student satisfaction and how educational programs can be revised based on this information.

3.6. EEG Study on Architecture Students at Antalya Bilim University and Akdeniz University

Two universities located in Antalya, Antalya Bilim University and Akdeniz University, conducted a comprehensive EEG experiment to measure the emotional states of architecture students. This experiment was carried out on a total of 34 architecture students.

Due to their intense training processes, projects, presentations, and design work, architecture students can often be under stress. Such an intense training process can have significant effects on students' emotional and cognitive states. The primary purpose of conducting the experiment on this particular group was to deeply examine the impact of challenges and successes in their academic lives on the emotional responses of the brain.

The data collected with EEG (Electroencephalography) captured signals from different regions of the brain and determined emotional states based on the frequency values of these signals. The two main values known as "arousal" and "valence" were the focal points of this experiment.

500 measurements were taken for each student. These measurements were repeated three times in total, aiming to ensure the accuracy and consistency of the data.

Another important goal of the experiment was to compare the emotional states of architecture students between Akdeniz University, a state university, and Antalya Bilim University, a private university.

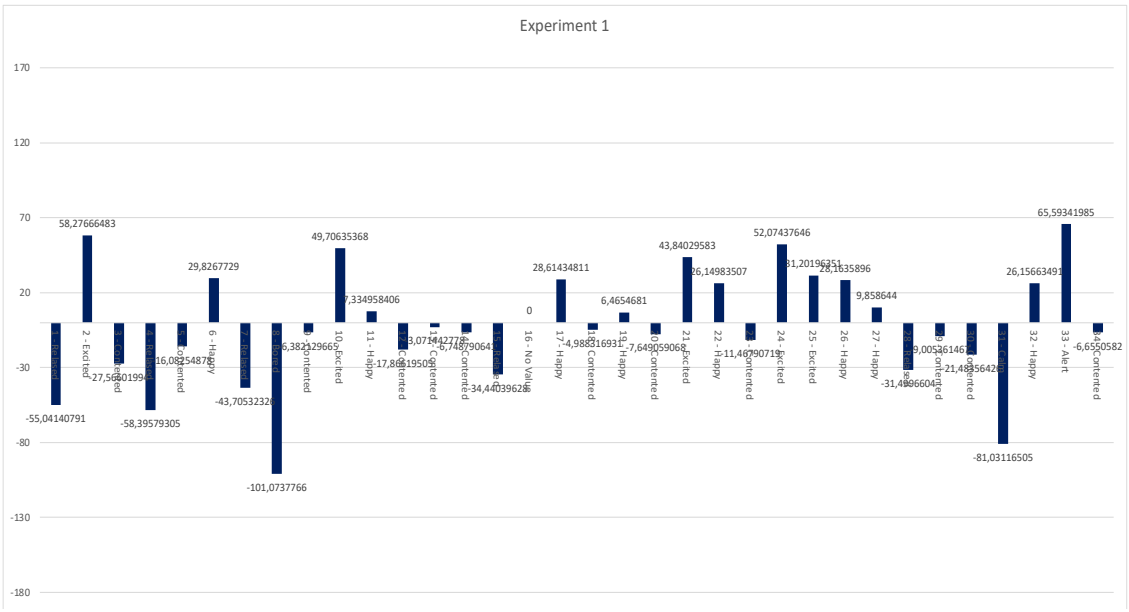
In conclusion, this EEG experiment is extremely valuable in shedding light on the emotional states of architecture students, understanding potential stress sources and moments of success during the educational process. The obtained data can provide more in-depth insights into the relationship between education and emotional well-being and can assist in improving architectural education methods.

4.FINDINGS

This study presents the results of an extensive EEG experiment conducted on 34 architecture students at Antalya Bilim University and Akdeniz University. The experiment, focusing on students' emotional states and their reactions based on specific brain frequencies, aimed to investigate in-depth the impact of the intensity and challenges of architectural education on student psychology. Below are the main findings detailed throughout the experimental process.

4.1 Average Emotional Responses of 34 Students in Hand Drawing

Below is a detailed comparison of a three-stage experiment in which 34 architecture students from Akdeniz University and Antalya Bilim University participated. This comparison primarily focuses on the 1st experiment. In this phase, the emotional changes experienced by students while drawing by hand using a drawing program are highlighted. Emotional data collected for each student during this experiment is compiled in this table for a holistic analysis. An in-depth evaluation has been conducted to understand the direction of the emotional reaction's students had while hand-drawing and to establish a general profile of these responses.



Graph 4-1. Average Emotional Responses of 34 Students in Hand Drawing

4.1.1. General Emotional Distribution:

A significant portion of students (approximately 41%) experienced the "Contented" emotional state. This suggests that students generally had a satisfying experience. The emotions "Relased" and "Excited" were also observed in 7 and 6 students respectively, indicating that most students felt relaxed and excited, reflecting generally positive emotional responses.

4.1.2. Distribution by University:

Looking at students from Akdeniz University, the majority predominantly felt "Contented" (47%) and "Relased" (27%). On the other hand, at Antalya Bilim University, the "Contented" emotion was the highest at 37%, but "Happy" and "Excited" also held significant places at 21% and 16% respectively. This may suggest that students at Antalya Bilim University had a more energetic and exciting experience.

4.1.3. Distribution by Gender:

For female students, the most common emotional states were "Contented" (44%) and "Happy" (22%). Male students, on the other hand, primarily felt "Contented" at 37%, but "Excited" and "Relased" also made significant appearances at 19% and 18%, respectively.

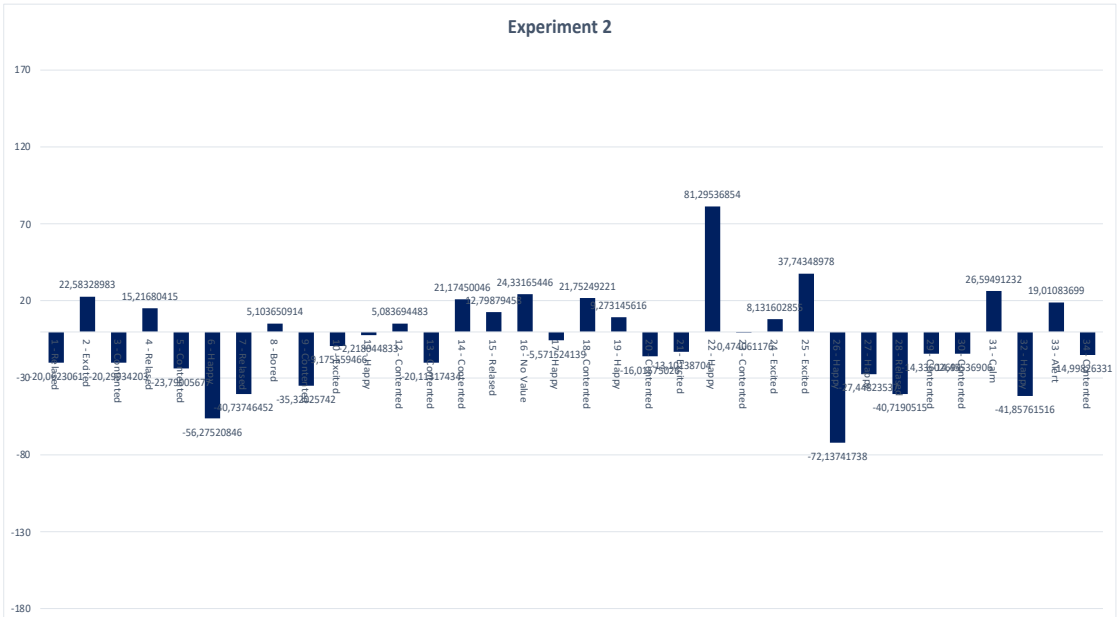
4.1.4. University and Gender Combination:

A large portion of female students at Akdeniz University experienced the "Contented" emotion, a sentiment echoed by both male and female students at Antalya Bilim University. Male students at Akdeniz University felt "Relased" more, while their counterparts at Antalya Bilim University felt more "Excited."

This analysis demonstrates the influence of gender and university type on students' emotional states. Students at Akdeniz University generally had a more relaxed and fulfilling experience, while those at Antalya Bilim University experienced a more energetic and exciting journey. Based on gender, female students generally had a satisfying experience, whereas male students felt both energetic and relaxed. These results indicate that both universities offer different experiences to their students.

4.2. Average Emotional Responses of 34 Students in 2D Drawing

Below is a detailed comparison of a three-stage experiment in which 34 architecture students from Akdeniz University and Antalya Bilim University participated. This comparison primarily focuses on the 2nd experiment. In this phase, the emotional changes experienced by students while drawing using a 2D program are highlighted. Emotional data collected for each student during this experiment is compiled in this table for a holistic analysis. An in-depth evaluation has been conducted to understand the direction of the emotional reaction’s students had while drawing with the 2D program and to establish a general profile of these responses



Graph 4-2. Average Emotional Responses of 34 Students in 2D Drawing

4.2.1. General Emotional Distribution:

About 44% of the students experienced the "Contented" emotional state, indicating a generally satisfactory experience. The emotion "Happy" was also observed in 13 students, representing a prevalent sentiment. Other notable emotions included "Relased" observed in 7 students and "Excited" in just one student.

4.2.2. Emotions Distribution by University:

For students from Akdeniz University, the prevailing emotions were "Contented" (43%) and "Happy" (36%). In Antalya Bilim University, the "Contented" emotion stood at 38%, with "Happy" following closely at 29%.

4.2.3. Distribution by Gender:

Looking at female students, the most prevalent emotions were "Contented" (41%) and "Happy" (32%). For male students, "Contented" dominated at 47%, followed by "Happy" at 29%.

4.2.4.University and Gender Combination:

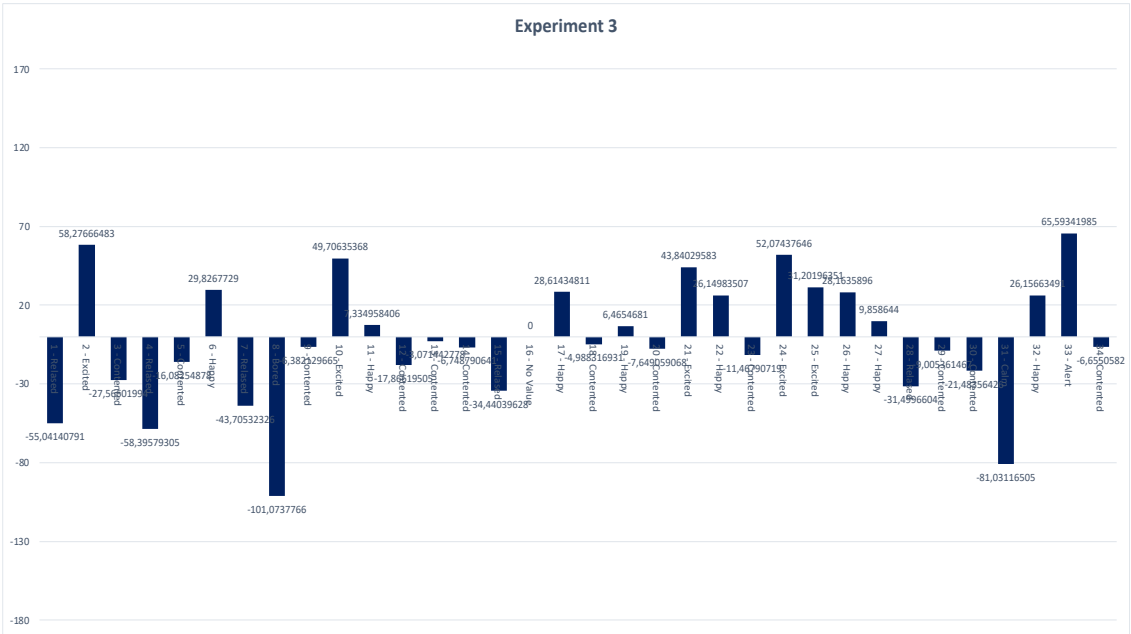
Female students at Akdeniz University primarily felt "Contented" and "Happy". This observation was consistent for females at Antalya Bilim University. The results were analogous for male students across both universities.

This analysis highlights the influence of gender and the type of university on students' emotional states. Both universities seem to offer a generally satisfactory and

joyful experience to their students. Gender-wise, both female and male students demonstrated similar emotional reactions.

4.3. Average Emotional Responses of 34 Students in 3D Drawing

Below is a detailed comparison of a three-stage experiment in which 34 architecture students from Akdeniz University and Antalya Bilim University participated. This comparison primarily focuses on the 3rd experiment. In this phase, the emotional changes experienced by students while drawing using a 3D program are emphasized. Emotional data collected for each student during this experiment is compiled in this table for a holistic analysis. An in-depth evaluation has been conducted to understand the direction of the emotional reaction's students had while drawing with the 3D program and to establish a general profile of these responses.



Graph 4-3. Average Emotional Responses of 34 Students in 3D Drawing

4.3.1. Overall Emotional Distribution:

47% of the students experienced the "Contented" mood, indicating that for many, the process of drawing was satisfactory. The emotion "Happy" is also prevalent, observed in 12 students. Emotions such as "Released", "Excited", and "Alert" were experienced by fewer students, seen in 4, 3, and 1 student respectively.

4.3.2. Emotion Distribution by University:

Most students from Akdeniz University felt "Contented" (54%) and "Happy" (29%). At Antalya Bilim University, the "Contented" mood was the highest at 38%. However, emotions like "Happy" (26%), "Excited" (15%), and "Relased" (12%) were also notably observed.

4.3.3. Emotion Distribution by Gender:

Most female students felt "Contented" (45%) and "Happy" (28%). For male students, the "Contented" emotion was dominant at 40%, followed closely by "Happy" at 30%.

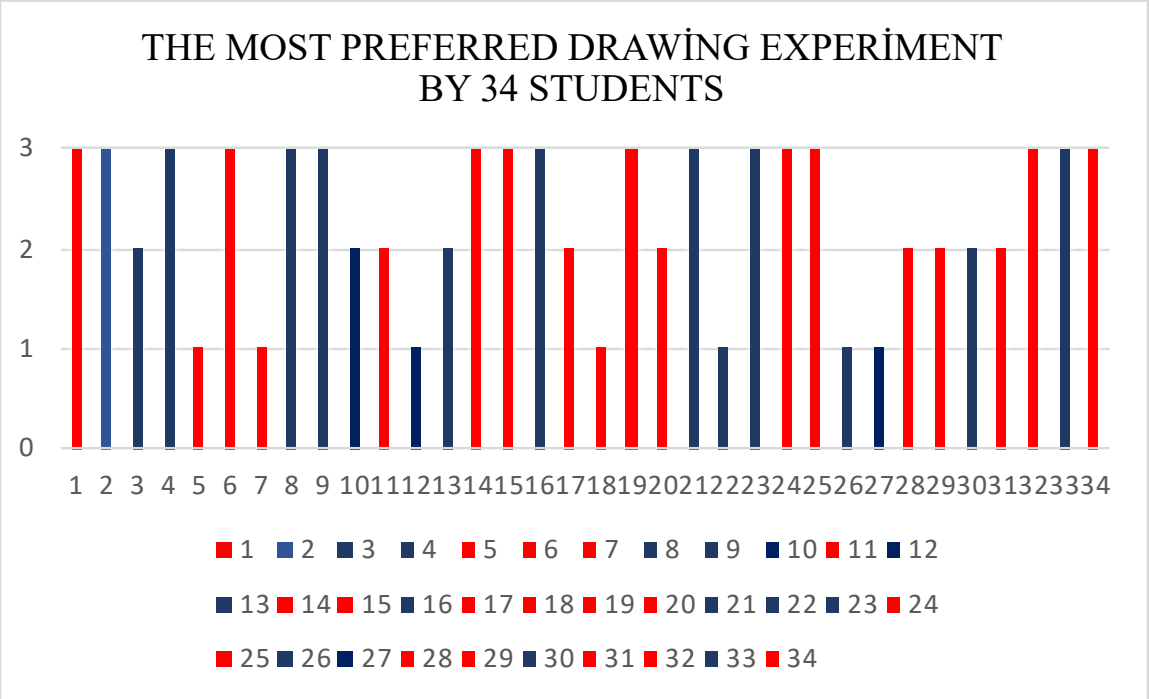
4.3.4. Combination of University and Gender:

Female students from Akdeniz University predominantly felt "Contented" and "Happy". The situation was similar for male students.
At Antalya Bilim University, while women mostly felt "Contented" and "Happy", men experienced emotions like "Contented", "Happy", and "Excited".

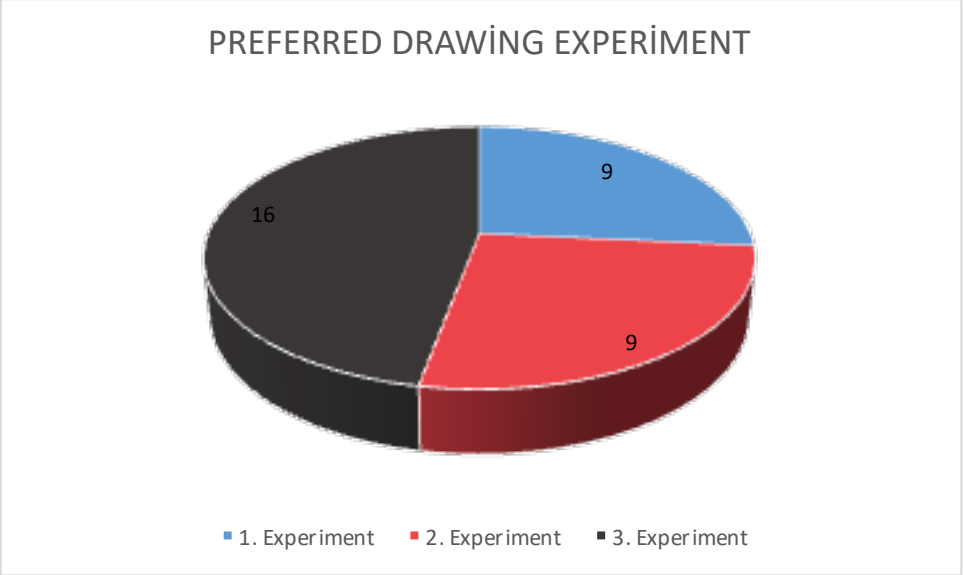
The results of the 3rd experiment reveal that the emotional states of the students vary not just based on the drawing tool (3D program) used, but also according to gender and type of university. While most students at Akdeniz University had a satisfying experience, those at Antalya Bilim University encountered a more energetic and excited one. When analyzed based on gender, both genders seemed to have similar emotional responses.

5. RESULT

In this experiment, which involved a total of 34 students, participants were from two different universities. 15 students participated from Akdeniz University, while 19 students from Antalya Bilim University took part in the experiment. In terms of gender distribution, the experiment appears to be quite balanced: both male and female groups consisted of 17 students each. When examining the students' levels of happiness during the experiments, the third experiment involving the 3D program was the most popular among students. Precisely 16 students indicated that they were happiest during this experiment. The other two experiments were preferred by 9 students each. Based on this information, we can infer that the drawing experiment using the 3D program had a more positive impact on the students.



Graph 5-1. The Most Preferred Drawing Experiment by 34 Students



Graph 5-2. Preferred Drawing Experiment

Linguistic summaries are presented that show the effects of the whole and stages of the experiments onparticipants individually and based on age and gender. All possible sentences are analyzed and thissection contained only the highest truth degree sentences**.**

Summaries	TD
Most time of Experiment-1, people are excited.	1
In general, Experiment-3 has a more positive impact on state university students than Experiment-1	1
In general, Experiment-3 has a more positive impact on state university students than Experiment-2	1
In general, Experiment-3 has a more positive impact on foundation university students than Experiment-1	1
In general, Experiment-3 has a more positive impact on foundation university students than Experiment-2	1
Foundation university students experience a more positive impact from Experiment-2 compared tostate university students.	1

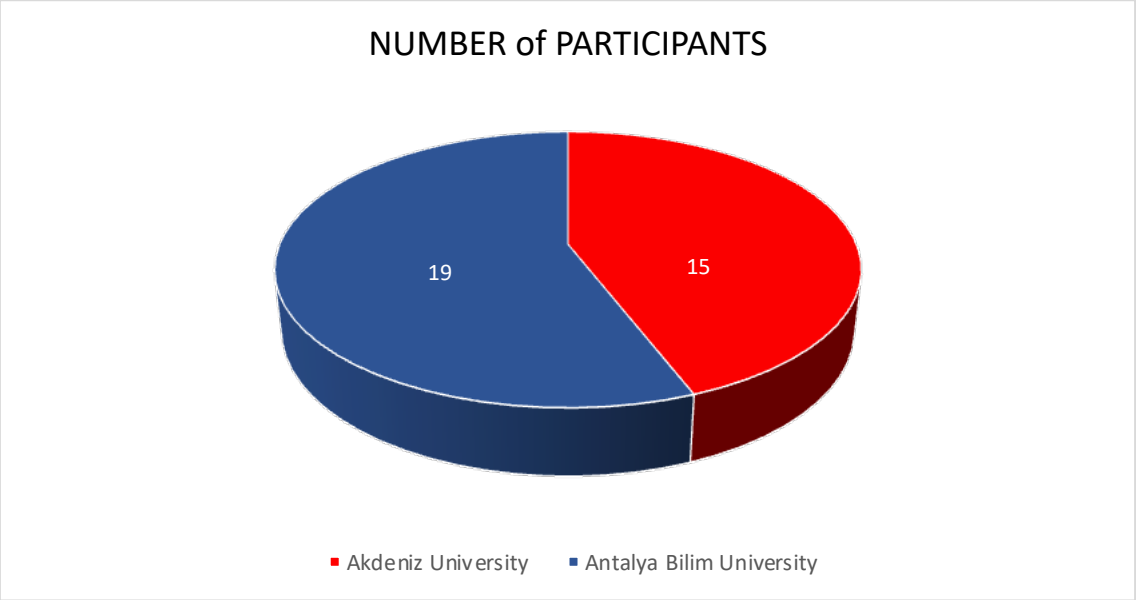
Table 5.1. Linguistic Summaries of Multivariate Data

The research has revealed that students, regardless of their diverse backgrounds, exhibit similar emotional responses to the same design methods and tools. However, the intensity of these emotional responses can vary depending on which stage of the design they are in and which tool is being used.

5.1. Distribution by Universities

In this experiment, which involved a total of 34 students, participants were from two different universities. 15 students participated from Akdeniz University, while 19 students from Antalya Bilim University took part in the experiment. In terms of gender distribution, the experiment appears to be quite balanced: both male and female groups

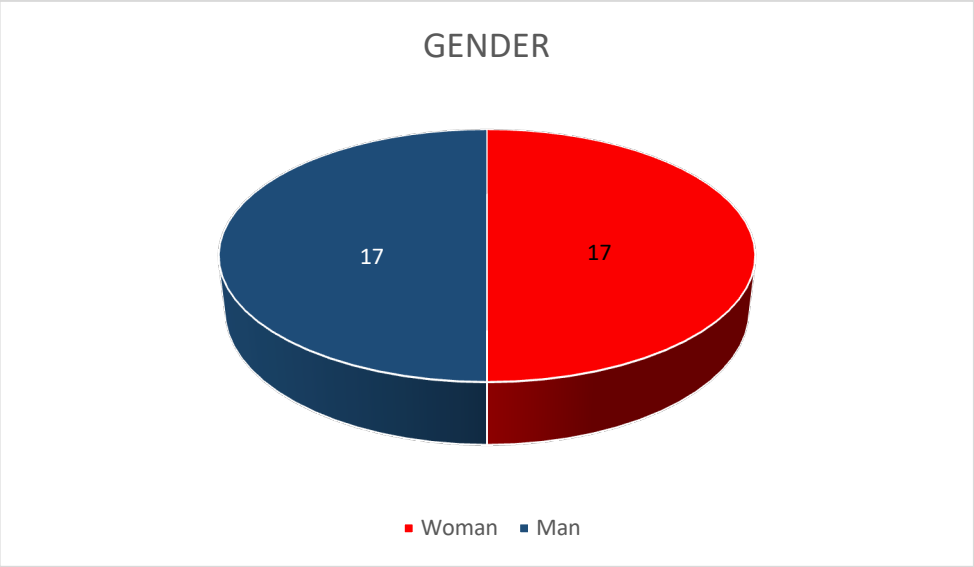
consisted of 17 students each. When examining the students' levels of happiness during the experiments, the third experiment involving the 3D program was the most popular among students. Precisely 16 students indicated that they were happiest during this experiment. The other two experiments were preferred by 9 students each. Based on this information, we can infer that the drawing experiment using the 3D program had a more positive impact on the students.



Graph 5-3. Number of Participants

5.2. Experiment Results by University and Gender

Male students from Akdeniz University reported feeling the happiest during the 3rd experiment. However, for the female students from this university, the situation is a bit more complex; they displayed an equal distribution between the 3rd and 1st experiments, indicating they felt similarly happy during both experiments. On the other hand, male students from Antalya Bilim University also felt happiest during the 3rd experiment. Yet, the female students from this university reported equal levels of happiness between the 2nd and 3rd experiments. This suggests that both experiments appealed similarly to the female students from Antalya Bilim University.



Graph 5-4. Number of Genders

5.3. General Commentary

This study reveals how students from Akdeniz University and Antalya Bilim University react to different drawing methods. Upon examining the data, it's evident that most of the students felt happiest during the 3rd experiment, which involved drawing using a 3D program. This suggests that technological tools and new software may have a motivational effect on students.

Among the male students, the 3D drawing experiment seems to be particularly popular. This might indicate that male students might am inclined towards technological tools or enjoy using 3D modeling more.

On the other hand, female students' reactions are more varied. They've shown different emotional responses both while drawing with the 3D program and while using other methods. This makes it challenging to generalize about female students' experiences and preferences. Perhaps their interest in different drawing methods is more tied to individual skills and areas of interest.

The student profile and educational quality of both universities could influence the results. In this experiment, 15 students participated from Akdeniz University, and most of these students preferred the 3rd experiment, drawing with the 3D program. This could suggest that students from a public university might be more open to technological innovations or find 3D modeling more appealing. On the other hand, as a private institution, Antalya Bilim University might have a different student profile and approach to experience. However, a significant number of students from this university also responded positively to the 3D drawing method.

Based on the experimental results, it can be said that the 3D program has generally had a positive impact on students from both universities. Considering the scope and participants of this experiment, it's important to note that these results are specifically relevant to the student profile of these two universities.

5.4. Investigation Of The Relationship Between Technical Drawing Methods And Student Emotions

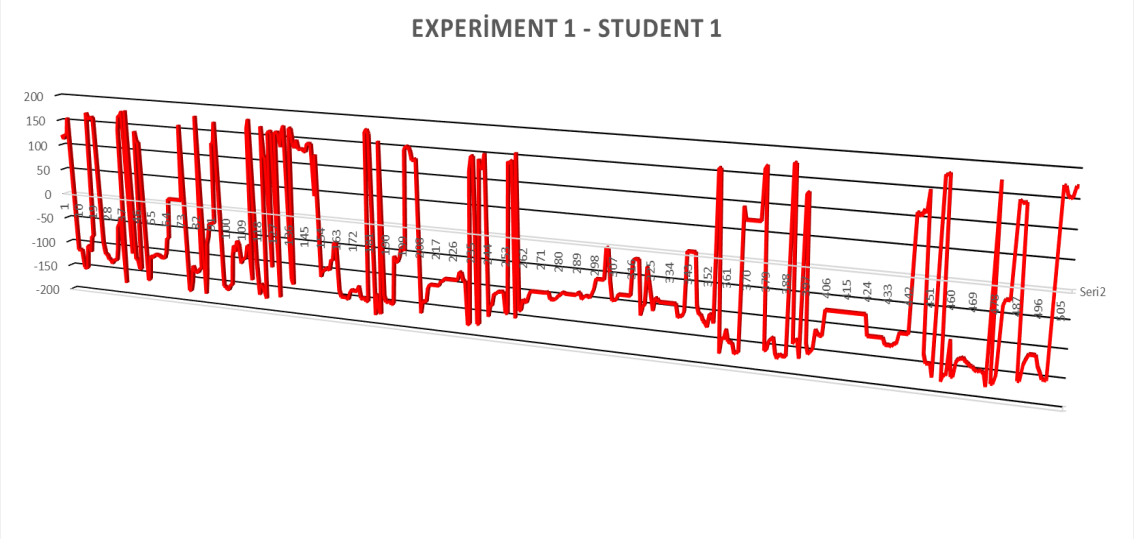
This section includes six different experiments that form the main part of the research. These experiments were carried out to examine the effect of technical drawing methods on the emotional states of students. The experiments were carried out at two different universities: the experiments carried out at Antalya Bilim University, a private university, and the experiments carried out at Akdeniz University, a state university.

Below, the results of the six experiments are provided. These six experiments include three conducted at Akdeniz University and three conducted at Antalya Bilim University. The results of the remaining 28 experiments are presented in APPENDIX-1.

5.4.1. Student 1

5.4.1.1. Experiment 1

In this section, the emotional changes of a female student studying at Akdeniz University during the first experiment have been examined. A total of 510 emotional data points were recorded during the experiment. This experiment was conducted while the student was drawing by hand.



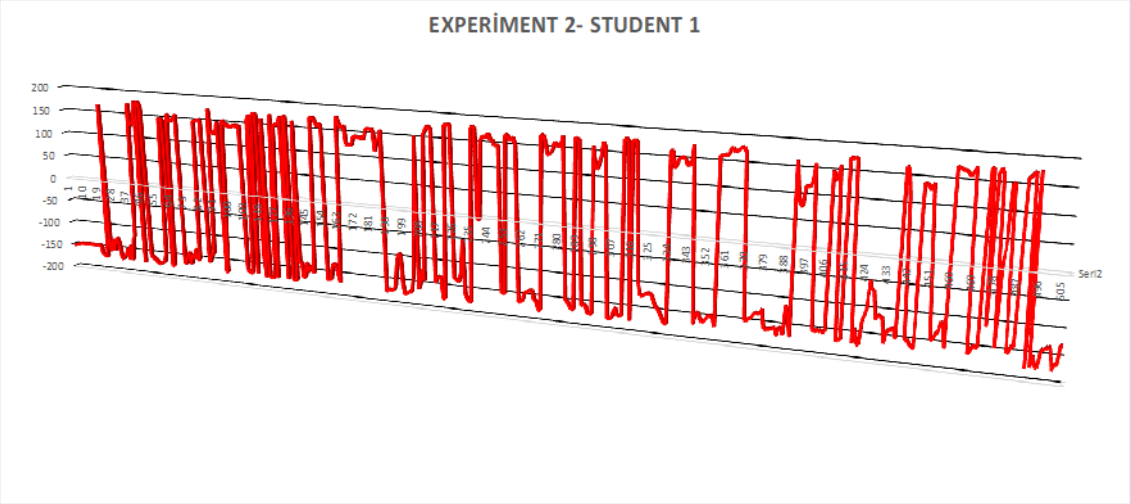
Graph 5-5. Experiment 1 - Student 1

Based on the provided data, we can interpret the student's emotional changes in a general overview as follows:From the data, it's evident that the student most commonly experienced the emotion of "Bored", possibly linked with the monotony of classes or daily routines. Other emotions like "Upset" and "Stressed" have also been observed

frequently. This suggests that there might have been instances when the student faced pressures or challenges. There are also mentions of emotions such as "Sad", "Depressed", and "Nervous", indicating that these were felt at specific times.On the brighter side, the student did experience positive emotions like "Happy", "Contented", and "Relaxed", though these were less frequent. This doesn't necessarily imply a predominantly unhappy state, but rather that during this data collection phase, the student recorded fewer positive emotions.Assessing the data over time reveals fluctuating emotional states for the student. It's noteworthy to see transitions from feeling "Bored" to states like "Upset" or "Stressed", hinting at a possible sensitivity or responsiveness to certain events or situations. Moreover, analyzing the provided degree values suggests a pattern in emotional experiences. Generally, negative emotions hover between -90 and -180 degrees, whereas positive ones fall between 0 and 90 degrees.Some additional context is that the student is a female attending Akdeniz University. While this information might not have a direct correlation with the recorded emotions, external factors like university pressures, academic expectations, or social interactions could play a role in shaping these emotional experiences.To wrap up, the findings show that the student, though feeling bored and stressed at times, did experience moments of positivity. Such emotional ebbs and flows are typical among university students, potentially influenced by personal events, academic pressures, social interactions, and other myriad factors.

5.4.1.2. Experiment 2

In this section, the emotional changes of a female student studying at Akdeniz University during her second experiment have been examined. During this experiment, a total of 510 emotional data points were recorded while the student was drawing using a 2D program.



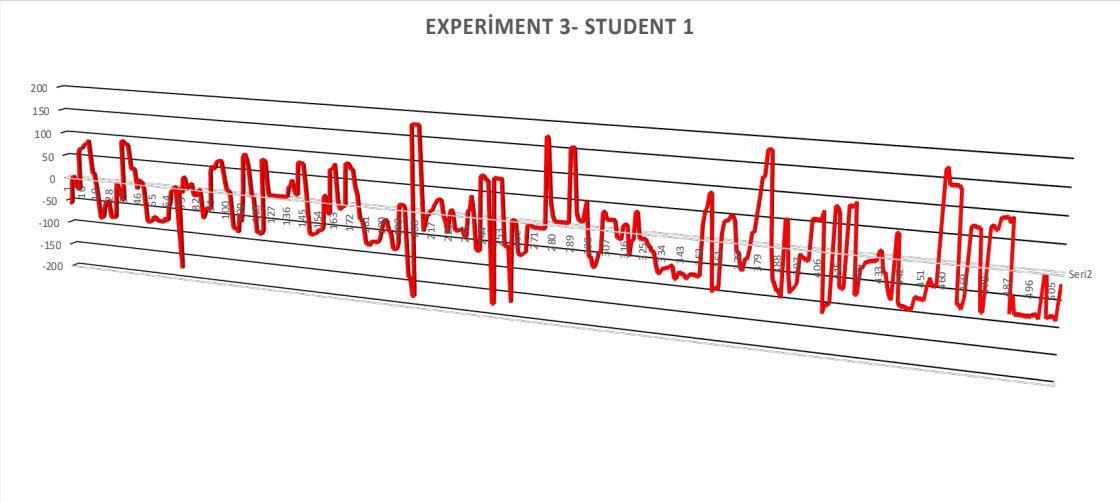
Graph 5-6. Experiment 2 - Student 1

This dataset contains the results generated by the student using a 2D program. These results specify degrees and moods.General data analysis reveals that the emotions "Depressed" and "Sad" are pronounced in their intensity. Notably, the "Depressed"

emotion, characterized by "-148.5298643" degrees, recurs frequently. The moods "Upset" and "stressed" also feature prominently in the data. Especially when looking at positive degrees, there is a recurring presence of the "Upset" mood. While emotions such as "Bored", "nervous", "alert", and "happy" can be found in the dataset, their occurrence is notably rarer. Moreover, even though the dataset does feature moods like "Relaxed" and "Calm", they appear less frequently when compared to other emotions.Considering the degrees, negative ones often align with negative emotions, such as sad and depressed. In contrast, positive degrees correlate predominantly with moods like "Upset", "stressed", and on occasion, "nervous". This trend likely reflects the scale or association made by the student within the 2D program. Observations show that extreme positive values, such as those over 170, often correspond with the "Upset" mood. Meanwhile, high negative values are frequently linked to feelings of being "Sad" or "Depressed". Another interesting observation is the recurrence of specific degree values. These repetitive values are often linked with consistent emotions, suggesting the student consistently associated emotional states with certain degrees. Conclusively, the insights derived from the 2D program indicate a consistent pattern where specific degrees correlate with particular moods. This consistency provides a glimpse into how the student, or perhaps the program, associates distinct emotional states with certain degree values.

5.4.1.3. Experiment 3

In this section, the emotional changes of a female student studying at Akdeniz University during her third experiment have been examined. During this experiment, a total of 510 emotional data points were recorded while the student was drawing using a 3D program.



Graph 5-7. Experiment 3 - Student 1

Based on the data, it's observed that the student frequently experienced the emotion of "Calm". This suggests that the student typically maintains a relaxed and controlled disposition. The emotion "Alert" also stands out, implying that the student often remains attentive or is sensitive to specific events or scenarios. Alongside these, states like "Relaxed" and "Contented" have been felt occasionally, indicating that the

student might have a balanced emotional structure.The student also felt positive emotions at specific times. The feeling of "Happy" demonstrates that there are moments when the student experiences positive moods. The emotion "Excited", on the other hand, could suggest that she reacts positively to new and intriguing situations or events.It's also evident that the student's emotional state is not static but fluctuates. Rapid transitions from being "Calm" to feelings of "Alert" or "Nervous" have been highlighted in the data. This variation in emotions might point towards her being highly energetic or attentive during particular instances.Another observation is the relationship between angles and emotions. Higher negative degree values often coincide with feelings of calmness and relaxation. Conversely, higher positive values are more in line with energetic and aroused emotional states.On an additional note, the student's engagement with the 3D program could be a testament to her creative abilities or inclinations. Conclusively, this student appears to have a calm and balanced emotional foundation but can exhibit heightened energy or attention levels when triggered by certain circumstances. These emotional dynamics might be rooted in her general life conditions, personal experiences, or specific activities she engages in.

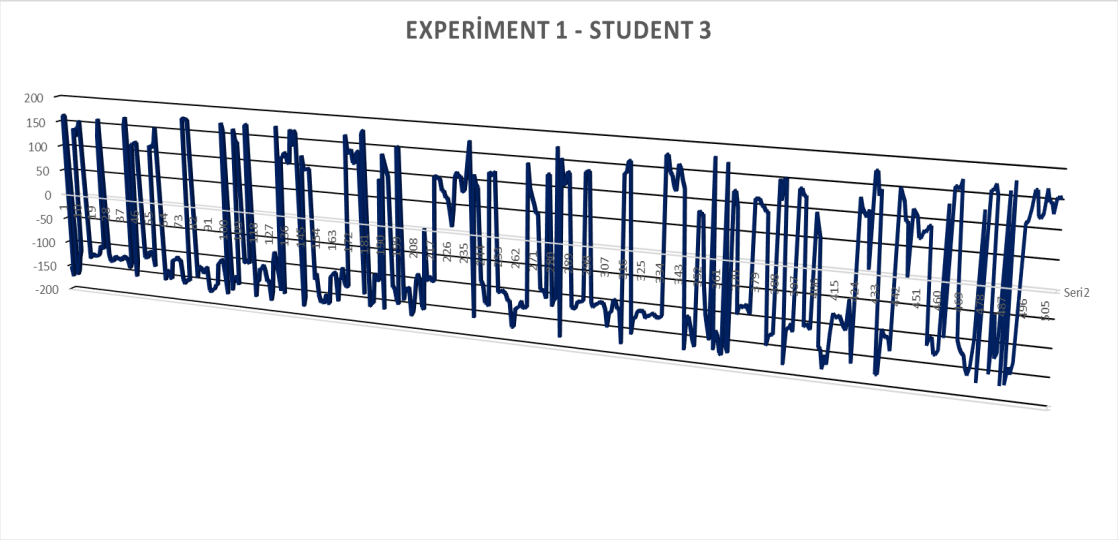
5.4.1.4. Experiment Analysis

In the hand drawing experiment, the student primarily felt "Calm" and "Relaxed", with the physical act possibly promoting relaxation. However, with 2D drawing tools, the emotions leaned more towards "Alert" and at times "Nervous", highlighting the technicality of the task. Despite the inherent complexity of 3D drawing, the student frequently experienced "Happy" and "Excited" emotions, hinting at a possible affinity or enhanced creative expression with 3D tools. Overall, among the three methods, the student appeared most content and expressive when engaged with 3D drawing.

5.4.2. Student 3

5.4.2.1. Experiment 1

In this section, the emotional changes of a male student studying at Akdeniz University during the first experiment have been examined. A total of 510 emotional data points were recorded during the experiment. This experiment was conducted while the student was drawing by hand.

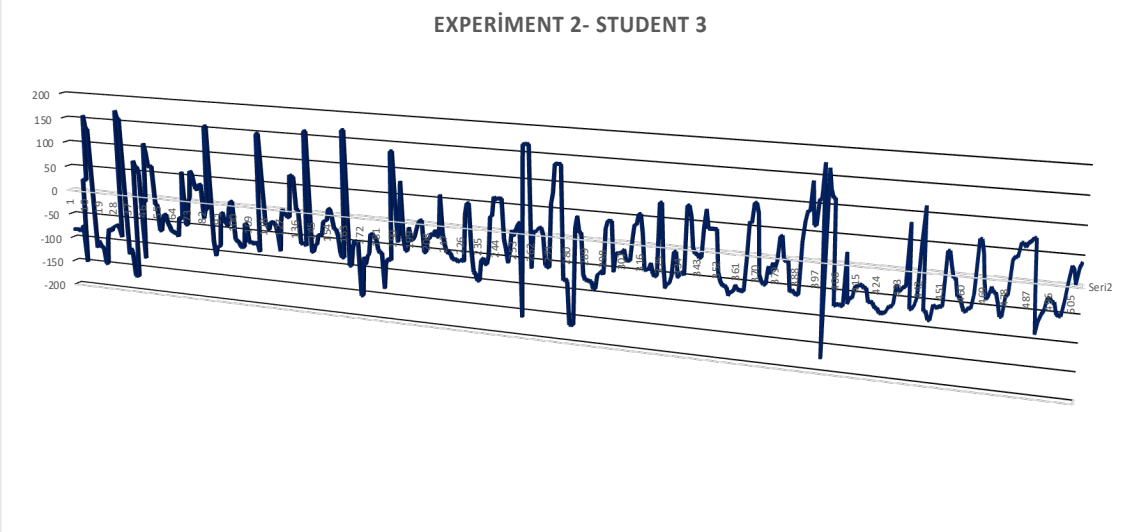


Graph 5-8. Experiment 1 - Student 3

During the manual drawing experiment conducted by the student, the emotional responses displayed were quite varied. This male student's dominant emotions are predominantly negative, frequently manifesting as "Depressed", "Sad", and "Bored". On the positive side, emotions like "happy" and "excited" appeared only a few times, with feelings of being "alert" and "relaxed" also becoming evident. The changes in emotion indicate that the student experienced a constantly shifting emotional journey throughout the experiment. There seems to be a specific pattern between angles and emotions: negative emotions typically concentrate between -90 to -180 degrees, while positive ones are more common between 0 to 90 degrees. This suggests that the emotional changes experienced by the student might cluster at specific angles. Although studying at Akdeniz University doesn't seem to directly influence the emotional shifts, potential stresses and social interactions from university life could impact the student's emotional experiences. In summary, this student predominantly experienced negative emotions while manually drawing, yet occasionally displayed positive emotional responses. The angle values suggest his emotional experience might follow a specific pattern.

5.4.2.2. Experiment 2

In this section, the emotional changes of a male student studying at Akdeniz University during his second experiment have been examined. During this experiment, a total of 510 emotional data points were recorded while the student was drawing using a 2D program.

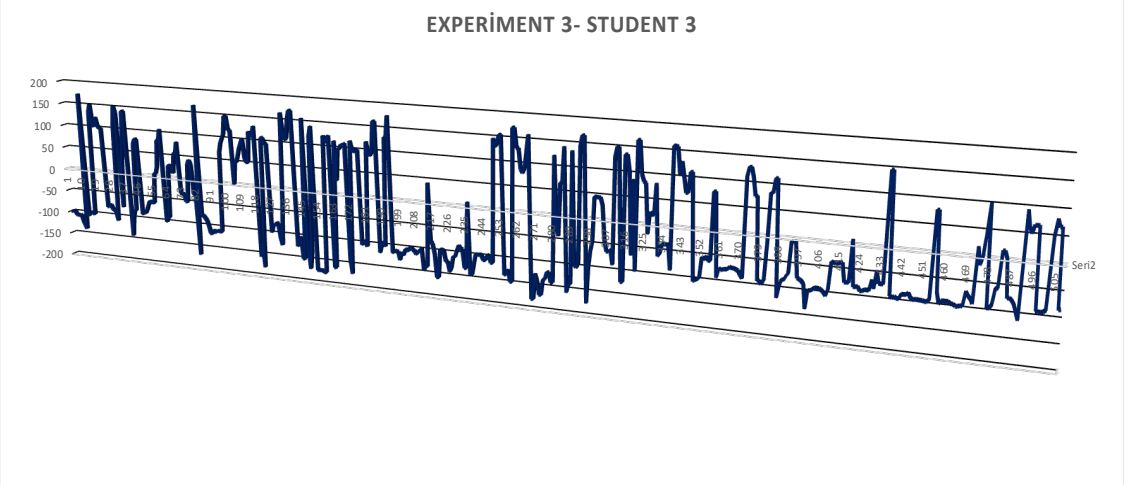


Graph 5-9. Experiment 2 - Student 3

When examining the emotional state of this male student studying at Akdeniz University during the experiment, it's evident that the dominant emotions that emerge are "Calm" and "Relased". The student generally has negative angle values associated with these two emotions, indicating he's predominantly in a calm and relaxed state. Among the positive emotions, "Happy", "Excited", and "Alert" stand out. Furthermore, throughout the experiment, there are moments where the student is associated with negative emotions such as "Upset" and "Sad". A correlation can be inferred between the student's angle values and his emotions; positive angle values typically correlate with positive emotions, whereas negative angle values are related to more neutral or negative emotions like calmness or relaxation. In conclusion, while the student experienced emotional fluctuations during 2D drawing with the program, he generally presents a calm and relaxed profile. This suggests that he is usually relaxed and focused while drawing, albeit occasionally experiencing moments of stress or mild tension. However, these stress moments are not persistent and are usually short-lived. The student's variable emotional responses could be attributed to the challenges he faces while drawing, perhaps due to the complexity of the program or expectations at a particular stage of drawing. However, broadly speaking, it can be said that the student perceives the drawing process as a positive experience and predominantly works in a relaxed and focused manner.

