

**Dynamic Text: Exploring the Relation Between Text Features and Human Emotions**

**by**

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## **Dedication**

I extend my genuine gratitude to all those who have supported and cheered me on throughout the journey of writing this thesis.

First and foremost, I thank God for always watching over me. In moments of doubt and during times when the path seemed impossible, it was through prayer and faith that I found the strength to persevere. I acknowledge that it is through His grace and love that I have completed this journey safely.

To my precious family and dear friends, I extend my deep gratitude. To my kindest dad, Chang Su Han, and my beautiful mom, Soo Kyung Kim, your support has been the cornerstone of my journey. I am certain that it would not be possible without your love and support. I am eternally grateful for the nurturing love and attentive care with which you raised me and for always seeing me with tenderness in your eyes and hearts.

To my older sister, Dahye, your presence throughout my life has been an immeasurable source of comfort, love, and strength. Each moment shared with you was full of joy and gratitude. I am so thankful that God created us as sisters. Thank you for being my sister, embracing me during my vulnerable times, and empowering me to endure. And to my brother-in-law, Doyeon, your bright smile and kind heart have always been a great encouragement. Thank you for your kind support.

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## Table of Contents

Dedication .....	ii
Acknowledgments.....	iv
List of Tables .....	vii
List of Figures.....	viii
List of Appendices .....	x
Abstract.....	xi
Chapter 1: Introduction.....	1
1.1 Background .....	1
1.2 Emotion in Text-based CMC .....	2
1.3 Typographical Features and Emotion.....	3
1.4 Study Objective .....	5
Chapter 2: Methods.....	6
2.1 Study Procedure .....	6
2.2 Participants .....	7
Chapter 3: Results .....	10
3.1 First Study: Identification of Descriptor Terms .....	10
3.1.1 Result of Factor Analysis .....	14
3.2 Second Study: Identifying Relations Between Design Elements and Descriptor Term .....	16
3.2.1 Selection of design elements .....	16
3.2.2 Data Collection Survey.....	20

3.2.3 Data Analysis.....	21
3.2.4 Discussion.....	42
Chapter 4: Conclusions .....	47
4.1 Conclusion.....	47
4.2 Limitations and Future Works.....	48
4.3 Study Implication .....	50
Appendices.....	51
Reference .....	73

## List of Tables

Table 1. Results of Factor Analysis .....	15
Table 2. 24 Combinations based on the Fractional Factorial Design .....	19
Table 3. ANOVA Results of Ratings on “Vibrancy” .....	22
Table 4. Partial Correlation Coefficient for Each Factor and Category Score- Vibrancy .....	22
Table 5. ANOVA Results of Ratings on “Comfort” .....	25
Table 6. Partial Correlation Coefficient for Each Factor and Category Score- Comfort .....	25
Table 7. ANOVA Results of Ratings on “Harmony” .....	28
Table 8. Partial Correlation Coefficient for Each Factor and Category Score- Harmony .....	28
Table 9. ANOVA Results of Ratings on “Happiness” .....	30
Table 10. Partial Correlation Coefficient for Each Factor and Category Score- Happiness .....	31
Table 11. ANOVA Results of Ratings on “Modernness” .....	34
Table 12. Partial Correlation Coefficient for Each Factor and Category Score- Modernness .....	34
Table 13. ANOVA Results of Ratings on “Confidence” .....	37
Table 14. Partial Correlation Coefficient for Each Factor and Category Score- Confidence .....	37
Table 15. ANOVA Results of Ratings on “Preference” .....	40
Table 16. Partial Correlation Coefficient for Each Factor and Category Score- Preference .....	40
Table 17. The Most Significant Factors and Category Items to Each Emotion .....	44



## List of Figures

Figure 1. Experiment Flow .....	7
Figure 2: Candidate Descriptor Terms.....	11
Figure 3. Example Images from the first survey.....	12
Figure 4. Sample Survey Form .....	13
Figure 5. Commonly Used Text Editing Platforms .....	17
Figure 6. Levels of Selected Text Features.....	18
Figure 7. Combination of Times New Roman, Italic, Non-Bold, Full spacing, Low Color Intensity, and Uppercase.....	19
Figure 8. Example of the Second Survey.....	20
Figure 9. Category Score of Significant Factors- "Vibrancy" .....	24
Figure 10. Category Score of Significant Factors- "Comfort".....	27
Figure 11. Category Score of Significant Factors- "Harmony" .....	30
Figure 12. Category Score of Significant Factors- "Happiness" .....	33
Figure 13. Category Score of Significant Factors- "Modernness".....	36
Figure 14. Category Score of Significant Factors- "Confidence".....	39
Figure 15. Category Score of Significant Factors- "Preference" .....	42
Figure 16. Text Features Related to "Vibrancy" Examples .....	44
Figure 17. Text Features Related to "Comfort" Examples .....	45
Figure 18. Text Features Related to "Harmony" Examples.....	45
Figure 19. Text Features Related to "Happiness" Examples .....	45
Figure 20. Text Features Related to "Modernness" Examples .....	46

Figure 21. Text Features Related to "Confidence" Examples ..... 46

Figure 22. Text Features Related to "Preference" Examples ..... 46

## **List of Appendices**

Appendix A: First Survey .....	48
Appendix B: Second Survey .....	54

## **Abstract**

Computer-mediated communication (CMC) allows people to interact with each other using various mediums such as text, images, videos, etc. Previous studies have shown that conveying one's emotion can be difficult in virtual communication due to the lack of non-verbal cues, which often act as crucial components for human emotion during face-to-face interaction. However, Social Information Processing (SIP) theory suggests that text-based CMC has the capacity to convey emotional and social context through verbal cues by facilitating additional information for overcoming the absence of non-verbal cues presented during face-to-face communication. Based on this theory, many studies identify strategies for adapting text-based emotional cues to express feelings in such settings. There has been an ongoing effort to categorize emotional cues in CMC into verbal (e.g., direct emotional words) and nonverbal (e.g., vocal spelling) ones in a multitude of research. One study demonstrates the use of lexical surrogates and altered vocal spellings as potential strategies for emotional expression in text communication. Previous studies also showed different mappings of non-verbal textual symbols to basic human emotion to explore their potential for effective and emotionally rich communication through manipulating textual cues during CMC. Overall, there have been studies that showed supported experiments that manipulation of textual cues has the potential to facilitate effective, emotionally rich communication, leading CMC to serve as a valued medium for both information exchange and emotional sharing.