5.4.2.3. Experiment 3

In this section, the emotional changes of a male student studying at Akdeniz University during his third experiment have been examined. During this experiment, a total of 510 emotional data points were recorded while the student was drawing using a 3D program.



Graph 5-10. Experiment 3 - Student 3

Upon examining the emotional changes of the third student during the experiment using the 3D program, it is evident that negative emotions predominantly emerge. The emotion "Bored" is frequently experienced, which might suggest that the student often felt disinterested and lost focus during the experiment. Additionally, deeper negative emotions like "Depressed" and "Sad" are prominently observed. When considering positive emotions, although "Happy" and "Excited" were experienced during the experiment, they appeared less frequently compared to the negative emotions. In terms of emotional fluctuations, one can observe that the student's emotional state changed frequently, with oscillations between positive and negative emotions at specific intervals. Without clear data in the database regarding the relationship between angles and emotions, it's challenging to make a definitive comment. However, the student's reactions during the experiment could be influenced by factors such as the complexity of the program, its user-friendliness, or the student's familiarity with such programs. Additionally, the fact that the student studies at Akdeniz University and is male might have had a particular influence on the emotional reactions during the experiment. However, to determine the direction of this influence, a more comprehensive analysis is required.

5.4.2.4. Experiment Analysis

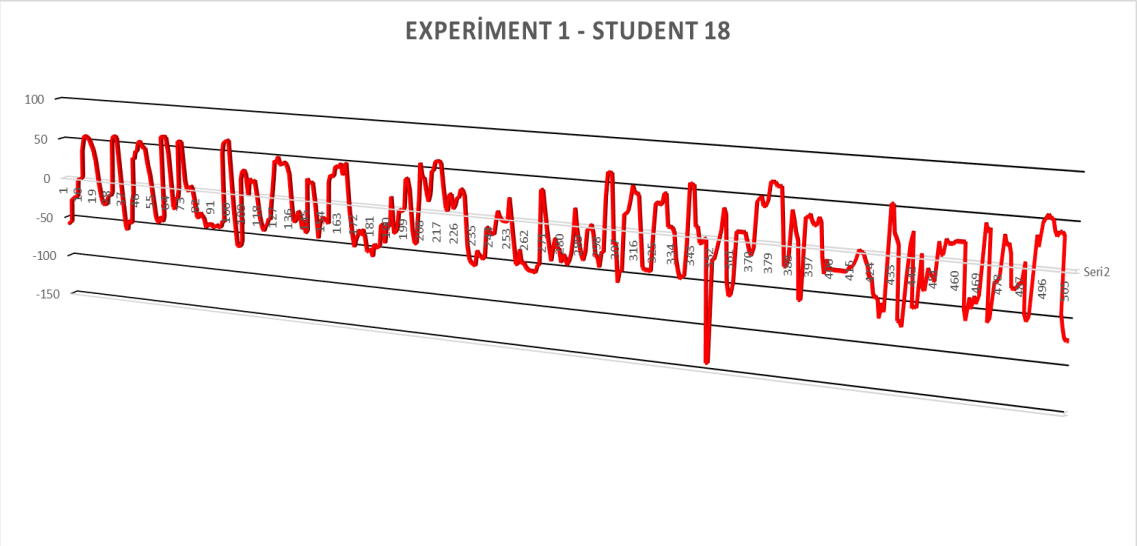
During the hand-drawn design experiment, the student predominantly exhibited a calm and relaxed profile, while occasionally showing positive emotional reactions. This suggests that the student might find hand-drawing more natural and soothing. In the 2D program-based drawing, the student generally worked in a relaxed and focused manner, sporadically experiencing stress or mild tension. This could hint at the student encountering some technical challenges while using the 2D program or perhaps experiencing mild stress while adapting to certain features of the program. However, in the 3D program-based drawing, the dominant emotion of the student was negative. They frequently felt bored, with feelings of depression and sadness prevailing. This could result from the complexity of the 3D program, the student's familiarity with such programs, or the program not being user-friendly.

Upon comparison, we can deduce that the student showed the most relaxed and positive emotional reactions while hand-drawing. They faced some challenges with the 2D program but overall had a positive experience, whereas they struggled the most and displayed the most negative reactions with the 3D program. This indicates that the student finds hand-drawing the most natural and soothing, but while drawing with technological tools, the emotional reactions vary based on experience level, user-friendliness of the program, and the complexity of the program.

5.4.3. Student 18

5.4.3.1. Experiment 1

In this section, we have examined the emotional fluctuations experienced by a female student from Antalya Bilim University during her first experiment, which involved manual drawing. Over the course of the study, we collected a total of 510 emotional data points, allowing for a comprehensive analysis of her emotional changes during the process.



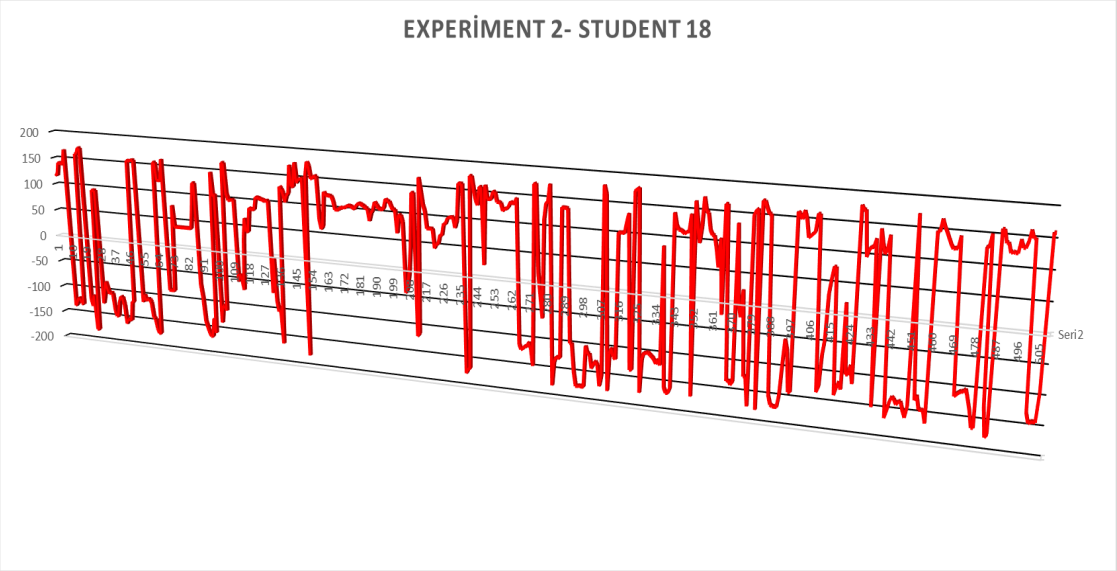
Graph 5-11 Experiment 1- Student 18

Based on the evaluation of the student's emotional changes during the first experiment, we can observe that the student's dominant emotional response was "Contented". Additionally, the student frequently experienced emotional reactions of "excited" and "happy". However, among the negative emotional responses, "Relased" and "Calm" were observed, with occasional very low values of "Depressed" reactions. It might be challenging to establish a general relationship between angle values and emotional responses, but generally, negative angle values can be associated with more tranquil emotional reactions like "contented", "relaxed", or "calm", while positive angle values might be linked to more energetic emotional reactions like "excited" or "happy". Furthermore, whether the student being female and studying at Antalya Bilim University has a direct impact on these emotional responses remains unclear, but these demographic details can assist in better understanding the emotional changes. Overall, we can say that

the student mostly experienced positive emotional reactions during the experiment but also showed negative emotional responses at times.

5.4.3.2. Experiment 2

In this section, we have delved into the emotional fluctuations encountered by a female student from Antalya Bilim University during her second experiment, where she used 2D software for sketching. Throughout the duration of this experiment, we collected a comprehensive dataset comprising 510 unique emotional data points. This dataset allows for a detailed analysis of her emotional changes throughout the process.



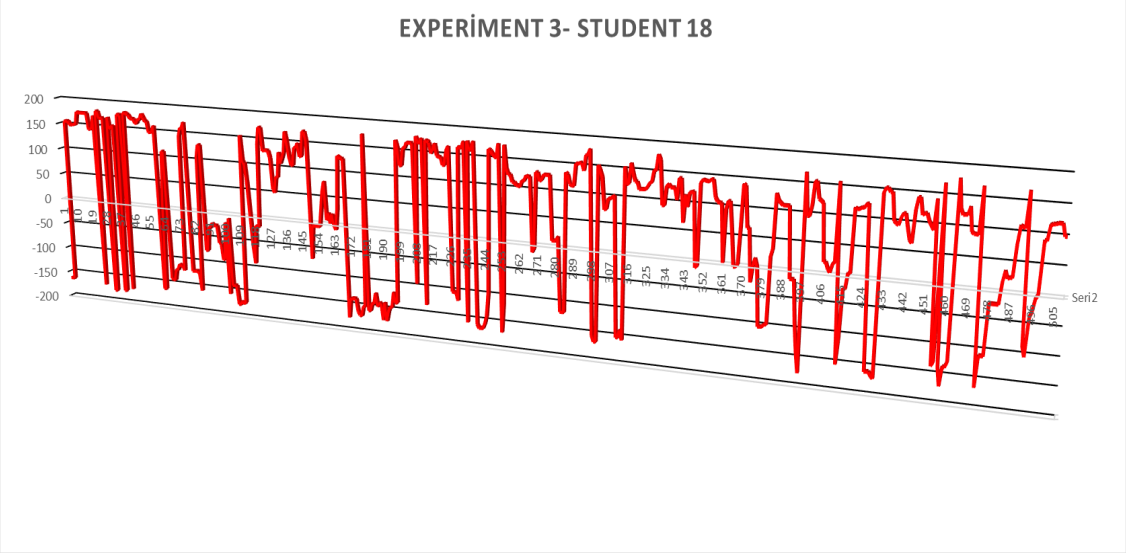
Graph 5-12. Experiment 2 - Student 18

When interpreting the emotional state of the 18th student's 2nd experiment, we can see that a significant portion of the emotions is negative. The dominant emotion is labeled as "Upset", which is a non-positive emotion. Other notable negative emotions include "stressed" and "Depressed", with "Bored" also frequently appearing. Among the positive emotions, expressions like "alert", "excited", and "happy" are present. However, the frequency of these positive emotions is less than the negative ones. When examining the relationship between angle values and emotions, negative values are generally associated with negative emotions. Additionally, the fact that the student studies at Antalya Bilim University, a private institution, and has been drawing with a 2D program might be related to these emotional responses. Academic pressure, the expectations brought about by attending a private university, or challenges faced while drawing could have played a role in these emotional reactions.

5.4.3.3. Experiment 3

In this section, we have explored the emotional fluctuations experienced by a female student from Antalya Bilim University during her second experiment, where she used 2D software for sketching. Over the course of this experiment, we collected a

comprehensive dataset comprising 510 unique emotional data points. This dataset allows for a detailed analysis of her emotional changes throughout the process.



Graph 5-13. Experiment 3 - Student 18

When I interpret the emotional state from the 2nd experiment of the 18th student, notable emotional fluctuations are evident. The most dominant emotions focus heavily on "Upset" and "stressed" categories, suggesting that the student felt discomforted or stressed for a significant portion of the experiment. Additionally, negative emotions such as "Sad" and "Depressed" frequently occur. Looking at positive emotions, we can see the presence of "happy" and "alert", but these emotions appear less frequently compared to the negative ones. Establishing a relationship between angle values and emotions, we can deduce that negative angle values are generally associated with negative emotions, while positive angle values correlate with mixed emotions. However, it should be noted that this relationship isn't entirely linear or definitive. While the fact that the student studies at Antalya Bilim University and has been drawing with a 3D program doesn't fully explain the reasons for these emotional fluctuations, it can be speculated that university life and specific courses or projects might contribute to these emotional swings.

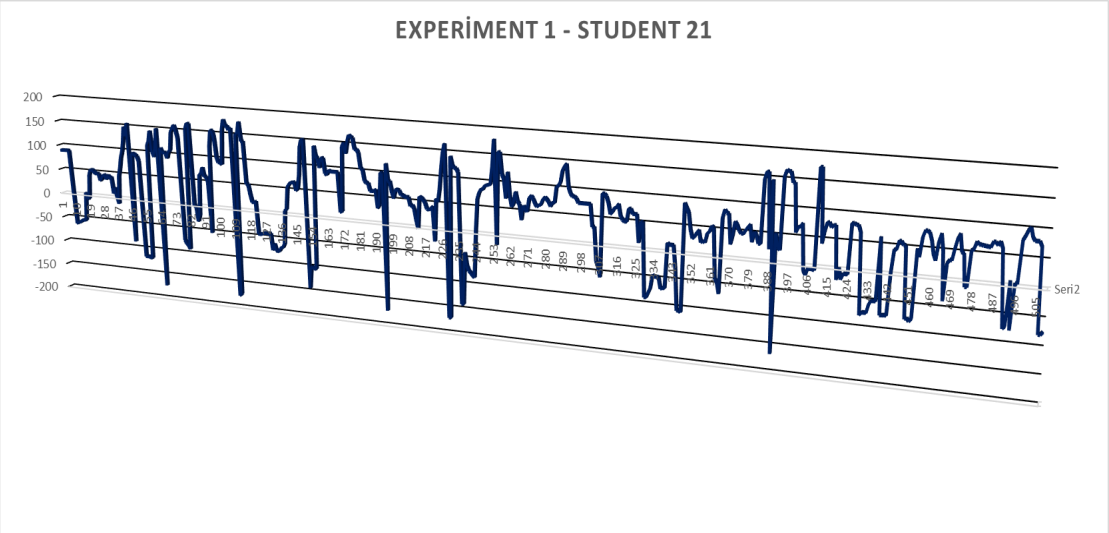
5.4.3.4. Experiment Analysis

Based on the experiment analysis, noticeable emotional fluctuations are observed in the 18th student over the course of three experiments. In the first experiment, the student's dominant emotional response was "Contented," and emotions like "excited" and "happy" were frequently experienced. In the second experiment, it is observed that the student predominantly felt "Upset" and "stressed." In the third experiment, there was an intensification of negative emotional responses. Comparing the three experiments, we can say that the student was in a more positive and happy emotional state during the first experiment compared to the others. Being educated at Antalya Bilim University and working with different drawing programs might be factors influencing these emotional responses. However, it's important to note that the experiment in which the student was the happiest was the first one.

5.4.4. Student 21

5.4.4.1. Experiment 1

In this section, we have examined the emotional variations experienced by a male student from Antalya Bilim University during his first experiment, which involved manual drawing. Over the course of the study, we collected a total of 510 emotional data points, allowing for a comprehensive analysis of his emotional changes during the process.

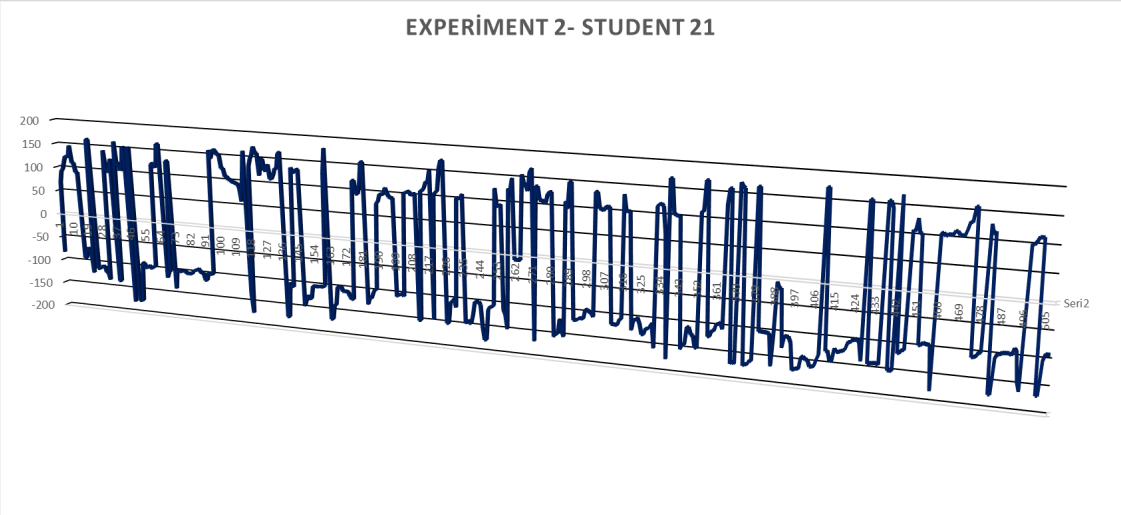


Graph 5-14. Experiment 1 - Student 21

Upon examining the emotional changes experienced by the 21st student during the first experiment, we observe that the student's dominant emotion is predominantly "alert". Among positive emotions, "happy" and "excited" are frequently repeated, while negative responses such as "Calm", "Bored", "Depressed", "Sad", and "Upset" are also noteworthy. During emotional fluctuations, the student typically shows energetic and attentive responses with positive angle values, whereas negative angle values are associated with calmer and more negative emotional reactions. The fact that the student is male and studies at Antalya Bilim University might be factors influencing emotional changes during the experiment, but the specific impact of gender and the university cannot be clearly determined in this experiment. However, in general, it can be said that this student experienced emotional oscillations during the experiment, encountering both energetic feelings and moments of calmness and negativity.

5.4.4.2. Experiment 2

In this section, we have analyzed the emotional fluctuations observed in a male student from Antalya Bilim University during his second experiment, where he used 2D software for sketching. Throughout the course of this experiment, we collected a total of 510 emotional data points, enabling a comprehensive analysis of his emotional changes during the process.

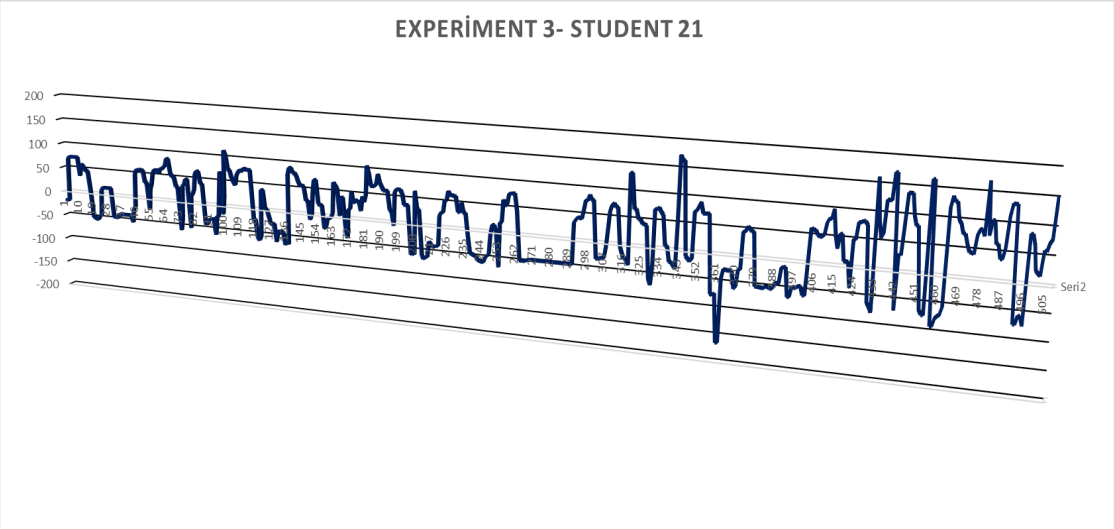


Graph 5-15. Experiment 2 - Student 21

The emotional changes experienced by this student during the experiment with the 2D program are quite pronounced. The dominant emotion that stands out is "Bored". This might indicate that the student frequently felt bored or challenged during the drawing. Positive feelings such as "alert", "excited", and "contented" are also present, but the frequency of these positive emotions is considerably less compared to negative ones. Emotional shifts like "stressed", "upset", "depressed", and "sad" could suggest that the student faced difficulties during the drawing, possibly due to technical challenges or encountering topics they didn't understand. When examining the relationship between angles and emotions, negative angle values generally correlate with negative emotions, while positive angle values can be associated with mixed emotions. However, a more comprehensive analysis is required before drawing a definitive conclusion. Additionally, while the student's male gender and attendance at a private university may not directly influence their emotional responses in this experiment, the academic pressures and expectations they face might have contributed to these emotional shifts.

5.4.4.3. Experiment 3

In this section, we have examined the emotional variations experienced by a male student from Antalya Bilim University during his second experiment, where he used 2D software for sketching. Throughout the duration of this experiment, we collected a comprehensive dataset comprising 510 distinct emotional data points. This dataset allows for a detailed analysis of his emotional transitions throughout the process.



Graph 5-16. Experiment 3 - Student 21

When we examine the emotional responses of the student during the experiment, the changes in their mood are clearly visible. We can say that their dominant emotion was "alert", as this response has been observed frequently. This might indicate that the 3D drawing program kept the student constantly on edge and focused intensely on the program. Strong negative emotional responses such as "upset" and "stressed" have also been observed. However, we can also see that the student experienced positive emotions like "excited" and "happy". The emotional changes occur quite frequently and rapidly, suggesting that the student might have encountered various challenges and moments of success during the experiment. The student's gender and the university they attend may have had some influence on their emotional responses, but based on this data, it's not possible to determine that impact directly.

5.4.4.4. Experiment Analysis

When examining the experiment analysis, the emotional changes experienced by the 21st student throughout three different experiments stand out. In the first experiment, the student's dominant emotion was "alert," while in the second experiment, which involved drawing with a 2D program, the predominant emotion shifted to "Bored." In the third experiment, conducted with a 3D drawing program, the student returned to the "alert" emotion. Comparing these three experiments overall, it can be observed that the student was more energetic and attentive during the 1st and 3rd experiments, while they appeared more bored and experienced negative emotions in the 2nd experiment. These results suggest that the 3D drawing program had a more positive effect on the student, and they seemed happier during that experiment.

6. CONCLUSION

From childhood to adolescence and higher education, drawing and writing with pencil and paper - and combinations of these two actions - become a reflexive action during practice, without involving any anxiety, stress, or other factors. Thus, users experience no stress when doing manual drawings. However, since drawing is an activity performed with hand muscles, it is an activity that requires the development of the muscles. Developing the mind-muscle control mechanism requires years of practice in manual drawing. This leads to the development of hand muscles. If there is stress, this practice is not performed, and this could be the reason why the 1st Experiment triggers less positive emotion than the 3rd Experiment. Therefore, manual drawing remains as a skill requiring mastery and practice.

Drawing by hand is a movement created by the person holding the pencil, without any intermediary between the drawer and the drawing. As a result, simultaneous design is possible, and a sense of emotional integrity can be achieved. The trend towards computer-assisted programs observed in the 2nd and 3rd experiments stems from students being immersed in this environment. Computer-aided drawing programs are preferred because they are faster and easier to learn. They may also be more appealing than manual drawing because they allow for quick measurements or copying. Thus, they can trigger the most positive emotions among users. The 3rd experiment indicates the behavior of the participants, although being positive in both cases, it triggered less positive emotion in state university students than foundation university students because the transition to 2D and 3D design tools was delayed.

In the 3rd Experiment, more positive emotion was triggered compared to the 2nd experiment phase. This is because students have shown more interest and happy feelings in 3D design behavior since it involves one more dimension than 2D design.
When we compared the happiness levels in experiments by gender, we reached clear results. Our statistical analyses show that male students from Akdeniz University felt happier during the 3rd experiment than female students. Similarly, we concluded that female students from Antalya Bilim University felt similar happiness levels during the 2nd and 3rd experiments. These findings provide a statistically reliable perspective on the results of our experiments.

With the help of brain-computer interfaces like the EEG devices used in this research, we believe that we can collect more data and, with the help of language summarization, reach different results on emotion recognition for students and other groups, which will allow us to improve the quality of both education and life.

This analysis highlights students' reactions to different drawing methods, especially emphasizing the differences between technology and manual methods. In education, it is essential to determine which methods are most effective to boost students' motivation and facilitate the learning process. This study showcases how technology, especially 3D drawing tools, offers students a more positive experience. However, we must not forget the inherent value of drawing by hand. The education system should

impart both technological and manual drawing skills to students and adopt a balanced approach between these two methods.

In conclusion, this research not only highlights the emotional dynamics of architectural students in response to different design methodologies but also provides significant insights into optimizing educational practices. As we stand at the confluence of tradition and technology, it's imperative that architectural education evolves in sync with the changing dynamics.

The experiment results reveal that the digital-native generation gravitates towards technologically advanced tools, like 3D design programs, reflecting their inclination towards interactive and dynamic mediums. However, the timeless essence and intrinsic value of hand drawing, fundamental to architecture, cannot be overshadowed.

This juxtaposition necessitates several improvements in our educational approach:

- **Technology Integration: Integrate** more tech tools like 3D modeling into the curriculum, ensuring students are adept at harnessing both contemporary and traditional methods.

- **Significance of Hand Drawing:** Reinvent how hand drawing is approached in education. Perhaps, teaching it through interactive methods like outdoor drawing sessions in nature or historical places could revive its significance and appeal.

- **Experience-Based Education:** Allow students to explore and identify their preferred drawing methods, which in turn can help curate a more personalized and effective curriculum.

- **Feedback and Evaluation:** Conduct short post-experiment surveys to gather student feedback, enabling iterative refinements in teaching methodologies.

- **Educator Training:** Enhance educator training, especially focusing on the latest technological tools to ensure they're equipped to offer students a holistic learning experience.

- **Student Participation and Collaboration:** Promote group-based projects integrating various drawing methods, fostering both individual creativity and collaborative skills.

In essence, as we ponder upon the advancements in computational neuroscience and design tools, it's crucial to ensure that the crux of architectural education — the blend of art and precision — isn't lost in translation. The confluence of hand drawings and advanced design tools should be harmoniously presented, encouraging students to cherish both. Continuous improvement, periodic feedback, and adaptability should be the cornerstones of future architectural education, ensuring it remains relevant, engaging, and effective for the students of today and tomorrow.

As we delve into the future of architectural education, a promising avenue for exploration lies in the application of clustering methodologies to better understand students' preferences and learning styles. Implementing clustering techniques on the collected data could unveil patterns in emotional responses, drawing preferences, and overall engagement. By categorizing students based on their proclivities towards manual or technological drawing methods, educators can tailor instructional approaches to cater to diverse needs. This personalized and adaptive approach, informed by clustering analysis, has the potential to enhance the efficacy of educational strategies, ensuring that each student's learning journey is finely tuned to their unique strengths and inclinations. Additionally, further research could investigate the integration of emerging technologies, such as artificial intelligence, to refine clustering algorithms and provide even more nuanced insights into the multifaceted realm of architectural education.

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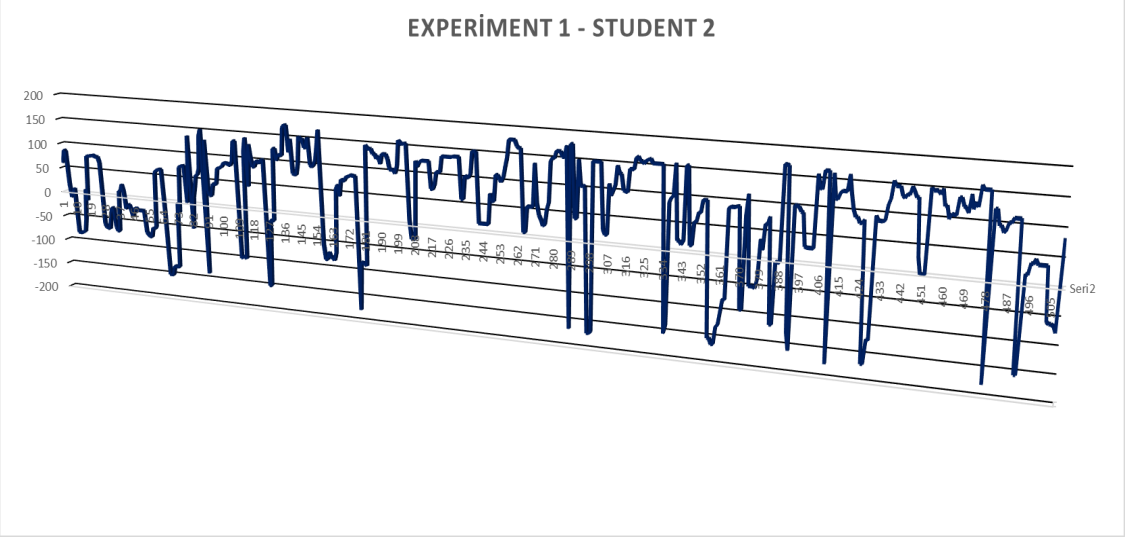
APPENDIX-1

The results section included a comprehensive comparison of the findings from all 34 experiments, along with visual representations. Furthermore, we provided detailed explanations of the outcomes from the initial six students' experiments. In this section, you will find the individual experiment results of the remaining 28 students from Chapter 5, along with corresponding interpretations for each study.

5.4.5. Student 2

5.4.5.1. Experiment 1

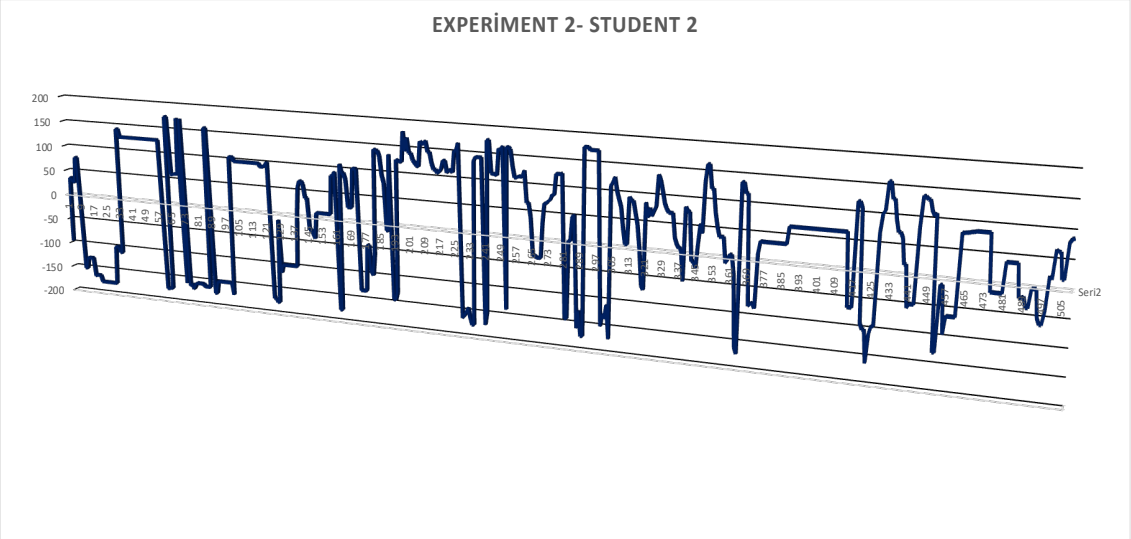
In this section, the emotional changes of a male student studying at Akdeniz University during the first experiment have been examined. A total of 510 emotional data points were recorded during the experiment. This experiment was conducted while the student was drawing by hand.



Based on the table, this male student predominantly experienced the emotion "alert," which may suggest that drawing by hand might make the student attentive and focused. Positive emotions like "happy" and "excited" appear frequently, indicating that the student enjoys this activity. However, the presence of negative emotions such as "Upset," "Sad," and "Stressed" suggests that certain aspects of drawing could be challenging for the student. Looking at the angle values, negative emotional states are generally concentrated between -90 to -180 degrees, while positive emotional states lie between 0 to 90 degrees. This indicates that the student's emotional experiences might follow a certain pattern. Additionally, the fact that the student studies at Akdeniz University and is male might not directly influence the emotional changes. Yet, stresses of university life or social interactions could affect the student's emotional experiences. In conclusion, this student experienced both positive and negative emotions while drawing by hand, suggesting that different stages of drawing have varying emotional impacts on the student.

5.4.5.2. Experiment 2

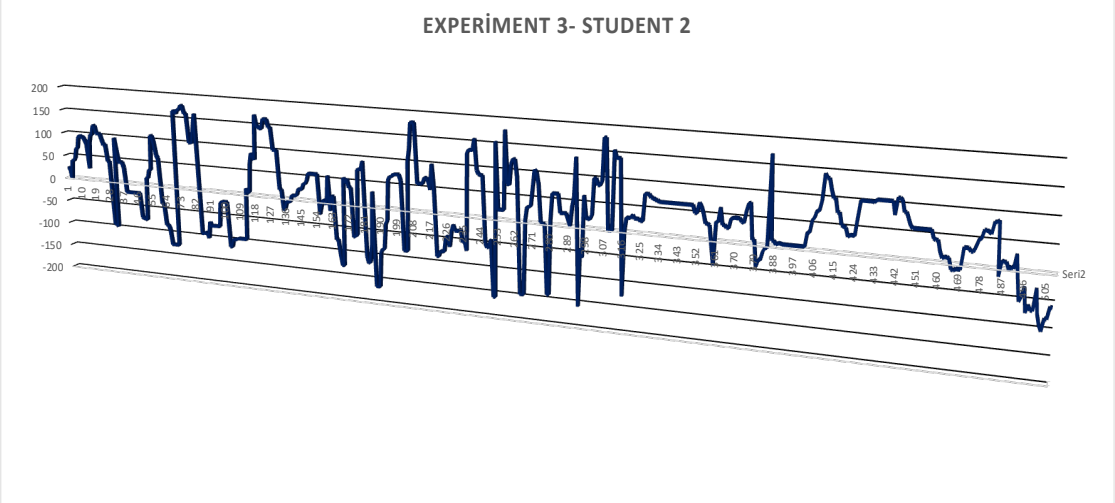
In this section, the emotional changes of a male student studying at Akdeniz University during his second experiment have been examined. During this experiment, a total of 510 emotional data points were recorded while the student was drawing using a 2D program.



Based on the data from the 2nd experiment of the 2nd student, the emotional change is as follows: The student predominantly experienced negative emotions. This is discerned from the abundance of data points with negative values. Dominant feelings include "Sad," "Depressed," and "Stressed." However, he also felt positive emotions like "Excited," "Happy," and "Aroused," as understood from the data points with positive values. The student's emotional fluctuations display continuous change throughout the data, which may indicate emotional instability. Additionally, it's noted that the student studies at Akdeniz University and is male, but no information has been provided regarding the direct impact of these details on the emotional changes.

5.4.5.3. Experiment 3

In this section, the emotional changes of a male student studying at Akdeniz University during his third experiment have been examined. During this experiment, a total of 510 emotional data points were recorded while the student was drawing using a 3D program.



During the drawing process using the 3D program, this male student's emotional experience has varied across a wide spectrum. Dominant emotions tend to fluctuate mainly between "alert" and "nervous," indicating that the student often experiences intense concentration and perhaps a degree of stress when using such software. Positive feelings, characterized by the words "happy" and "excited," frequently recur, suggesting that the student typically enjoys his work and feels excitement at certain moments in the learning process. However, we also occasionally see the emergence of negative emotions like "bored," "depressed," and "sad," which might represent moments he found challenging or difficult to comprehend. Examining the angle values, one can observe significant oscillations between positive and negative emotions. This signifies that the student's emotional experience is constantly changing and that such a task elicits a complex emotional response. In general, we can say that this student has experienced emotional highs and lows during drawing with the 3D program, encountering both positive and negative feelings throughout the process.

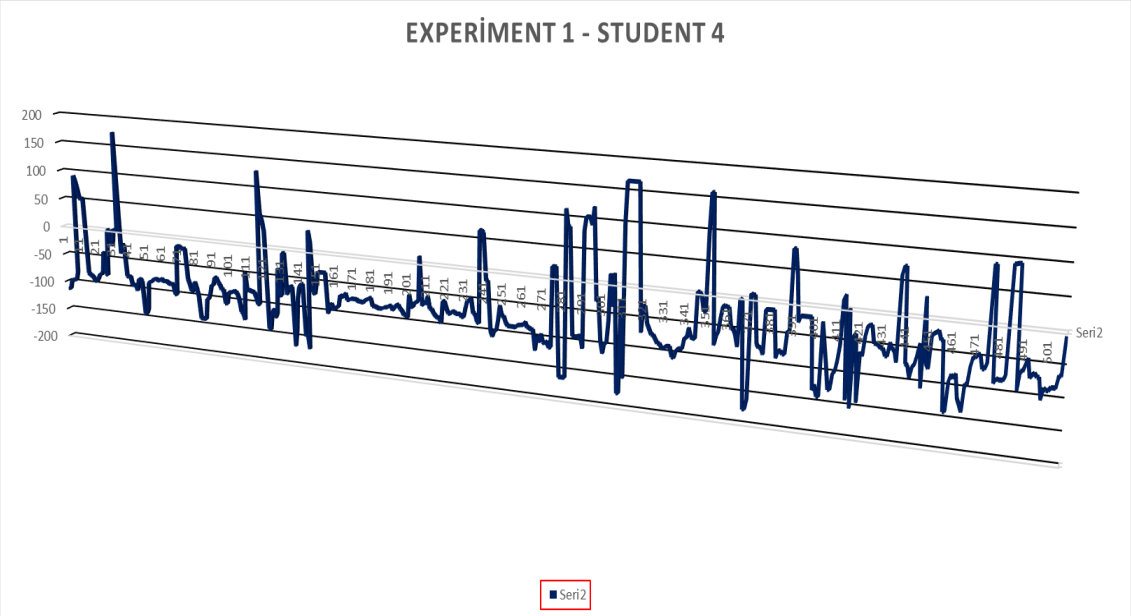
5.4.5.4. Experiment Analysis

The emotional responses of the second student throughout the three experiments varied depending on the drawing method used. During the manual drawing experiment, the student typically felt "relaxed" and "peaceful"; this might suggest that the physical activity provided him a sense of relaxation. However, when 2D drawing tools were employed, the student felt more "alert" and "anxious", indicating that this method may be a more technical and focus-demanding task. Most intriguingly, with the 3D drawing method, the student predominantly felt "happy" and "excited" but also experienced negative emotions like "bored", "depressed", and "sad". This suggests that 3D drawing has a steep learning curve, and the student may have faced challenges in certain parts of the process. An overall look at the data reveals that the student experienced "happy" and "excited" emotions most intensely in the 3D drawing experiment, exhibiting the most positive emotional responses in this trial. Whether studying at Akdeniz University and being male had any discernible effect on these emotional reactions remains uncertain. However, the data gathered throughout the three experiments demonstrate that the drawing methods and tools used are determinative of the student's emotional experiences.

5.4.6. Student 4

5.4.6.1. Experiment 1

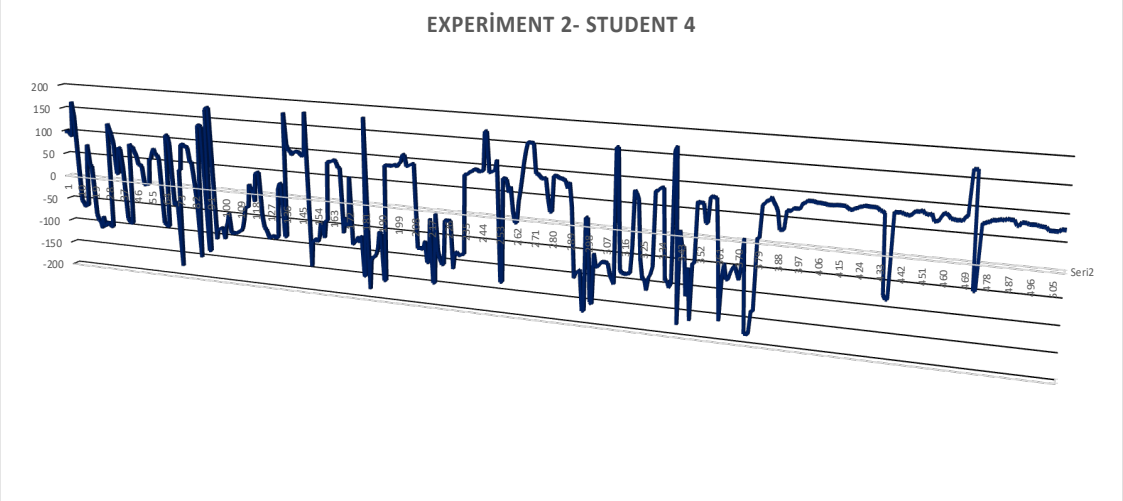
In this segment, we've analyzed the emotional shifts experienced by a male student from Akdeniz University during the initial experiment. Throughout the experiment, a cumulative of 510 emotional data entries were documented. This study took place while the student engaged in hand-drawing.



When looking at the 4th student's hand-drawing experiment, the most dominant emotion appears to be "Calm." This suggests that the student typically feels relaxed and peaceful while drawing. The emotion "Bored" also frequently emerges, indicating that at certain stages of the drawing process, the student might lose interest or feel unengaged. Among the positive emotions, "happy," "excited," and "alert" stand out, while the most pronounced negative emotions are "Depressed" and "Sad." A correlation can be observed between the angle values and emotions: negative angle values are generally associated with negative or neutral emotions (like calm, bored), whereas positive angle values are linked to positive emotions (such as excited, happy). The fact that the student studies at Akdeniz University might cause emotional fluctuations due to possible academic or social pressures. However, in general, it can be said that during this experiment, the student mainly experienced the drawing process in a calm manner but felt bored or experienced negative emotions at certain intervals.

5.4.6.2. Experiment 2

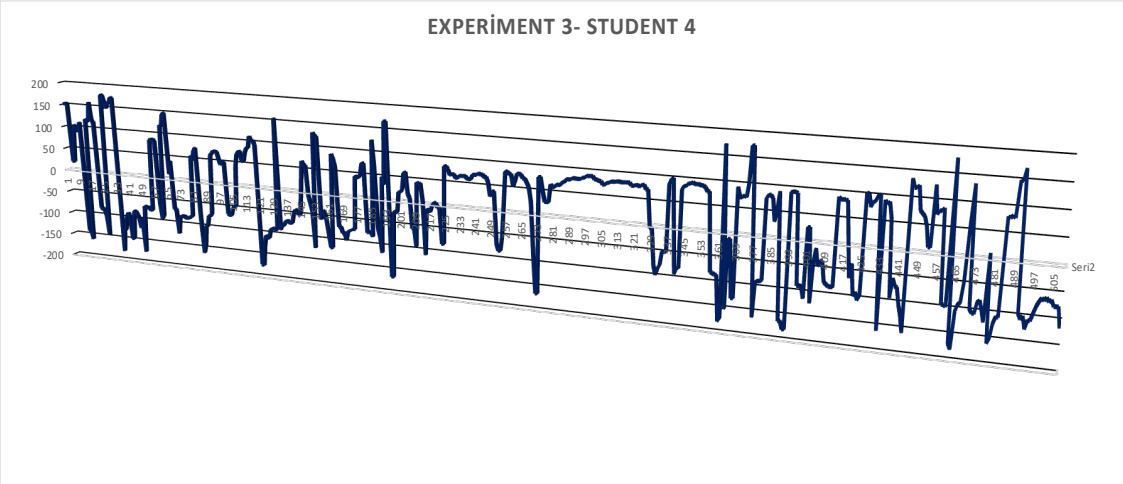
In this part, we've delved into the emotional fluctuations of a male student from Akdeniz University throughout his second experiment. While the student was sketching using a 2D software, we gathered a total of 510 emotional data entries.



Based on the data provided above, the observation for the 4th student's second experiment reveals that he predominantly has high positive angle values, often being in an "alert" state, indicating that the student is alert and attentive. While "alert" stands out as the dominant emotion, positive emotions like "happy" and "excited" are also prominently observed. However, negative emotions such as "Calm," "Bored," and "Sad" were also intermittently present throughout the experiment. This suggests that at various moments during the experiment, the student felt bored, relaxed, or sad. When the angles are closer to positive values, it can be inferred that the student's emotions are more positive; as they approach negative values, his emotions seem more negative. It is evident that this male student from Akdeniz University experienced emotional fluctuations during his drawing with the 2D program, and these fluctuations appear to align with the angle values.

5.4.6.3 Experiment 3

In this segment, we explore the emotional fluctuations of a male student from Akdeniz University throughout his third experiment. In this experiment, while he engaged with a 3D drawing program, a comprehensive set of 510 emotional data points were documented.



Based on the values provided above, noticeable emotional fluctuations of the student during the experiment are evident. Dominant emotions such as "Alert" and "Nervous" stand out, while emotions like "Sad", "Calm", and "Bored" are also frequently observed. The student's emotional responses are predominantly negative. When examining the angle values in relation to emotions, alertness and nervousness are correlated with positive values, while calmer and sadder states relate to negative values. The student's emotional state appears to change frequently, indicating that the experiment or activity might be complex and challenging. Whether demographic information like the student's gender and university has a direct influence on these emotional shifts would require a more extensive analysis or data from other students. This suggests that the student undergoes a mentally and emotionally intense process while drawing with the 3D program.

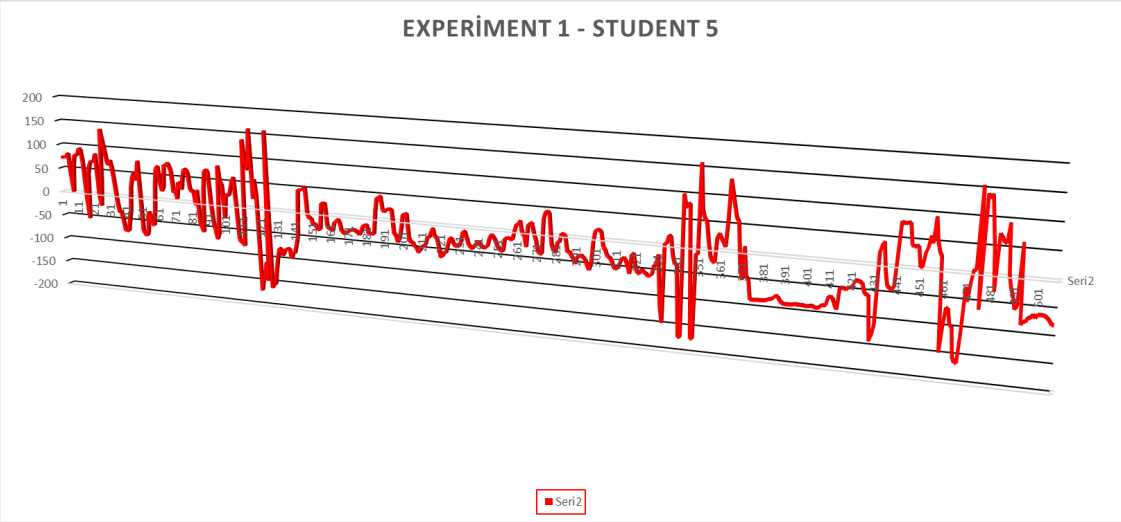
5.4.6.4 Experiment Analysis

Throughout the three experiments conducted with the 4th student, noticeable emotional fluctuations are evident. During the hand drawing, the most dominant emotion was 'Calm'. In contrast, when using the 2D program, the student predominantly felt "Alert". However, drawing with the 3D program elicited the student's most intense emotional responses, where "Alert" and "Nervous" feelings were prevalent, and negative emotions also frequently surfaced. The angle values also appear to be consistent with the student's emotional state: positive values are associated with positive emotions, whereas negative values relate to negative or neutral emotions. Overall, the student displays varying emotional reactions across different drawing platforms, with the most pronounced changes observed during the 3D program drawing session.

5.4.7. Student 5

5.4.7.1. Experiment 1

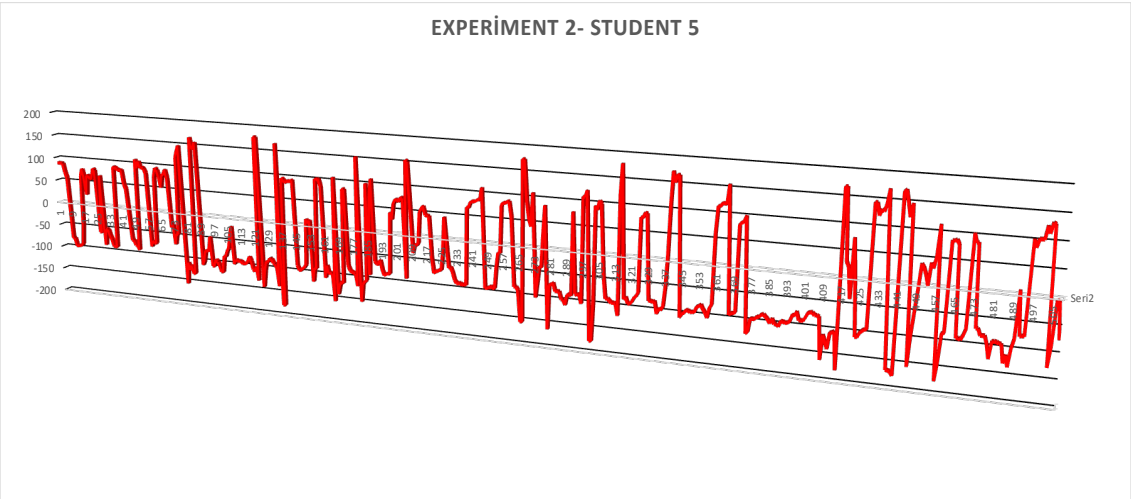
In this section, we examined the emotional variations of a female student at Akdeniz University during her first experiment. A total of 510 emotional data points were gathered throughout the study. This data was collected while the student was involved in manual drawing.



Upon reviewing the data, it's evident that the 5th student underwent an emotional transition during the experiments. Initially in a happy emotional state, the student subsequently shifted into a positive mood characterized by excitement and joy. This shift is also positively reflected in the angular data, as an increasing positive trend in emotional state is observed. Especially towards the end of the first experiment, the student's emotional state reached its peak. On the other hand, there is no observed negative change in the student's mood or dominant negative emotions. In conclusion, this student experienced a positive emotional transition during the experiments and predominantly exhibited positive emotions. These results may reflect the student's enthusiasm for the experiments and their positive experiences.

5.4.7.2. Experiment 2

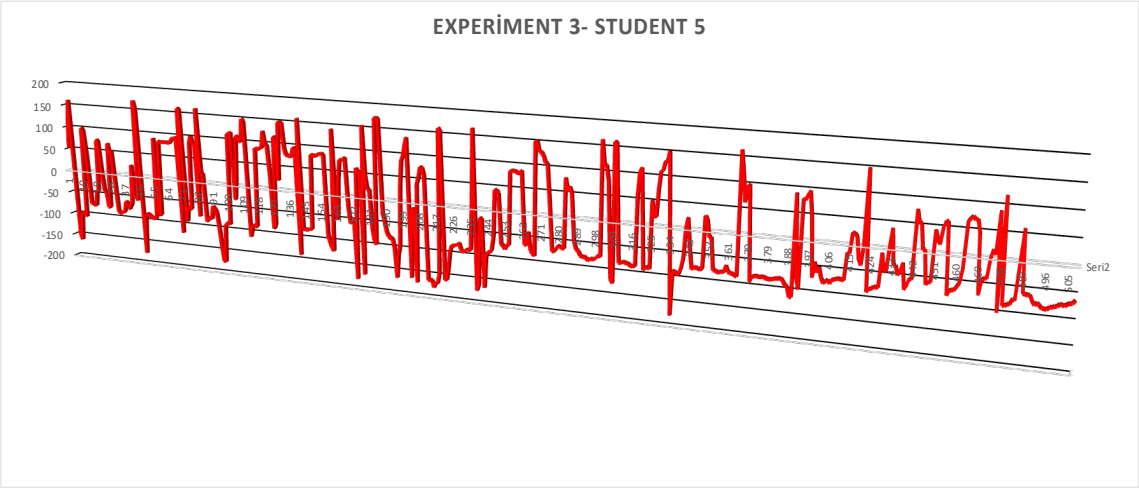
In this section, we've explored the emotional dynamics of a female student from Akdeniz University during her second experiment. As she sketched with a 2D software, we collected 510 distinct emotional data points.



The emotional changes observed in the 4th student during the second experiment display a rather fluctuating profile. Starting off with a sense of being "alert", transitioning to positive emotions such as "excited" and "happy", and ultimately gravitating towards negative feelings like "nervous" and "stressed", suggests the student reacted to different stages and outcomes throughout the experiment. Positive emotional responses might indicate the student found creativity and enjoyment in 2D drawing, while the negative responses could reflect certain challenges or concerns. Though it's difficult to establish a direct link between angles and emotional changes, it's important to note that these emotional fluctuations might potentially influence the student's work efficiency. The emotional shifts experienced by the student in this experiment could mirror the emotional challenges and successes encountered at different stages of the drawing process.

5.4.7.3. Experiment 3

In this analysis, we examine the emotional shifts experienced by a female student from Akdeniz University during her third experiment. As she interacted with a 3D drawing program, we captured a total of 510 distinct emotional data entries.



The student's prevailing emotion seems to be "Bored", as negative emotions predominantly emerge in most of the experiments. Positive emotions, such as "happy" and "excited", appear to manifest only at specific moments during the experiments, suggesting moments of positive sentiments. Emotional fluctuations are quite varied, switching between positive and negative feelings at times. There are notable shifts especially between "nervous" and "calm" emotions. Regarding angles, the data itself doesn't contain angular values, making it challenging to provide a direct comment on this matter. However, the rapid transitions between positive and negative emotions could indicate emotional fluctuations at different stages of the experiments. Without notes or the context of the experiments provided, it's hard to add more detail. Yet, from what is available, it appears this student experienced emotional ups and downs during the experiment, with negative feelings generally being more prevalent.

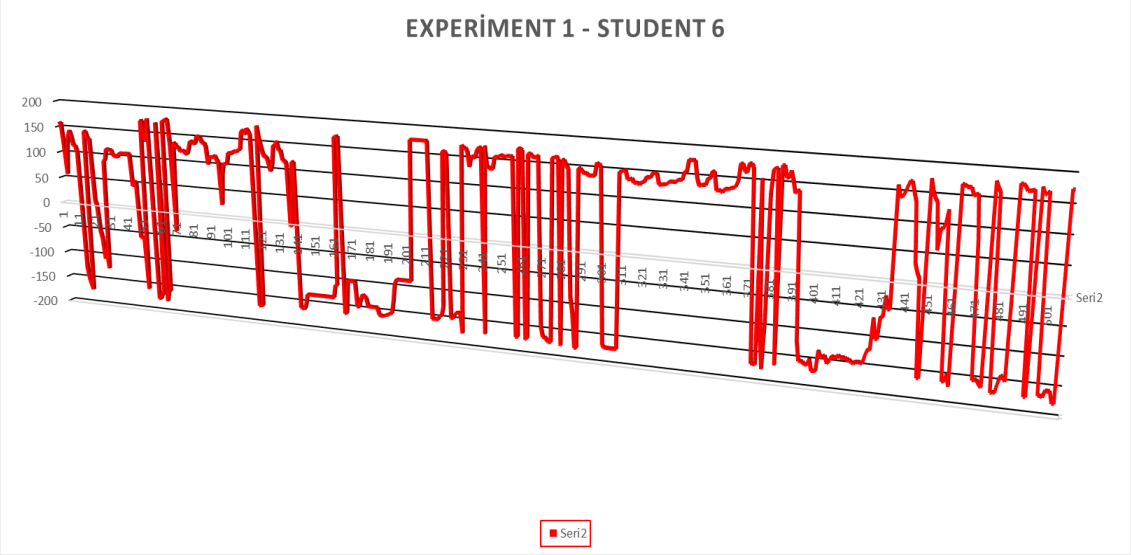
5.4.7.4. Experiment Analysis

Based on the given experimental results, it is observed that the 5th student experienced emotional changes during the three separate experiments. In the first experiment, the student's emotional state changed positively, dominant positive emotions were observed, and the experience was deemed positive. In the second experiment, emotional fluctuations were noticed; particularly during periods when positive emotions increased, it can be inferred that the student's work productivity was high and she had positive experiences. Conversely, during periods when negative emotions increased, the effects of stress and discomfort were observed. In the third experiment, the student's mood was predominantly negative, with positive emotions emerging only at specific moments. Angular data indicates rapid transitions between positive and negative emotions, consistent with the emotional changes. However, more contextual information and further details about the experiments themselves are needed. Based on the data, we can say that the happiest experiment for the 5th student was the first one. In the first experiment, it's evident that dominant positive emotions, especially feelings like "happy" and "excited," were prevalent, indicating that the 5th student was happier at the start of the experiment. In the second experiment, even though emotional fluctuations were observed, it could be assumed that the student felt happy during periods when positive emotions increased. In the third experiment, negative emotions predominantly emerged, with positive emotions appearing more rarely. Therefore, based on this comparison, the 1st experiment was observed to be the one where the 5th student was emotionally the happiest.

5.4.8. Student 6

5.4.8.1. Experiment 1

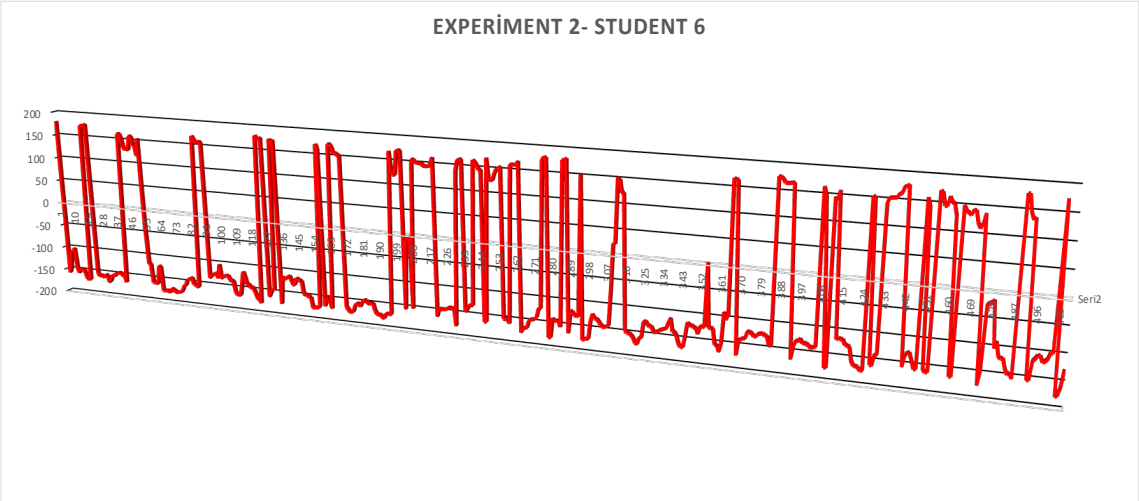
In this section, we examined the emotional variations of a female student at Akdeniz University during her first experiment. A total of 510 emotional data points were gathered throughout the study. This data was collected while the student was involved in manual drawing.



Based on the data from the 6th student's first experiment, the dominant emotions appear to be "stressed" and "upset." Furthermore, emotions such as "nervous" and "sad" have also frequently been experienced. However, alongside these negative emotions, positive feelings like "excited," "happy," and "alert" are also present. Examining the emotional transitions, it is observed that there are frequent shifts between positive and negative feelings. In terms of angular data, positive values are generally associated with more stressful and unsettling emotions like "upset," "stressed," and "nervous," whereas negative values are linked to negative emotions like "sad," "depressed," and "bored." However, feelings of relaxation, such as "calm," "contented," and "relaxed," are also seen in the negative angles. The fact that the student is studying at Akdeniz University suggests that the stresses of university life could be contributing to the fluctuations in her mood. The student's gender is female, and literature indicates that gender may influence emotional reactions. However, with this data set, it's challenging to establish a direct connection between gender and emotional responses. It's plausible to state that the emotional fluctuations experienced by this student could stem from both individual factors and environmental influences.

5.4.8.2. Experiment 2

In this section, we've explored the emotional dynamics of a female student from Akdeniz University during her second experiment. As she sketched with a 2D software, we collected 510 distinct emotional data points.

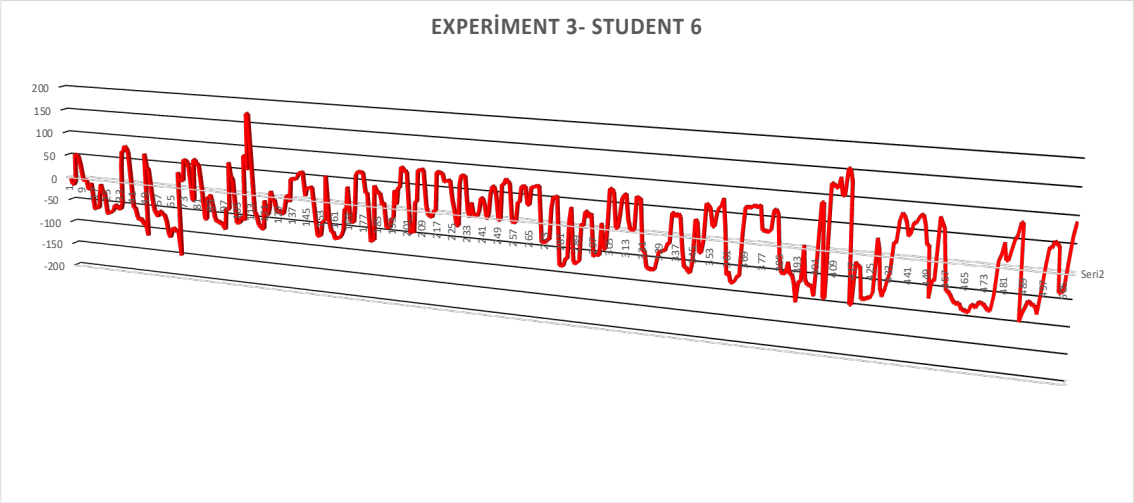


Upon examining the data from the student's second experiment, it's evident that this student's emotional profile predominantly centers around negative emotions. The dominant feelings, including "Sad," "Depressed," and "Upset," are recurrent. Additionally, other negative emotions such as "stressed" and "bored" are also noteworthy. Positive feelings, especially "happy" and "contented," appear less frequently. When looking at the angular values, negative angles are typically associated with negative emotions, whereas positive angles can correlate with both positive and negative emotional responses, such as "upset." This may indicate that the 2D drawing program presents a challenging experience for the student. It's difficult to definitively say whether gender and the student's enrollment at Akdeniz University play roles in these emotional reactions,

but academic and social pressures could contribute to the emotional fluctuations experienced by the student during this experiment.

5.4.8.3. Experiment 3

In this analysis, we examine the emotional shifts experienced by a female student from Akdeniz University during her third experiment. As she interacted with a 3D drawing program, we captured a total of 510 distinct emotional data entries.



During the third experiment, the student prominently experienced positive emotions like "Excited" and "Happy," indicating that drawing with the 3D program brought about significant joy and excitement for her. When examining the emotional shifts, it's apparent that this experiment had a much more positive impact compared to previous ones. Based on angle values, positive emotions in this experiment were represented with higher angles. Factors such as the student's female gender and attending a state university might also influence emotional responses. Nevertheless, the overarching takeaway is that this experiment was overwhelmingly positive for the student and significantly improved her emotional state. Without overlooking the potential effects of certain factors, the third experiment stands out as the moment when the student had her most positive emotional experience.

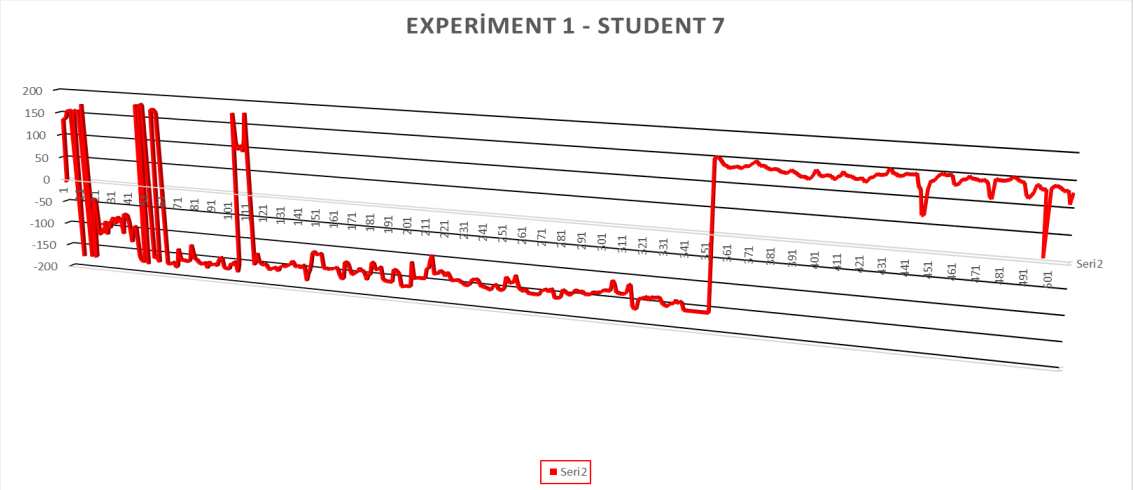
5.4.8.4. Experiment Analysis

Throughout the three experiments, the 6th student exhibited varied emotional responses. In the first experiment, her emotional profile predominantly leaned towards negative emotions like "stressed" and "upset". In the second experiment, emotions like "Sad," "Depressed," and "Upset" were more pronounced. However, in the third experiment involving the use of a 3D drawing program, positive emotions such as "Excited" and "Happy" became dominant. We can infer that among the three experiments conducted, the female student from Akdeniz University was happiest during the one involving the 3D program. This suggests that the 3D program might be more appealing and motivating for the student.

5.4.9. Student 7

5.4.9.1. Experiment 1

In this section, we examined the emotional variations of a female student at Akdeniz University during her first experiment. A total of 510 emotional data points were gathered throughout the study. This data was collected while the student was involved in manual drawing.



In the student's first experiment, based on the data you provided, the emotion "stressed" predominantly stands out. Alongside this, we frequently observe feelings of "Sad" and "Upset". However, despite these negative emotions, we also note the presence of positive feelings such as "happy" and "alert" during the experiment. The student's emotional shifts occur frequently throughout the experiment, indicating varied emotional responses during this period. When examining the relationship between angle values and emotions, negative angle values are typically associated with negative emotions (e.g., "Sad", "Depressed"), whereas positive angle values relate to both positive ("happy") and negative emotions ("stressed", "Upset"). While one might speculate that attending Akdeniz University and gender could have influenced these emotional fluctuations, a direct connection cannot be established with the given dataset. However, it's conceivable that the stresses of university life might have contributed to the observed emotional responses during the experiment

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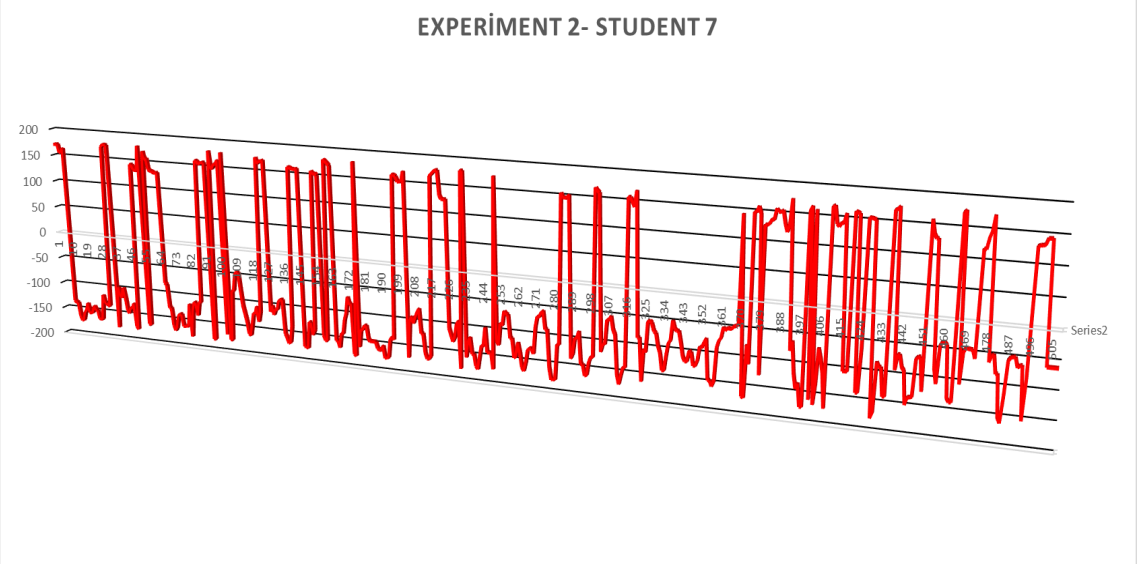
5.4.9.2. Experiment 2

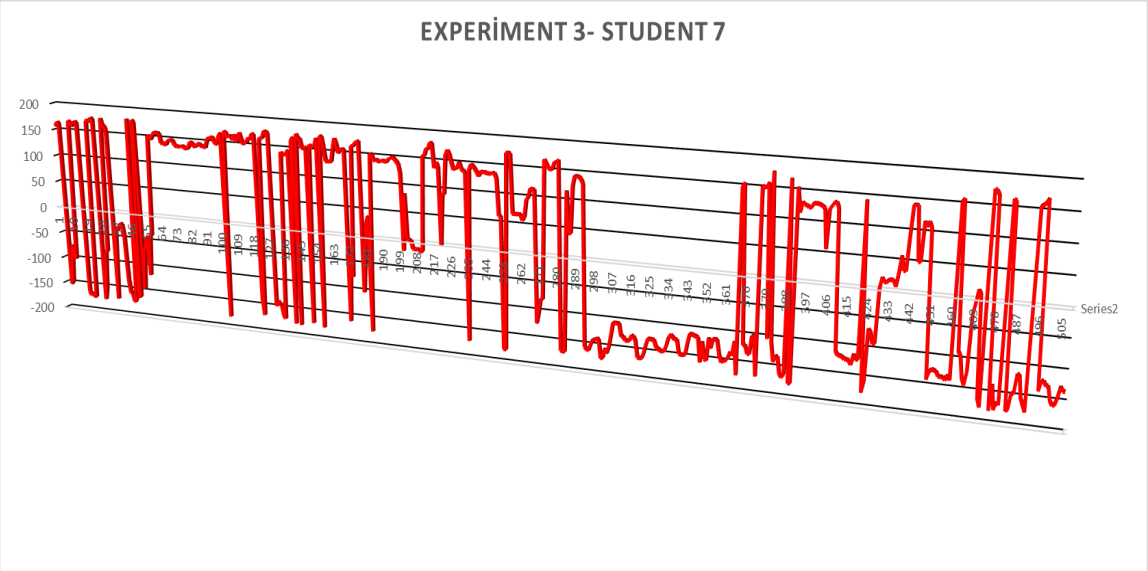
In this segment, we have explored the emotional fluctuations of a female student enrolled at Akdeniz University during her second experiment, which revolved around using 2D software for sketching. Throughout this experiment, a comprehensive dataset of 510 distinct emotional data points was gathered, enabling a detailed analysis of her emotional transitions during the process.



Based on the data provided, the dominant emotions for the 7th student during her second experiment (conducted with a 2D program) are "Upset" and "Depressed". Most of the angles indicate a correlation with the emotion "Upset" in positive values and "Depressed" or "Sad" in negative values. This suggests that the student was generally in a negative mood during this experience. However, alongside these negative emotions, there are also emotions such as "Relaxed", "Calm", and "Stressed" which may indicate neutral or slightly positive moods. This highlights emotional fluctuations and diversity throughout the experiment. The student seems to have experienced mood changes during the experiment, with certain angles intensifying these changes. For instance, negative values intensify feelings of "Depressed" and "Sad", while positive values amplify feelings of "Upset". Yet, feelings like "Calm" and "Relased" are concentrated at lower values. There's a discernible relationship between angles and emotions: more positive angles correlate with feelings of "Upset", while more negative angles are associated with "Depressed" and "Sad". Being a female student at Akdeniz University might be factors influencing emotional fluctuations and stress levels.

5.4.9.3. Experiment 3

In this analysis, we explore the emotional fluctuations experienced by a female student from Akdeniz University during her third experiment. While she engaged with a 3D drawing program, we recorded a total of 510 unique emotional data points.



Based on the data provided, we can infer that this female student from Akdeniz University predominantly exhibited negative emotional responses during her drawing experience with the 3D program. The dominant emotions observed indicate that she largely felt feelings of "Upset", "Sad", and "Depressed". The instances of positive emotions, especially in categories like "happy" and "excited", are considerably limited in comparison to the overall experience. The student's mood swings seem to operate mostly within a negative spectrum, hinting that her experience was generally unfavorable during this experiment. The given angle values exhibit variability, predominantly between high positive and negative values, indicating frequent mood fluctuations. However, to determine a precise relationship between angles and emotions, more analytical data would be required. Overall, we can deduce that the student experienced a predominantly negative mood during her 3D drawing experience, albeit with a few positive moments. This could suggest that the 3D drawing experience might have been challenging and emotionally tumultuous for her.

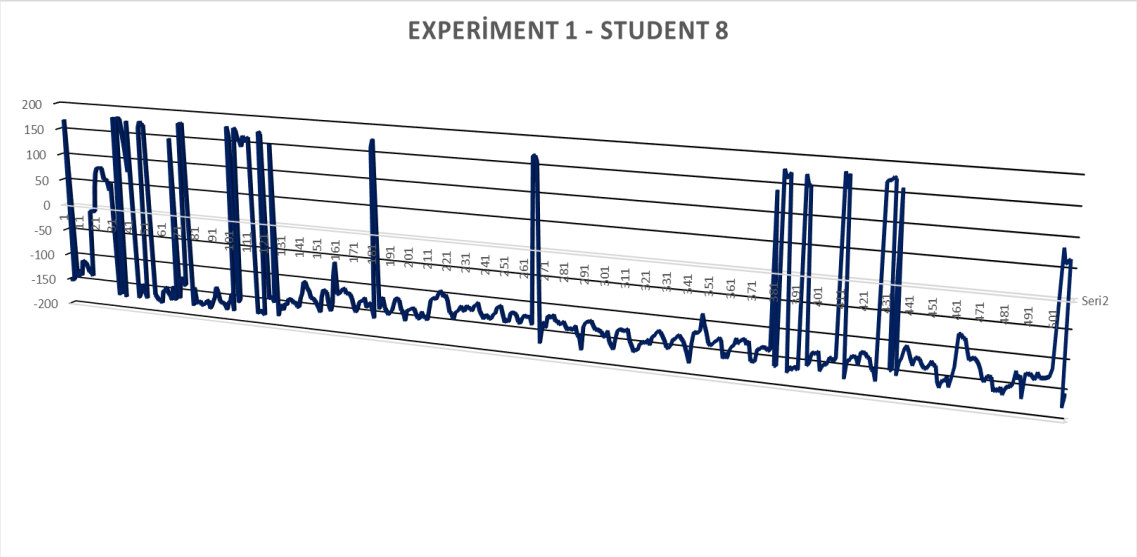
5.4.9.4. Experiment Analysis

We measured a student's emotional responses across three different experiments. During the first experiment, "stressed" was the most prominent emotion, but positive emotions like "happy" and "alert" were also observed. In the second experiment (using a 2D program), "Upset" and "Depressed" were the dominant emotions. In the third experiment (using a 3D program), the student predominantly felt feelings of "Upset", "Sad", and "Depressed". Comparing the three experiments, we can observe that the student had the most positive experience during the first trial. The 3D drawing experiment was the most challenging for her. Based on this data, we can infer that the drawing method (2D or 3D) might have a significant impact on the student's emotional responses.

5.4.10. Student 8

5.4.10.1. Experiment 1

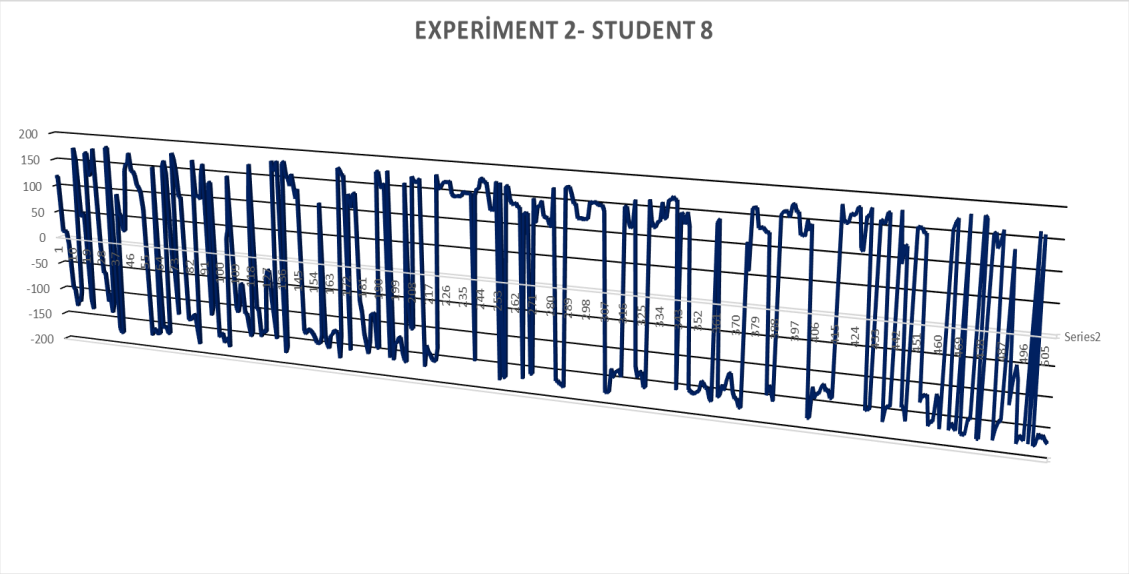
In this section, we investigated the emotional fluctuations of a male student at Akdeniz University during his initial experiment. A total of 510 emotional data points were collected during the course of the study. This data was gathered while the student was engaged in manual drawing.



Based on the data from the 8th student's first experiment, we can observe that the dominant emotional tendency is "Sad". This emotion is associated with a large number of negative angle values. Additionally, there are moments where the student felt positive emotions such as "excited" and "alert". It's evident that the student exhibited emotional changes throughout the experiment; notably, there were moments of positive emotions despite the many negative feelings. There seems to be a relationship between angle values and emotions; negative angle values are generally associated with negative emotions ("sad", "depressed"), while positive angle values are linked with both positive ("excited", "alert") and sometimes negative emotions. It's challenging to say that being a male student at Akdeniz University has a distinct effect on these emotional reactions, but the stresses and expectations of university life might have contributed to such emotional fluctuations.

5.4.10.2. Experiment 2

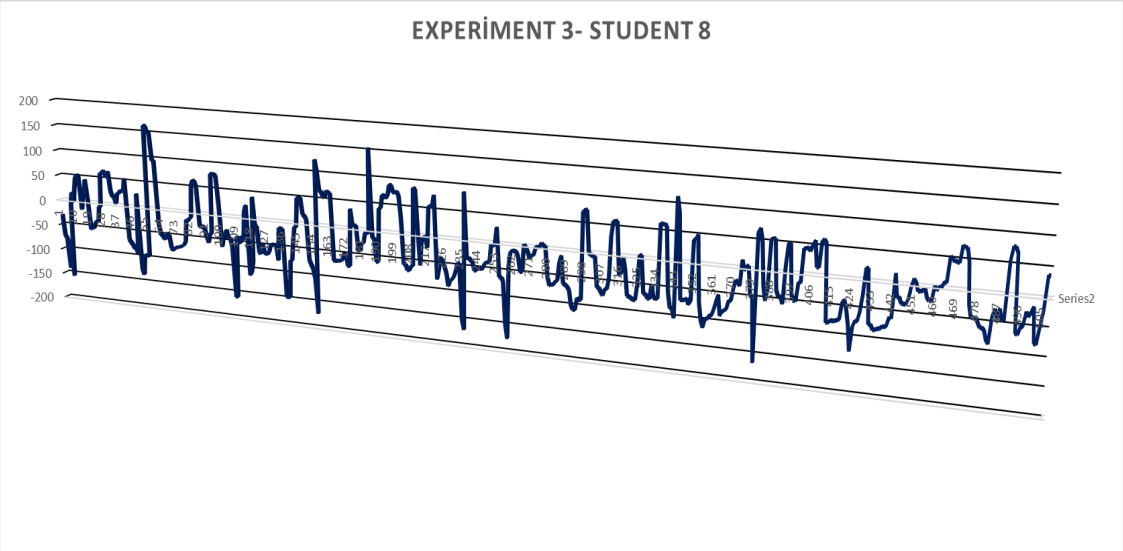
In this section, we delved into the emotional shifts experienced by a male student from Akdeniz University during his second experiment, where he used 2D software for sketching. Over the course of this experiment, we collected a comprehensive dataset consisting of 510 unique emotional data points. This dataset allows for a detailed analysis of his emotional changes throughout the process.



Based on the data from the 8th student's 2nd experiment, the dominant mood of the student seems to lean predominantly negative; emotions such as "Upset", "Depressed", "Sad", and "Stressed" appear quite frequently. However, there are also positive sentiments like "happy" and "excited", but their occurrence is relatively infrequent compared to the negative ones. Analyzing from the perspective of angle values, negative values typically correspond with negative emotions, while positive values largely align with negative emotions as well, albeit with some exceptions. The student's emotional shifts are frequent and significant, especially oscillating among negative feelings. This could indicate that the student struggles to maintain emotional balance and might be facing sources of stress either in university life or personal matters. Overall, this data provides insight that the general emotional state of the student is quite volatile and predominantly negative. The impact of being a student at Akdeniz University on this situation or other potential factors is hard to conclude as there's no data on that. However, this analysis suggests that there might be a need for support or assistance to improve the student's emotional well-being.

5.4.10.3. Experiment 3

In this investigation, we delve into the emotional shifts encountered by a male student from Akdeniz University during his third experiment. As he interacted with a 3D drawing program, we collected a total of 510 distinct emotional data entries.



Based on the provided experimental results of the student, the emotional shifts span a wide spectrum. Dominant moods like 'Calm', 'Relased', and 'Contented' stand out, indicating that the student is generally in a calm and relaxed state of mind. However, there are also reactions with high values such as "alert" and "excited". Notably, positive emotions like 'happy' and 'excited' are frequently observed. Nevertheless, we also notice the emergence of negative emotions like 'Sad', 'Depressed', and 'Bored' at times. To determine a definitive relationship between angles and moods, more analytical data would be required. In general, we can say that the student predominantly experienced positive emotions during the 3D drawing experiment. This suggests that the 3D drawing experience for this student might be challenging yet emotionally gratifying and dynamic.

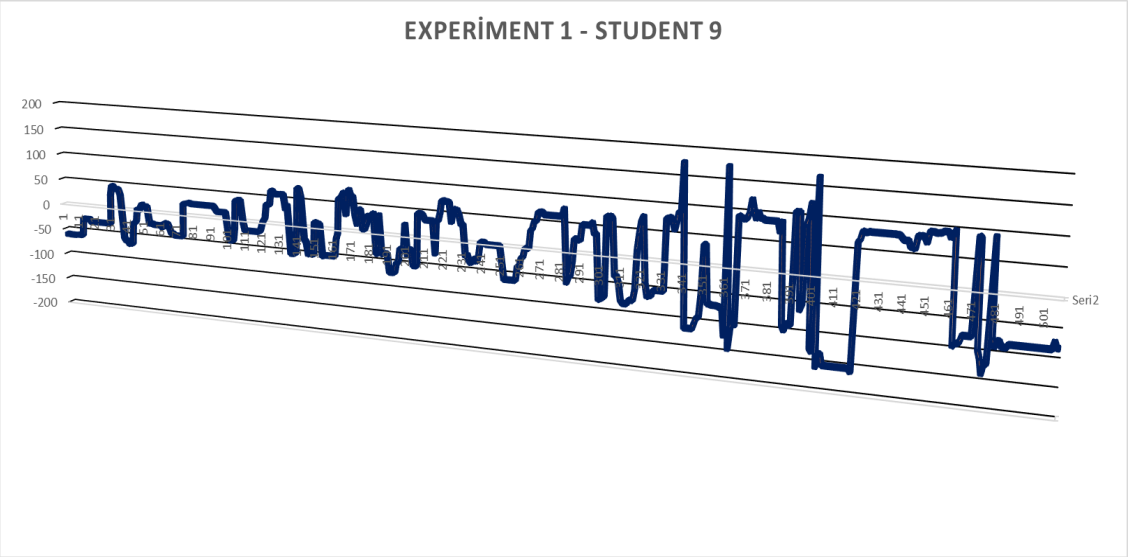
5.4.10.4. Experiment Analysis

Upon examining the experiment analysis, we can observe that the 8th student experienced emotional shifts across all three experiments. In the first experiment, the dominant emotional tendency of the student was observed to be "Sad", while in the second experiment, the student's emotional state was predominantly negative; emotions such as "Upset", "Depressed", "Sad", and "Stressed" were frequently observed. However, the third experiment indicates that the student was generally in a positive state of mind. This could suggest that even though the 3D drawing experience might have been challenging for the student, it was emotionally gratifying and dynamic. In a general assessment, we can infer that out of the three experiments, the third one was where the student felt the happiest. While these results don't conclusively determine the impact of being a student at Akdeniz University on these emotional reactions, they do suggest that university life could contribute to emotional fluctuations.

5.4.11. Student 9

5.4.11.1. Experiment 1

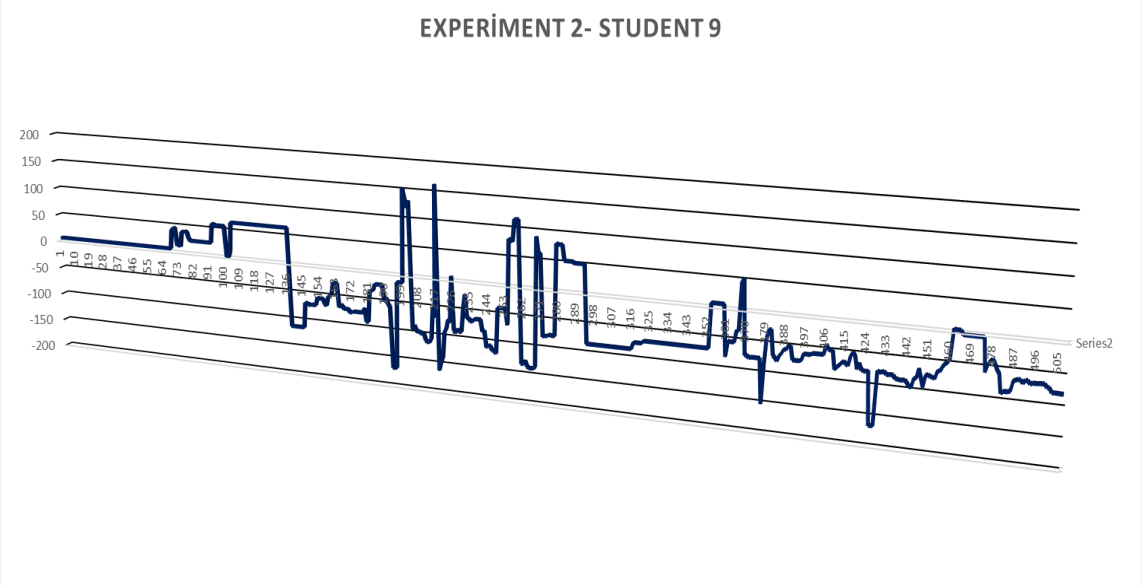
In this section, we have analyzed the emotional fluctuations observed in a male student studying at Akdeniz University during his initial experiment. Over the course of the study, we amassed a total of 510 emotional data points. These data points were acquired while the student was actively involved in manual drawing.



In the 9th student's first experiment, the most dominant emotion felt is "Calm", which is frequently observed alongside emotions like "Relased" and "Contented". However, positive feelings such as "happy", "excited", and "alert" also prominently emerge. Negative emotions like "Upset", "Bored", "Depressed", and "Sad" appear when angle values typically vary between -100 and 100. There's a noticeable relationship between angle values and emotions; specifically, negative angle values are often associated with feelings of calmness and relaxation, while positive values relate more to emotions of excitement and alertness. However, we also observe some negative emotions appearing at positive angle values. Being male and studying at Akdeniz University might influence the emotional fluctuations observed in the experiment.