However, despite the continued effort to find a correlation between emotion and text, most of the previous studies have not been able to provide a significant relationship between the

two factors without supplying a concrete scientific basis. Therefore, the current research aimed to explore how the manipulation of textual cues affects human emotion and, specifically, which emotions are associated with different text features to which extent by utilizing a more refined and methodological approach that led to an objective and scientific conclusion.

The experiment was designed based on the application of Kansei Engineering as the methodological framework, which aims to measure and translate perceived human emotion to quantifiable values. While applying this method, two stages of online surveys and analysis were conducted to assess participants' perceptions of text features. Key findings highlight the effects of Noteworthy font in italics on vibrancy, spacing on comfort, Times New Roman font and boldness on harmony, and its combination with letter case on happiness. The type of font is shown to affect modernness, and Arial font with spacing relates to confidence. Regarding general preferences, Times New Roman in sentence case was most preferred, while in uppercase, it was least preferred. The findings can provide clarity on the way certain text features trigger unique emotional reactions, with potential applications for enhancing the user experience in text-driven virtual environments.

## **Chapter 1: Introduction**

### **1.1 Background**

Communicating virtually has become one of the most prominent communication methods nowadays. As Internet services have improved, Computer-Mediated Communication (CMC) allows people to exchange information and express their thoughts and feelings freely even though they are physically not in the same area. Nowadays, people accept this type of digitalized communication method as usual (Walther, 1992).

When people communicate, in addition to verbal cues, they use nonverbal behavioral cues such as facial, vocal, and body gestures to express their emotions (Scherer, 2005). For instance, one might use hand gestures to engage people more in their stories, and some might speak quietly when feeling under the weather. Exchanging these social cues is one of the most essential things for interacting with each other successfully. Birdwhistell argued the significance of applying various types of cues when communicating comprehensively. From Birdwhistell's preliminary tests, it is suggested that from conversational interaction, less than 30 to 35 percent of the social context meanings are delivered (Birdwhistell, 2010). This supports how significant it is to share non-verbal cues when interacting with each other.

However, unlike Face-to-Face (F2F) communication, when communicating CMC, especially text-based interactions, it is hard to visually see or hear people's facial expressions, tone of voice, and or gestures, those of so-called non-verbal cues (Kiesler et al., 1984). The lack of nonverbal cues caused many studies to investigate how these communication types might

influence peoples' emotions and how they express them during text-based CMC (Hancock et al., 2007, 2008; Walther, 1992; Walther et al., 2005).

## **1.2 Emotion in Text-based CMC**

As more studies are conducted and a growing number of CMC users, researchers demonstrated that CMC can be interpersonal communication, which can help people exchange information and share their emotional state and social context. Wang introduced a chat system that shows users' emotional state during the chat through animated text by using physiological data gained while they are chatting. It is suggested that an emotional chat system that displays users' emotional information enhances the effectiveness of interaction among people (Wang et al., 2004). From social Information Processing (SIP) theory, text-based CMC enables people to convey emotional and social context information by using verbal cues, which are typically transferred through non-verbal cues in in-person communication (Walther et al., 2005). In line with SIP theory, numerous studies have identified distinct strategies for how people adapt and use text-based emotional cues to express their emotional states. (Hancock et al., 2007, 2008; Pirzadeh & Pfaff, 2012). Derks et al. proved that it is not possible to indicate that CMC is a less emotional or impersonal medium compared to F2F based on their experiments (Derks et al., 2008). Boonthanom identified two categories of emotional cues in CMC: verbal and nonverbal. Verbal cues include emotional words (e.g., happy, sad) and linguistic markers (e.g., I miss her so much). Nonverbal cues in text-based CMC include 5 features: vocal spelling, lexical surrogates, spatial arrays, manipulation of grammatical markers, and minus features (Boonthanom, 2004). Under the categorization of Boonthanom's study, Pirzadeh demonstrated that lexical surrogates (e.g., hehe, aha) and changing vocal spellings (e.g., wowww, noo) are one of the strategies

people use to express their emotions during text communication (Pirzadeh & Pfaff, 2012). Njeri Mwangi et al. demonstrated the mapping of non-verbal textual symbols with primary human emotion (Njeri Mwangi et al., 2014). Such studies show some supported experiments that manipulation of textual cues has the potential to facilitate effective, emotionally rich communication.

### **1.3 Typographical Features and Emotion**

Given its potential, many studies tried to discern implicit meanings within typographical features that may lead to more emotive communication.

Mackiewicz & Moeller examined the personality attributes that people designated to typefaces and why they made those decisions (Mackiewicz & Moeller, 2004). Employing 15 typefaces from the survey, they asked participants to rate 10 attributes of typeface personality with a Likert scale. Their study strengthened the suggestion that previous studies made that each typeface possesses distinct personality traits (Brumberger, 2003a, 2003b). The survey findings indicate that typefaces such as Times New Roman, Helvetica, and Courier New received high ratings for conveying professional and technical personality, while other attributes were highly rated on the friendly attribute.

Lim presented a case analysis that demonstrates typography as a tool for conveying emotion (Lim, 2022). The author demonstrated Expressive Typography, Kinetic Typography, and Interactive Typography to show how typography has changed throughout the development of media. Based on the analysis, it is argued that interactive typography can effectively convey human emotion by altering various elements of typography, such as shape, color, and. The author



suggested that future research should endeavor to focus on systematically categorizing and analyzing the elements of typography.