5.4.11.2. Experiment 2

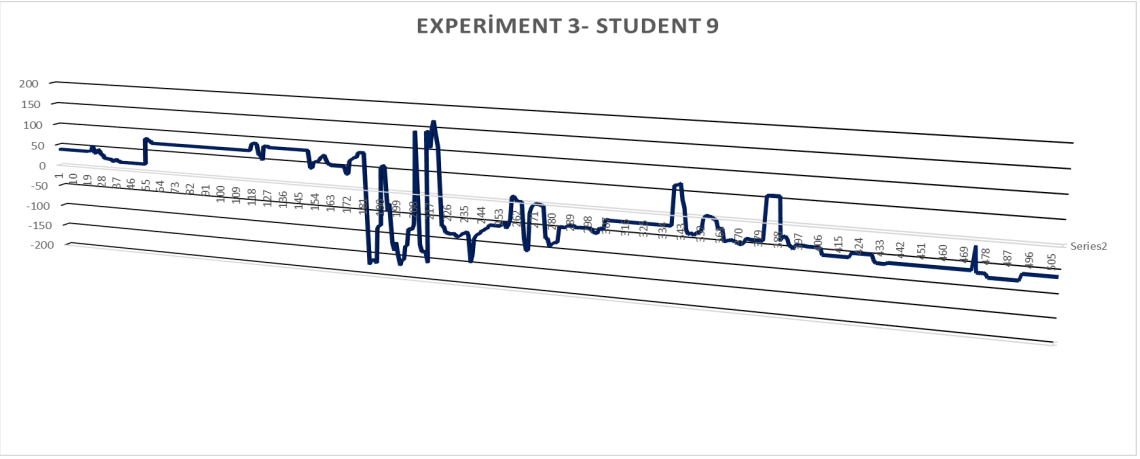
In this segment, we explored the emotional fluctuations encountered by a male student from Akdeniz University during his second experiment, which involved utilizing 2D software for sketching. Throughout the duration of this experiment, we amassed a comprehensive dataset comprising 510 distinct emotional data points. This dataset provides the opportunity for a thorough analysis of his emotional transitions throughout the process.



In the 9th student's second experiment, we can predominantly see the emotion "Calm" taking precedence. Alongside this state of calmness, positive emotions such as "happy", "excited", and "alert" are also frequently observed. However, some negative emotional states are present; specifically, emotions like "Bored", "Sad", and "Depressed" are experienced at certain times. When considering the relationship between angles and emotions, negative angle values can generally be associated with negative emotions, while positive angle values can be linked with positive emotions. This suggests that the angles used in the 2D drawing program can be directly correlated with emotional states. Additionally, we can observe sudden shifts in emotional states at specific times, for example, transitioning rapidly from calmness to a state of stress or sadness. This might indicate that the student was exposed to certain triggers or experienced an internal change in state during the experiment.

5.4.11.3. Experiment 3

In this study, we explore the emotional changes experienced by a male student from Akdeniz University during his third experiment. Throughout his interaction with a 3D drawing program, we gathered a total of 510 unique emotional data entries.



Based on the data, it appears that the student's dominant emotion throughout the experiment was "excited", suggesting that the student was generally in an enthusiastic state. Additionally, the emotion "alert" frequently emerged, indicating that the student was attentive and alert. Among the positive emotions, "happy" was commonly observed. However, during the experiment, the presence of negative emotions, such as "sad", "depressed", and "bored", was also evident. While angle values were generally concentrated in positive values (above zero), some negative emotional responses are associated with negative angle values. In particular, higher negative angle values might represent moments when the student experienced more intense negative emotional reactions. It can be inferred that the student had a generally positive experience while drawing with the 3D program during the experiment, but encountered some moments of negative emotional reactions. This might be interpreted as the student generally enjoying drawing with the 3D program but experiencing negative emotions when faced with certain challenges or obstacles. Additionally, factors such as the student studying at Akdeniz University and being male might influence emotional responses, though it's not possible to directly measure their impact with this dataset.

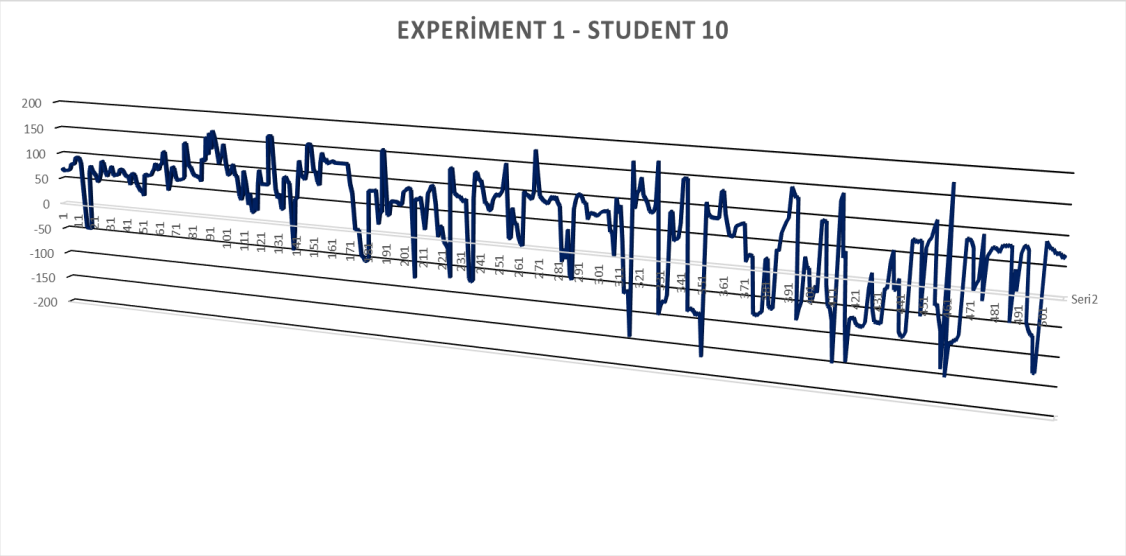
5.4.11.4. Experiment Analysis

Within the scope of the experiment analysis, when we examine the emotional responses of the 9th student across three experiments; in the first experiment, we observe that the dominant emotion is "Calm", suggesting the student was generally in a tranquil state. This calmness continues into the second experiment, though accompanied by positive emotions, some negative emotional responses are also observed. In the third experiment, it appears the student was primarily "excited", indicating that they generally enjoyed the experience of 3D drawing. However, it can be inferred that they felt negative emotions when faced with certain challenges. The relationship between angle values and emotions suggests that negative angle values are associated with feelings of calmness and relaxation, while positive values correlate with excitement and alertness. While the student's male gender and attending Akdeniz University might hint at a potential influence on emotional responses, we would require additional data to draw definitive conclusions from this experiment. In a general conclusion, we can say that among the three experiments, the student was happiest during the third experiment, which involved the 3D drawing program.

5.4.12. Student 10

5.4.12.1. Experiment 1

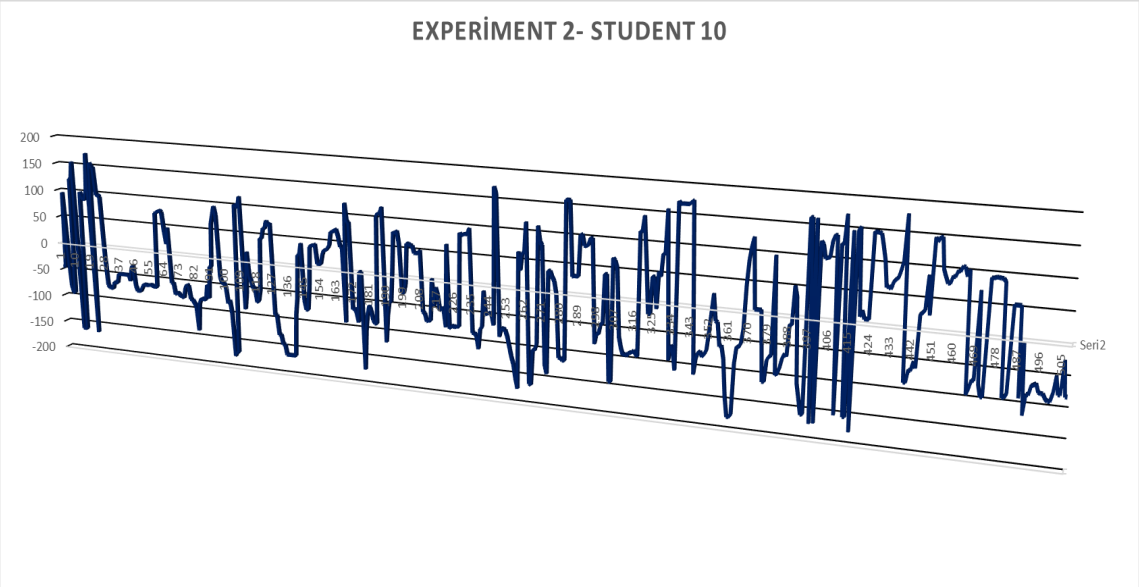
In this section, we have analyzed the emotional fluctuations observed in a male student studying at Akdeniz University during his initial experiment. Over the course of the study, we amassed a total of 510 emotional data points. These data points were acquired while the student was actively involved in manual drawing.



Based on the results of the student's first experiment, the dominant emotion is frequently observed as "alert." Among positive emotions, feelings such as "excited" (enthusiastic), "happy" (pleased), and "contented" (satisfied) are commonly encountered. However, negative emotions draw attention, with emotional responses like "nervous" (tense), "upset" (distressed), "bored" (uninterested), "sad" (downhearted), and "depressed" (disheartened). Particularly, positive angle values (values above 0) are generally associated with the "alert" emotion, whereas high positive values can be linked with feelings of "nervous" and "stressed." Negative angle values, on the other hand, are usually related to emotions like "relaxed," "calm," "contented," and in deeper negative values, the "depressed" feeling. Throughout the experiment, the student typically remained alert and attentive. However, at certain moments, possibly due to challenges faced in the drawing process, the student exhibited negative emotional responses like tension and stress. The fact that the student studies at Akdeniz University and is male could influence their emotional responses during the experiment. However, determining the exact direction and extent of this influence is challenging based solely on this data set.

5.4.12.2. Experiment 2

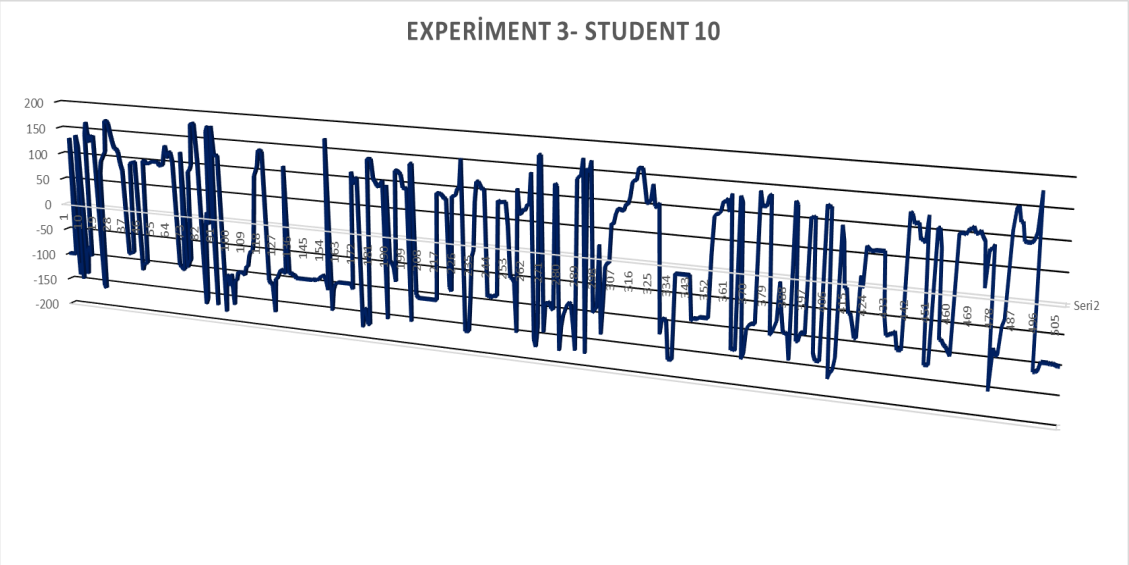
In this section, we have examined the emotional variations experienced by a male student from Akdeniz University during his second experiment, where he utilized 2D software for sketching. Over the course of this experiment, we collected a comprehensive dataset consisting of 510 unique emotional data points. This dataset enables a detailed analysis of his emotional transitions throughout the process.



Considering that this student's experiment was conducted using a 2D program, upon examining their emotional responses, we can observe that the dominant emotional reactions are primarily "Calm" and "Relaxed." This indicates that the student maintained a calm and relaxed emotional state for a significant portion of the experiment. Alongside this, there are negative emotional reactions such as "Upset," "Bored," and "Sad," but these negative responses tend to be observed for shorter durations. Among the positive responses, there are feelings like "happy" and "excited," suggesting that certain parts of the experiment were enjoyable for the student. However, some larger angle values may lead to negative emotional responses (like feeling stressed or sad), while others can result in positive emotional reactions (such as excitement).

5.4.12.3. Experiment 3

In this study, we investigate the emotional changes experienced by a male student from Akdeniz University during his third experiment. We collected a total of 510 distinct emotional data entries as he interacted with a 3D drawing program.



In the student's drawing experiment using the 3D program, we predominantly observe negative emotional responses. Dominant emotions include "Bored", "Depressed", and "Sad", indicating that the student was generally in a negative emotional state during the drawing process. However, there are also intermittent positive emotional reactions such as "alert", "happy", and "excited". Looking at the angle values, we can see that negative emotions generally align with negative angle values, while positive emotions match positive angle values, with some exceptions. The student appears to experience frequent mood swings during this experiment. This suggests that the 3D drawing process was both challenging and occasionally satisfying for the student. Additionally, to determine the extent to which the student's gender and university influenced these mood changes, a more comprehensive study would be needed. In general, it can be said that the student predominantly felt negative emotions during the 3D drawing experiment, with sporadic experiences of positive emotions.

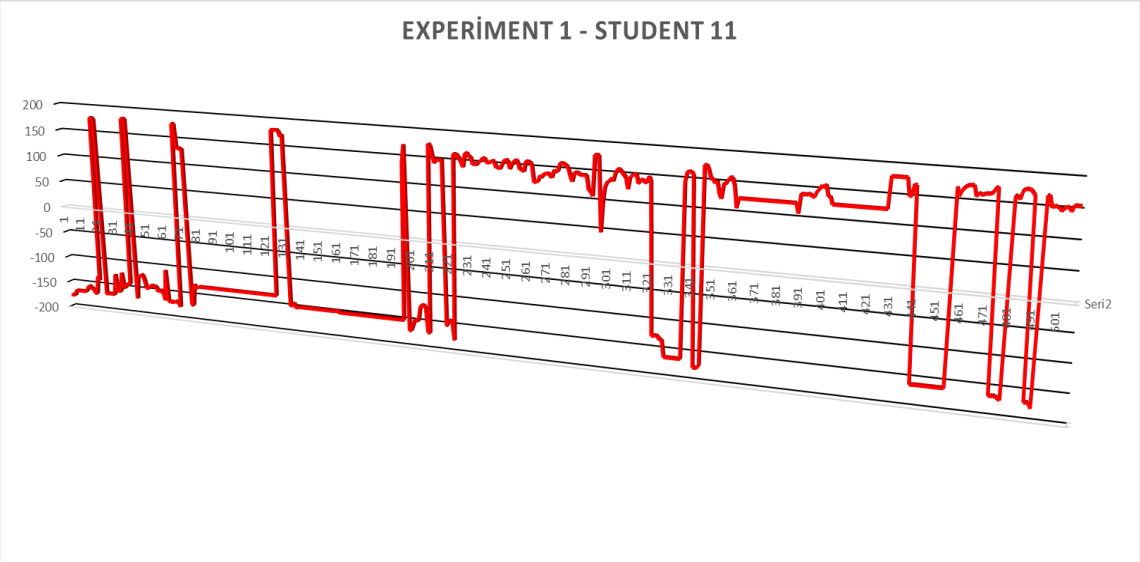
5.4.12.4. Experiment Analysis

Throughout the three different experiments, the student's emotional responses have shown variability. In the first experiment, the student predominantly experienced an "alert" emotion, occasionally displaying positive emotional reactions such as excitement, happiness, and contentment. However, due to challenges encountered, the student also felt negative emotions like stress and tension. In the second experiment, conducted with a 2D program, the student generally felt calm and relaxed. Negative emotional responses in this experiment were of shorter duration, and certain parts of the experiment were enjoyable for the student. In the third experiment, conducted with a 3D program, the student primarily showed negative emotional responses. However, the challenges of the 3D drawing process could also affect the student's emotional fluctuations. When evaluating all three experiments in a general overview, it can be said that the student was overall happier and in a more positive emotional state during the experiment conducted with the 2D program.

5.4.13. Student 11

5.4.13.1. Experiment 1

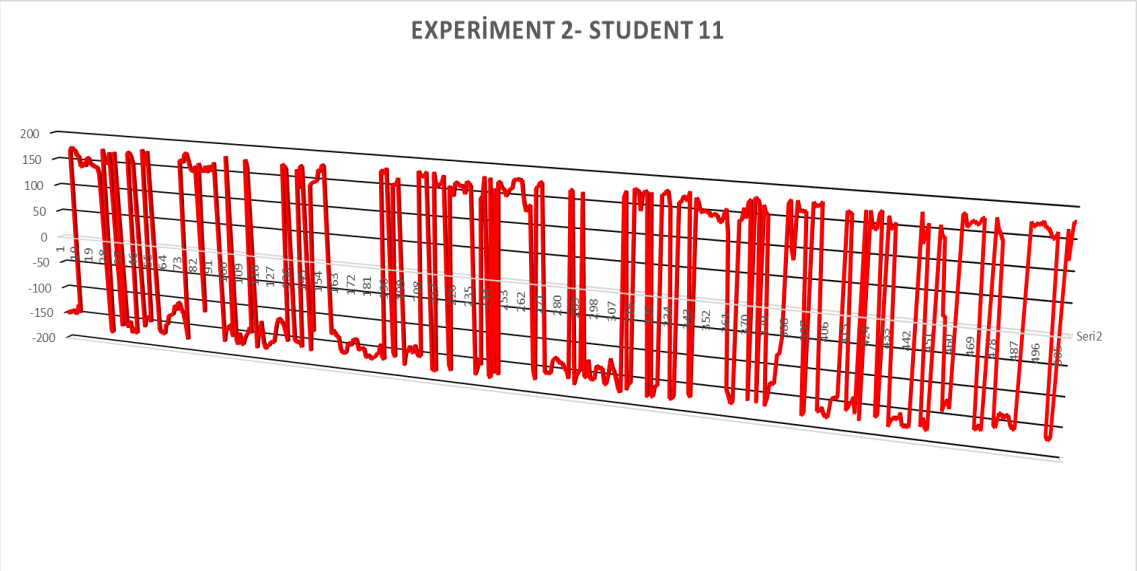
In this section, we have examined the emotional variations experienced by a female student enrolled at Akdeniz University during her first experiment. Throughout the study, we collected a total of 510 emotional data points. This data was gathered while the student was actively engaged in manual drawing.



During the first experiment of the 11th student, the most dominant emotion appears to be "Sad." Alongside this, emotions such as "Depressed" and "Upset" are frequently observed, indicating that the student generally exhibited negative emotional reactions during the experiment. The only positive emotion mentioned is "excited," which appears only once, suggesting that the student had very few positive emotional responses during the experiment. The angles are predominantly in the negative range, reflecting the continuity of the student's negative emotional state. However, emotions like "Upset" and "stressed" have also been observed with some positive angle values. This indicates that the student underwent some mood changes during the experiment but was generally in a negative emotional state. We can infer that this female student from Akdeniz University predominantly had negative emotional reactions during the experiment. This could be related to the content of the experiment, her personal experiences, or her current mood. However, a deeper analysis would require more information and context.

5.4.13.2. Experiment 2

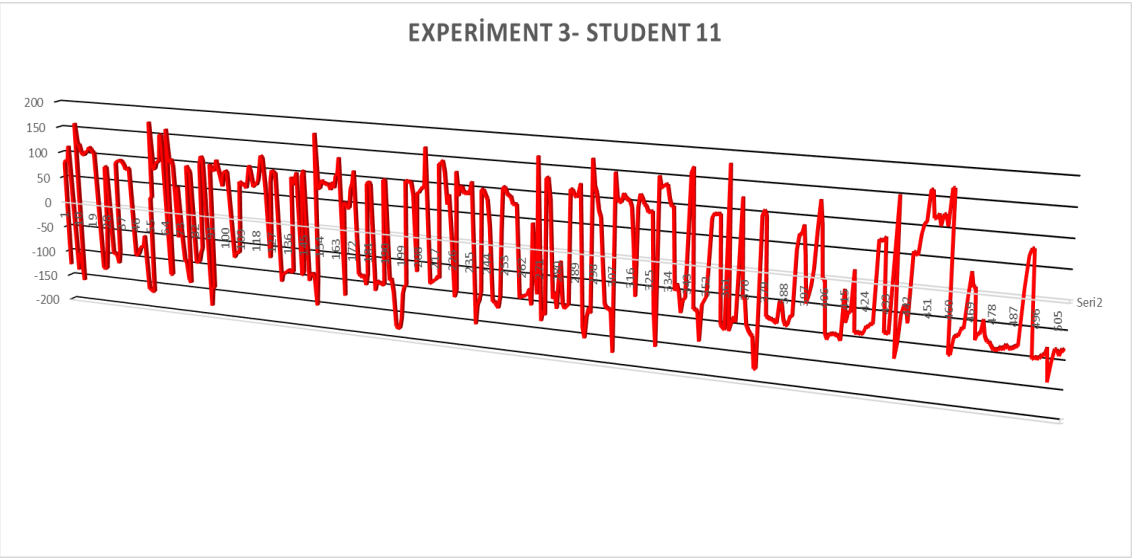
In this section, we have delved into the emotional shifts experienced by a female student from Akdeniz University during her second experiment, where she utilized 2D software for sketching. Throughout this experiment, we gathered a comprehensive dataset consisting of 510 unique emotional data points. This dataset provides the opportunity for a thorough analysis of her emotional transitions throughout the process.



Upon reviewing the overall experimental results of the student, the dominant emotion appears to be "Upset." Additionally, we can say that negative emotions ("Sad," "Depressed," "Stressed") tend to be more prevalent than positive emotions ("Happy," "Relaxed," "Alert"). This suggests that the student was generally in a negative mood. Based on the angle values, we observe that negative emotions usually fall between -180 to 0 degrees, while positive emotions lie between 0 to 180 degrees. This indicates that the angles play a significant role in determining the emotional state. We can infer that this female student from Akdeniz University predominantly had a negative emotional disposition, and the experiment clearly reflected this emotional state.

5.4.13.3. Experiment 3

In this analysis, we explore the emotional shifts experienced by a female student from Akdeniz University during her third experiment. As she engaged with a 3D drawing program, we recorded a total of 510 unique emotional data entries.



When this student is drawing using the 3D program, we can observe that they generally experience a negative emotional state. Dominant emotions include "Bored", "Calm", and "nervous". This indicates that the student was both bored and felt tension at certain moments during the experiment. The emotion "Calm" might suggest moments when the student felt at ease. Positive emotions such as "happy" and "excited" are observed, but their frequency is less compared to negative emotions. It could be inferred that the student might generally be under pressure or stress while drawing, possibly due to the complexity of the program or certain expectations. However, this is just an interpretation based on the data and might not fully reflect the student's true emotional state and experience.

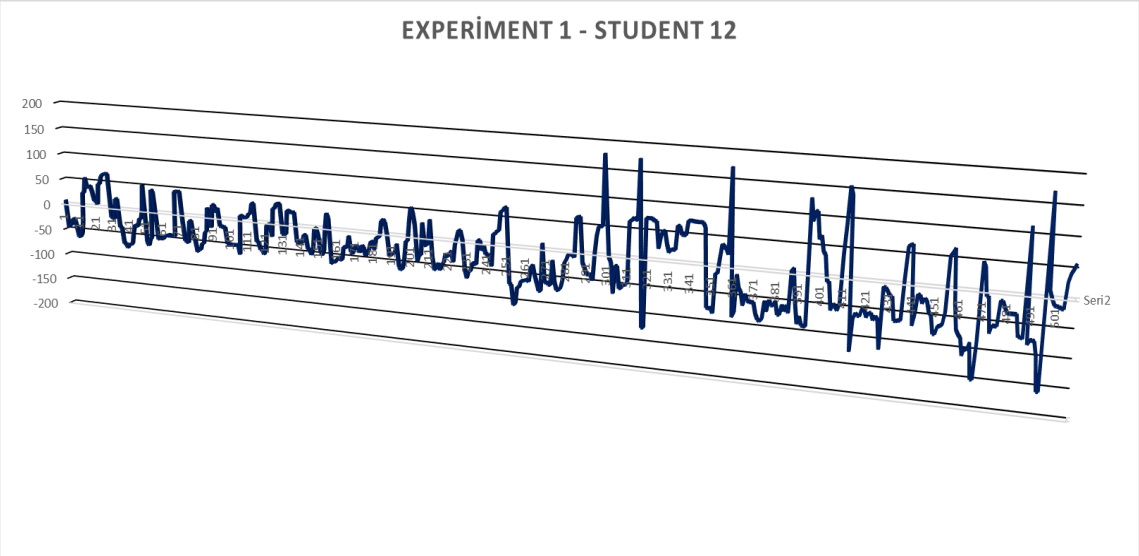
5.4.13.4. Experiment Analysis

Based on the experiment analysis, we can observe that the 11th student generally experienced a negative emotional state throughout the three experiments. In the first experiment, the dominant emotion observed was "Sad", while in the second experiment it was "Upset", and in the third, the emotion "Bored" was prominent. Positive emotional responses were relatively infrequent across all three experiments. However, when comparing between these three experiments, we can say that the second experiment elicited the most positive emotional responses from the student. Positive emotions such as "Happy" and "Relaxed" were observed more frequently in the second experiment. We can conclude that this student from Akdeniz University typically displayed a negative emotional state during the experiments, but showed slightly more positive emotional responses during the second experiment.

5.4.14. Student 12

5.4.14.1. Experiment 1

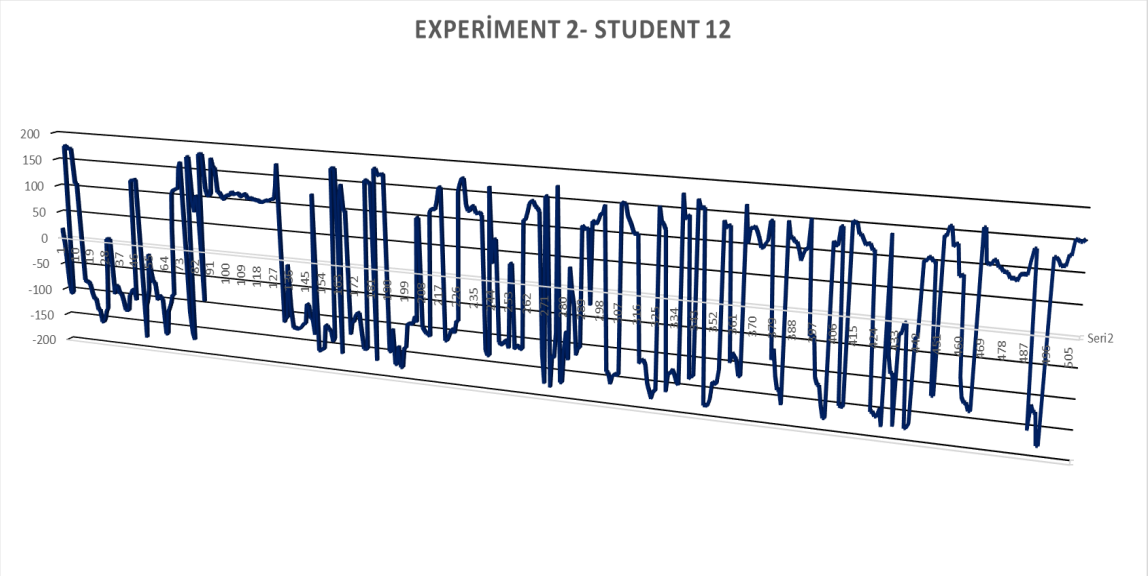
In this segment, we have explored the emotional fluctuations of a male student enrolled at Akdeniz University during his initial experiment. Throughout the duration of the study, we gathered a total of 510 emotional data points. These data points were collected while the student was actively participating in manual drawing.



Based on the results of the student's first experiment, this student generally exhibited negative emotional responses during the experiment. Among the dominant emotions, reactions such as "Calm", "Relaxed", and "Contented" were observed, while extreme emotional responses included "Depressed" and "Sad". Additionally, positive emotional reactions like "Excited", "Happy", and "Alert" were also noted. When examining the angle values, emotions with negative angles suggest that the student typically maintained a negative emotional state throughout the experiment, whereas emotions with positive angles indicate moments of positive emotional responses from the student. The relationship between the angles and emotions serves as a significant indicator in understanding the student's emotional shifts and reactions during the experiment. Overall, we can say that this male student from Akdeniz University generally remained in a negative emotional state during the experiment but exhibited positive emotional reactions at certain moments.

5.4.14.2. Experiment 2

In this segment, we've explored the emotional fluctuations encountered by a male student from Akdeniz University during his second experiment, where he used 2D software for sketching. Throughout the duration of this experiment, we collected a comprehensive dataset comprising 510 unique emotional data points. This dataset allows for a detailed analysis of his emotional changes throughout the process.

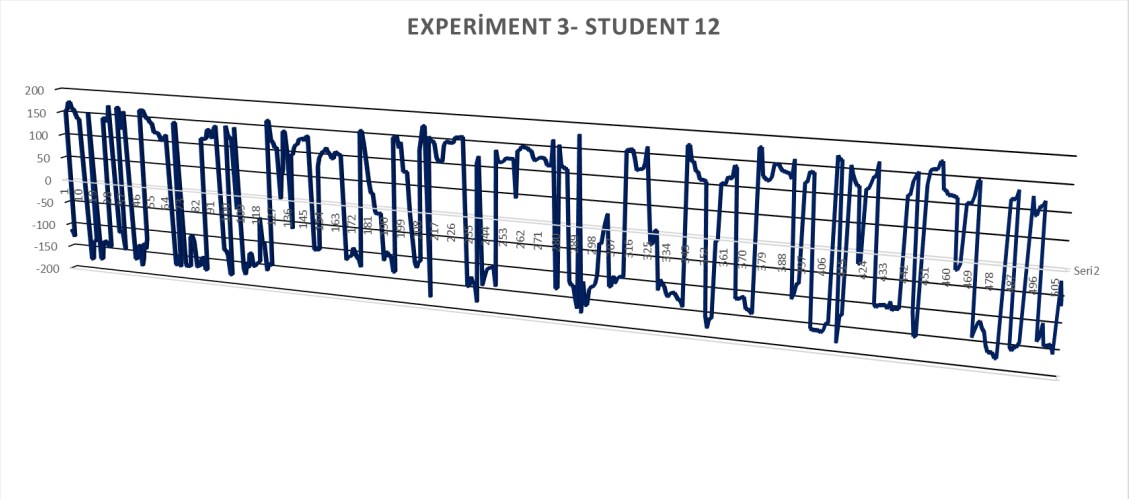


Analyzing the emotional shifts of the 12th student during their second experiment, the dominant emotion seems to be "nervous". We observe that this student felt this emotion multiple times throughout the second experiment. Furthermore, emotions such as "stressed" and "upset" also frequently recur. When looking at the positive emotions, we can see that the student experienced feelings of "happy", "excited", and "alert". However, these positive feelings are fewer in number compared to the negative ones. A clear relationship can be established between angle values and emotions: Positive angle values are generally associated with more positive or neutral emotions, while negative angle values are often linked with more negative emotions. However, it's important to

note that this relationship isn't absolute, and there are some exceptions. In summary, this student appears to have predominantly felt tense and stressed during the experiment. The emotional fluctuations experienced by this male student studying at Akdeniz University might have been triggered by the drawing done with the 2D program, or it could be attributed to other factors.

5.4.14.3. Experiment 3

In this section, we have explored the emotional fluctuations encountered by a male student from Akdeniz University during his second experiment, where he used 3D software for sketching. Throughout the duration of this experiment, we collected a comprehensive dataset comprising 510 unique emotional data points. This dataset allows for a detailed analysis of his emotional changes throughout the process.



Analyzing the emotional transitions of the 12th student in the 3rd experiment, who is a male student studying at Akdeniz University and underwent a test using a 3D program, it's evident that negative emotions such as "stressed," "upset," and "depressed" predominantly stand out. This might indicate that the student faced challenges or felt stressed while working with the 3D program. Upon examining positive emotions, we notice that feelings like "happy" and "contented" appear infrequently. The angle values, which are predominantly negative, showcase a significant shift among these emotional responses. Specifically, the negative angles typically imply that the student felt negative emotions. The relationship between angles and emotions suggests that the angles are generally negative and these negative angles correlate with the negative emotions. The student's overall emotional state during the experiment appears to be predominantly stagnant and negative. However, it's essential to note that there were moments of positive emotions throughout the process. In summary, during this experiment, it seems the student was largely stressed and uncomfortable, but there were moments when he felt positive emotions as well.

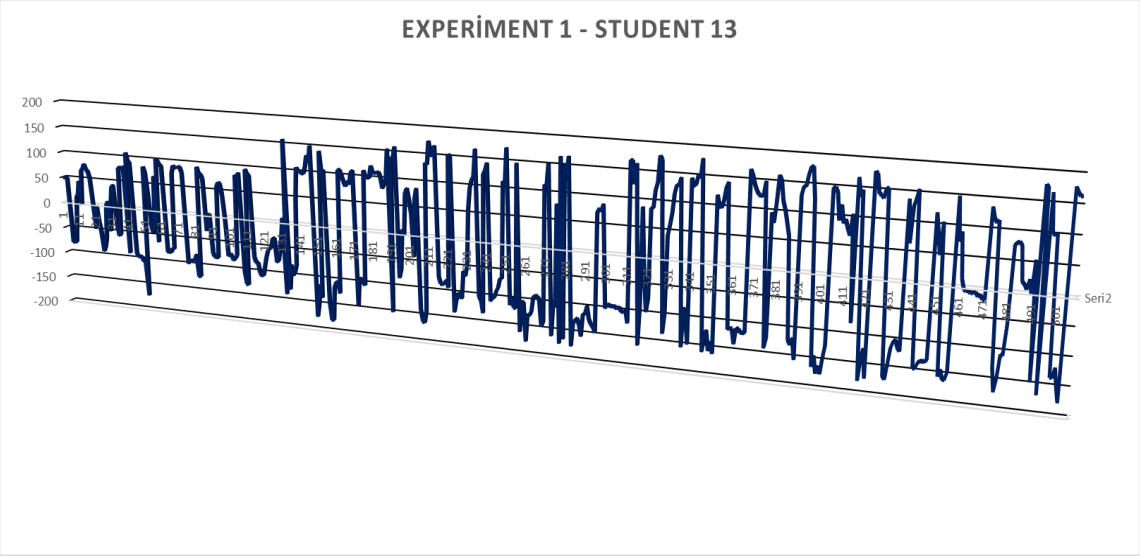
5.4.14.4. Experiment Analysis

In the experiment analysis, we examined the emotional responses of a male student studying at Akdeniz University across three distinct experiments. In the first experiment, despite the student primarily displaying negative emotional responses, relatively positive reactions such as "Calm", "Relaxed", and "Contented" were also observed. In the second experiment, the dominant emotion was identified as "nervous", and we observed that the student was mostly under tension and stress during this trial. In the third experiment, which involved the use of a 3D program, the student generally felt negative emotions, but he also exhibited positive emotional responses at specific moments. Evaluating the three experiments as a whole, we can say that the moments when the student was happiest occurred during the first experiment. The student's emotional responses varied depending on the type of experiment and the programs used, but overall, it was observed that he displayed a more balanced and positive mood during the first experiment.

5.4.15. Student 13

5.4.15.1. Experiment 1

In this section, we have delved into the emotional variations experienced by a male student from Akdeniz University during his first experiment, which involved manual drawing. Over the course of the study, we collected a total of 510 emotional data points, enabling a comprehensive analysis of his emotional changes during the process.

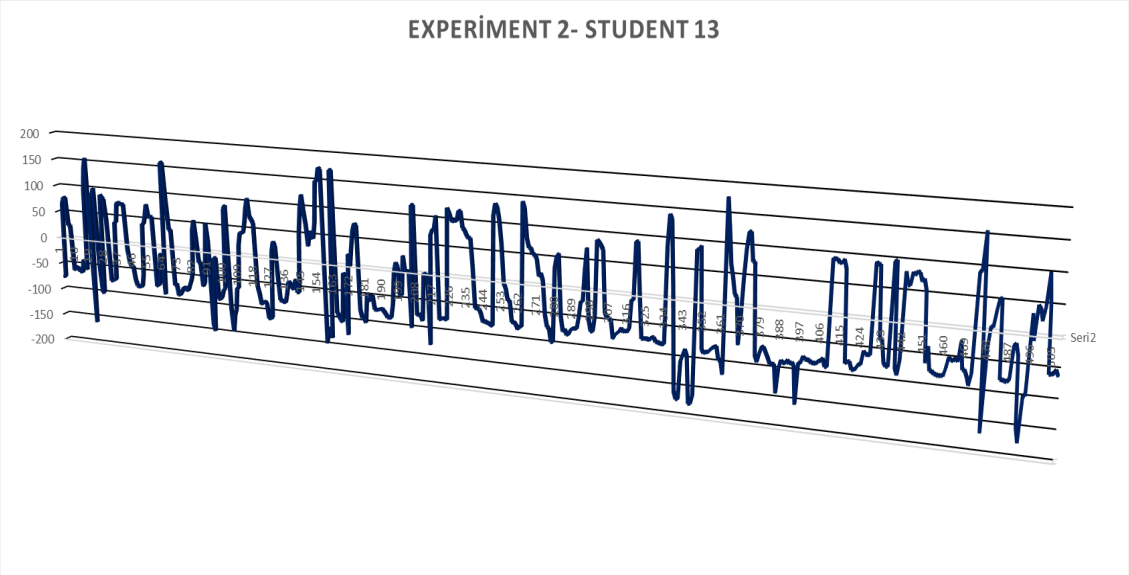


When examining the emotional responses of a male student studying at Akdeniz University during his first experiment, it is evident that he generally displayed varied emotional reactions. Dominant emotions such as "nervous", "stressed", and "alert" emerge frequently. This suggests that the student was broadly tense during the experiment and maintained a heightened level of alertness. On the positive side, emotions like "happy", "excited", and "alert" are observed. However, the existence of negative emotional reactions such as "Depressed", "Sad", and "Upset" indicate that the experiment had a negative impact on the student at certain moments. Additionally, during this

experiment, the student's emotional responses changed often, and we believe these fluctuations may relate to challenges, failures, or successes in the drawing process. In summary, the student displayed both positive and negative emotional reactions throughout the experiment, and these reactions can be linked to the nature of the experiment and the student's experiences during it.

5.4.15.2. Experiment 2

In this section, we have analyzed the emotional fluctuations observed in a male student studying at Akdeniz University during his second experiment, where he used 2D software for sketching. Throughout the course of this experiment, we collected a comprehensive dataset comprising 510 unique emotional data points. This dataset allows for a detailed analysis of his emotional transitions throughout the process.

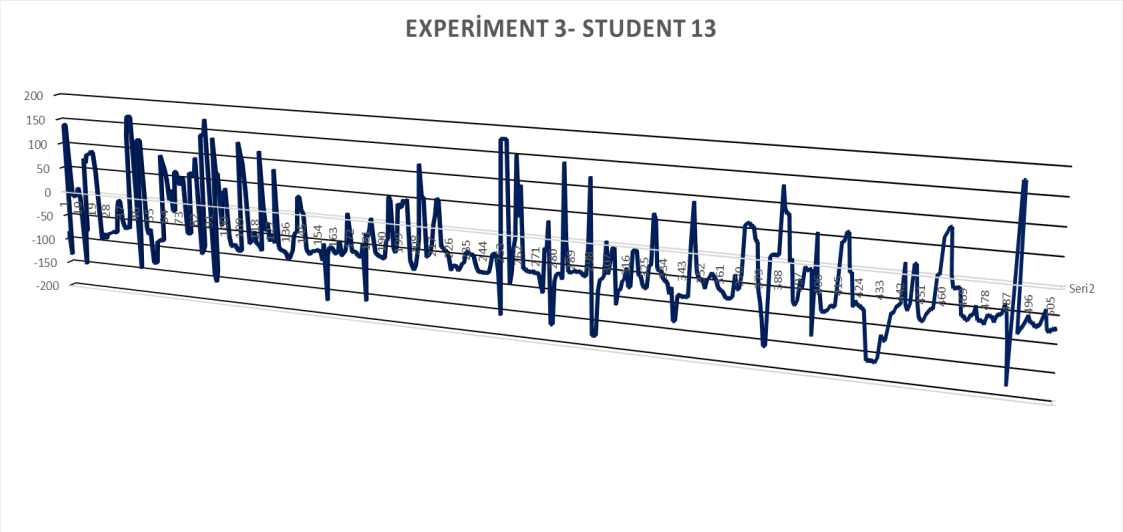


During the 13th student's 2nd experiment, it is observed that the dominant emotion experienced was "Calm". Furthermore, the student frequently felt emotions such as "Relaxed" and "alert". Looking at positive emotions, "happy" and "excited" feelings are prominently present. Emotional shifts typically occurred from calmness to alertness or states of relaxation. When attention is drawn to the relationship between angles and emotions, negative values are generally associated with calm and relaxed emotions, while positive values are linked to feelings of alertness, excitement, and stress. It's noted that during the 2nd experiment where the student was drawing with a 2D program, he experienced the emotion "Calm". As an additional note, no data has been provided regarding whether the gender of this student and the university he attends influenced the emotional shifts during the experiment. However, it should be kept in mind that various factors (e.g., individual differences, daily life, stress level) might affect emotional shifts in such experiments.

5.4.15.3. Experiment 3

In this section, we've examined the emotional changes experienced by a male student from Akdeniz University during his second experiment, where he utilized 3D

software for sketching. Throughout the duration of this experiment, we collected a comprehensive dataset comprising 510 unique emotional data points. This dataset allows for a detailed analysis of his emotional shifts throughout the process.



Based on the data obtained from the student's experiment, the dominant emotion is typically observed as "Calm". This suggests that the student usually maintains a calm demeanor. Among the positive emotions, "happy" and "excited" frequently emerge, indicating that the student provides positive emotional responses. However, negative emotional reactions such as "Sad", "Depressed", and "Bored" are also present, signaling that there are fluctuations in emotions. Regarding angle values, negative values can generally be associated with negative emotions, while positive values can be linked to positive emotions. However, this trend is not always consistent. For instance, high positive values can also be associated with negative emotions like "stressed" and "upset". In conclusion, considering that the student is male and studies at Akdeniz University, we can suggest that these results may reflect how a male student copes with the stresses and challenges of university life. Additionally, the emotional shifts experienced while doing 3D drawings might reflect the student's interest in or reaction to this activity.

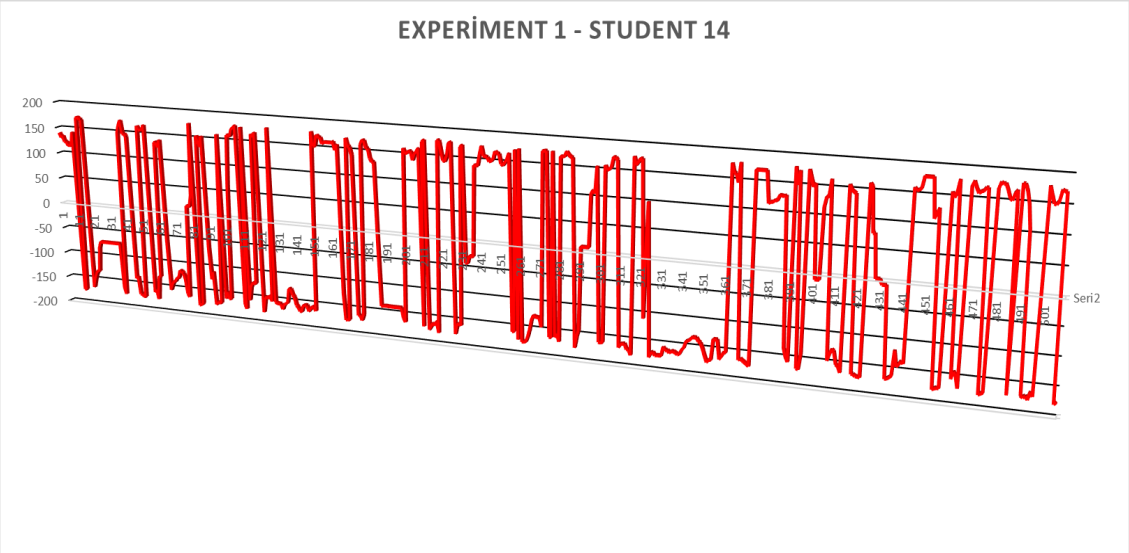
5.4.15.4. Experiment Analysis

When examining the emotional responses of a male student at Akdeniz University across three different experiments, it's evident that during the first experiment, he displayed a wide range of emotional reactions. The student generally felt tense and maintained a heightened state of alertness throughout the experiment. In the second experiment, the dominant emotion was identified as "Calm", and while drawing with a 2D program, he exhibited a more tranquil emotional state. In the third experiment, which involved 3D drawing, the prevailing emotion was again identified as "Calm". However, this experiment also revealed pronounced negative emotional reactions alongside the positive ones. Comparing all experiments, it can be concluded that the student was happiest during the second experiment when working with the 2D drawing program. This analysis reflects how the student copes with the stresses of university life and his emotional responses to different drawing techniques.

5.4.16. Student 14

5.4.16.1. Experiment 1

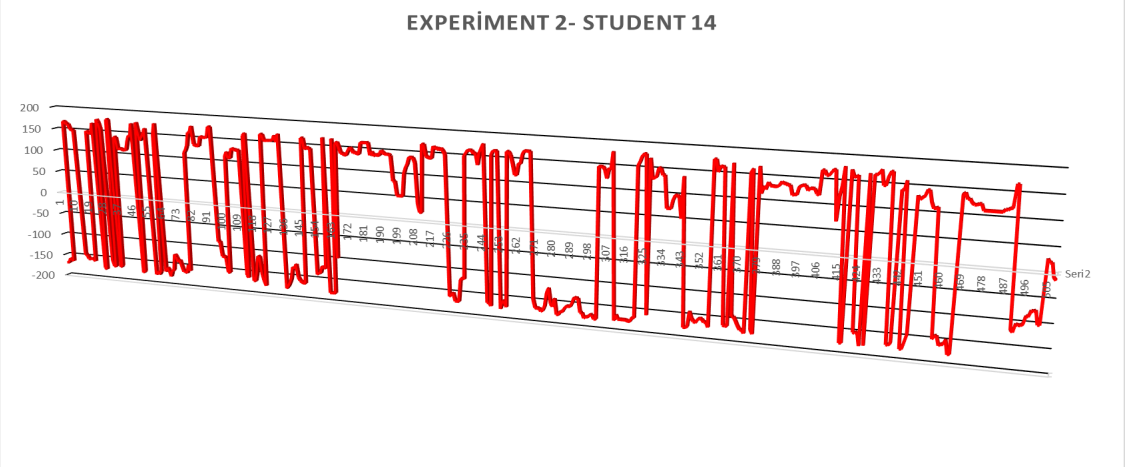
In this section, we have examined the emotional variations experienced by a female student from Akdeniz University during her first experiment, which involved manual drawing. Over the course of the study, we collected a total of 510 emotional data points, allowing for a comprehensive analysis of her emotional changes during the process.



When examining the emotional responses of a female student at Akdeniz University during her first experiment, her dominant emotions are predominantly seen as "Sad" and "Stressed". From a positive emotions perspective, reactions such as "Happy" and "Excited" are present, though in fewer numbers. However, overall, the student displayed negative emotional reactions throughout the experiment. Analyzing the impact of angle values on emotional reactions, it is observed that negative angle values are typically associated with negative emotions (especially "Sad" and "Depressed"), whereas positive angle values are more related to reactions like "Stressed" and "Annoyed". These data suggest that the drawing process may impose certain pressures and challenges on the student, potentially affecting her emotional responses. Additionally, no definitive information is provided regarding whether the student's gender and her enrollment at Akdeniz University have a specific impact on these emotional reactions, but it should be kept in mind that individual differences and daily life experiences might influence her emotional responses during the experiment.

5.4.16.2. Experiment 2

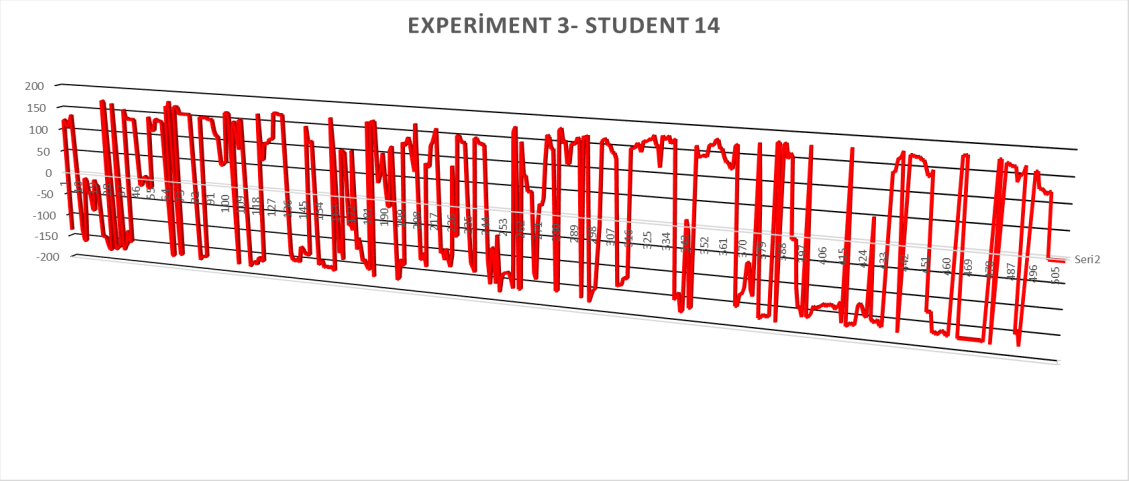
In this section, we have explored the emotional changes that a female student from Akdeniz University underwent during her second experiment, in which she used 2D software for sketching. Over the course of this experiment, we collected a comprehensive dataset comprising 510 distinct emotional data points. This dataset enables a detailed analysis of her emotional shifts throughout the process.



While analyzing the emotional responses displayed by the student during her second experiment, the given values, whether positive or negative, indicate a particular emotional state. Alongside dominant emotions such as "happy" and "satisfied", it's important to remember that there could be other emotional responses during the experiment. Concerning the relationship between angles and emotions, negative angles have generally been associated with negative emotions, while positive angles are linked to positive emotions. Lastly, the fact that this student studies at Akdeniz University and her gender being female may not be definitive in influencing the emotional reactions experienced during the experiment, but individual experiences and perceptions might differ. In summary, this student generally experienced positive emotions while drawing with a 2D program.

5.4.16.3. Experiment 3

In this section, we have examined the emotional fluctuations experienced by a female student from Akdeniz University during her second experiment, where she used 3D software for sketching. Throughout the course of this experiment, we collected a comprehensive dataset consisting of 510 distinct emotional data points. This dataset allows for a detailed analysis of her emotional changes throughout the process.



The student has predominantly experienced negative emotions, which could indicate that she was not comfortable during the experiment or encountered challenges. Dominant emotions primarily manifest as "Sad", "Depressed", and "Upset". However, emotions also categorized as "Contented" are present, suggesting that the student felt positive emotions at certain stages of the experiment. Emotional shifts might have occurred during different phases of the experiment and perhaps in the face of various tasks or challenges. When angles are negative, we can observe that the student feels more negative emotions, and when positive, she tends to lean towards more unsettling emotions.

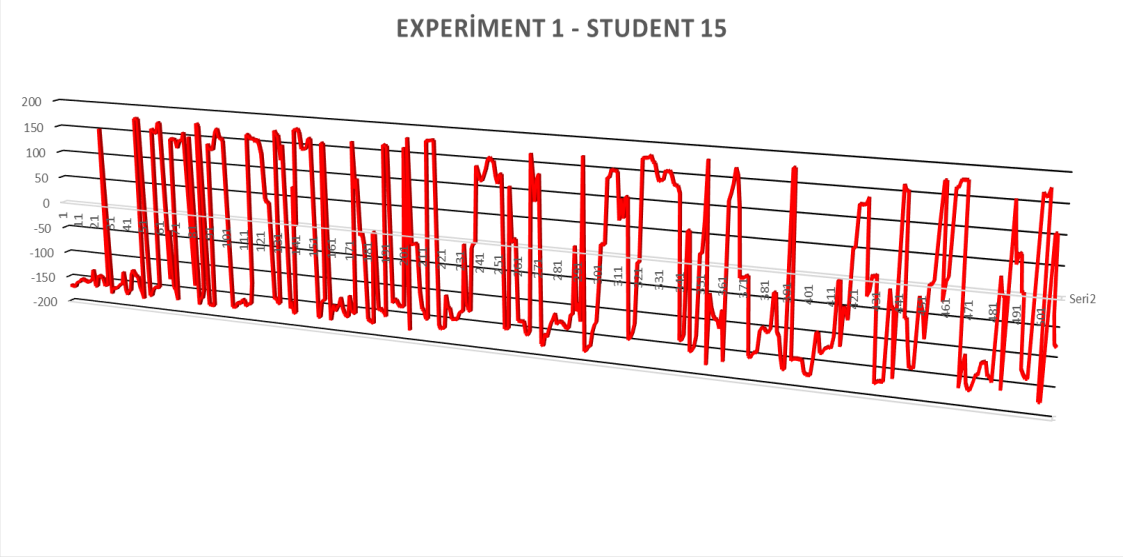
5.4.16.4. Experiment Analysis

Upon analyzing the experiment, the following conclusions have been drawn regarding the emotional responses of a female student studying at Akdeniz University across three different experiments: In the first experiment, the student's predominant emotions were observed to be "Sad" and "Stressed". In contrast, the second experiment saw a prominence of positive emotional responses such as "Happy" and "Contented". In the third experiment, the student primarily exhibited negative emotional responses. When analyzing the correlation between angle values and emotional responses, negative angle values were generally associated with negative emotions, while positive angle values were typically linked to negative emotions as well. Evaluating these three experiments holistically, it is concluded that the second experiment was the one in which the student felt the happiest.

5.4.17. Student 15

5.4.17.1. Experiment 1

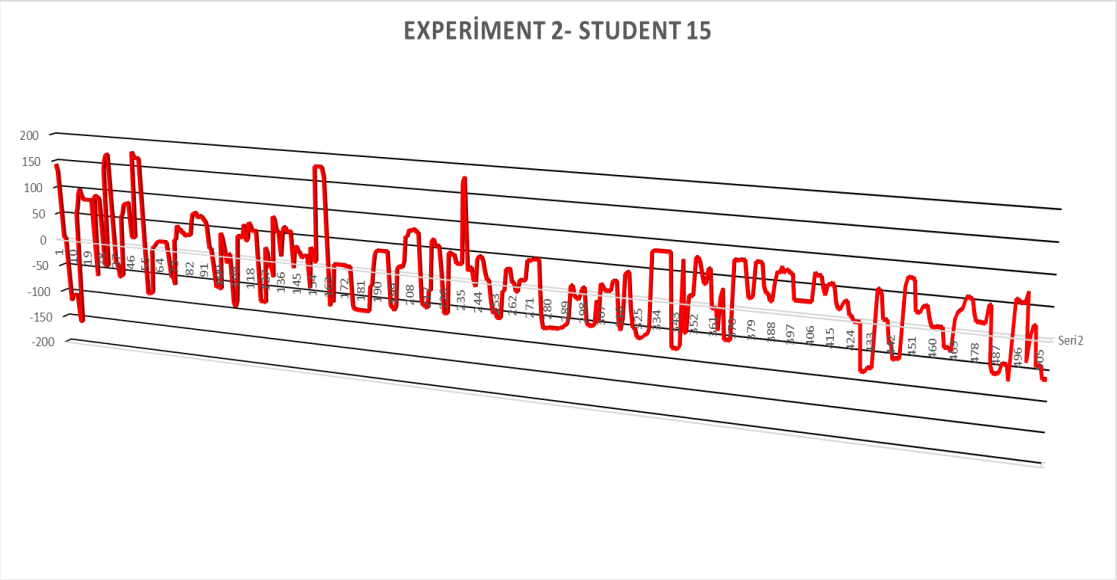
In this section, we have examined the emotional variations experienced by a female student from Akdeniz University during her first experiment, which involved manual drawing. Throughout the study, we collected a total of 510 emotional data points, allowing for a comprehensive analysis of her emotional changes during the process.



Upon examining the emotional changes of the 15th female student studying at Akdeniz University during her first experiment, we can observe that the dominant emotions are generally "Sad" and "Depressed". In addition, positive emotional responses such as "Happy", "Excited", and "Contented" are also present, but these reactions appear less frequently. Emotional shifts occurred several times during the experiment, which could indicate that the student encountered different stages or challenges in the drawing process. When analyzing the relationship between angle values and emotions, we can see that negative angle values ara typically associated with negative emotions, especially emotions like "Sad" and "Depressed".

5.4.17.2. Experiment 2

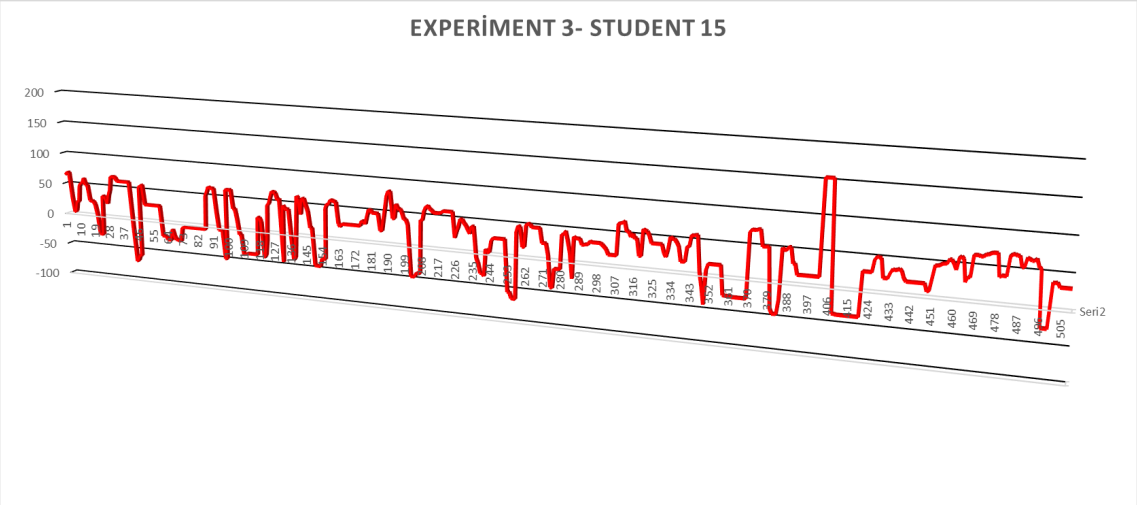
In this section, we have examined the emotional fluctuations experienced by a female student from Akdeniz University during her second experiment, where she utilized 2D software for sketching. Over the course of this experiment, we collected a comprehensive dataset consisting of 510 unique emotional data points. This dataset allows for a detailed analysis of her emotional transitions throughout the process.



During the 15th student's 2nd experiment, dominant emotions such as 'alert', 'excited', 'happy', and 'calm' frequently recur. Among the positive emotions, 'happy', 'excited', and 'alert' are quite pronounced. However, the student also experienced feelings of 'calm' and 'relaxed', indicating moments of relaxation and calmness during certain points. Among the emotional shifts, in addition to positive and calm emotions, negative feelings like 'upset' and 'bored' are also observed, indicating that the student experienced negative emotions at certain moments during the experiment. A more detailed statistical analysis is required to determine if there's a specific relationship between angles and emotions, but higher degree angles generally seem to be associated with more intense emotions like 'alert' and 'upset', while lower or negative angles appear to correlate with calmer or positive emotions like 'calm', 'relaxed', and 'happy'. In general, we can say that this student experienced emotional fluctuations during the experiment, transitioning between both positive and negative feelings.

5.4.17.3. Experiment 3

In this section, we investigated the emotional variations that a female student from Akdeniz University underwent during her second experiment, which involved using 3D software for sketching. Throughout this experiment, we gathered a comprehensive dataset comprising 510 distinct emotional data points. This dataset enables a detailed analysis of her emotional transitions throughout the process.



During the 15th student's 3rd experiment, the student predominantly experienced emotions of "excited" and "alert" throughout the experiment. Positive emotions prominently featured are "happy" and "excited", while an unusual negative emotion observed is "Relased", which might imply relaxation or feeling released. There are also moments when the student felt "Contented". Emotional shifts occurred frequently throughout the dataset, and it appears that the student generally provided a positive emotional response during the experiment. Based on the angles, we can presume that positive values may represent high emotional arousal, and negative values might signify low emotional arousal. Overall, it is observed that the student was emotionally stimulated during the experiment and predominantly displayed positive emotional reactions. We can infer that this female student studying at Akdeniz University had a positive emotional response to drawings made with the 3D program.

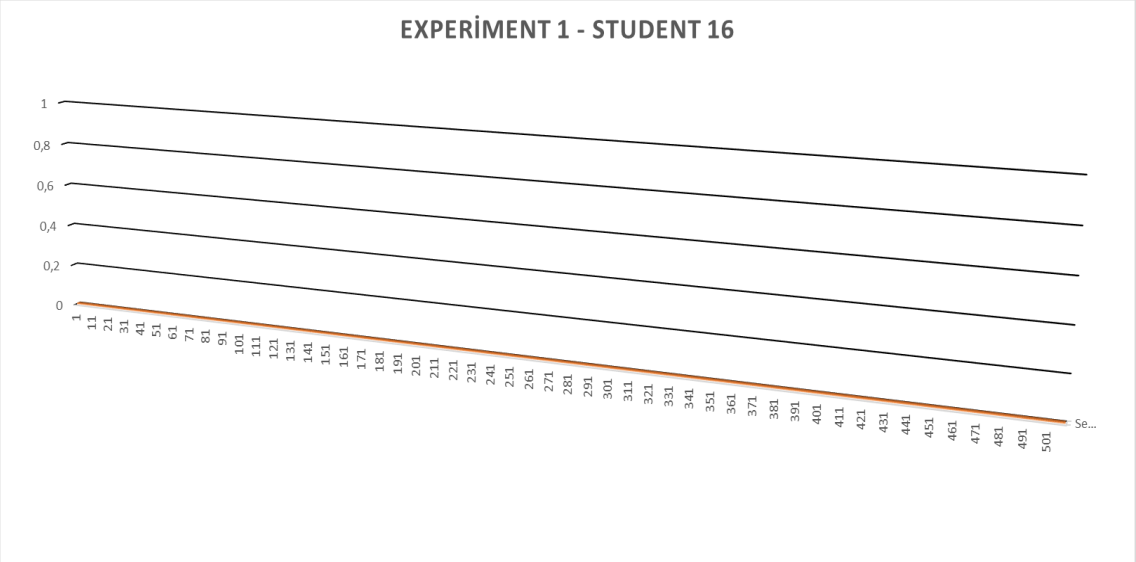
5.4.17.4. Experiment Analysis

Upon examining the emotional responses of the 15th student studying at Akdeniz University across three experiments, we observe that the student predominantly experienced emotions of "Sad" and "Depressed" during the first experiment. In the second experiment, the student displayed a more balanced emotional profile; exhibiting positive responses like "alert", "excited", and "happy", but also experiencing calmer moments of feeling "calm" and "relaxed". In the third experiment, the student predominantly responded with positive emotions such as "excited" and "alert". Comparing the three experiments, based on the student's reaction to the drawings made with the 3D program, we can conclude that she gave the most positive emotional responses in the third experiment, suggesting she was the happiest during that trial.

5.4.18. Student 16

5.4.18.1. Experiment 1

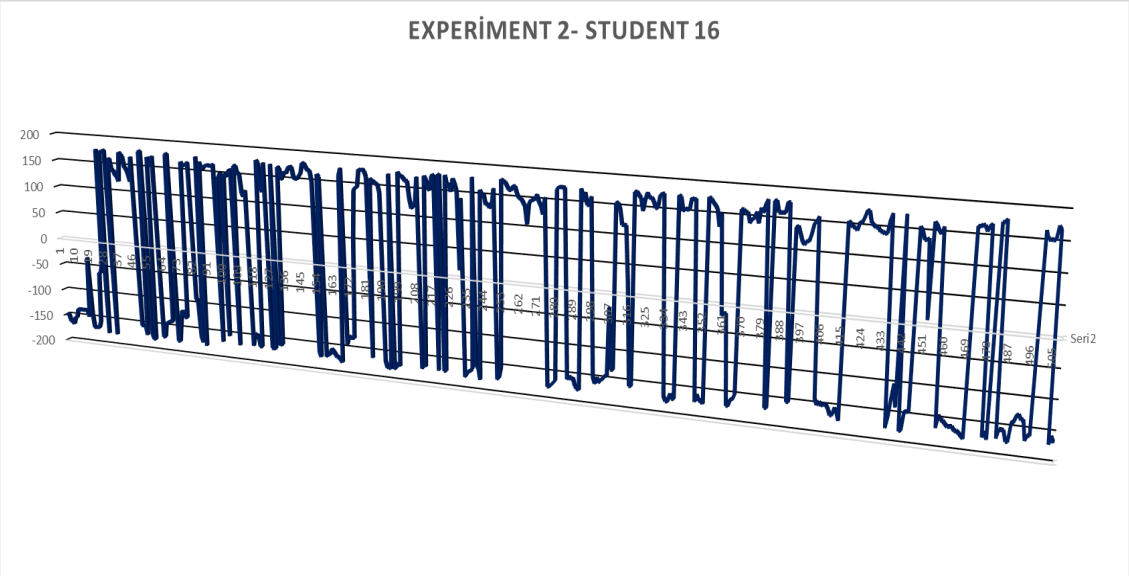
In this section, we have explored the emotional fluctuations that a male student from Antalya Bilim University experienced during his initial experiment, which centered on manual drawing. Throughout the study, we gathered a total of 510 emotional data points, allowing for a comprehensive analysis of his emotional changes during the process.



Measurement data for the 16th student studying at Antalya Bilim University's first experiment is not available. For some reason, emotional responses might not have been measured during the experiment. In this case, it's not possible to assess the student's emotional changes during the experiment, dominant emotions, or the relationship between angles and emotions. Missing data directly affects the depth and accuracy of the analysis; therefore, it is impossible for us to provide a definitive and informative comment for this particular situation.

5.4.18.2. Experiment 2

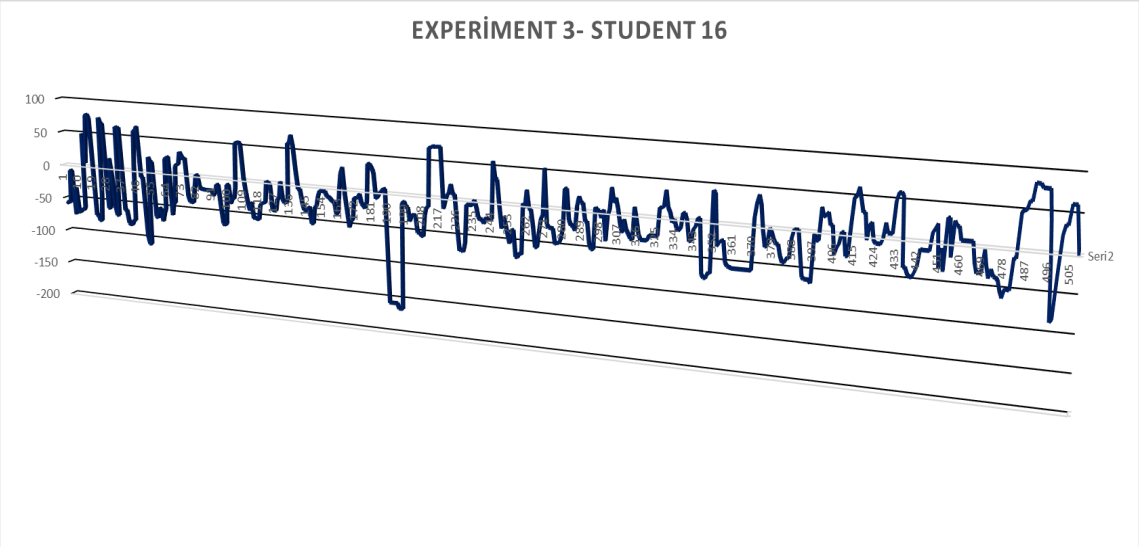
In this section, we have examined the emotional variations observed in a male student enrolled at Antalya Bilim University during his second experiment, where he employed 2D software for sketching. Over the duration of this experiment, we gathered a comprehensive dataset consisting of 510 distinct emotional data points. This dataset enables a detailed analysis of his emotional shifts throughout the process.



Based on the results of the second experiment conducted by the 16th student studying at Antalya Bilim University using a 2D program, the student's dominant emotional responses are predominantly "Sad" and "Depressed". Another notable emotion is "Upset". Although the measurement data is heavily concentrated in negative angular values, positive emotional responses are also present. Positive emotional reactions such as "Relased" (relaxed), "Calm", "Contented" (pleased), and "Happy" suggest that the student experienced positive feelings at times during the experiment. Examining the relationship between angle values and emotions, negative angle values are generally associated with negative emotions, while positive angle values are primarily linked with the "Upset" emotion. Overall, it can be said that the student experienced emotional fluctuations during the experiment process and these fluctuations tend to lean towards negative emotions. However, it's essential to note that alongside these negatives, positive emotional responses were also experienced at certain stages of the experiment.

5.4.18.3. Experiment 3

In this section, we have explored the emotional fluctuations encountered by a male student from Antalya Bilim University during his second experiment, where he used 3D software for sketching. Throughout the duration of this experiment, we collected a comprehensive dataset comprising 510 unique emotional data points. This dataset allows for a detailed analysis of his emotional changes throughout the process.



When analyzing the emotional states of the 16th student during the 3rd experiment, it's evident that dominant emotions with negative values, such as "Calm" (Peaceful) and "Relased" (Relaxed), are predominantly observed throughout the duration of the experiment. However, emotions with positive values like "excited" (excited), "happy" (happy), and "alert" (alert) are also present. Although the student's emotional state generally progresses in a calm and relaxed manner from the beginning to the end of the experiment, sporadic positive emotional reactions are also observed. Examining the relationship between angles and emotions, negative values are typically associated with calmness and relaxation, while positive values can be linked to excitement, happiness, and alertness. The association of particularly high positive values with the "alert" emotion suggests that the student was especially attentive and focused at certain moments. This could imply that the experience of 3D drawing elicits mixed effects on the student, such as relaxation and an increase in attentiveness.

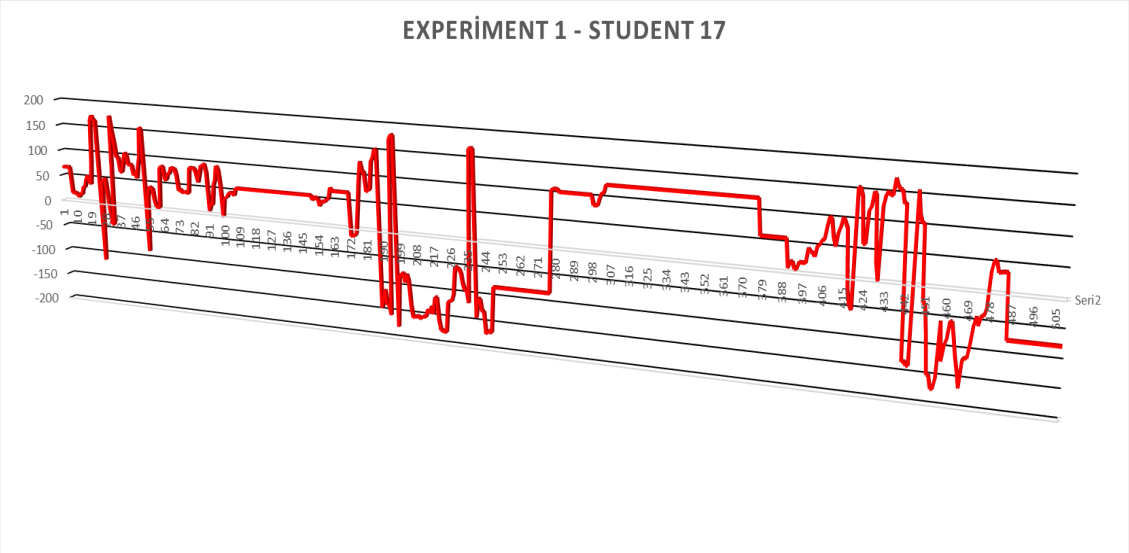
5.4.18.4. Experiment Analysis

When examining the emotional responses of the 16th student studying at Antalya Bilim University across three different experiments; for the first experiment, no data is available, making evaluation impossible. In the second experiment, which utilized a 2D program, it is observed that the student predominantly exhibited emotional reactions of "Sad" and "Depressed". However, it's worth noting that positive emotional reactions were sporadically observed despite these negative emotions. In the third experiment, during the 3D drawing experience, the student generally exhibited a calm and relaxed emotional state, but there were moments when she was notably attentive and focused. Comparing the three experiments, we can conclude that the 3D drawing experiment had the most positive impact on the student, suggesting that she was the happiest during this particular trial.

5.4.19. Student 17

5.4.19.1. Experiment 1

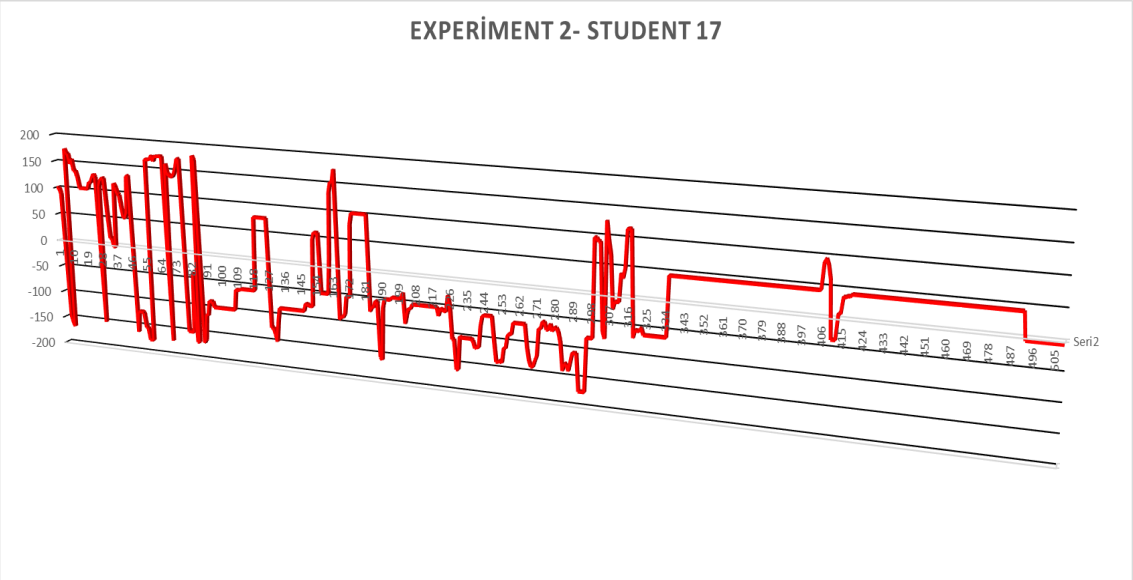
In this section, we've explored the emotional changes that a female student from Antalya Bilim University underwent during her first experiment, which involved manual drawing. Over the course of the study, we collected a total of 510 emotional data points, enabling a comprehensive analysis of her emotional shifts during the process.



Based on the data obtained from the 17th student's first experiment conducted at Antalya Bilim University, certain distinctive features in their emotional responses are evident. Dominant emotions such as "alert" and "stressed" prominently emerge, with "excited" and "nervous" feelings also frequently observed. Alongside positive emotions like "happy" and "excited", negative emotional reactions such as "upset", "stressed", and "depressed" have also been experienced during the experiment. Examining the angle values, positive angles are typically associated with alertness, excitement, and nervousness, while negative angles seem to relate to calmness, relaxation, and depression. The student's emotional shifts have displayed a fluctuating trajectory throughout the experiment. Overall, it can be said that the student's emotional state continuously changed during the experiment, experiencing both positive and negative emotional responses. The fact that the student studies at a specific university might be a decisive factor influencing the complexity of the experiment and the emotional fluctuations; however, this shouldn't be regarded as a definitive conclusion.

5.4.19.2. Experiment 2

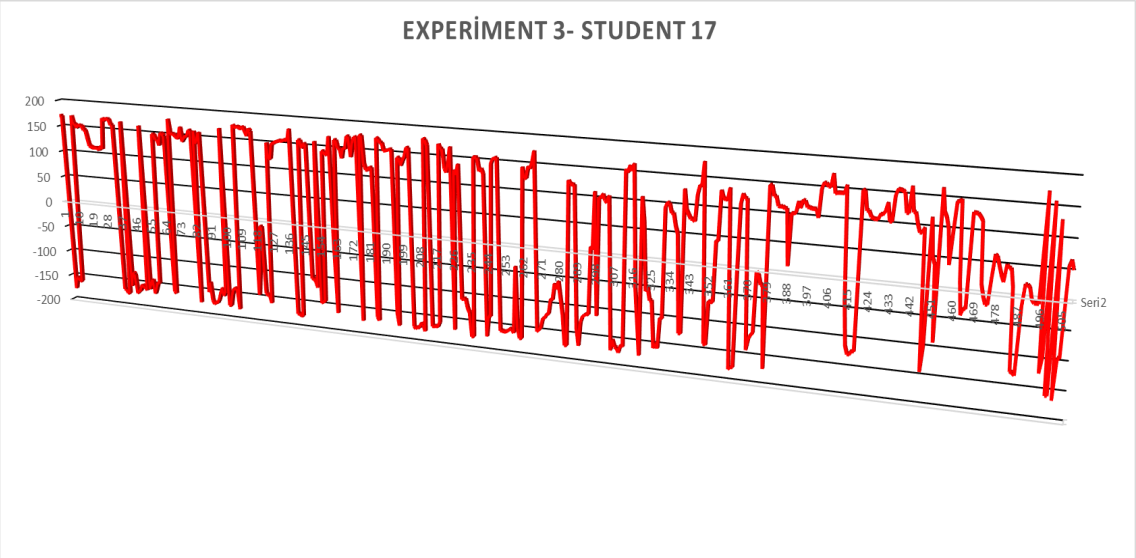
In this section, we have explored the emotional shifts experienced by a female student from Antalya Bilim University during her second experiment, in which she used 2D software for sketching. Throughout the duration of this experiment, we collected a comprehensive dataset comprising 510 distinct emotional data points. This dataset enables a detailed analysis of her emotional changes throughout the process.



When examining the emotional shifts displayed by the student during the second experiment, the dominant emotion observed is "Contented." This emotion recurs 17 times, indicating its dominance throughout the experiment. In terms of positive emotions, this contentment suggests that the student had a positive experience from the experiment, feeling comfortable and happy during the process. There seems to be no observed fluctuations or changes in the student's emotional state, implying a consistent feeling of contentment. As for the relationship between angles and emotions, it's uncertain whether the given angle (-5,566290044) directly affects the emotional state; however, this consistent angle could be associated with the stability in the student's emotions. Additionally, knowing that this student studies at Antalya Bilim University and is female might help contextualize this data, but it's challenging to definitively comment on how these demographic details directly influence the emotional state. In summary, throughout the experiment, the student consistently felt contentment, which was the dominant emotion.

5.4.19.3. Experiment 3

In this section, we have investigated the emotional fluctuations experienced by a female student from Antalya Bilim University during her second experiment, in which she used 3D software for sketching. Over the course of this experiment, we collected a comprehensive dataset comprising 510 unique emotional data points. This dataset allows for a detailed analysis of her emotional transitions throughout the process.



During the student's second experiment, we observe that the most dominant emotional states are categorized as 'Upset', 'Sad', and 'Stressed'. However, alongside these negative emotions, the student occasionally displays feelings of 'Nervousness', and more rarely, positive emotional reactions like 'Happy' and 'Alert'. When examining the angles, we can notice that during instances of predominantly positive values, emotions like 'Upset' and 'Stressed' are prevalent, whereas during negative values, the emotion 'Sad' tends to dominate. However, as this isn't a strictly linear relationship, it's possible other factors also influence these emotional states. Additionally, during the experiment using a 3D program, the student's emotional state is often 'Excited', which could suggest a positive reaction to such technologies. Furthermore, it's important to note that a more extensive dataset would be required to determine if the student's gender and the university she attends have a determinative impact on these emotional shifts. Overall, it can be said that this student frequently exhibits negative emotional reactions, but also displays positive responses in certain situations.

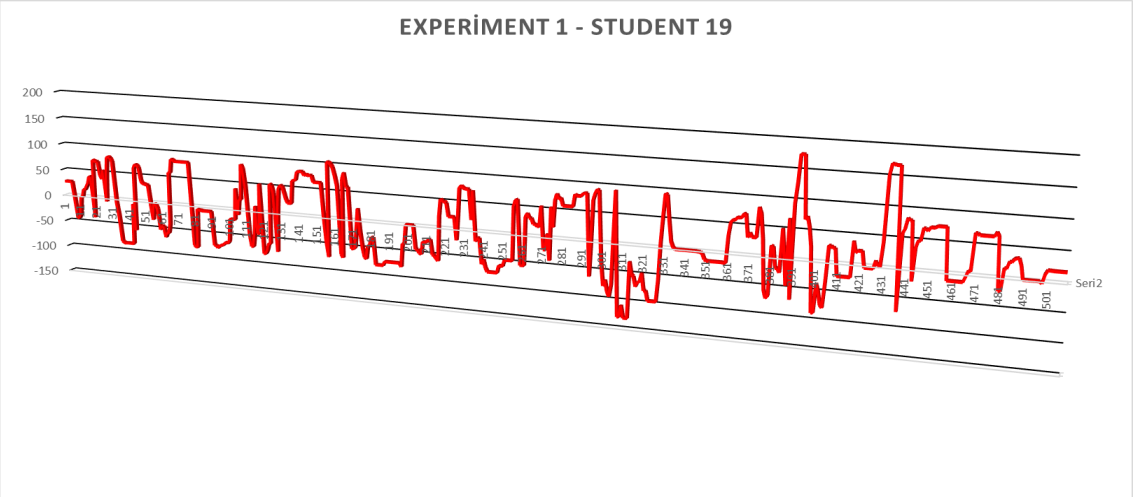
5.4.19.4. Experiment Analysis

Based on the experiment analysis, it is observed that the 17th student displayed different emotional responses in all three experiments. In the first experiment, the dominant emotions were "alert" and "stressed", while in the second experiment, the student predominantly felt "Contented". In the third experiment, more negative emotions such as "Upset", "Sad", and "Stressed" were observed. However, among these experiments, the student exhibited the most positive and consistent emotional response during the second experiment. In other words, the student had a happier and more contented experience in the second experiment compared to the others. Additionally, it is challenging to definitively state whether the student's attendance at Antalya Bilim University or their gender had a direct impact on these emotional responses. Overall, this analysis reveals that the student showed different emotional reactions in different experiments, with the most positive emotional response occurring during the second experiment.

5.4.20. Student 19

5.4.20.1. Experiment 1

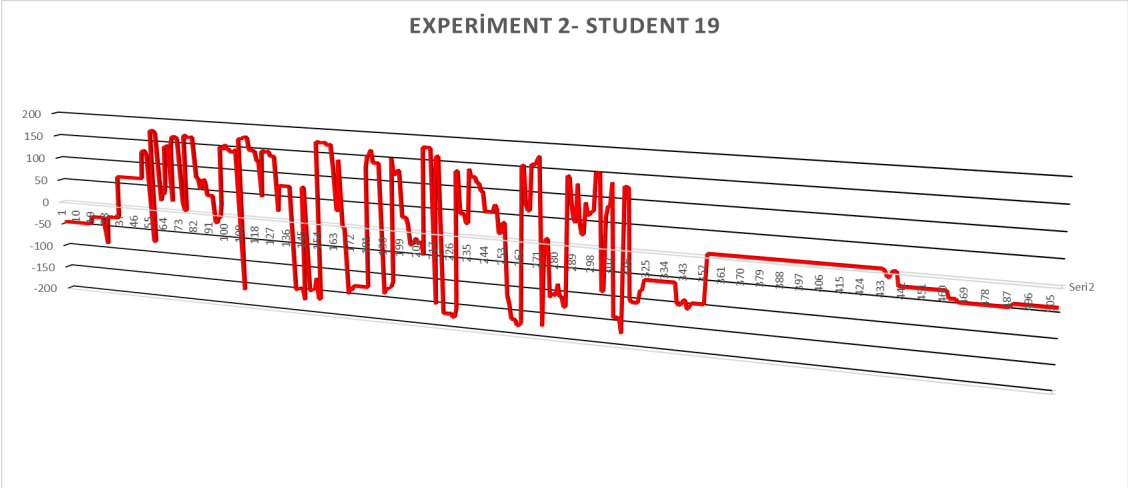
In this section, we have analyzed the emotional fluctuations observed in a female student from Antalya Bilim University during her first experiment, which involved manual drawing. Throughout the course of the study, we collected a total of 510 emotional data points, enabling a comprehensive analysis of her emotional changes during the process.



When examining the overall emotional state of the 19th student during the first experiment, we observe that the dominant emotion is "happy." This emotional response is frequently noted, especially with positive angle values. Other positive emotions the student experienced throughout the experiment include "excited" and "alert." However, the student also occasionally displayed significant negative emotional responses, particularly at high negative angle values, experiencing emotions like "Upset," "Depressed," and "Bored." A general relationship can be established between angle values and emotional responses; positive angle values are typically associated with positive emotional responses, while negative angle values might be associated with negative emotional responses. However, this relationship is not strictly linear, and there are some exceptions. The fact that the student is female and is studying at Antalya Bilim University (a private institution) may influence these emotional responses, though not necessarily determine them. In particular, the academic pressure and expectations of the private university environment could have contributed to fluctuations in emotional responses.

5.4.20.2. Experiment 2

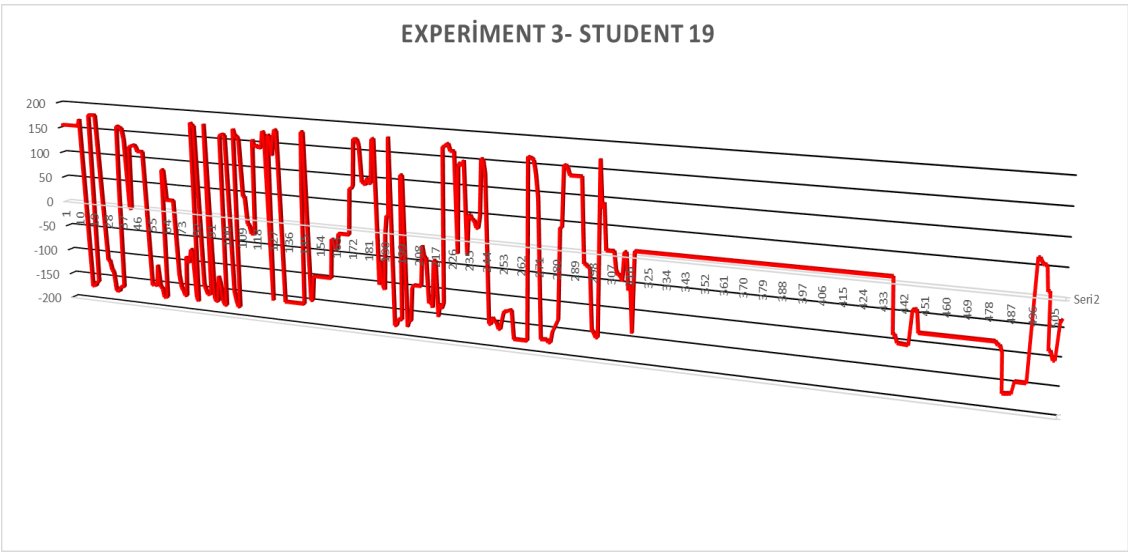
In this section, we have explored the emotional shifts experienced by a female student from Antalya Bilim University during her second experiment, in which she used 2D software for sketching. Throughout the duration of this experiment, we collected a comprehensive dataset comprising 510 distinct emotional data points. This dataset enables a detailed analysis of her emotional changes throughout the process.



The emotional responses of the 19th student while using the 2D drawing program are notable. According to the analyzed data, the student predominantly felt "Relased." This suggests that the student felt comfortable and at ease while using this program. However, despite this dominant emotional state, some positive fluctuations are evident. Specifically, feelings of being "happy" frequently recur. Yet, it's also observed that the student occasionally shifted to negative emotions like "stressed," "upset," and "depressed." In conclusion, this data suggests that using the 2D drawing program has a significant impact on the student's emotional state, but a more in-depth analysis would be required to determine the exact nature of this effect.

5.4.20.3. Experiment 3

In this section, we have explored the emotional shifts experienced by a female student from Antalya Bilim University during her second experiment, in which she used 2D software for sketching. Throughout the duration of this experiment, we collected a comprehensive dataset comprising 510 distinct emotional data points. This dataset enables a detailed analysis of her emotional changes throughout the process.