The study conducted by Ho has explored the realm of 'emotion in type/typography,' demonstrating its lack of clear identification (Ho, 2013). The author highlighted the importance of considering typographic design's emotional effects by demonstrating the '3E' model ('emotionalize design, emotional design, emotion design') from previous studies (Ho & Siu, 2009; Suri, 2003). The findings suggested that additional research is needed to investigate the features, applications, and theoretical explanations of 'emotion in type/typography.'

Another study investigated the impact of typefaces on conveying emotional nuances (Choi & Aizawa, 2019). The study focused on which typefaces are useful for delivering emotion when communicating through mobile chat applications. Through experiments, the researchers examined whether typefaces affect the valence of chat messages and whether knowing which typefaces intensify the valence of the context. Multiple versions of conversations were presented, applying three different typefaces: positive, neutral, and negative. The results revealed that the usage of multiple typefaces influenced the positive or negative emotions perceived by users and improved the liveliness mood of the user. This suggests that even if emotions are not explicitly articulated in the text, emotions can be transmitted through typefaces.

Consequently, based on the previous studies, it was revealed that distinct features of text typography possess the capability to convey implicit emotion along with explicit meaning in the text.

## 1.4 Study Objective

Despite various previously mentioned studies exploring the correlation between emotion and text and providing evidence for the potential of typographical features to convey human emotions, none have definitively established an objective link between these two factors. The current research aims to investigate the relationship between the manipulation of typographical cues and their impact on human emotions. Kansei Engineering was applied in the study for the evaluation of textual cues. Kansei Engineering is one of the methods that Nagamachi first introduced (Nagamachi, 1995). Kansei is a Japanese word that contains the meaning of human feeling or emotion that can be experienced through one's senses toward a product, environment, and or situation aiming to consider human emotion toward design objectively (Nagamachi, 2002). Many industries have constantly applied this technology to design and develop certain products or services. For instance, Mitsubishi, Toyota, Honda, Ford, Hyundai, and more companies used Kansei engineering to understand and develop their products in the automotive industry. Also, the electric home appliance industries (Sharp, Matsushita Electric Works, LG, Samsung), the Office machine industries (Fuji Xerox, Cannon, Fuji Film), and house construction industries (Matsushita Electric Works, YKK Design, Kansai Electric Power Plant) utilized this technology to transfer consumers' psychological feelings to design elements and to know physiological issues for a better design approach (Schütte \* et al., 2004).

Therefore, to successfully transfer users' psychological feelings, the study explores the relationship between human emotions and textual features by conducting Kansei Engineering. By doing so, the study aims to provide a more comprehensive understanding of the intricate interplay between text and human emotions.

## **Chapter 2: Methods**

### **2.1 Study Procedure**

The experiment was conducted using two stages of an online survey following the process of Kansei Engineering (Osgood, 1964). Surveys were spread out through various online platforms. Research investigations were conducted after receiving approval from the Institutional Review Board (IRB) at the University of Michigan. For both studies, exemptions were given after a comprehensive assessment of the research protocol (HUM00233951, HUM00237340).

At the beginning of the study, the selected domain was text features, and the aim was to quantify complex human emotions toward these features. The first study involves collecting and selecting descriptor terms that match a semantic space and the corresponding text features to build semantic properties. The second study aims to establish a connection between the semantic space and the space of properties and to conduct an experiment to confirm its validity. As the study attempted to adapt the Kansei Engineering procedure, the experiment method and result of the analysis will be explained in two separate parts, one for identifying descriptor terms and the other one for the selection of design words and identifying the relationship between descriptor terms and design elements. Figure 1 shows the overall experiment and analysis flow.

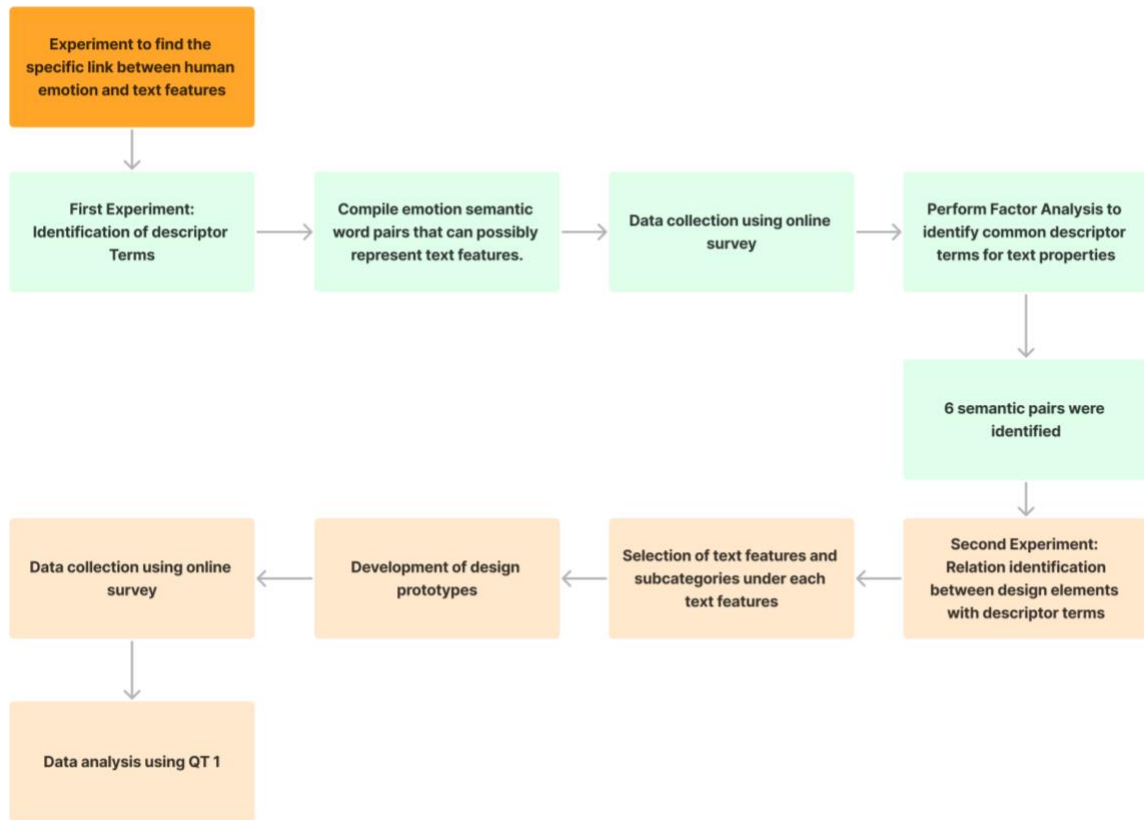


Figure 1. Experiment Flow

## 2.2 Participants

Upon describing each procedure, the explanation of participant recruiting for each survey will be described in this section. While recruiting the participants, both surveys were distributed using a non-probabilistic convenience sampling method to gather a broad range of responses. In the first phase, the survey link was shared with personal contacts, and they were requested to disseminate the invitation through their respective networks further. A digital strategy was employed to broaden the survey's reach, where the survey was posted on social media platforms to leverage their extensive audiences. The goal of this approach was to facilitate the rapid propagation of the survey instrument by capitalizing on social connections and the potential

snowball effect generated by participants sharing the survey within their circles. Therefore, the first survey got 65 responses and used 50 responses among them. 15 were discarded due to several reasons, such as completion rate (i.e., missing some parts from the answers) and or completion time (i.e., too short duration time compared to the average response time). Three demographic information were asked as background questions, including their gender, age, and proficiency in using English. The study included 15 male and 35 female participants, with a mean age of 26.44 years old (SD = 5.61).

The second survey similarly capitalized on convenience sampling but did so through a distinct channel—posting the survey link on a forum that is commonly frequented by individuals who regularly participate in surveys. This method allowed for rapid collection of responses without purposive selection criteria applied to potential participants, aside from their presence and activity on the survey forum. Out of the 516 responses received for the second survey, 166 were considered unsuitable, leaving 350 responses to be analyzed. From the data collected on gender and age, it was found that 235 male participants, 113 female participants, and one individual who preferred not to disclose their gender took part in the survey. The mean age of the participants was 22.89 years old, with a standard deviation of 4.06. Respondents were also asked to provide their email addresses and indicate if they were willing to participate in the random raffle for a 10-dollar compensation. All participants were asked for consent to participate at the beginning of the survey questionnaire page.

While using a convenient sampling could be effective for reaching a considerable number of respondents quickly, the recruitment strategies for both surveys might have certain limitations pertinent to convenience sampling. The first survey relied on personal and social networks, possibly over-representing specific demographics linked to those networks. The second survey,

through a survey forum, reached regular survey-takers who may not reflect the overall population, possibly introducing volunteer bias. Therefore, the results from both surveys should be interpreted with caution since the results should be regarded as being potentially indicative of the trends within the respondent pool rather than extrapolatable to the broader population. Future studies could use more systematic sampling methods to enhance the representativeness and reliability of the data.

## Chapter 3: Results

### 3.1 First Study: Identification of Descriptor Terms

A collection of descriptor terms was first made to identify emotion descriptors that people may commonly perceive about text properties. The words were collected from various references such as articles, websites, and dictionaries. Initially, the pool of emotion-descriptive adjectives exceeded 140 pairs. A reasonable data reduction was employed to mitigate participant fatigue during the questionnaire completion, which could affect the quality of data (Schütte & Eklund, 2001). The initial step involved a manual reduction, grouping all collected adjectives and selecting from each group that can represent basic human emotions. Consequently, a list of 32 semantic pairs was compiled as a candidate set that could possibly illustrate a variety of text features. Figure 2 displays the gathered semantic descriptor terms. From the first survey, participants were given sample text images that represented different text features, such as boldness, italics, uppercase, and letter case, to identify shared descriptor terms within the candidate set. A total of 8 text images were generated, and four randomly selected text designs were given to each participant. Each of the text designs was a combination of various text features. Figure 3 shows the given design examples. Participants were asked to rate their perception of the text design depicted in the photograph according to the given adjectives, regardless of the meaning of the text. A set of 32 semantic pairs of words were asked to be rated on a scale from 1 to 10 for each text image; Figure 4 demonstrates an example of the rating scale. The complete survey is specified in Appendix A.

Safe	↔	Dangerous
Happy	↔	Sad
Confident	↔	Afraid
Beautiful	↔	Ugly
Comfortable	↔	Uncomfortable
Simple	↔	Complicated
Predictable	↔	Unpredictable
Calm	↔	Intense
Natural	↔	Artificial
Playful	↔	Serious
Exciting	↔	Terrifying
Strong	↔	Weak
Acceptive	↔	Rejective
Nice	↔	Awful
Attractive	↔	Boring
Modern	↔	Dated
Encouraged	↔	Discouraged
Certain	↔	Unsure
Dynamic	↔	Static
Adorable	↔	Hateful
Harmonious	↔	Conflicting
Easy	↔	Difficult
Sympathetic	↔	Inhumanity
Flexible	↔	Rigid
Reliable	↔	Unreliable
Vibrant	↔	Lifeless
Curious	↔	Indifferent
Unique	↔	Common
Friendly	↔	Hostile
Open	↔	Isolated
Active	↔	Passive
Optimistic	↔	Pessimistic

Figure 2: Candidate Descriptor Terms





Figure 3. Example Images from the first survey

Please rate your perception of the text design depicted in the photograph below according to the adjectives provided in each question, regardless of the meaning of the text.