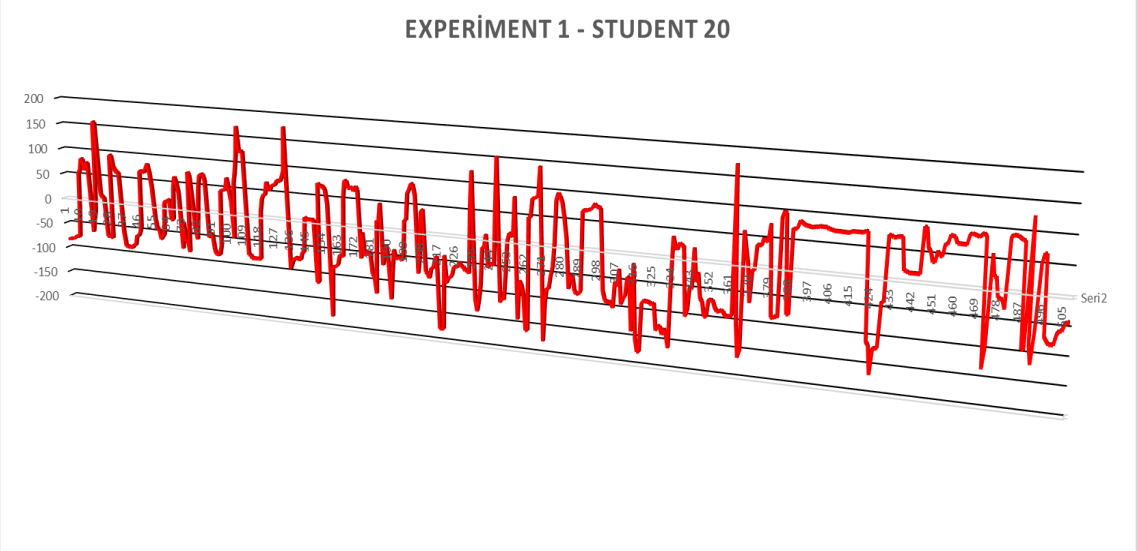
5.4.20.4. Experiment Analysis

Based on the experiment analysis, the emotional responses of the 19th student have varied throughout the three experiments. In the first experiment, the feeling of "happiness" was dominant, while in the subsequent experiments, the sensation of "relaxation" became more pronounced. While using the 2D drawing program, the student generally felt at ease, but occasionally experienced feelings of stress and sadness. However, when working with the 3D drawing program, the student was observed to feel relaxed. Comparatively, the student was happiest during the first experiment. However, the most relaxed moments occurred when using the 3D program. The student's gender and education at a private university might have influenced these emotional responses.

5.4.21. Student 20

5.4.21.1. Experiment 1

In this section, we have analyzed the emotional fluctuations observed in a female student from Antalya Bilim University during her first experiment, which involved manual drawing. Throughout the course of the study, we collected a total of 510 emotional data points, enabling a comprehensive analysis of her emotional changes during the process.

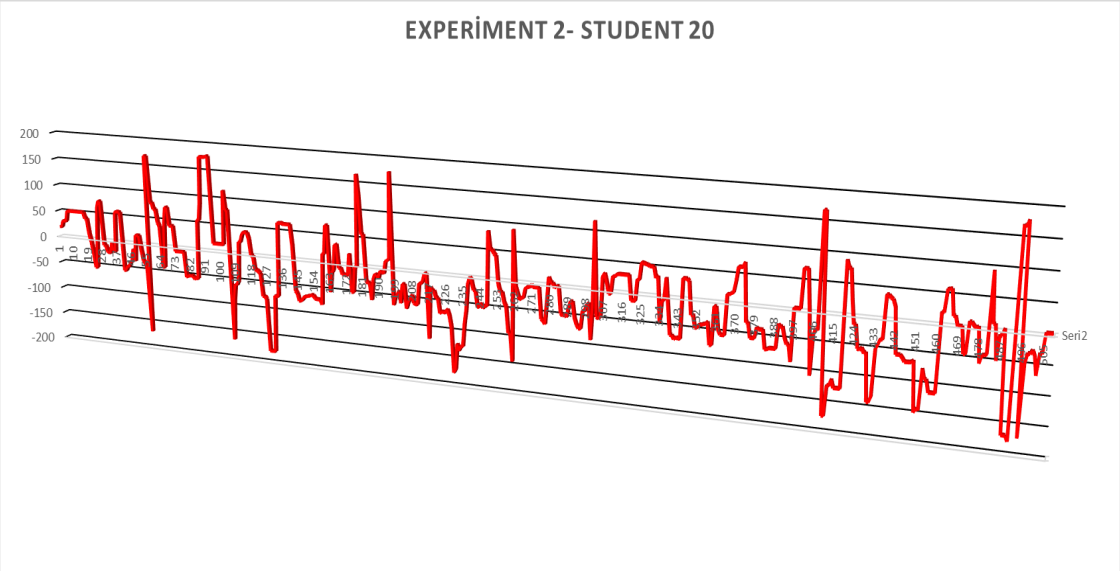


When examining the emotional changes the student experienced during the 1st experiment, the most dominant emotion appears to be "Calm". Among the positive emotions, "happy", "excited", and "alert" stand out. However, negative emotional responses such as "Upset", "Bored", and "Depressed" have also been observed during the experiment. Looking at the angle values, it is observed that negative angle values are mostly associated with emotions like calmness and relaxation, while positive angle values generally lead to more energetic and positive emotional responses. However, this relationship isn't entirely linear, and there are exceptions. Being female and studying at Antalya Bilim University, especially the academic pressures and expectations brought by a private university, are considered factors that might determine emotional responses.

However, based on this data, the exact impact of these factors on the emotional changes the student experienced during the experiment cannot be determined.

5.4.21.2. Experiment 2

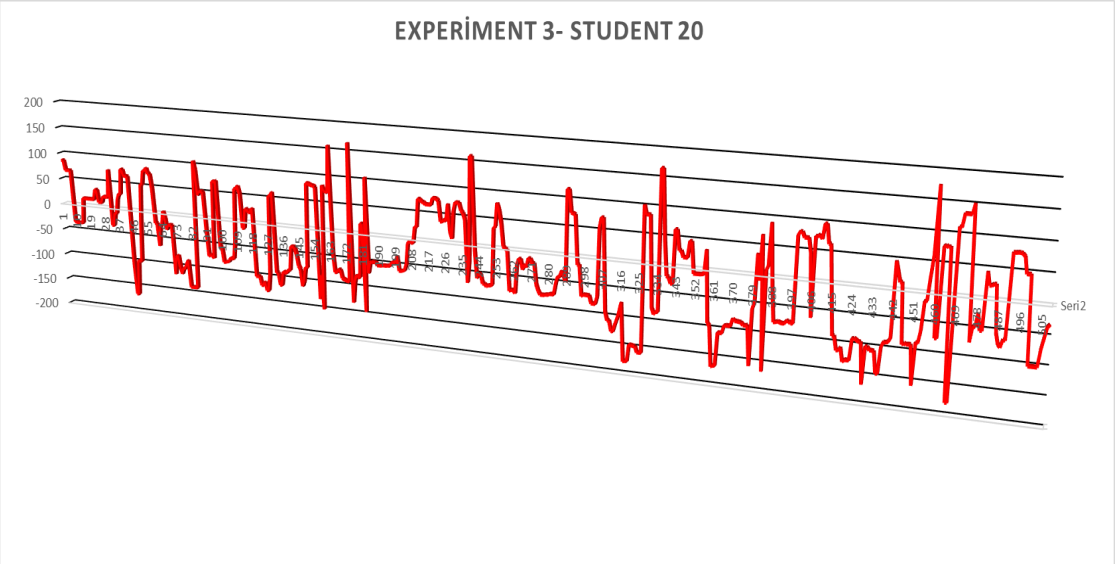
In this section, we have explored the emotional shifts experienced by a female student from Antalya Bilim University during her second experiment, in which she used 2D software for sketching. Throughout the duration of this experiment, we collected a comprehensive dataset comprising 510 distinct emotional data points. This dataset enables a detailed analysis of her emotional changes throughout the process.



When we examine the emotional states of the 19th student during the 2nd experiment, we can see that the emotion "excited" is quite dominant. Among the positive emotions, the feeling of "happy" also frequently appears. However, the student has occasionally experienced quite negative emotions as well, such as "sad", "depressed", and "upset". When we investigate the relationship between angle values and emotions, we can observe that positive values generally correspond with positive emotions, while negative values are more associated with negative emotions. However, this relationship isn't always definitive. We can also see that the student displayed emotional responses like "alert" and "nervous" while drawing, which might suggest that the student occasionally struggled with the 2D program or that the process induced some tension in them. Studying at Antalya Bilim University and being in a private institution could bring along many factors that might influence the student's emotional responses, but it's challenging to determine these factors conclusively with this data. Overall, we can say that the student generally felt positive emotions while drawing but also experienced stress and tension from time to time.

5.4.21.3. Experiment 3

In this section, we have explored the emotional changes experienced by a female student from Antalya Bilim University during her second experiment, where she utilized 3D software for sketching. Over the course of this experiment, we collected a comprehensive dataset consisting of 510 unique emotional data points. This dataset allows for a detailed analysis of her emotional transitions throughout the process.



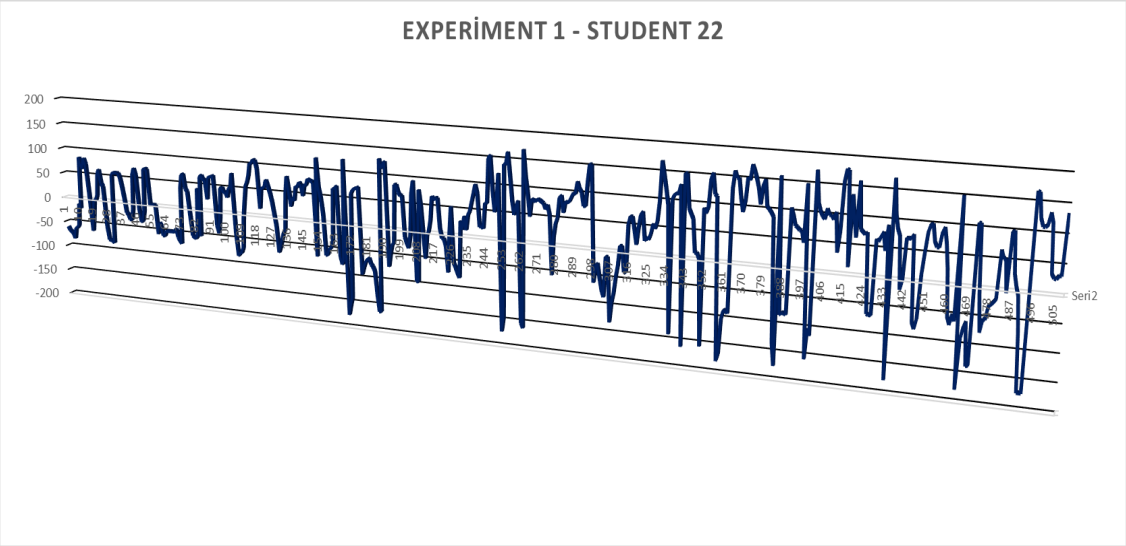
5.4.21.4. Experiment Analysis

Upon examining the results of the three experiments, noticeable variations in the student's emotional responses can be observed. In the first experiment, the student's dominant emotion was recorded as "Calm", whereas in the second it was "excited", and in the third, it was "Relased". Evaluating in terms of positive emotions, the student experienced feelings of happiness in all three experiments, but this emotional response was most frequently observed in the second experiment. On the other hand, the recurring frequency of the "Depressed" emotion in the third experiment is striking. While the relationship between angle values and emotional responses is not linear, generally positive angle values indicate positive emotional reactions, and negative angle values suggest negative reactions. It might be hypothesized that this student, studying at Antalya Bilim University, exhibited emotional responses due to the academic pressures and expectations of attending a private university. However, looking at all three experiments, it can be stated that the student exhibited a happier emotional state during the second experiment compared to the others.

5.4.22. Student 22

5.4.22.1. Experiment 1

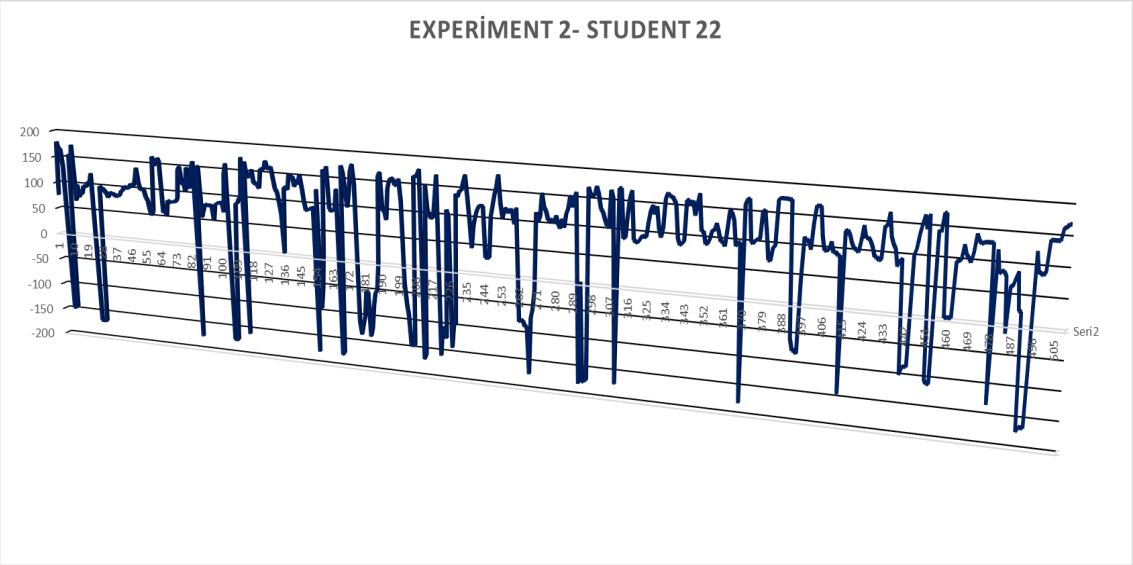
In this section, we have analyzed the emotional fluctuations observed in a male student from Antalya Bilim University during his first experiment, which involved manual drawing. Throughout the course of the study, we collected a total of 510 emotional data points, enabling a comprehensive analysis of his emotional changes during the process.



When examining the emotional changes experienced by the 22nd student during the 1st experiment, the dominant emotion frequently observed is "Calm." In addition, energetic and intense emotional responses such as "alert" and "nervous" are also often repeated. Looking at the emotional fluctuations, it's determined that the student frequently shifts from an energetic emotion to a calm one, and at times, exhibits negative emotional responses like "Sad" and "Depressed." Focusing on the relationship between angles and emotions, negative angle values are generally associated with calm and negative emotions, while positive angle values correlate with energetic and positive emotions. It's difficult to definitively determine from this data whether the student's gender and attending a private university directly influence these emotional changes; however, academic pressures and expectations might be considered as factors influencing the student's emotional fluctuations during this experiment.

5.4.22.2. Experiment 2

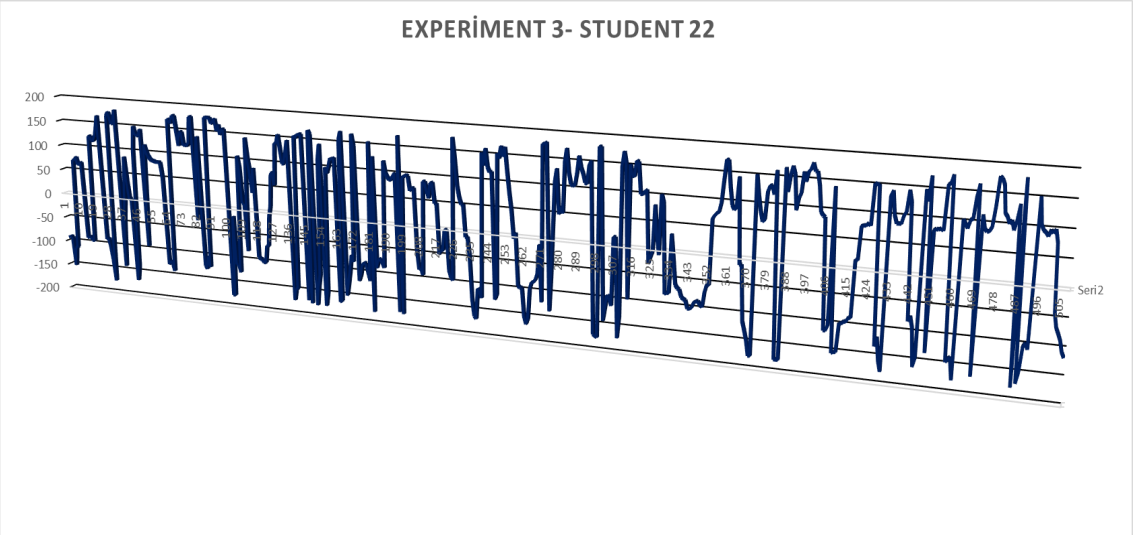
During his second experiment in Bilim University, where he used 2D software for this section, we have examined the emotional variations experienced by a male student from Antalya sketching. Throughout the course of this experiment, we collected a total of 510 emotional data points, allowing for a comprehensive analysis of his emotional changes during the process.



When we examine the emotional profile of this student, the data predominantly shows that the student experienced emotions of "Upset" and "stressed," indicating that the dominant emotions are negative. Additionally, emotions such as "nervous" and "alert" are frequently repeated. In terms of emotional fluctuations, transitions between negative emotions are frequently observed throughout the data set. Even though a large majority of the angles are in positive values, these positive angles are generally associated with negative emotions. However, positive emotions like "happy," "excited," and "Contented" have also been experienced. While it's challenging to establish a direct relationship between angles and emotions, it can be said that specific angle ranges are more often associated with particular emotions. The fact that the student studies at Antalya Bilim University might suggest that they could be under certain academic or social pressures due to its being a private institution. However, directly correlating these outcomes with gender or the type of university wouldn't be accurate. Overall, it can be stated that this student primarily experienced negative emotions during the 2D drawing experiment, although there were moments of positivity as well.

5.4.22.3. Experiment 3

In this section, we have analyzed the emotional fluctuations observed in a male student from Antalya Bilim University during his second experiment, where he used 3D software for sketching. Throughout the course of this experiment, we collected a total of 510 emotional data points, enabling a comprehensive analysis of his emotional changes during the process.



Based on the data, the overall emotional state of the 22nd student leans negative; the most dominant emotion appears to be "Bored". The emotional fluctuations of this student are typically characterized by brief transitions from negative emotions (bored, sad, depressed) to positives (alert, happy). Regarding the relationship between emotions and angles, negative angle values are generally associated with negative emotions, while positive angle values typically correlate with feelings of being alert or stressed. It's observed that the student also felt "Bored" during the 3rd experiment where they drew with a 3D program. This might indicate that the student gets bored or loses interest in such tasks. However, the fact that this student is studying at a private university like Antalya Bilim University could suggest they possess a certain academic skill or interest. In general, it can be said that this student seems to get bored with specific tasks or activities but experiences brief emotional changes at times.

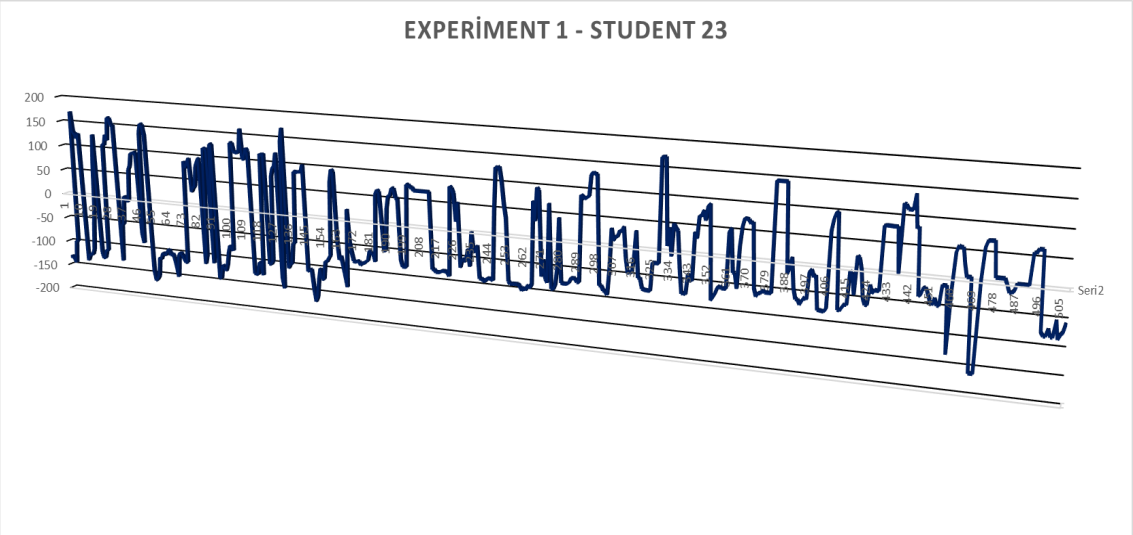
5.4.22.4. Experiment Analysis

Upon examining the emotional profile of the 22nd student over the course of three experiments, it's evident that the student generally exhibits a negative emotional inclination. In the first experiment, the student predominantly felt "Calm", while energetic responses like "alert" and "nervous" were also frequently observed. In the second experiment, dominant emotions for the student were noted as "Upset" and "stressed", indicating an overall negative emotional experience. In the third experiment, while working with the 3D program, the student reported feelings of being "Bored". Overall, across all three experiments, it's clear that the student often felt bored and experienced negative emotions, but also experienced brief periods of positive emotional changes. However, when comparing the three experiments, it can be said that the student exhibited the most positive emotional response during the first experiment. While it's difficult to conclusively determine whether attending Antalya Bilim University directly influenced the student's emotional responses in these experiments, we can speculate that academic expectations or pressures might have influenced these emotional fluctuations.

5.4.23. Student 23

5.4.23.1. Experiment 1

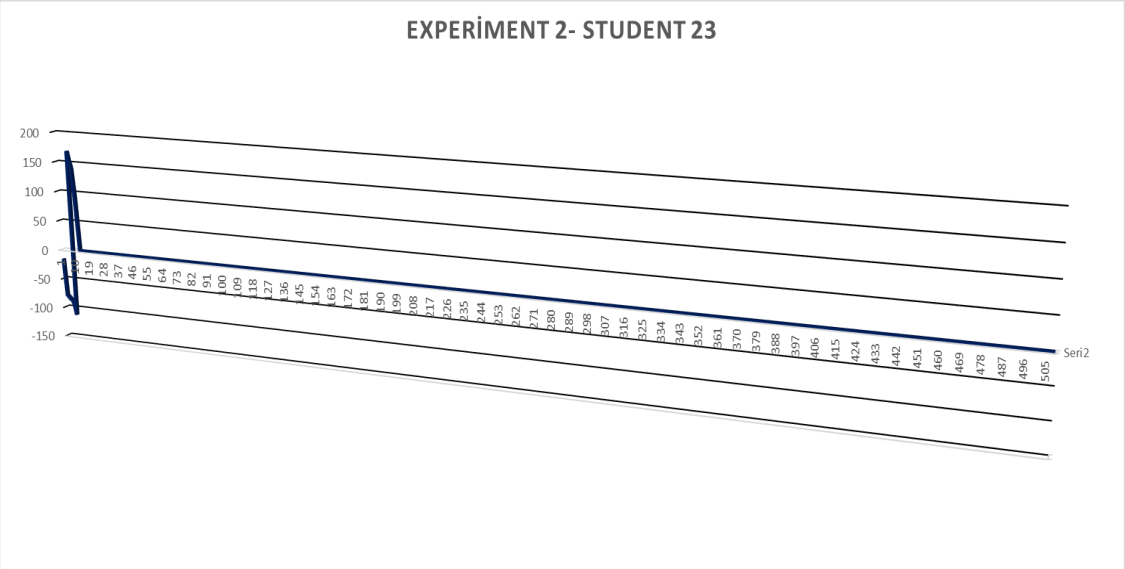
In this section, we have examined the emotional variations experienced by a male student from Antalya Bilim University during his first experiment, which involved manual drawing. Throughout the course of the study, we collected a total of 510 emotional data points, allowing for a comprehensive analysis of his emotional changes during the process.



Based on the data from the 23rd student's first experiment, the dominant emotions exhibited largely lean towards negative tendencies such as "Bored", "Depressed", and "Calm". However, throughout the experiment, positive emotional responses like "happy", "excited", and "alert" were also observed. Notably, negative angle values are generally associated with negative emotions like "Depressed", "Bored", and "Calm", while positive angle values are more often correlated with energetic and alert feelings, namely "alert", "nervous", and "excited". Frequent emotional fluctuations are observed in the student's emotional profile, which may suggest that they might easily get bored or experience emotional swings in response to certain tasks or activities. Additionally, the fact that the student is studying at Antalya Bilim University, a private institution, could imply that academic or social pressures might influence these emotional changes. However, it is challenging to directly infer from this data that gender has a direct impact on these emotional shifts.

5.4.23.2. Experiment 2

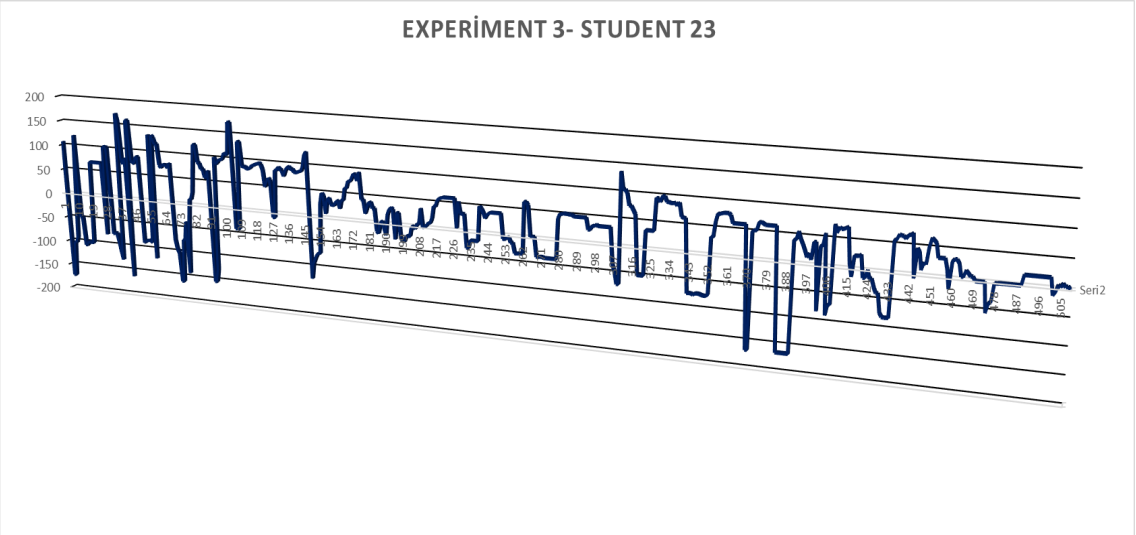
In this section, we have analyzed the emotional fluctuations experienced by a male student from Antalya Bilim University during his second experiment, where he used 2D software for sketching. Throughout the course of this experiment, we collected a total of 510 emotional data points, enabling a comprehensive analysis of his emotional changes during the process.



Based on the data from the 23rd student's second experiment, the most dominant emotion appears to be "Calm", which is typically associated with negative angle values. Additionally, other emotions such as "Bored" and "Contented" are observed. During the experiment, the student also displayed intense emotional responses like "Upset", "stressed", and "nervous", which are associated with positive angle values. However, when looking at the provided data, while we expect to see a total of 510 results, only a few are present, indicating the analysis might be incomplete or not comprehensive. The fact that the student is enrolled in Antalya Bilim University, a private institution, could potentially influence their emotional responses, but it's challenging to directly infer that gender or the type of university has a significant impact on these emotional shifts based on this data.

5.4.23.3. Experiment 3

In this section, we examined the emotional variations experienced by a male student from Antalya Bilim University during his second experiment, where he used 3D software for sketching. Throughout the course of this experiment, we collected a total of 510 emotional data points, enabling a comprehensive analysis of his emotional changes during the process.



From the 3rd experiment of the 23rd student, a variety of emotional responses are observed. Dominant emotions include positive feelings like "alert", "excited", and "happy", yet there are frequent instances of negative emotions such as "Bored", "Calm", and "Sad". There seems to be a correlation between the angle values and emotions; for example, negative angle values typically align with emotions like "Sad", "Bored", and "Calm", while positive angles correspond with feelings of "alert", "excited", and "happy". There are frequent shifts in the student's emotional profile. Being a student at Antalya Bilim University, a private institution, might influence these emotional responses, but it's challenging to infer a direct impact of gender or university type based on this data.

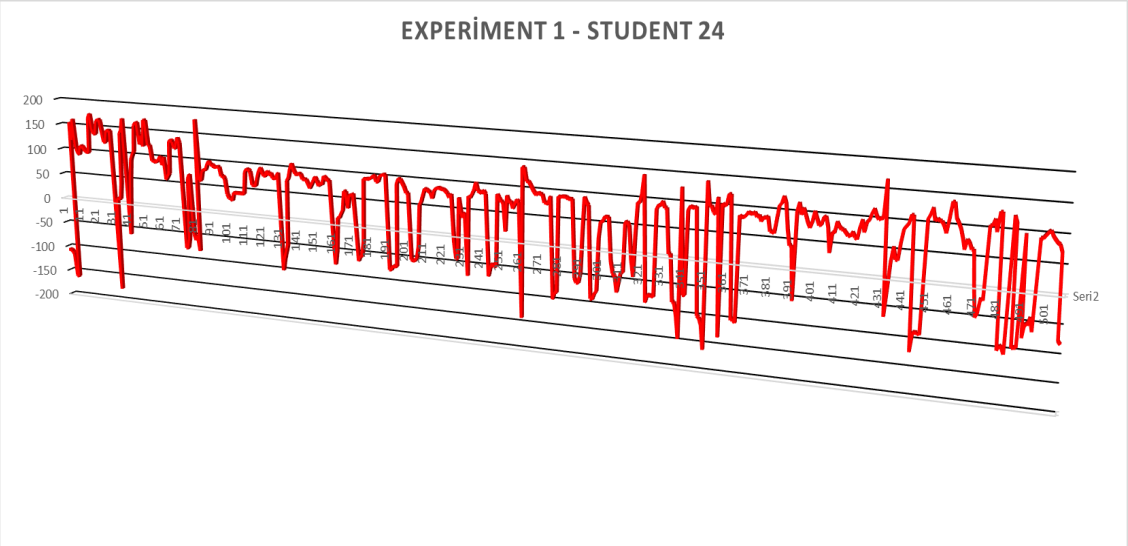
5.4.23.4. Experiment Analysis

Based on the data from three separate experiments, the emotional responses of the 23rd student appear to span a diverse range. In the first experiment, the student's dominant emotions were predominantly negative, leaning towards feelings like "Bored", "Depressed", and "Calm". In the second experiment, the "Calm" emotion was prevalent, but given only a few results were considered, the outcomes from this experiment might not be entirely comprehensive. In the third experiment, it's observed that the student displayed more positive emotions, such as "alert", "excited", and "happy". When evaluating all three experiments collectively, it can be said that the student displayed a happier and more positive emotional profile during the third experiment, which involved drawing with the 3D program. It's speculated that attending Antalya Bilim University, a private institution, could influence these emotional reactions, but there is insufficient data to claim that gender or the type of university has a direct effect on these emotional shifts.

5.4.24. Student 24

5.4.24.1. Experiment 1

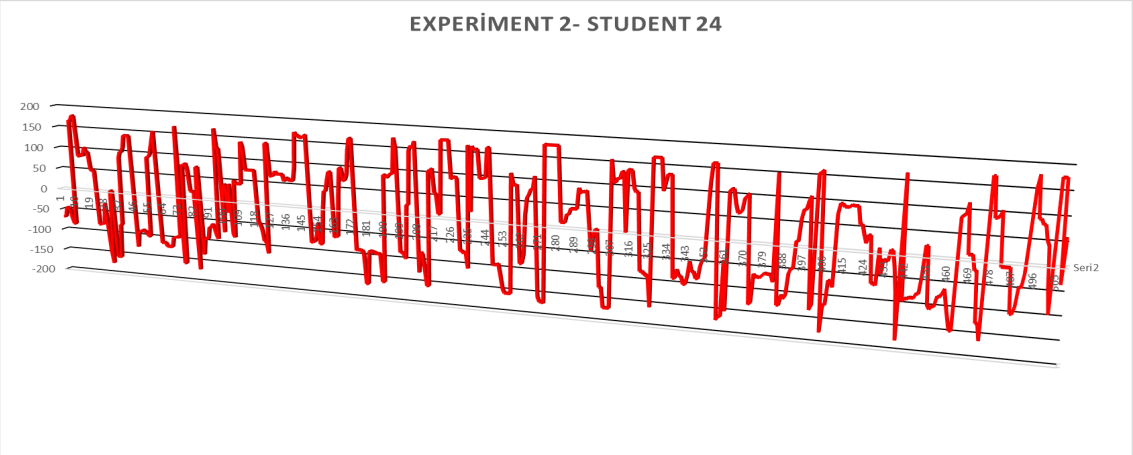
In this section, we explored the emotional fluctuations encountered by a female student from Antalya Bilim University during her first experiment, which involved manual drawing. Throughout the study, we collected a total of 510 emotional data points, enabling a comprehensive analysis of her emotional changes during the process.



Based on the 24th student's first experiment, the predominant emotional response appears to be "Bored". Additionally, the emotion "Sad" is also noticeable. Positive emotions are represented by feelings like "happy", "excited", and "alert", but these positive emotions seem to be less frequent. Emotional shifts are particularly associated with angles; negative angles point to negative emotions, while positive angles indicate positive emotions. The student's emotional profile displays significant fluctuations during the experiment, suggesting they might frequently experience emotional shifts in response to specific tasks or activities. Studying at Antalya Bilim University could influence these emotional responses, but based on this data, it's difficult to say that gender or the type of university has a pronounced effect on these emotional shifts.

5.4.24.2. Experiment 2

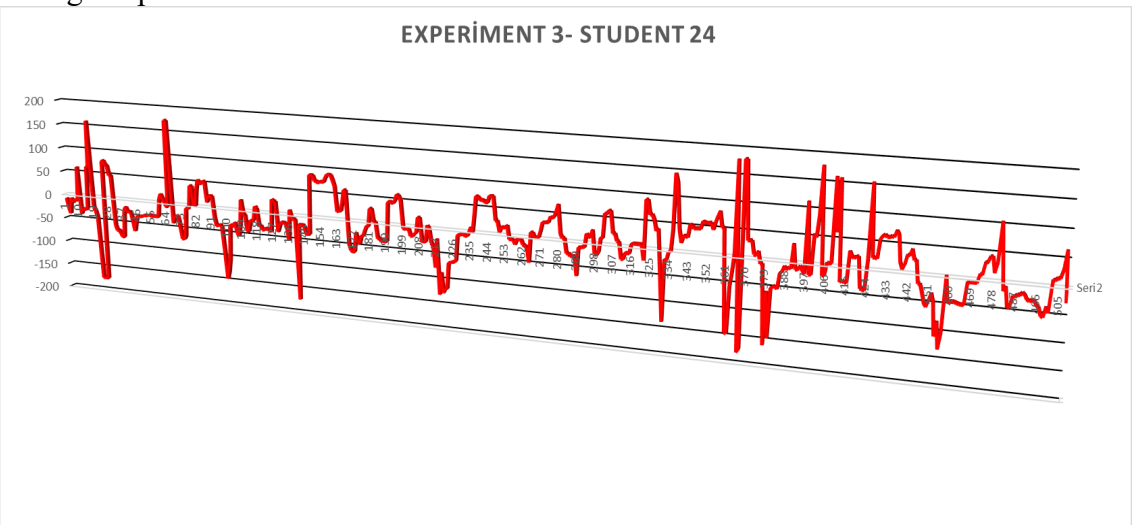
In this section, we have analyzed the emotional fluctuations experienced by a female student from Antalya Bilim University during her second experiment, where she used 2D software for sketching. Throughout the course of this experiment, we collected a total of 510 emotional data points, enabling a comprehensive analysis of her emotional changes during the process.



During the student's experiment process, the initial emotion felt at the beginning of the experiment was identified as "excited". This indicates that the student was highly motivated and interested when starting the experiment. However, as the experiment progressed, we observe a shift in the student's emotional state. Towards the end of the experiment, the dominant emotion for the student became "upset". This could suggest that the student faced challenges during the experiment or that their expectations were not met. Overall, it can be said that the experiment began with a positive emotion but evolved in a negative direction as time went on. Establishing a direct relationship between angles and emotions may be challenging, but generally, negative angles are associated with calm and negative emotions (e.g., calm, bored, sad) while positive angles are linked with more active and positive emotions (e.g., excited, alert, nervous).

5.4.24.3. Experiment 3

In this section, we examined the emotional fluctuations experienced by a female student from Antalya Bilim University during her second experiment, where she used 3D software for sketching. Throughout the course of this experiment, we collected a total of 510 emotional data points, enabling a comprehensive analysis of her emotional changes during the process.



In the 24th student's third experiment, several noteworthy trends in emotional state are observed. Firstly, the dominant emotion frequently emerging is "Contented". This suggests the student generally feels a balanced and peaceful emotional state. However, a slightly diminished state of "Contented" is observed with a value of -26,33751095 during the 3D drawing experiment with the software. This could hint that technological tools might induce a minor negative effect on the student's emotional state. In terms of positive emotions, we can particularly see the presence of "happy" and "excited". As for emotional fluctuations, mild oscillations are generally observed, though there are spikes or drops at certain points. No specific information on the relationship between emotions and angles has been provided, but given that the values are mostly negative, it can be said that the student's emotional state is mostly associated with relaxation or satisfaction.

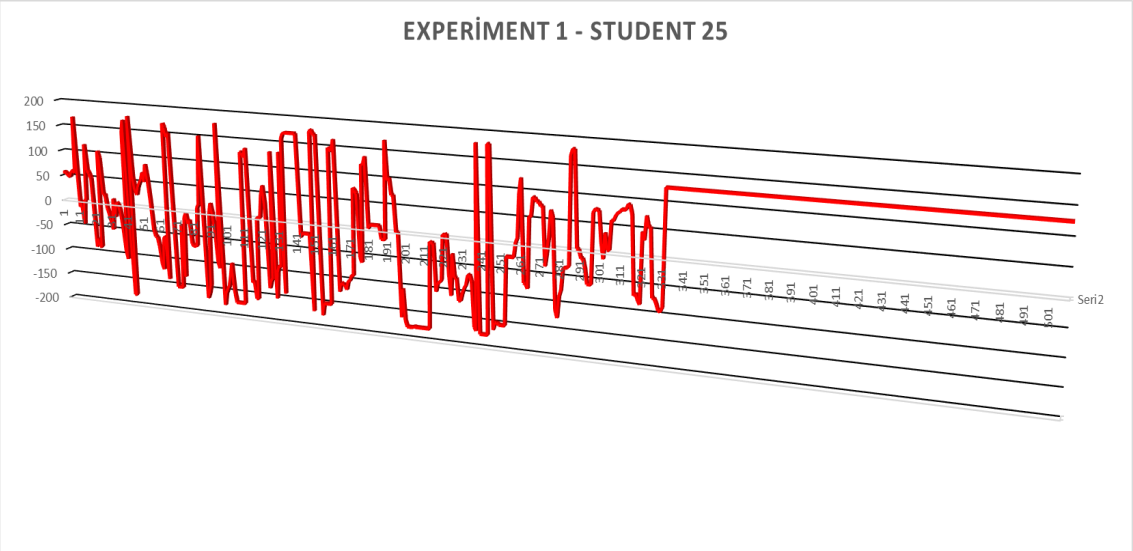
5.4.24.4. Experiment Analysis

According to the experiment analysis, the emotional responses of the 24th student vary across three different experiments. In the first experiment, the student predominantly experienced "Bored" and "Sad" emotions. In the second experiment, they began with the "excited" emotion at the beginning of the experiment but later transitioned to feeling "upset." In the third experiment, "Contented" is the prevailing emotion, although this emotion slightly decreased during the experiment involving the 3D drawing program. Overall, it can be observed that the student displayed a more balanced and peaceful emotional state in the third experiment compared to the other experiments, but experienced more negative emotions in the first experiment. Based on this analysis, we can conclude that the 24th student was happiest during the third experiment.

5.4.25. Student 25

5.4.25.1. Experiment 1

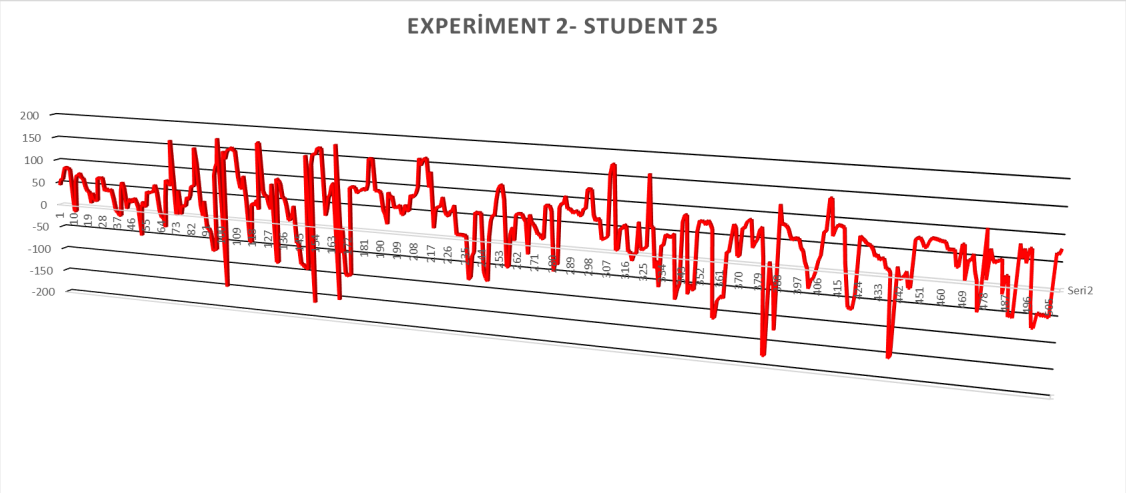
In this segment, we delved into the emotional shifts experienced by a female student from Antalya Bilim University during her first experiment, which involved manual drawing. Over the course of the study, we collected a total of 510 emotional data entries, allowing for a comprehensive analysis of her emotional changes throughout the process.



Upon examining the student's emotional responses based on the provided data, it's noted that a total of 510 data points should be present, yet the provided list doesn't reach this number, indicating that the analysis will be based on incomplete information. The list predominantly showcases a range of emotional reactions, suggesting that the student frequently experiences emotions such as "Upset" and "Sad". Among the positive emotions, "happy" and "excited" appear regularly. Angles can't be directly correlated with emotions, but the negative and positive values in the data might signify shifts in emotional states. In general, it can be said that this student experiences emotional fluctuations, rapidly transitioning between both positive and negative emotional responses.

5.4.25.2. Experiment 2

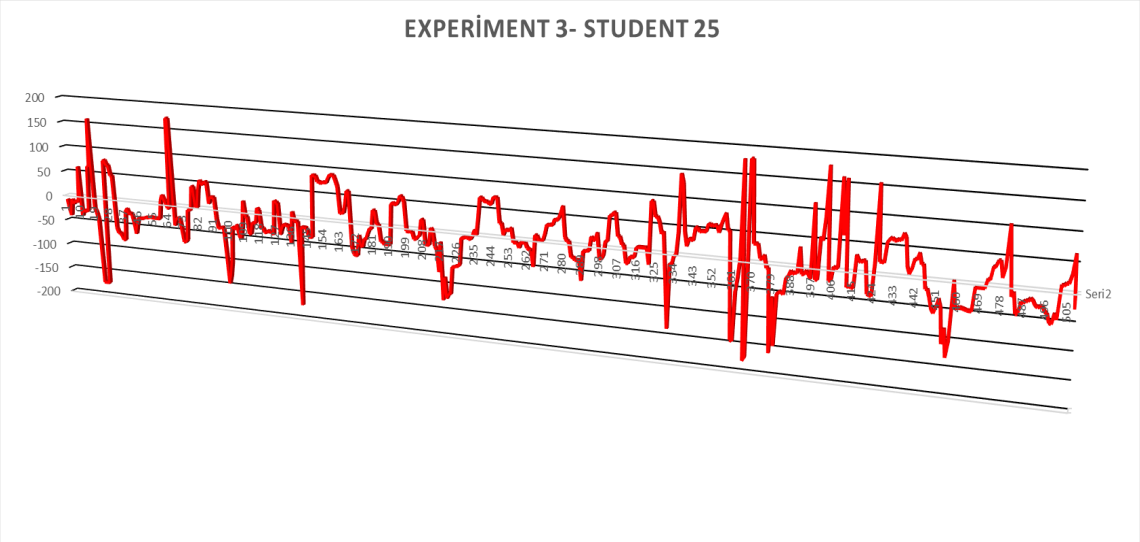
In this section, we have examined the emotional variations experienced by a female student from Antalya Bilim University during her second experiment, where she used 2D software for sketching. Throughout the course of this experiment, we collected a total of 510 emotional data points, allowing for a comprehensive analysis of her emotional changes during the process.



Analyzing the emotional shifts exhibited by the 25th student in the second experiment, it's evident that the dominant emotion was "alert". This indicates the student maintained a high level of attention and was constantly on guard throughout the experiment. Furthermore, emotions like "excited" and "happy" were frequently experienced, suggesting the student conducted the experiment with an overall positive energy. However, encountering negative emotions (such as "Sad" and "Upset") several times during the experiment may imply the student faced challenges or encountered certain issues at some stages. When inspecting emotional shifts, the frequent co-occurrence of "alert" and "excited" might suggest a possible linkage between these two emotions. The angles drawn by the student predominantly clustered around positive values, implying the experiment was generally a positive experience. However, it's observed that extremely high or low angle values coincide with negative emotions, indicating the potential influence of angles on emotional states. Lastly, the fact that the student is being educated at Antalya Bilim University indicates they are receiving quality education at a private institution and may thus evaluate the experiment from a distinct perspective. In light of this information, it can be inferred that the student had a generally positive experience during the experiment but did encounter certain challenges, which influenced their emotional state.