**ABCD abcd 1234 HELLO hello**

Discouraged	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Encouraged
Unsure	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Certain
Static	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Dynamic
Hateful	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Adorable
Conflicting	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Harmonious
Difficult	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Easy
Inhumanity	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Sympathetic
Rigid	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Flexible
Unreliable	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Reliable
Lifeless	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Vibrant
Indifferent	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Curious
Common	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Unique
Hostile	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Friendly
Isolated	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Open
Passive	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Active
Pessimistic	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Optimistic

Figure 4. Sample Survey Form

### ***3.1.1 Result of Factor Analysis***

Following the compilation of 32 pairs of descriptor terms, a factor analysis was conducted to determine the number of factors necessary to characterize text features. The ratings for the descriptor term pairs underwent a factor analysis with a Varimax rotation. The analysis defined six factors, acting as latent variables that explain around 71% of the total variance in text features. Table 1 provides the factor loading values for each pair linked to their respective factor. The process of selecting representative semantic pairs for each factor from the result of factor analysis was executed by prioritizing the highest loadings to capture the strongest variable-factor relationships. Lower yet statistically significant loadings were also included to afford a comprehensive understanding of each factor's influence. This manual, iterative process ensured that predominant dimensions were emphasized and subtler, yet relevant associations were not overlooked. Consequently, six descriptor words were identified as representatives for each variable: Comfortable/Uncomfortable, Happy/Sad, Harmonious/Conflicting, Vibrant/Lifeless, Modern/Dated, and Confident/Afraid. The meaning of each term is described as follows.

- Variable 1- Vibrancy (Vibrant-Lifeless): Assesses the liveliness of text features. A vibrant score indicates a lively and vivid impression, while a lifeless score indicates dullness.
- Variable 2- Comfort (Comfortable-Uncomfortable): Measures how people perceive the comfort level of text features. A comfortable score implies a positive and pleasant perception, while an uncomfortable score indicates a negative or uneasy feeling.

- Variable 3- Happiness (Happy-Sad): Gauges whether people perceive the given text feature as conveying happiness or sadness. A happy score signifies a positive and joyful impression, while a sad score suggests a more negative sentiment.
- Variable 4- Modernness (Modern-Dated): Explores people's perceptions of the temporal quality of the text feature. A modern score indicates a contemporary feel, while a dated score suggests an older or outdated impression.
- Variable 5- Harmony (Harmonious-Conflicting): Evaluates whether people see the text example as harmonized or conflicting. A harmonious score implies a cohesive and well-integrated impression, while a conflicting score suggests discord or lack of unity.
- Variable 6- Confidence (Confident-Afraid): Measures how people perceive the level of confidence in the given example. A confident score indicates a strong and self-assured impression, while an afraid score suggests a sense of fear or lack of confidence.

Table 1. Results of Factor Analysis

<b>Variable</b>	<b>Factor 1</b>	<b>Factor 2</b>	<b>Factor 3</b>	<b>Factor 4</b>	<b>Factor 5</b>	<b>Factor 6</b>
<b>Vibrant</b>	0.785	0.062	-0.342	-0.168	-0.012	-0.005
Curious	0.781	0.076	-0.257	-0.15	0.07	0.111
Unique	0.728	0.136	-0.195	-0.089	-0.274	-0.148
Flexible	0.717	-0.255	-0.265	-0.301	-0.045	0.28
Adorable	0.713	-0.01	-0.227	-0.271	0.356	0.013
Dynamic	0.617	-0.092	-0.146	-0.297	-0.384	-0.023
Sympathetic	0.579	-0.217	-0.219	-0.145	0.369	0.226
Friendly	0.422	-0.084	-0.408	-0.374	0.248	0.392
<b>Comfortable</b>	0.025	-0.795	-0.391	-0.141	0.088	-0.059
Natural	0.118	-0.785	-0.021	-0.183	0.029	0.122
Predictable	-0.095	-0.761	0.152	0.041	0.013	-0.19
Simple	-0.325	-0.749	-0.091	-0.245	0.105	0.028
Calm	0.147	-0.69	-0.329	0.1	-0.072	-0.021
Safe	-0.018	-0.556	-0.384	-0.116	0.147	0.173
Beautiful	0.447	-0.493	-0.402	0.104	-0.062	-0.12

Playful	0.288	-0.058	-0.766	-0.234	0.007	0.158
Attractive	0.377	0	-0.712	-0.273	-0.008	-0.065
Exciting	0.335	-0.281	-0.699	-0.21	0.046	0.099
Nice	0.292	-0.433	-0.664	-0.075	0.007	-0.045
Happy	0.277	-0.36	-0.65	-0.367	-0.039	0.085
Acceptive	0.357	-0.552	-0.626	0.035	0.027	-0.059
Modern	0.081	-0.168	-0.285	-0.68	-0.033	-0.067
Active	0.548	-0.063	-0.081	-0.659	-0.105	-0.01
Optimistic	0.475	-0.077	-0.203	-0.639	0.183	0.122
Open	0.477	-0.092	-0.171	-0.639	0.101	0.296
Encouraged	0.269	-0.01	-0.145	-0.604	0.488	-0.176
Harmonious	0.135	-0.027	-0.135	0.104	0.84	0.15
Easy	0.027	-0.126	0.049	-0.266	0.799	0.099
Reliable	-0.26	-0.125	0.271	0.069	0.665	-0.297
Certain	-0.222	0.24	-0.165	-0.107	0.598	-0.517
Confident	-0.034	-0.346	-0.197	-0.053	-0.04	-0.767
Strong	0.009	0.103	0.261	0.065	0.019	-0.753

## 3.2 Second Study: Identifying Relations Between Design Elements and Descriptor Term

### 3.2.1 Selection of design elements

While conducting the first study to find descriptor terms, properties that can represent text features are determined. Many platforms and software that have the function to edit text, such as G Docs, S sheet M Word, and Excel, were being used as a source to collect those features. Figure 5 illustrates sources that were used as a reference when collecting text features.

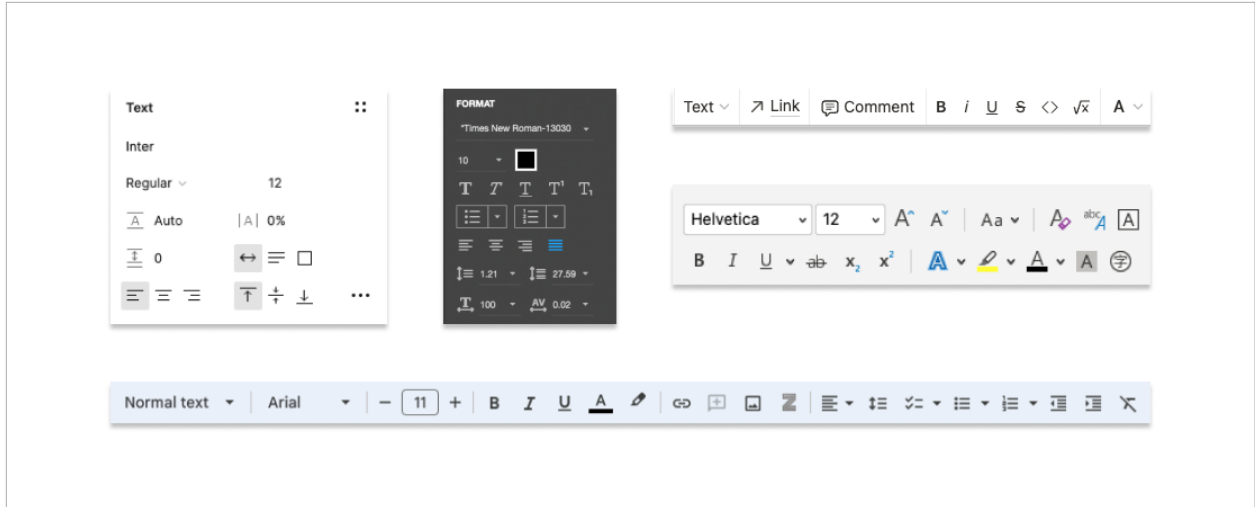


Figure 5. Commonly Used Text Editing Platforms

Upon completion of collecting, selection among collected features was held manually with subjective estimation. In designing this experiment, careful consideration was given to the selection of typefaces to ensure a diverse representation of font categories. The fonts chosen were Arial, Times New Roman, and Noteworthy. Arial is a widely recognized sans-serif font known for its clarity and legibility across various digital interfaces. Times New Roman, a serif font, is revered for its classic look and readability in print and on-screen contexts. Noteworthy is characterized as a decorative font, appreciated for its informal and distinct style that adds a touch of personality to digital content. Each of these fonts is frequently encountered within web environments, making them ideal candidates to examine the influence of font type on user perception and behavior in an online setting. Other text features were selected based on the most frequently used text editing tools. The focus was changing the text itself; decorative aspects that do not directly change typography, such as underlining or background colors, were not considered in this study. Consequently, 6 text features were selected. It includes boldness, italics,

color intensity, letter case, spacing, and font. 3 different fonts were used, and 5 other features leveled into 2 each. Figure 6 shows the organized selection of features and levels of them.

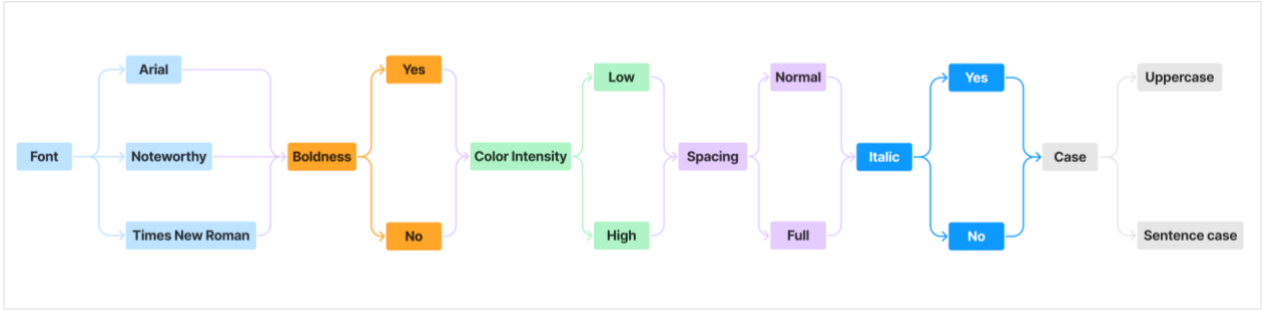


Figure 6. Levels of Selected Text Features

However, combining all features and levels leads to too many prototypes, which is 96. Therefore, a fractional factorial design was utilized to minimize the prototype size, resulting in a total of 24 prototypes. Table 2 demonstrates the combination of 24 prototypes, and Figure 7 shows an example of the combination prototype.

Table 2. 24 Combinations based on the Fractional Factorial Design

Typeface	Italic	Boldness	Spacing	Color Intensity	Letter Case
Arial	Y	Y	Normal	High	Low
Arial	Y	Y	Full	High	Up
Arial	Y	N	Normal	Low	Low
Arial	Y	N	Full	Low	Up
Arial	N	Y	Normal	Low	UP
Arial	N	Y	Full	Low	Low
Arial	N	N	Normal	High	Up
Arial	N	N	Full	High	Low
Noteworthy	Y	Y	Normal	High	Low
Noteworthy	Y	Y	Full	High	Up
Noteworthy	Y	N	Normal	Low	Low
Noteworthy	Y	N	Full	Low	Up
Noteworthy	N	Y	Normal	Low	UP
Noteworthy	N	Y	Full	Low	Low
Noteworthy	N	N	Normal	High	Up
Noteworthy	N	N	Full	High	Low
Times New Roman	Y	Y	Normal	High	Low
Times New Roman	Y	Y	Full	High	Up
Times New Roman	Y	N	Normal	Low	Low
Times New Roman	Y	N	Full	Low	Up
Times New Roman	N	Y	Normal	Low	UP
Times New Roman	N	Y	Full	Low	Low
Times New Roman	N	N	Normal	High	Up
Times New Roman	N	N	Full	High	Low

*THIS IS A SAMPLE PHRASE.*

Figure 7. Combination of Times New Roman, Italic, Non-Bold, Full spacing, Low Color Intensity, and Uppercase



### 3.2.2 Data Collection Survey

The selection of specific text features was determined, and prototypes incorporating these elements were developed. Subsequently, the second survey was conducted to find the relation of those 6 semantic pairs and 24 combinations of text features. The survey procedure was identical to the first survey. Participants were asked to rate their perception of given images on a scale from 1 to 10, with 6 pairs of adjectives that were aggregated from the previous stage and one general preference. The order of generated images was presented randomly to avoid ordering effects. Figure 8 depicts part of the survey's design, and a detailed version can be found in Appendix B.