5.4.25.3. Experiment 3

In this section, we explored the emotional fluctuations encountered by a female student from Antalya Bilim University during her second experiment, where she used 3D software for sketching. Throughout the course of this experiment, we collected a total of 510 emotional data points, allowing for a comprehensive analysis of her emotional changes during the process.



During the experiment, we observe that the majority of the student's emotions were predominantly "Calm", indicating they generally felt serene and at ease throughout. However, alongside this tranquil emotional state, there are also some pronounced emotional shifts. Specifically, we notice significant peaks in positive emotions ("Excited", "Happy") and profound dips in the negative spectrum ("Sad", "Depressed").

This suggests that at certain moments during the experiment, they were prone to emotional fluctuations. As a general trend between angle values and emotional states, negative angle values correspond to moments when they felt more calm or soothed, whereas positive values represent heightened or stimulated emotional states. However, there are also some exceptions, highlighting the complexity of the experiment and the individuality of the student's response to it.

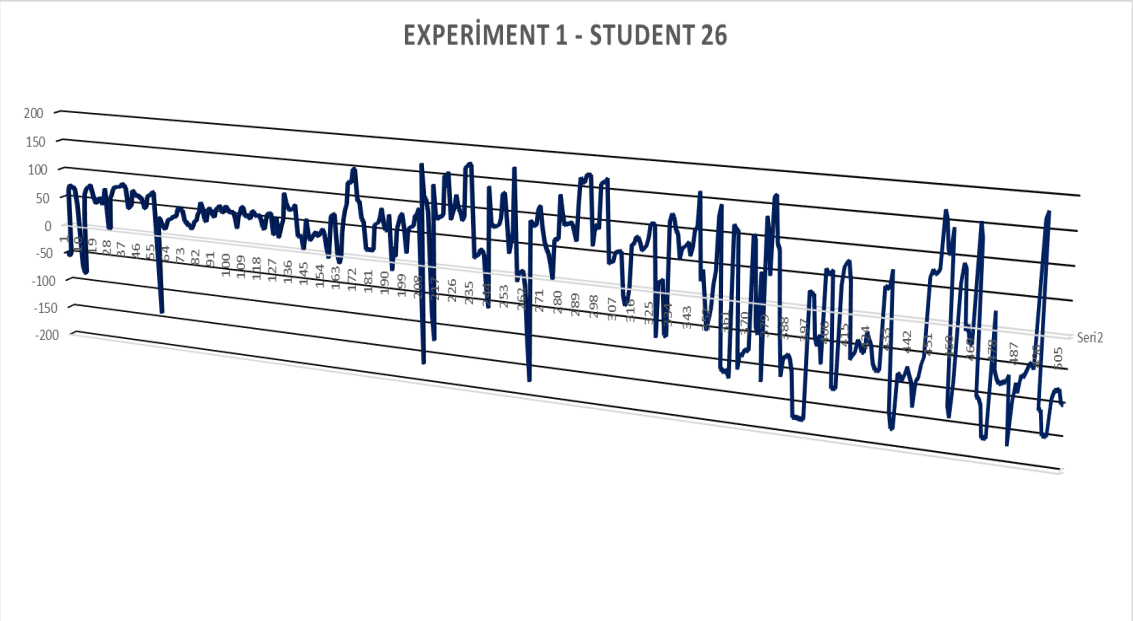
5.4.25.4. Experiment Analysis

Upon reviewing the experimental results, it is evident that the 25th student displayed various emotional responses across different experiments. In the first experiment, although a full analysis could not be conducted due to incomplete data, it's apparent that the student primarily experienced negative emotions, notably "Upset" and "Sad". In the second experiment, while the student generally exhibited a positive energy, they also encountered some negative emotional reactions. In the third experiment, observations indicate that the student demonstrated the most balanced and peaceful emotional state, with "Calm" being the dominant emotion; however, there were some pronounced emotional shifts. From an overall assessment, it can be said that the student exhibited the happiest and most balanced emotional state during the third experiment. This might stem from the structure of the experiment or the methods and tools employed. The student's emotional responses seem to vary based on the complexity of the experiment and their individual reactions.

5.4.26. Student 26

5.4.26.1. Experiment 1

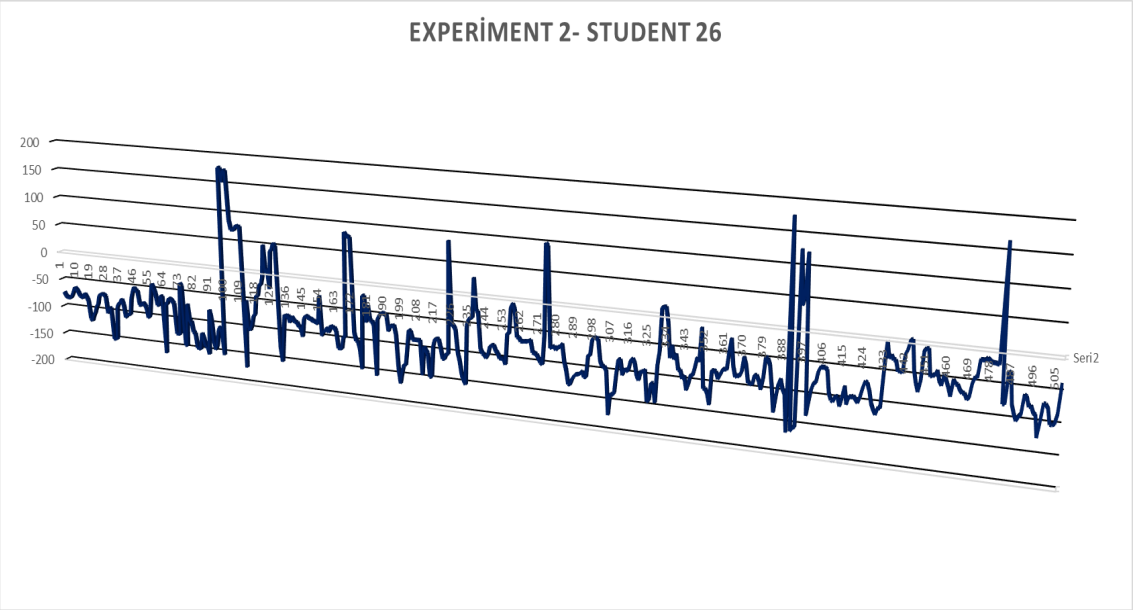
In this segment, we have explored the emotional variations experienced by a male student from Antalya Bilim University during his first experiment, which involved manual drawing. Throughout the course of the study, we collected a total of 510 emotional data points, enabling a comprehensive analysis of his emotional changes during the process.



In the 26th student's first experiment, it's evident that they experienced a broad spectrum of emotions throughout the process. The dominant emotions were predominantly identified as "alert", "excited", and "nervous", suggesting that the student was generally high in energy and alertness. Alongside these, the student also exhibited various positive emotions, with "happy" being particularly prevalent. Notably, there were frequent emotional shifts, which might indicate the student's sensitivity to different stimuli or internal reflections during the experiment. In terms of the relationship between graded angles (degrees) and emotions, it's observed that negative degrees typically correlate with more calm or negative emotions, such as "calm", "relaxed", "contented", "sad", and so forth.

5.4.26.2. Experiment 2

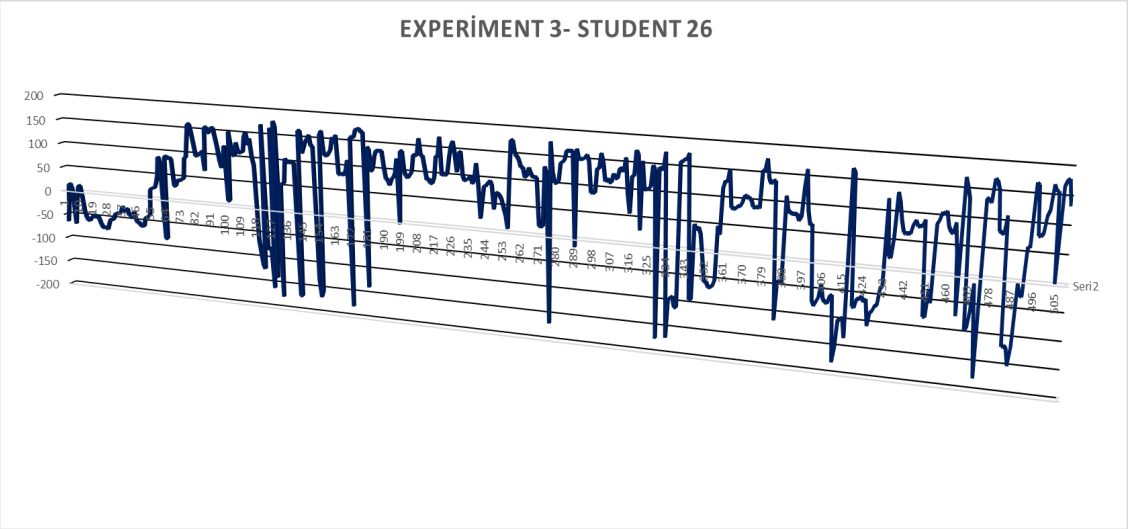
In this section, we have analyzed the emotional fluctuations experienced by a male student from Antalya Bilim University during his second experiment, where he used 2D software for sketching. Throughout the course of this experiment, we collected a total of 510 emotional data points, enabling a comprehensive analysis of his emotional changes during the process.



In the 26th student's second experiment, while working with a 2D program, the emotional changes experienced appear to be quite varied and fluctuating. The dominant emotion frequently emerging is "Calm". This suggests that the student was often calm and focused during the experience. However, negative emotional responses such as "Bored", "Depressed", and "Sad" are also present, indicating moments when the student might have felt disinterested or disheartened. Among the positive emotions, feelings like "Relaxed", "Contented", and "Happy" are observed, though they appear less frequently than the negative ones. The fact that the student studies at Antalya Bilim University suggests that other factors might be influencing these emotional changes. For instance, the expectations of attending a private university, academic pressures, or the influence of a social environment could potentially contribute to these emotional responses. In summary, it can be said that this student generally felt calm during the 2D drawing experience, but there were specific times when they felt disheartened or bored. Moreover, it's essential to recognize that not just the experiment itself, but various external factors could also influence the student's emotional responses.

5.4.26.3. Experiment 3

In this section, we have examined the emotional variations experienced by a male student from Antalya Bilim University during his second experiment, where he used 3D software for sketching. Throughout the course of this experiment, we collected a total of 510 emotional data points, allowing for a comprehensive analysis of his emotional changes during the process.



When examining the emotional changes in the student's third experiment, we can predominantly see values in the negative range, suggesting dominant feelings of stress, sadness, and calmness. The magnitude of these negative values frequently indicates moments when the student felt relaxed, calm, or sad. However, we also observe positive values representing happier and more excited moments. Emotional shifts are often characterized by sudden transitions from negative to positive values or vice versa. While no specific details have been provided regarding angles, larger angles can generally be associated with more intense emotional shifts. The fact that the student is studying at Antalya Bilim University, a private institution, and experiencing these emotional reactions while conducting an experiment with a 3D program could be related to the academic pressures or the complexity of the experiment. Being male might also be related to the perceived pressure or stress during the experiment; however, it's challenging to make generalizations about the definitive impact of gender on emotions.

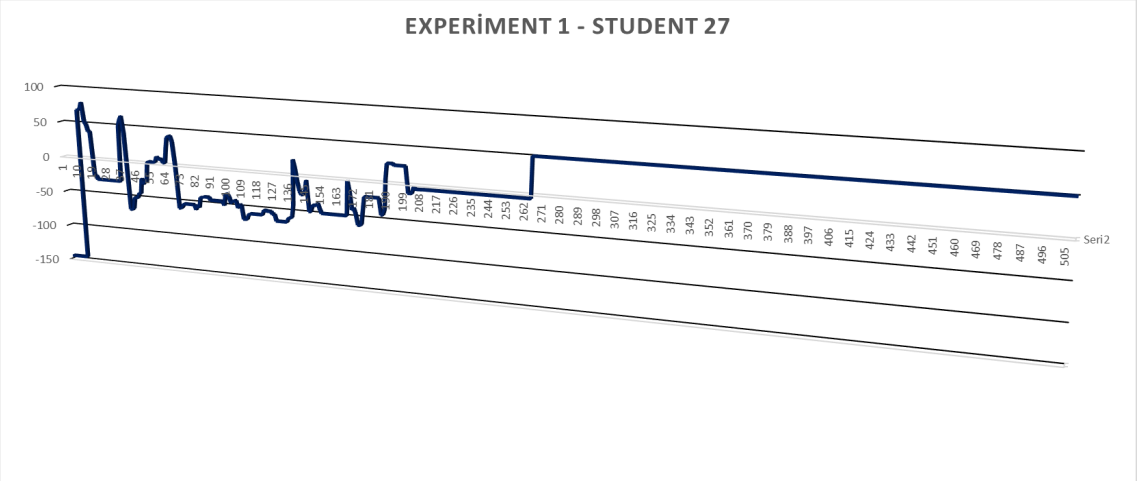
5.4.26.4. Experiment Analysis

The experiment analysis is as follows: Upon reviewing the three experiments conducted by the 26th student, it is evident that the student exhibited varied emotional responses across different experiments. In the first experiment, the student encountered energetic emotions such as "alert", "excited", and "nervous", indicating that the experiment kept the student active and spirited. In the second experiment, while working with a 2D program, the student predominantly felt "calm", but there were also negative emotional reactions such as "bored", "sad", and "unhappy". In the third experiment, the student predominantly faced negative emotions such as stress, sadness, and calmness. When comparing the three experiments, it can be concluded that the student felt the happiest during the first experiment. Studying at Antalya Bilim University might have contributed to the emotional fluctuations experienced by the student during the experiments. Specifically, the expectations and academic pressures associated with attending a private university could have influenced the student's emotional responses.

5.4.27. Student 27

5.4.27.1. Experiment 1

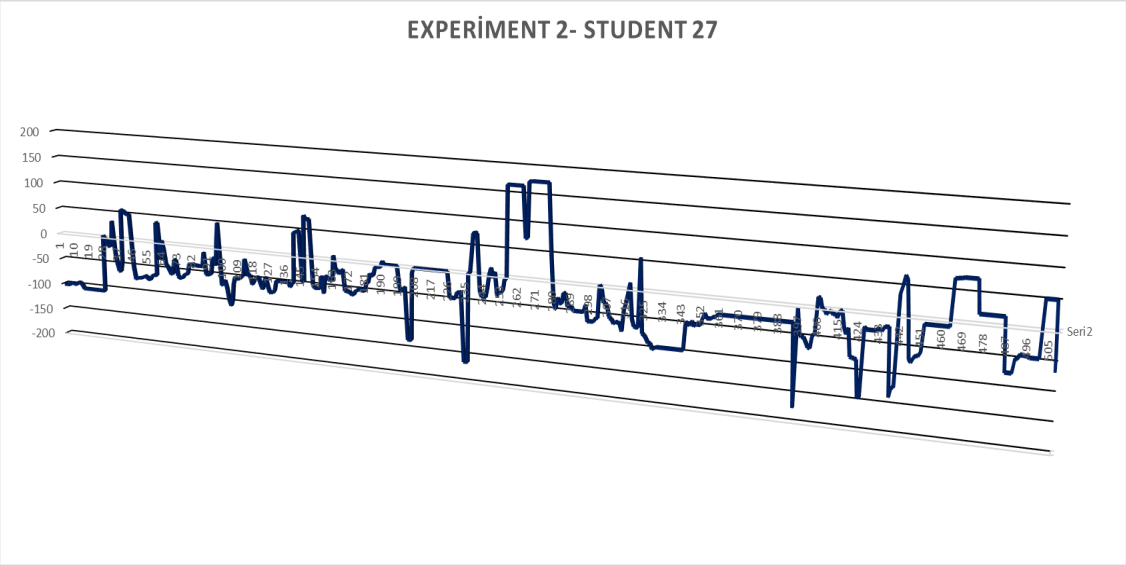
In this segment, we have examined the emotional fluctuations encountered by a male student from Antalya Bilim University during his first experiment, which involved manual drawing. Over the course of the study, we collected a total of 510 emotional data points, allowing for a comprehensive analysis of his emotional changes throughout the process.



Based on the data from the 27th student's first experiment, the student's emotional shifts are quite pronounced. The recurring frequency of the "Depressed" emotion with high negative angle values suggests that the student began the experiment in a notably negative emotional state. In contrast, among the positive emotions, "happy" and "excited" are dominant. When examining the relationship between the student's angle values and emotional shifts, negative angle values typically correlate with calmer or negative emotions ("Calm", "Relased", "Contented"). However, during times the student felt "alert", the angle values are positive and of high magnitude. The fact that the student is studying at Antalya Bilim University, a private institution, might have had an influence on the emotional shifts experienced during the experiment; however, this cannot be definitively determined. High expectations, academic pressures, or the influence of their social environment might have contributed to these emotional changes. Whether the student's gender, being male, has a specific effect on his emotional responses can be debated, but it's challenging to draw a definitive conclusion based solely on this data. In summary, it can be said that the student generally felt calm or relieved during the experiment but also exhibited positive emotional responses at specific times.

5.4.27.2. Experiment 2

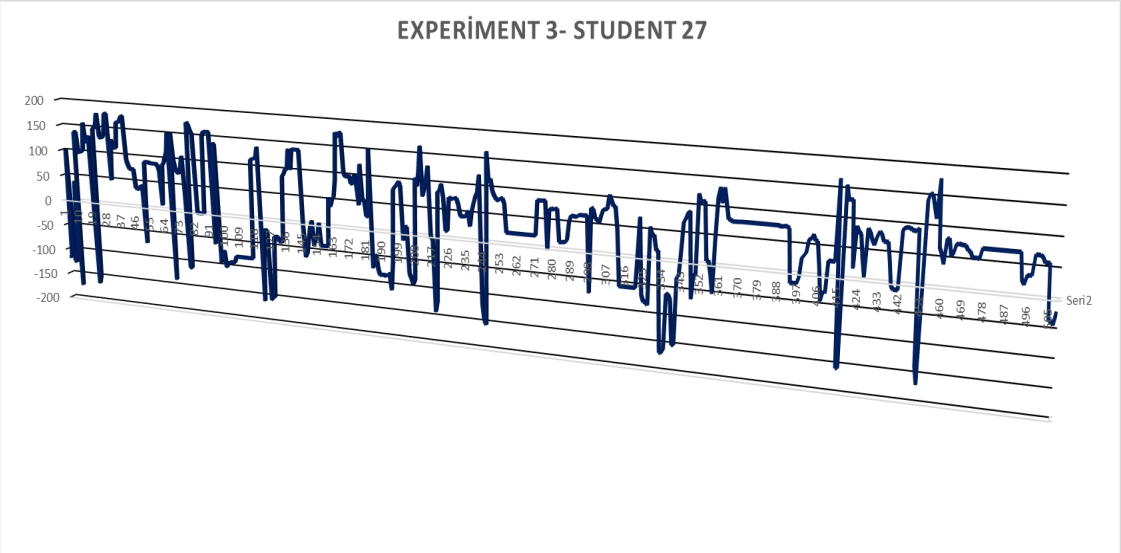
In this section, we have examined the emotional variations experienced by a male student from Antalya Bilim University during his second experiment, in which he used 2D software for sketching. Throughout the course of this experiment, we collected a total of 510 emotional data points, allowing for a comprehensive analysis of his emotional changes during the process.



When examining the student's emotional data, it appears that this individual often displays negative emotional responses. Dominantly, more tranquil emotional states such as "Relased" and "Calm" are prevalent, while the presence of negative emotions like "Depressed" and "Sad" is also observed. Additionally, positive emotional responses like "excited", "happy", and "alert" are seen from time to time. Especially, responses with high values for "alert" and "Upset" indicate that the student exhibits intense emotional reactions at certain points. Establishing a direct relationship between angle values and emotional responses may be challenging, but it can generally be said that more negative angle values correlate with negative emotional responses, and positive angle values usually relate to positive emotional responses. The information that the student studies at Antalya Bilim University and works with a 2D drawing program could have influenced their emotional responses; perhaps the process of learning a new program or their experiences at the university might be related to these emotional fluctuations. However, more comprehensive information and analysis would be required to reach this conclusion.

5.4.27.3. Experiment 3

In this section, we have explored the emotional fluctuations encountered by a male student from Antalya Bilim University during his second experiment, where he used 3D software for sketching. Throughout the duration of this experiment, we collected a comprehensive dataset comprising 510 unique emotional data points. This dataset allows for a detailed analysis of his emotional changes throughout the process.



Upon examining the recorded emotional changes of the student, a predominantly negative emotional state is observed. Especially when considering moments when they felt "Relased", it appears the student tends to frequently experience a sense of relief from pressure or stress. This could potentially be attributed to the academic and social pressures of university life or the novelty of experiencing drawing with a 3D program for the first time. In terms of positive emotions, there are moments when they felt "happy", but these moments are fewer in comparison to their overall experience. The student's emotional shifts often display a trend moving from stress to relaxation or from unhappiness to happiness. Finally, the student's gender and the fact that they are studying at a private university might have a certain influence on their emotional shifts.

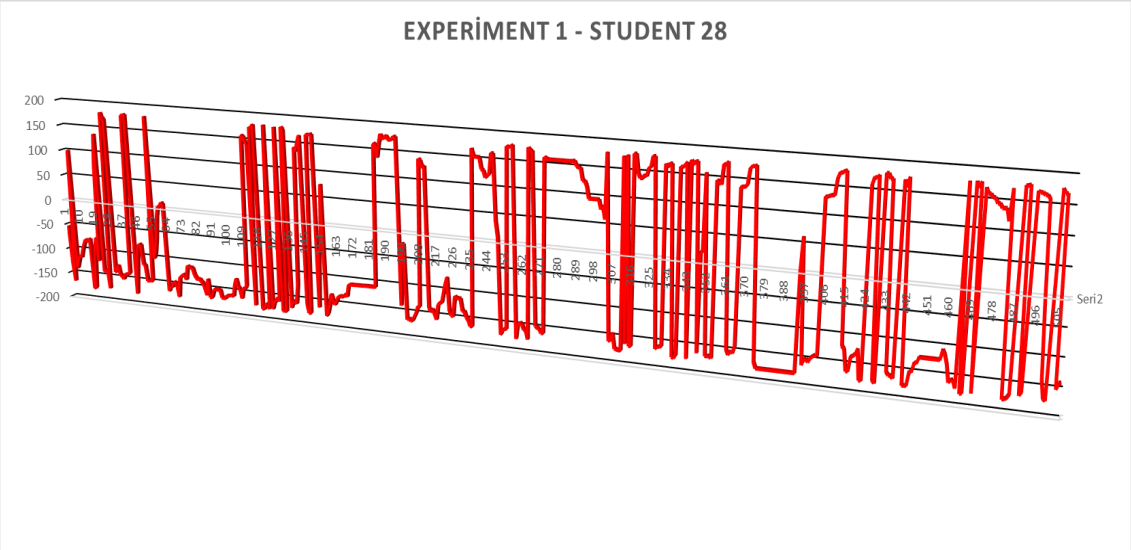
5.4.27.4. Experiment Analysis

The emotional shifts of the 27th student, analyzed across three experiments, are notably diverse. In the first experiment, the student started with a prominently negative emotional state, particularly marked by the frequent recurrence of the "Depressed" emotion with high negative angle values. In the second experiment, while the student predominantly showed negative emotional responses, calm emotional states like "Relased" and "Calm" were dominant, yet negative emotions such as "Depressed" and "Sad" were also conspicuous. In the third experiment, the student often seemed to be in a mood of relief from pressure or stress, but there were moments when they felt "happy". Evaluating the three experiments holistically, we can deduce that the student was happiest during the first experiment, attributable to the dominance of positive emotions like "happy" and "excited" in this test. The fact that the student studies at Antalya Bilim University and the programs used might have exerted specific influences on the student's emotional responses.

5.4.28. Student 28

5.4.28.1. Experiment 1

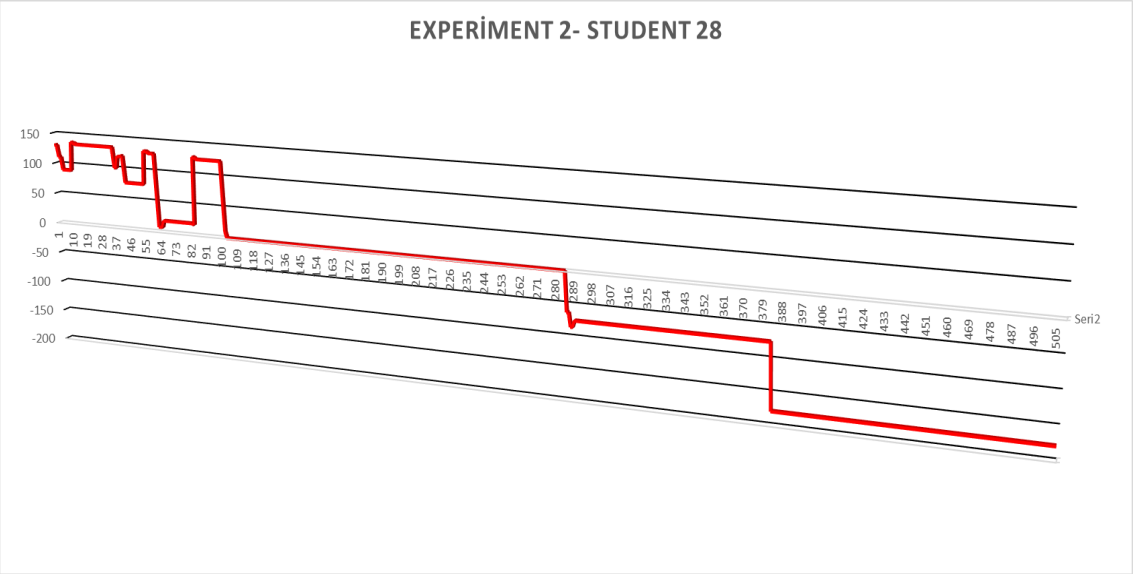
In this segment, we have analyzed the emotional fluctuations observed in a female student from Antalya Bilim University during her first experiment, which involved manual drawing. Throughout the course of the study, we collected a total of 510 emotional data points, enabling a comprehensive analysis of her emotional changes during the process.



Based on the data from the 28th student's first experiment, the student's dominant emotion appears to be 'Depressed', frequently recurring with negative angle values. Additionally, emotions like 'Upset' and 'Sad' are also prevalent. While positive emotions such as 'happy', 'excited', and 'Contented' are observed, their frequency is notably less compared to negative emotions. Examining the relationship between the student's angle values and emotions, negative angle values typically correlate with negative emotions, and positive angle values often align with positive emotions. However, we can observe that the 'Upset' emotion matches with high positive angle values, suggesting that the student displayed intense emotional reactions at specific times. The fact that the student is attending Antalya Bilim University (a private institution) and is female might influence their emotional responses, but it's challenging to draw definitive conclusions from this data set alone. In summary, the 28th student predominantly exhibited a negative emotional state during this experiment, although they displayed positive emotional reactions at certain times.

5.4.28.2. Experiment 2

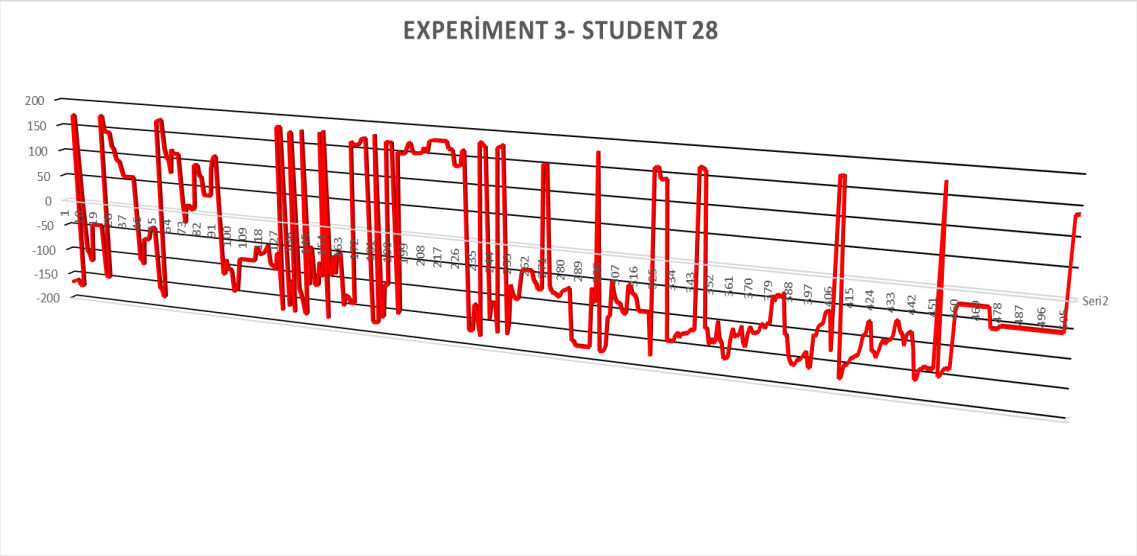
In this section, we have analyzed the emotional fluctuations experienced by a female student from Antalya Bilim University during her second experiment, where she used 2D software for sketching. Throughout the course of this experiment, we collected a total of 510 emotional data points, enabling a comprehensive analysis of her emotional changes during the process.



Upon examining the emotional state of the 28th student during their second experiment, it's evident that the predominant emotion experienced was "stressed". Additionally, emotions of "contented" and "calm" were frequently observed. Among the positive emotions, the feelings of "happy" and "contented" were present. In terms of emotional shifts, there's a clear transition from moments of stress to those of calmness or happiness, but the overarching sentiment seems to be one of stress. When analyzing the relationship between angles and emotions, negative angles (e.g., -179) often correlate with negative emotions such as "sad", while positive angles typically align with positive or neutral emotions like "happy" or "contented". We lack specific data on whether the student's gender and the university they attend influence this emotional experience. However, the fact that the Antalya Bilim University is a private institution might suggest potential academic and social pressures impacting the student. In conclusion, this student predominantly felt stressed during the experiment, but there were intervals where this was replaced by feelings of calmness and happiness.

5.4.28.3. Experiment 3

In this section, we have analyzed the emotional fluctuations experienced by a female student from Antalya Bilim University during her second experiment, where she used 3D software for sketching. Throughout the course of this experiment, we collected a total of 510 emotional data points, enabling a comprehensive analysis of her emotional changes during the process.



Upon examining the emotional shifts experienced by this student during the experiment, it's evident that the predominant emotion was "stressed". The student was found to feel stressed while working with a 3D program during the experiment. However, based on the available data, it's challenging to determine if the level of stress directly correlates with the prestige of the university they attend or their gender. Broadly speaking, the data suggests that negative emotional responses were more dominant. Nonetheless, a more detailed analysis would be required to establish a clear relationship between angles and emotions. The student's emotional state might also be influenced by external factors like the complexity of the 3D program used, their individual skills, or the conditions of the experiment. Thus, to make any definitive interpretation, more information on the student's pre- and post-experiment condition, the circumstances of the experiment, and other individual factors would be necessary.

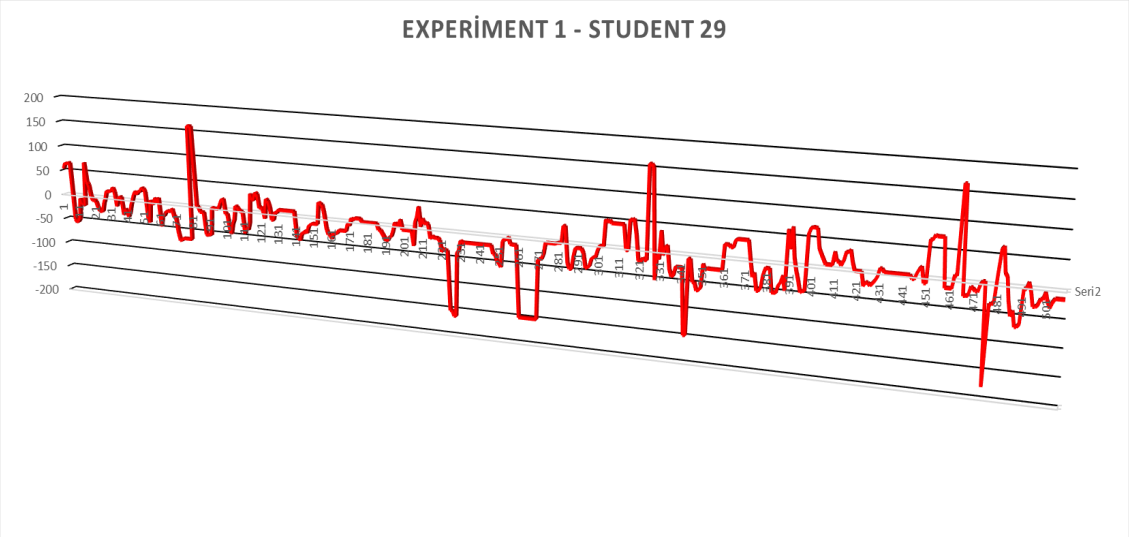
5.4.28.4. Experiment Analysis

Upon analyzing the experiment results, it's observed that the 28th student's emotional shifts vary across different experiments. In the first experiment, the student predominantly exhibited negative emotional responses. Emotions like "Depressed", "Upset", and "Sad" were frequently observed, while positive emotions like "happy", "excited", and "Contented" appeared less often. In the second experiment, the dominant emotion was "stressed", yet positive emotions such as "contented" and "calm" were also noticeable. In the third experiment, it was determined that the student felt stressed while working with the 3D program. Taking a broad overview, we can infer that the student was calmer and happier in the second experiment compared to the first and third. However, directly linking these outcomes to the university the student attends or their gender is challenging. Considering the overall distribution of emotional responses, the second experiment can be identified as the one where the student felt the happiest.

5.4.29. Student 29

5.4.29.1. Experiment 1

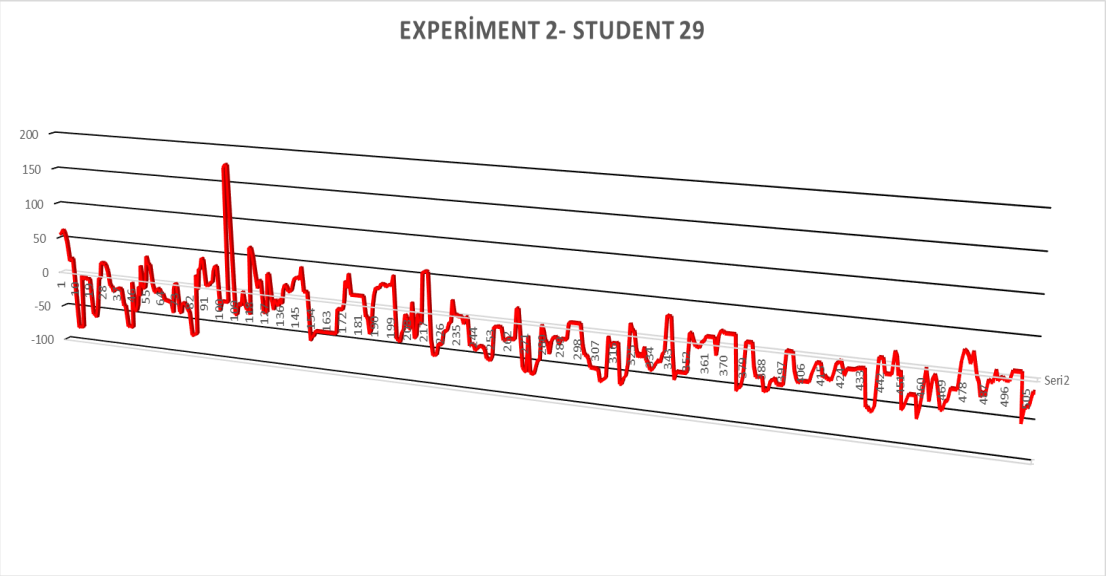
In this section, we have analyzed the emotional fluctuations observed in a female student from Antalya Bilim University during her first experiment, which involved manual drawing. Throughout the course of the study, we collected a total of 510 emotional data points, allowing for a comprehensive analysis of her emotional changes during the process.



When examining the data from the 1st experiment of the 29th student, it's evident that the student predominantly experienced emotions like "alert", "happy", and "contented". Among positive emotions, "happy", "excited", and "alert" frequently recur, while in the spectrum of negative emotions, there are feelings of "relased", "calm" and, albeit more rarely, "sad" and "upset". Looking at the angle values, positive angles can generally be associated with positive emotions and negative angles with negative ones, though there are exceptions to this rule. For instance, very high positive angle values (e.g., 159.5112477) are associated with the "Upset" emotion. The fact that the student studies at Antalya Bilim University and her gender being female might have an impact on the emotional responses; however, it's challenging to definitively determine such a relationship from this dataset. In conclusion, the student generally showed positive emotional responses during the experiment, but also experienced intense negative emotions at specific times.

5.4.29.2. Experiment 2

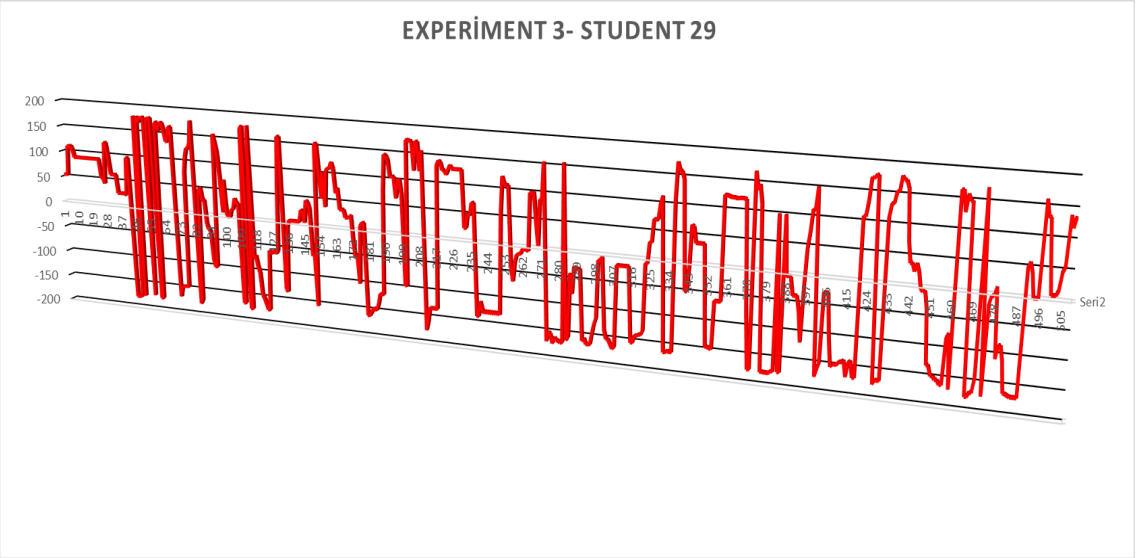
In this section, we have analyzed the emotional fluctuations that a female student from Antalya Bilim University experienced during her second experiment, in which she utilized 2D software for sketching. Over the course of this experiment, we gathered a total of 510 emotional data points, allowing for a thorough analysis of her emotional changes throughout the process.



Firstly, based on the provided information, when we look at the emotional states of the 29th student, we can observe that the most dominant emotion is "Contented". This suggests that the student was generally calm and satisfied during the experiment. Additionally, among positive emotions, "happy" and "excited" stand out. This indicates that the experiment had a generally positive impact on the student. However, it's worth noting that there isn't a noticeable presence of negative emotions or significant emotional fluctuations in the data. In terms of angles, negative values seem to represent calmer emotions (Calm, Relased), while positive values seem to correspond to more energetic and positive emotions (excited, happy). Furthermore, the fact that this student is studying at Antalya Bilim University, though we can't draw definitive conclusions about how attending a private university might influence their emotional state during the experiment, suggests they were generally in a positive emotional state.

5.4.29.3. Experiment 3

In this section, we have analyzed the emotional fluctuations experienced by a female student from Antalya Bilim University during her second experiment, where she used 3D software for sketching. Throughout the course of this experiment, we collected a total of 510 emotional data points, enabling a comprehensive analysis of her emotional changes during the process.



During the student's drawing experiment with the 3D program, the emotional shifts indicate a tendency to feel "stressed". This might suggest that drawing with the 3D program was a challenging and stressful experience for this student. However, in some parts of the experiment, the student also experienced positive emotions like "happy" and "excited". The emotional shifts could be proportional to different stages of the 3D drawing experience. Additionally, a more in-depth analysis is needed to determine if there's a direct relationship between specific angles and emotions. The fact that the student is studying at Antalya Bilim University, a private institution, implies there might be unique pressures or expectations associated with this experience. In summary, we can say that this student had complex emotional reactions during their 3D drawing experience. These reactions could be related to the student's expectations associated with this task, their experience, and their overall situation at the university.

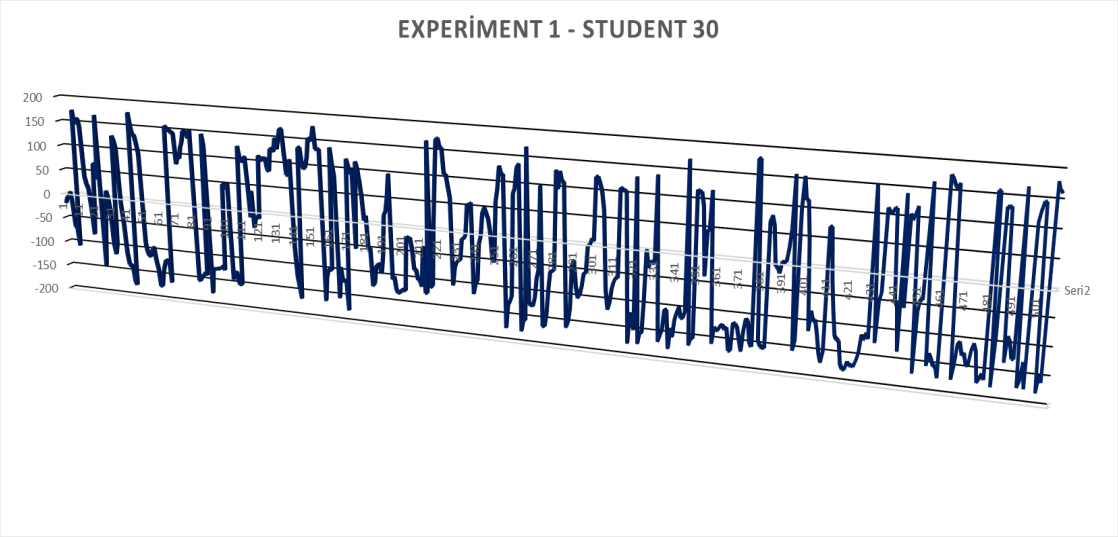
5.4.29.4. Experiment Analysis

When examining the emotional states of the 29th student across three separate experiments; in the first experiment, the student predominantly experienced feelings of "alert", "happy", and "contented". In the second experiment, the student generally seemed to be in a "pleased" emotional state. However, during the third experiment, which involved drawing with a 3D program, the student was often observed to be "stressed" or tense, though they also displayed some positive emotional responses. We can deduce that the second experiment was the one where the student felt the happiest. While the exact reasons or factors behind the student's emotional shifts cannot be precisely determined, it is speculated that studying at Antalya Bilim University, a private institution, could have influenced their reactions to the experiments.

5.4.30. Student 30

5.4.30.1. Experiment 1

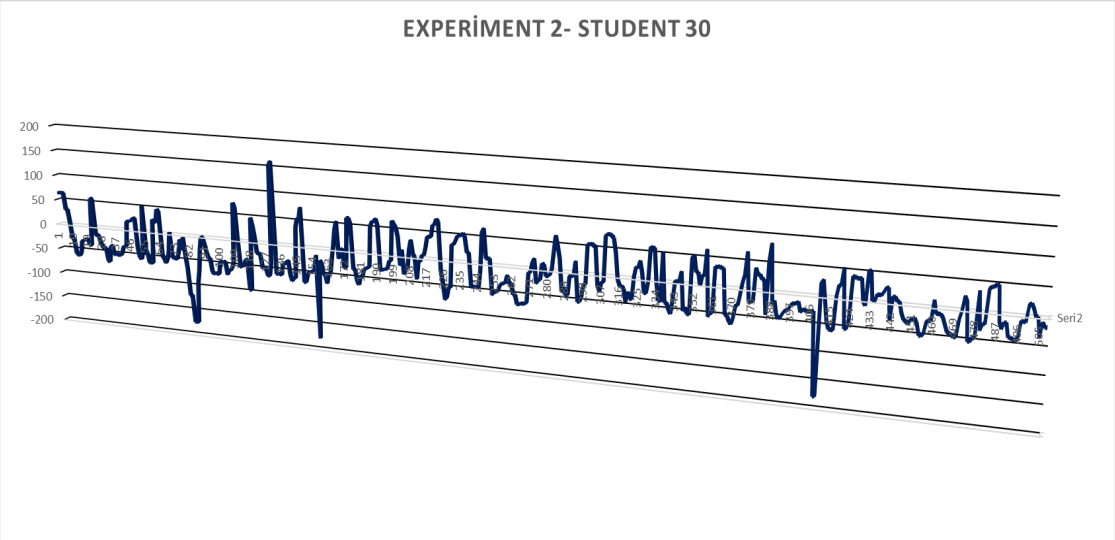
In this section, we have examined the emotional fluctuations experienced by a male student from Antalya Bilim University during his first experiment, which involved manual drawing. Over the course of the study, we collected a total of 510 emotional data points, enabling a comprehensive analysis of his emotional changes throughout the process.