***This is a sample phrase.***

Lifeless	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Vibrant
Uncomfortable	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Comfortable
Sad	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Happy
Dated	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Modern
Conflicting	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Harmonious
Afraid	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Confident
Dislike	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Like

Figure 8. Example of the Second Survey

### 3.2.3 Data Analysis

Quantification theory Type 1 (QT1) was applied for the data analysis to investigate the most relevant and influential factors. The evaluation using QT1 establishes the connections between the emotion descriptor terms and the prototypes generated based on the combination of text features. Two-way interaction was also employed during the analysis. The analysis revealed that certain factors significantly impact each emotion, while others did not show a significant impact. The following section will describe partial correlation and scores of each category to descriptor terms.

#### **Vibrancy: “Vibrant-Lifeless”**

Table 3 presents the results of the analysis concerning 'Vibrant-Lifeless.' Notably, Font ( $F(2, 8063) = 6.01, p < 0.002$ ), Italic ( $F(1, 8063) = 7.03, p < 0.008$ ), Font\*Italic ( $F(2, 8063) = 10.18, p < 0.000$ ), Font\*Bold ( $F(2, 8063) = 4.14, p < 0.016$ ), and Font\*Letter Case ( $F(2, 8063) = 4.32, p < 0.013$ ) are identified as statistically significant factors. It is revealed that the joint influence of font and italics plays a pivotal role, with emphasis on the impact of utilizing the Noteworthy font and italics emerge as the most influential factor, significantly shaping the perception of vibrancy. The score for each category under a combination of font and italic are: Arial\*Italic (0.1351), Arial\*Non Italic (-0.1351), Times New Roman\*Italic (0.0194), Times New Roman\*Non Italic (-0.0194), Noteworthy\*Italic (0.1545), and Noteworthy\*Non Italic (- 0.1545). The combination of Noteworthy font and Italics exudes the most vibrant ambiance while opting for Noteworthy with non-italicized text imparts a subdued, lifeless sentiment. A visual representation of the significant factors and their nuanced contributions is depicted in Table 4 and Figure 9.

Table 3. ANOVA Results of Ratings on “Vibrancy”

<b>Factor</b>	<b>DF</b>	<b>Adj SS</b>	<b>Adj MS</b>	<b>F-Value</b>	<b>P-Value</b>
Font	2	67.4	33.6799	6.01	0.002*
Italic	1	39.4	39.4354	7.03	0.008*
Bold	1	0.2	0.1796	0.03	0.858
Spacing	1	5.6	5.6383	1.01	0.316
Color Intensity	1	4	4.033	0.72	0.396
Letter Case	1	11.3	11.3457	2.02	0.155
Font*Italic	2	114.2	57.0767	10.18	0*
Font*Bold	2	46.5	23.2253	4.14	0.016*
Font*Spacing	2	10.1	5.0532	0.9	0.406
Font*Color Intensity	2	13.8	6.8767	1.23	0.293
Font*Letter Case	2	48.4	24.199	4.32	0.013*
Bold*Spacing	1	4.2	4.1528	0.74	0.39
Bold*Letter Case	1	12	12.0429	2.15	0.143
Error	8063	45216.2	5.6079		
Lack-of-Fit	4	59.6	14.9018	2.66	0.031
Pure Error	8059	45156.6	5.6033		
Total	8082	45590.7			

Table 4. Partial Correlation Coefficient for Each Factor and Category Score- Vibrancy

<b>Factor</b>	<b>Partial- Correlation Coefficient</b>	<b>Category</b>	<b>Category Score</b>
Font	0.0386	Arial	0.1219
		Times	-0.0238
		Note	-0.0981
Italic	0.0295	Y	0.0699
		N	-0.0699
Bold	0.0021	Y	-0.0047
		N	0.0047
Spacing		Norm	0.0264
		Full	-0.0264
Color Intensity	0.0094	High	-0.0223
		Low	0.0223
Letter Case	0.0158	Sen	0.0375

		Up	-0.0375
Font*Italic	0.0502	Arial*Y	0.1351
		Arial*N	-0.1351
		Times*Y	0.0194
		Times*N	-0.0194
		Note*Y	0.1545
		Note*N	-0.1545
Font*Bold	0.0321	Arial*Y	- 0.0255
		Arial*N	0.0255
		Times*Y	0.1029
		Times*N	-0.1029
		Note*Y	- 0.0773
		Note*N	0.0773
Font*Spacing	0.0149	Arial*Norm	0.0075
		Arial*Full	- 0.0075
		Times*Norm	-0.0466
		Times*Full	0.0466
		Note*Norm	0.0390
		Note*Full	-0.039
Font*Color Intensity	0.0175	Arial*High	- 0.0515
		Arial*Low	0.0515
		Times*High	0.0018
		Times*Low	-0.0018
		Note*High	0.0497
		Note*Low	-0.0497
Font*Letter Case	0.0327	Arial*Up	0.026
		Arial*Sen	-0.026
		Times*Up	- 0.1050
		Times*Sen	0.105
		Note*Up	0.079
		Note*Sen	-0.079
Bold*Spacing	0.0096	Y*Norm	0.0227
		Y*Full	- 0.0227
		N*Norm	- 0.0227
		N*Full	0.0227
Bold*Letter Case	0.0163	Y*Up	-0.0386
		Y*Sen	0.0386
		N*Up	0.0386
		N*Sen	-0.0386