When examining the 30th student's first experiment, we observe that the student's emotional state varies across a broad spectrum. Dominantly, feelings of "Upset", "Sad", and "stressed" prominently emerge, suggesting that the student frequently grappled with negative emotions during the experiment. Within the positive emotions, "happy", "excited", and "alert" recur frequently; however, the frequency of these positive emotions is less in comparison to the negative ones. When looking at the angle values, we find that negative values are typically associated with negative emotions (Sad, Depressed, Bored) while positive values are generally linked with either positive emotions (happy, excited) or negative ones such as "Upset" and "stressed". In summary, the student primarily exhibited negative emotional responses during the drawing experiment but also displayed positive reactions in certain parts of the experiment. This might indicate that the drawing experiment was a challenging experience for this student.

5.4.30.2. Experiment 2

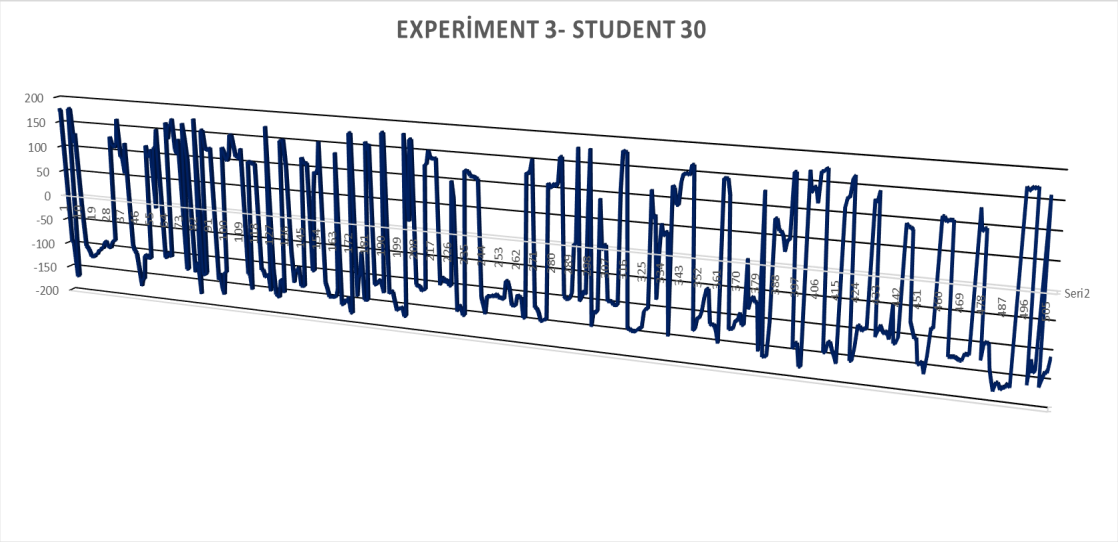
In this section, we have examined the emotional fluctuations encountered by a male student from Antalya Bilim University during his second experiment, where he utilized 2D software for sketching. Throughout the duration of this experiment, we collected a comprehensive dataset comprising 510 unique emotional data points. This dataset allows for a detailed analysis of his emotional changes throughout the process.



Upon examining the emotional changes recorded during the 30th student's second experiment, we find that values in the "Relased" and "Contented" categories dominate the emotions experienced. This suggests that the student predominantly felt relaxed and contented. In terms of positive emotions, categories such as "happy", "excited", and "alert" stand out. However, it should be noted that this student occasionally exhibited negative emotional reactions like "Sad" and "Bored". There seems to be a general correlation between the magnitude of angles and emotional states: positive emotions typically coincide with positive angle values, while negative emotions correspond to negative angle values. Still, it's important to note that this trend might not always hold true. Additionally, while the student's education at Antalya Bilim University and his male gender might not have a definitive impact on these emotional reactions, they might be influenced by his overall life experiences and stress levels.

5.4.30.3. Experiment 3

In this section, we have explored the emotional fluctuations experienced by a male student from Antalya Bilim University during his third experiment, in which he used 3D software for sketching. Throughout the duration of this experiment, we collected a comprehensive dataset comprising 510 unique emotional data points. This dataset allows for a detailed analysis of his emotional changes throughout the process.



In the student's third experiment, the recorded emotion is predominantly noted as "bored". Overall, the data suggests a dominance of negative emotions. Especially, feelings of "sad", "depressed", and "bored" are prominent. When considering positive emotions, fewer instances of feeling "happy", "excited", and "alert" are observed. However, these positive emotions are typically recorded at lower angle values. The overall negative angles indicate that the student frequently experienced negative emotional states. This might be related to the fact that the university is a private institution, or possibly to the student's gender. In summary, the student's overall emotional state can be interpreted as being dominated by negative emotions, experiencing a limited number of positive emotions, and this emotional state may be related to various factors.

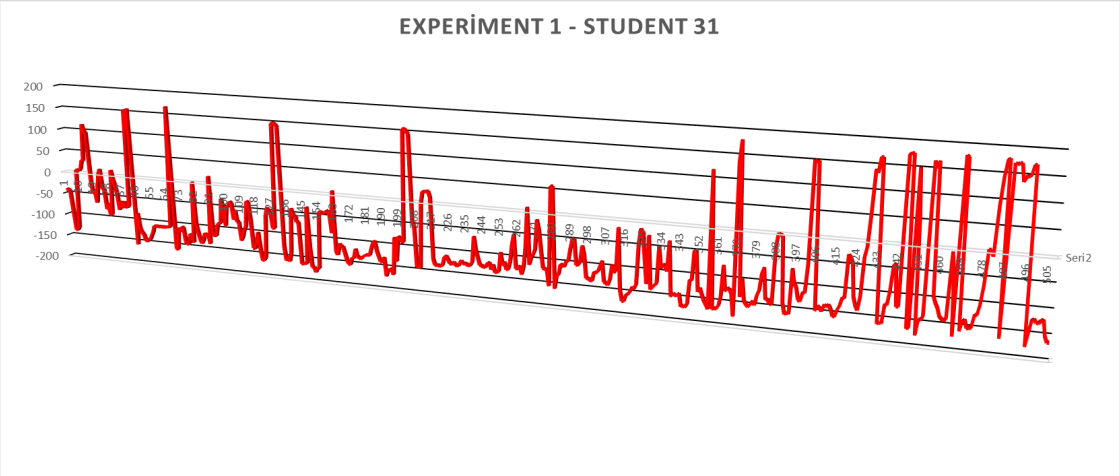
5.4.30.4. Experiment Analysis

Considering the emotional shifts of the 30th student throughout the three experiments, we observe a broad spectrum of mood changes. In the first experiment, the student predominantly grappled with negative emotions. In contrast, the second experiment showed a leaning towards positive emotions like relaxation and contentment. The third experiment highlighted feelings of boredom. Taking a holistic view of all experiments, we can infer that the student displayed the most positive emotional responses and was happiest during the second experiment. While his education at Antalya Bilim University and his gender might not definitively define his emotional reactions, they could be significant factors influencing them. However, a more comprehensive analysis would be required to fully understand the student's emotional transitions.

5.4.31. Student 31

5.4.31.1. Experiment 1

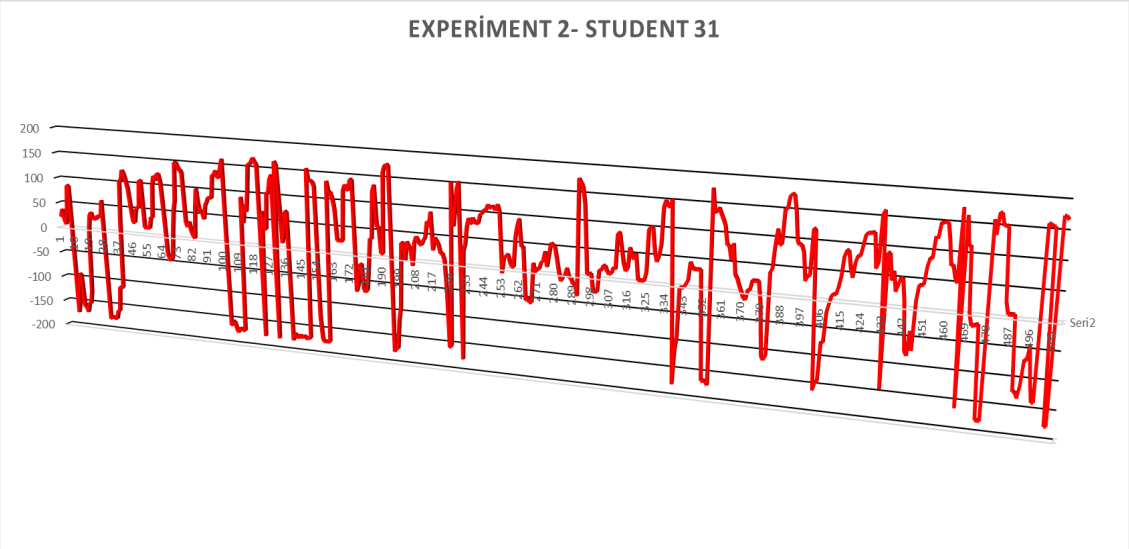
In this section, we have analyzed the emotional fluctuations observed in a female student from Antalya Bilim University during her first experiment, which involved manual drawing. Throughout the course of the study, we collected a total of 510 emotional data points, allowing for a comprehensive analysis of her emotional changes during the process.



Upon examining the first experiment of the 31st student, it is evident that the student predominantly felt "Depressed." Alongside this negative emotion, other negative feelings like "Sad" and "Bored" also frequently reoccur. In terms of positive emotions, "Happy" and "Excited" stand out. However, the frequency of negative emotions is higher compared to the positive ones. When looking at the angle values, it's observed that negative values typically correlate with negative emotions, while positive values usually align with positive emotions or some negative feelings like stress and sadness. The frequency of the student's emotional shifts indicates that the experimental process was a turbulent experience for her. Additionally, the fact that the student is studying at Antalya Bilim University and is female might be factors influencing her emotional responses. However, the direct impact of these factors cannot be definitively determined. Overall, it can be said that throughout the experiment, the student mostly exhibited negative emotional reactions and frequently experienced shifts in her emotions.

5.4.31.2. Experiment 2

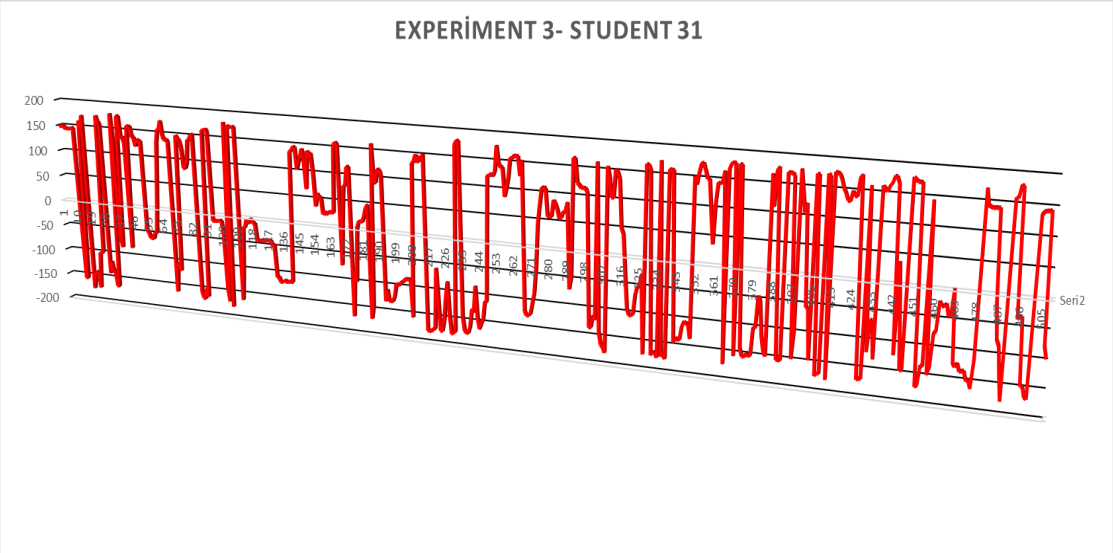
In this section, we have analyzed the emotional fluctuations experienced by a female student from Antalya Bilim University during her second experiment, where she used 2D software for sketching. Throughout the course of this experiment, we collected a total of 510 emotional data points, enabling a comprehensive analysis of her emotional changes during the process.



When examining the emotional reactions of the student during the experiment with the 2D program, it's evident that the emotion "Upset" predominantly emerges. This might indicate that the student experienced discomfort or stress during the experiment. A significant portion of the student's emotional responses is negative. However, positive emotional reactions like "happy" are also observed. Establishing a general relationship between angles and emotions, it's noted that negative angle values typically correlate with negative emotions (Sad, Depressed), while positive angle values are usually associated with positive or alert emotions (happy, excited, alert). However, this relationship might not always be consistent and shows individual variations. The fact that the student is studying at Antalya Bilim University and her gender being female necessitates a more detailed investigation to understand the reasons behind these emotional shifts. The emotional changes experienced by the student might stem from the complexity of the 2D program she used during the experiment, her personal skills, or other factors related to the experiment itself.

5.4.31.3. Experiment 3

In this section, we have explored the emotional fluctuations experienced by a female student from Antalya Bilim University during her third experiment, in which she used 3D software for sketching. Throughout the duration of this experiment, we collected a comprehensive dataset comprising 510 unique emotional data points. This dataset allows for a detailed analysis of her emotional changes throughout the process.



During the 3rd experiment, the 31st student predominantly felt stressed and uncomfortable, as indicated by the emotions "stressed" and "upset". However, she also experienced some positive emotional states such as "contented" and "relaxed" during the experiment. The angles typically indicate that she felt stressed and uncomfortable at positive values and experienced more positive or neutral emotions at negative values. Particularly when using the 3D program, the student's emotional state was determined as "bored", suggesting that she might find this type of technology tedious. Her gender and the fact that the university is a private institution might not be decisive factors for these emotional reactions. However, perhaps the pressures or expectations she faces might influence these emotional responses.

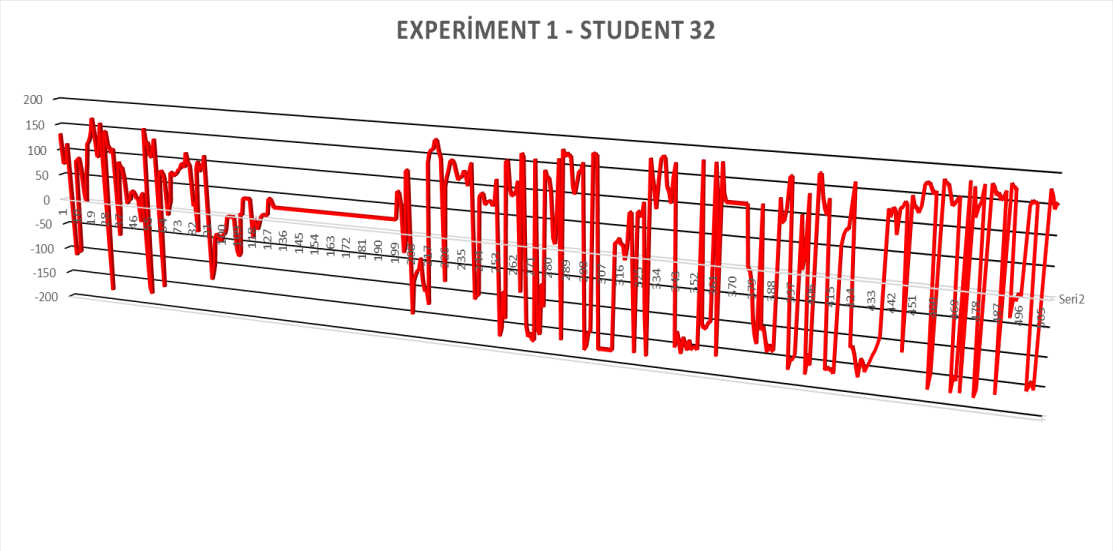
5.4.31.4. Experiment Analysis

Upon analyzing the experiment results, it's evident that the 31st student exhibited varied emotional responses across the three experiments. In the first experiment, the student predominantly felt "Depressed." In the second experiment, while working with a 2D program, the prevailing emotion was "Upset", but positive emotional responses such as "happy" were also observed. In the third experiment, when using a 3D program, the emotions "stressed" and "upset" were dominant, yet sporadically, positive feelings like "contented" and "relaxed" were also experienced. The experiment in which the student felt happiest was the second, where positive emotions like "happy" and "excited" were observed. These findings highlight that the student's emotional responses to technological tools and the complexity of the experiment vary. While factors such as attending Antalya Bilim University and being female might not definitively dictate these emotional reactions, it can be concluded that such experiments can elicit different emotional impacts on individuals.

5.4.32. Student 32

5.4.32.1. Experiment 1

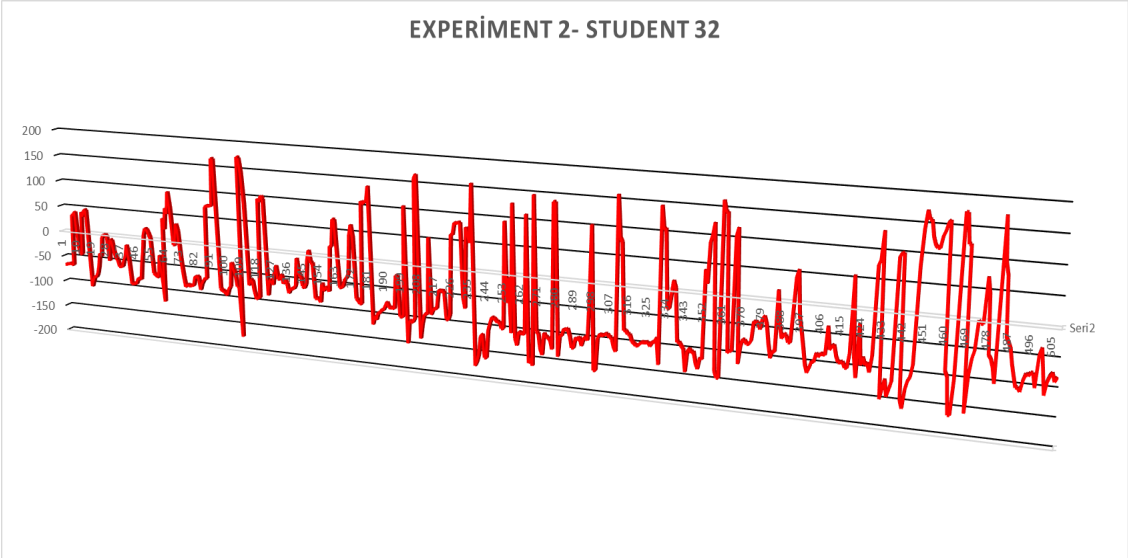
In this section, we have examined the emotional shifts observed in a female student from Antalya Bilim University during her initial experiment, which centered around manual drawing. Over the course of the study, we amassed a total of 510 data points related to her emotional states, providing the groundwork for a comprehensive analysis of her emotional fluctuations throughout the process.



Looking at the results of the 32nd student's first experiment, it appears that the student's emotional state is predominantly characterized by negative emotions. Leading the dominant emotions are "stressed", "upset", and "nervous". Throughout the experiment, the student experienced positive emotions like "happy", "excited", and "alert" a few times; however, the frequency of these positive emotions is less compared to the negative ones. An analysis of angle values suggests that positive values are mostly associated with negative emotions, while negative values generally correspond to emotional responses like "Bored", "Sad", and "Relased". The frequent emotional fluctuations indicate that the experiment was quite a turbulent experience for the student. Being female and studying at Antalya Bilim University (a private university) might be influential factors in her emotional responses. However, the direct impact of these factors cannot be definitively determined. Overall, it can be said that the student spent much of this experiment experiencing negative emotional reactions and exhibited frequent shifts in emotional state.

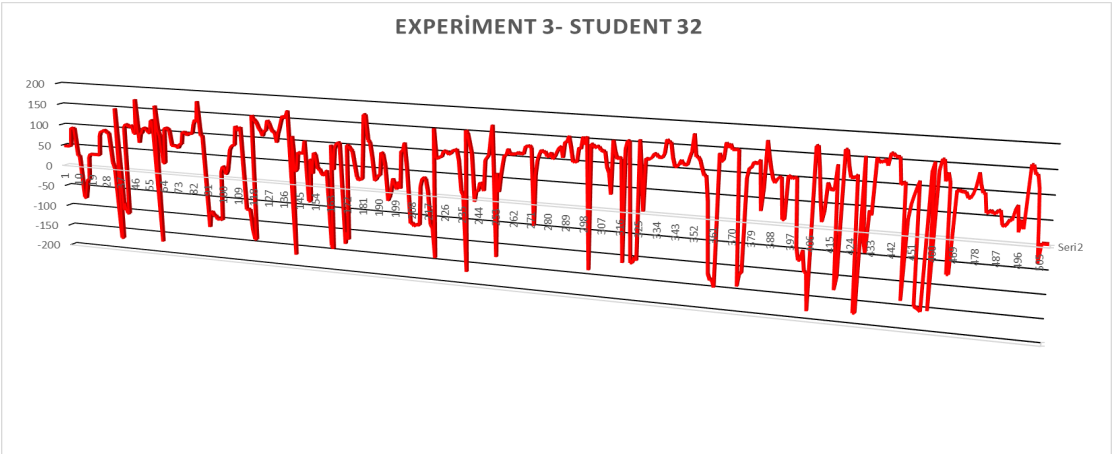
5.4.32.2. Experiment 2

In this segment, we've explored the emotional variations encountered by a female student from Antalya Bilim University during her second experiment, where she utilized 2D software for sketching. Throughout the duration of this experiment, we collected a comprehensive dataset comprising 510 unique emotional data points. This dataset allows for a detailed analysis of her emotional transitions throughout the process.



When examining the emotional changes experienced by the 32nd student during their second experiment, we observe that a significant portion of their emotional state is dominated by the feeling of "Calm". This indicates that the student generally approached the drawing activity in a tranquil manner. However, positive emotional reactions such as "excited" and "alert" are noteworthy, especially at higher positive angles. This may suggest that the student exhibited heightened interest and energy towards the activity at certain moments. Upon assessing the range of emotions, we also notice the presence of varied emotional responses like "Relased", "Contented", and "Bored". Typically, negative angles are associated with calmer or more negative emotions, while positive angles tend to correlate with more energetic and positive feelings. However, this association isn't strictly consistent and could be influenced by the student's personal reactions. Lastly, it's indeterminable from the data whether the student's education at a private university and her gender have a pronounced influence on her emotional responses during the experiment. Nevertheless, it's essential to consider that such demographic details might have some bearing on individual reactions.

5.4.32.3. Experiment 3



Based on the provided data, we observe that the student experienced feelings of "happiness" during the 3D drawing experiment. Predominantly, the most evident emotions experienced by this student are "nervous" and "stressed". Alongside these, she frequently felt positive emotions, notably "happy" and "excited". The data suggests that her emotional transitions often ranged from stressful and tense states to happy and excited ones, or vice versa. Emotional angles are typically expressed with high positive or high negative values, possibly indicating the intensity of the student's emotional responses. We can infer that the 3D drawing experiment had a positive effect on the student, as feelings of "happiness" were experienced post-experiment. However, this positive emotional state seems short-lived, as we can observe frequent returns to stressed and tense situations. Additionally, the fact that the student studies at Antalya Bilim University and her gender being female might influence the emotional reactions experienced. However, based on this data, determining the exact impact of these factors on her emotional responses is challenging.

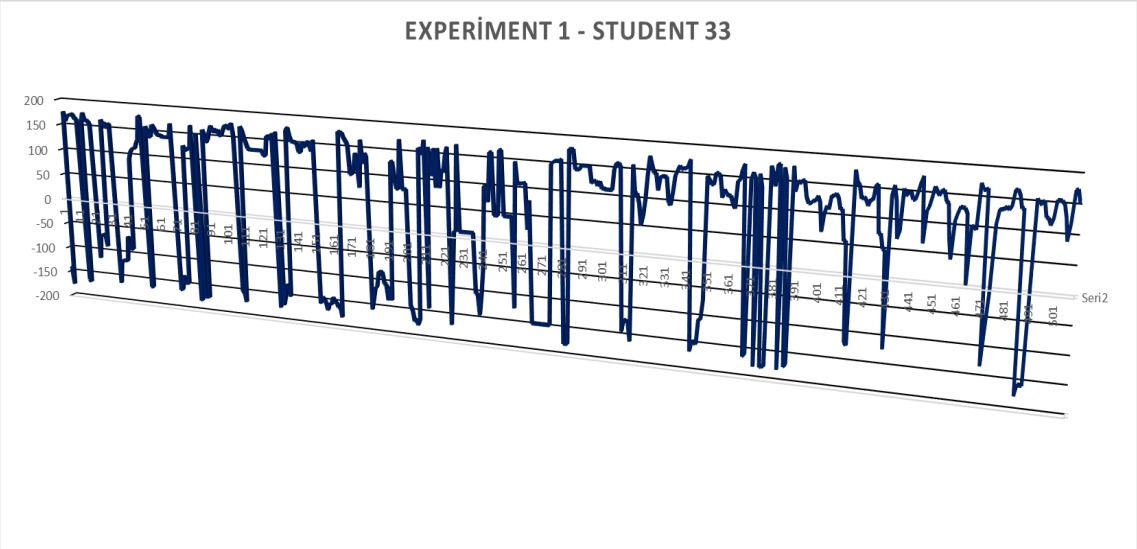
5.4.32.4. Experiment Analysis

Upon analyzing the results of the experiments, emotional fluctuations experienced by the 32nd student during three distinct experiments have been observed. During the first experiment, the student's emotional state was predominantly characterized by negative feelings, with "stressed," "upset," and "nervous" emotions being particularly prominent. In the second experiment, the student generally felt "Calm," indicating a more relaxed approach to this experiment. However, positive emotional responses like "excited" and "alert" should not be overlooked. The third experiment, the 3D drawing trial, was where the student felt "happy." Comparing the three experiments, we can deduce that the 3D drawing experiment was the one where the student felt the happiest. In summary, this analysis reveals how the 32nd student's emotional responses varied across the experiments and identifies which trial elicited the most positive emotional response.

5.4.33. Student 33

5.4.33.1. Experiment 1

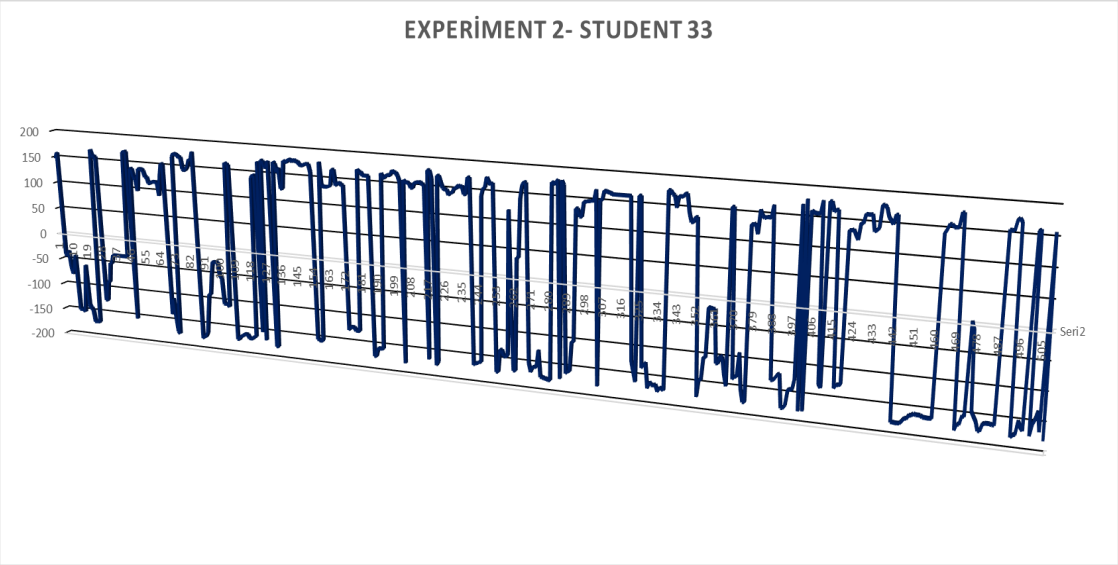
In this segment, we've explored the emotional shifts encountered by a male student from Antalya Bilim University during his first experiment, where he was engaged in manual drawing. Throughout the duration of this study, we gathered a comprehensive dataset comprising 510 unique emotional data points. This dataset allows for a detailed analysis of his emotional transitions throughout the process.



When observing the emotional changes experienced by the 33rd student during the first experiment, we can predominantly identify the emotion "Upset." This negative emotion was frequently experienced throughout the experiment. Positive feelings such as "alert," "excited," and "happy" were observed, but their frequency was less compared to the negative emotions. Given the frequent emotional fluctuations, we can infer that the experiment was a tumultuous experience for the student. A clear relationship is observed between the angle values and emotional responses; positive angle values are generally associated with more energetic or positive emotions, whereas negative angle values correlate with calmer or negative emotions. While the direct influence of the student's gender and attending a private university on their emotional responses can't be determined with this data, we should consider that these factors might impact their emotional reactions. In summary, the 33rd student frequently experienced negative emotional reactions during this experiment and demonstrated frequent changes in their emotional state.

5.4.33.2. Experiment 2

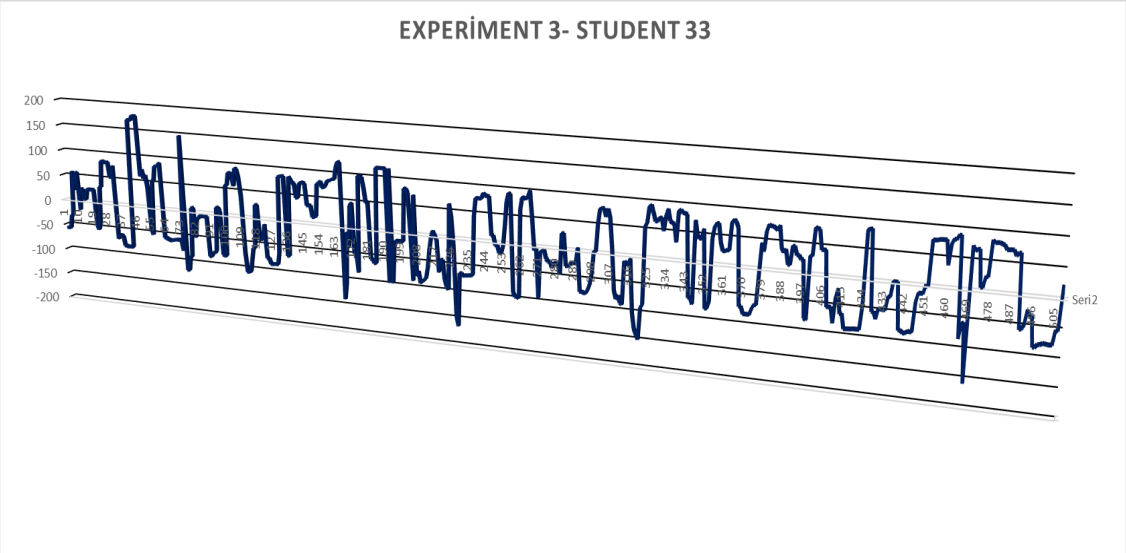
In this section, we examined the emotional fluctuations experienced by a male student from Antalya Bilim University during his second experiment, where he used 2D software for sketching. Throughout the duration of this experiment, we collected a comprehensive dataset comprising 510 unique emotional data points. This dataset allows for a detailed analysis of his emotional changes throughout the process.



When analyzing the emotional state of the 33rd student during the 2nd experiment through their drawings, it is observed that negative emotions predominantly prevail. Dominant emotions such as "Upset," "Sad," "Depressed," and "stressed" are at the forefront, which generally represent a negative spectrum. Positive emotions are quite limited and include emotional responses like "happy," "excited," and "Contented." However, the frequency of these responses is much less compared to negative emotions. Examining the angles, it's seen that negative values are associated with negative emotions, while positive values typically relate to negative emotions (and occasionally with positive emotions). This may indicate that the student's emotional state might have a correlation with the direction of the angles in the drawings. Additionally, the fact that this student is being educated at a private university might suggest that the stress or pressure they face could play a determinative role in their emotional state. In summary, this student predominantly encounters negative emotional responses, with positive emotional reactions being rare, and these responses could potentially be related to the environment they are educated in or their personal experiences.

5.4.33.3. Experiment 3

In this section, we investigated the emotional fluctuations encountered by a male student from Antalya Bilim University during his third experiment, where he used 3D software for sketching. Throughout the duration of this experiment, we collected a comprehensive dataset comprising 510 unique emotional data points. This dataset allows for a detailed analysis of his emotional changes throughout the process.



Based on the data presented for the 33rd student's 3rd experiment, when evaluating the student's emotional changes, we can observe that the dominant emotion is "alert". Throughout the experiment, the student frequently felt "alert," suggesting vigilance or attentiveness. This might imply that drawing with the 3D program required a high level of attention and alertness from the student. Additionally, there are moments where the student felt positive emotions like "happy" and "excited", indicating that the experiment induced positive feelings in them. However, the student's emotional state occasionally shifted to more relaxed feelings such as "Relased" and "Calm". This could indicate moments during the experiment where the student felt at ease or was less focused. Regarding the relationship between angles and emotions, although larger angle values seem to generally indicate more intense emotional responses, a thorough analysis requires more information. The student's attendance at Antalya Bilim University and their male gender might have exerted a certain influence on the experiment's outcomes, but determining the specific impact of gender or university choice on emotional responses is challenging based on this data.

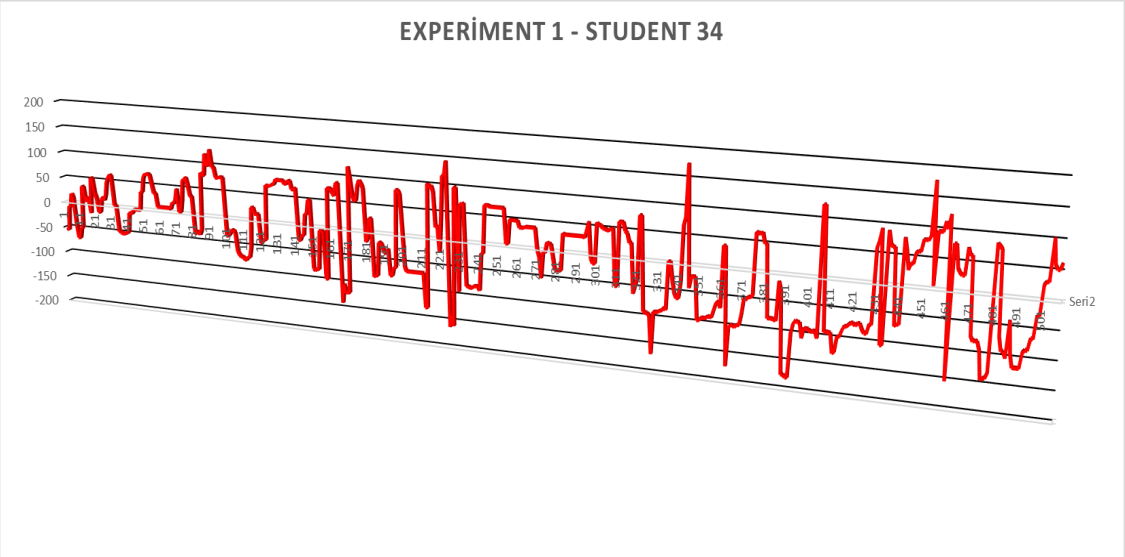
5.4.33.4. Experiment Analysis

Upon analyzing the experiment results, when evaluating the emotional responses of the 33rd student across three experiments, we arrive at the following conclusions: In the first experiment, the student frequently experienced the emotion "Upset," displaying a general negative emotional state. In the second experiment, through the drawings, it's understood that the student experienced negative emotions even more intensively, with positive emotions being quite limited. In the third experiment, while drawing with the 3D program, it was observed that the student frequently felt "alert" or attentive, but also experienced positive emotions. Comparing the three experiments, we can say that the student gave the most positive emotional response during the third experiment. However, the definite impact of the university the student attends and their gender on their emotional responses cannot be determined based solely on this data.

5.4.34. Student 34

5.4.34.1. Experiment 1

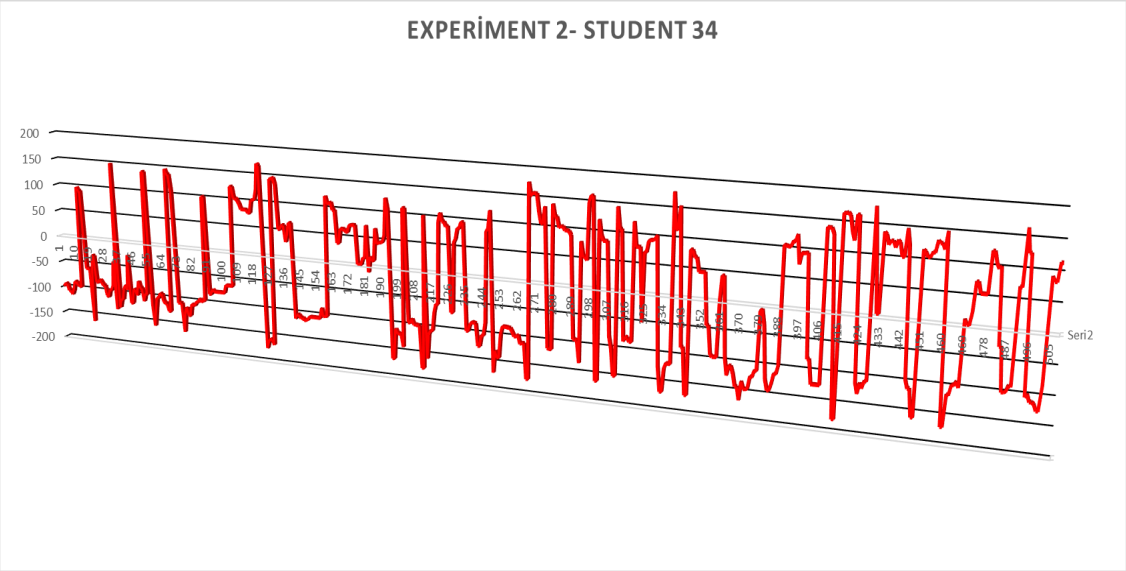
In this section, we have explored the emotional changes experienced by a female student from Antalya Bilim University during her initial experiment, which involved manual drawing. Throughout the study, we collected a total of 510 emotional data points, enabling a comprehensive analysis of her emotional fluctuations throughout the process.



Based on the data from the 34th student's first experiment, this student experienced various emotional changes throughout the experiment. Dominant emotions such as "alert", "nervous", and "Relased" stand out. Among the positive emotions, "happy" and "excited" are the most frequently recurring, while more calm or neutral emotions like "Calm", "Relased", and "Contented" are also frequently observed. In terms of emotional changes, the student often experienced emotional fluctuations throughout the experiment, indicating a significant impact of the experiment on the student. When establishing a general relationship between angle values and emotions, negative angle values are typically associated with calm or neutral emotions, while positive angle values are related to more energetic and positive emotions. However, notably high positive angle values are also associated with negative emotions like "nervous", "stressed", and "Upset". Additionally, the fact that the student is female and is studying at a private university might have a determining effect on her emotional responses during the experiment.

5.4.34.2. Experiment 2

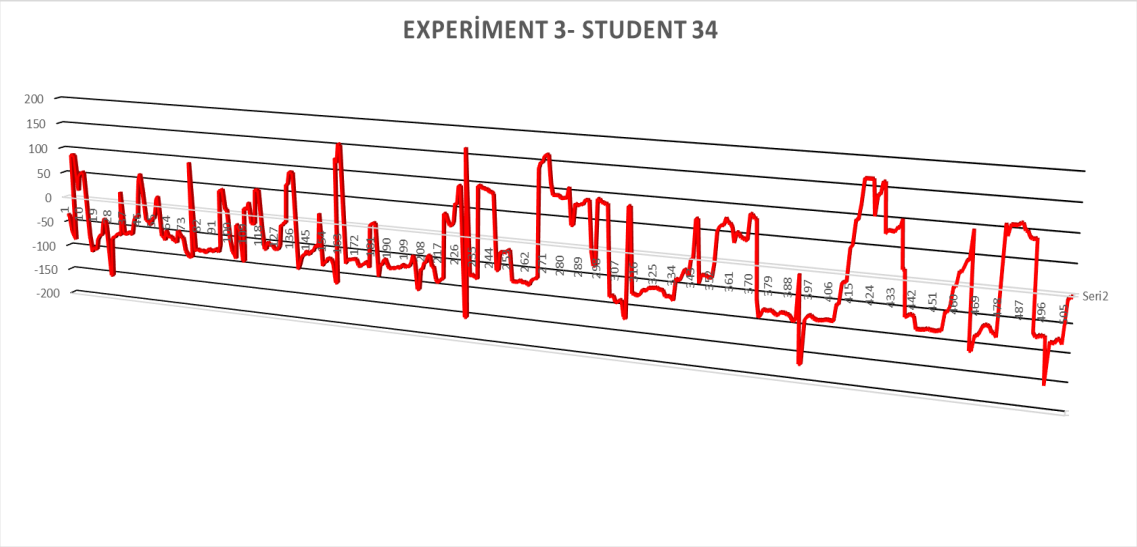
In this segment, we have investigated the emotional fluctuations experienced by a female student from Antalya Bilim University during her second experiment, where she used 2D software for sketching. Over the course of this experiment, we collected a comprehensive dataset consisting of 510 unique emotional data points. This dataset enables a detailed analysis of her emotional transitions throughout the process.



During the 34th student's second experiment, the student's emotional state was largely determined by negative emotions. We particularly notice the frequent repetition of the term "Bored", indicating that this emotion was dominant for the student. Additionally, the student's emotional state also encountered heavier emotional states like "Sad", "Depressed", and "Upset". In terms of positive emotions, "happy", "alert", and "excited" are the most prominent. The angle values are typically in the negative, confirming the generally negative emotional states. However, we can also observe that the student transitioned into positive emotional states a few times. It's possible to suggest a general relationship between angles and emotions; positive angle values usually associate with positive emotional states, while negative angle values correlate with negative emotional states. Furthermore, factors such as the student studying at Antalya Bilim University and being female might influence emotional changes, but we would need more information to confirm their specific effects based on this data. In summary, while the student was mostly in negative emotional states, they experienced positive emotional changes at certain times.

5.4.34.3. Experiment 3

In this segment, we have examined the emotional variations experienced by a female student from Antalya Bilim University during her third experiment, where she utilized 3D software for sketching. Throughout the duration of this experiment, we collected a comprehensive dataset comprising 510 unique emotional data points. This dataset allows for a detailed analysis of her emotional changes throughout the process.



Looking at the emotional changes displayed by the 34th student during the third experiment, the data suggests that they predominantly felt "Contented". This might indicate that the student was able to work comfortably with the 3D drawing program and perceived the experience positively. The most frequently felt positive emotions are "Contented" and "happy", while among the negative emotions, "Calm" recurs most often; however, this could indicate that the student was relaxed or did not find the experiment stressful. To establish a direct relationship between angles and emotions, a more detailed analysis would be required, but generally, negative values seem to be associated with feelings of calmness or relaxation. Furthermore, it's not definitively stated whether the student's gender and the university they attend have a direct influence on this emotional state. However, overall, it appears that this student had a relaxed and positive experience during the experiment with the 3D program.

5.4.34.4. Experiment Analysis

When evaluating the emotional changes experienced by the 34th student across three experiments, the first experiment shows a mixture of energetic, positive, and neutral emotions. In the second experiment, it's observed that the student predominantly exhibited negative emotional states, especially a dominant feeling of being "Bored". In contrast, during the third experiment, the student largely felt "Contented" and seemed to perceive the experiment in a positive light. Comparing the three experiments, it can be said that the third experiment was the one in which the 34th student felt the happiest. While the definitive influence of the student's gender and attending a private university on the emotional reactions during the experiments cannot be ascertained, it is plausible to say that the experiment involving the 3D drawing program had a positive effect on the student.