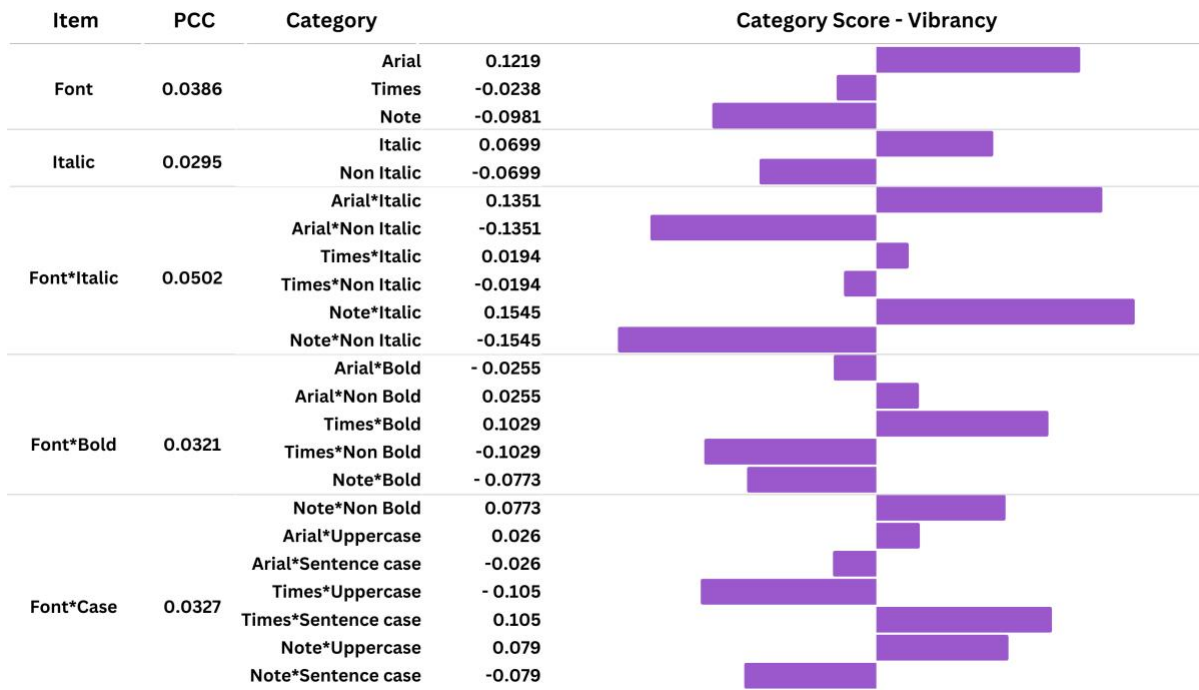


Figure 9. Category Score of Significant Factors- "Vibrancy"

### Comfort: "Comfortable-Uncomfortable"

Table 5 provides a comprehensive overview of the significant findings from the analysis concerning 'Comfortable-Uncomfortable.' Spacing ( $F(1, 8133) = 5.51, p < 0.019$ ) and Letter Case ( $F(1, 8133) = 3.5, p < 0.061$ ) emerge as statistically significant and marginally significant factors contributing to the perceived comfort level. In particular, spacing has a more influence with a partial correlation of 0.026. Normal spacing is connected to a positive category score of 0.0566, evoking feelings of comfort. On the contrary, full spacing is correlated with discomfort, reflected in a negative category score of -0.0566. Table 6 and Figure 10 show the overall correlation coefficient for each category of comfort perception.

Table 5. ANOVA Results of Ratings on “Comfort”

<b>Factor</b>	<b>DF</b>	<b>Adj SS</b>	<b>Adj MS</b>	<b>F-Value</b>	<b>P-Value</b>
Font	2	19	9.4825	2	0.136
Italic	1	6.4	6.3561	1.34	0.247
Bold	1	1.9	1.856	0.39	0.532
Spacing	1	26.1	26.1459	5.51	0.019*
Color Intensity	1	4.5	4.537	0.96	0.328
Letter Case	1	16.6	16.5995	3.5	0.061*
Font*Italic	2	9.3	4.6502	0.98	0.375
Font*Bold	2	16.9	8.4626	1.78	0.168
Font*Spacing	2	18	8.9922	1.9	0.15
Font*Color Intensity	2	4.5	2.2627	0.48	0.621
Font*Letter Case	2	17.4	8.7235	1.84	0.159
Bold*Spacing	1	2.5	2.5057	0.53	0.467
Bold*Letter Case	1	0.5	0.4997	0.11	0.746
Error	8133	38589.9	4.7449		
Lack-of-Fit	4	5.6	1.3876	0.29	0.883
Pure Error	8129	38584.4	4.7465		
Total	8152	38733.7			

Table 6. Partial Correlation Coefficient for Each Factor and Category Score- Comfort

<b>Factor</b>	<b>Partial- Correlation Coefficient</b>	<b>Category</b>	<b>Category Score</b>
Font	0.0222	Arial	0.0453
		Times	0.0215
		Note	-0.0668
Italic	0.0129	Y	0.0279
		N	-0.0279
Bold	0.0070	Y	0.0151
		N	-0.0151
Spacing	0.0260	Norm	0.0566
		Full	-0.0566
Color Intensity	0.0108	High	-0.0236
		Low	0.0236
Letter Case	0.0207	Sen	-0.0451
		Up	0.0451
Font*Italic	0.0155	Arial*Y	0.0314
		Arial*N	-0.0314
		Times*Y	0.0154

		Times*N	-0.0154
		Note*Y	-0.0469
		Note*N	0.0469
Font*Bold	0.0209	Arial*Y	-0.0259
		Arial*N	0.0259
		Times*Y	0.0641
		Times*N	-0.0641
		Note*Y	-0.0381
		Note*N	0.0381
Font*Spacing	0.0216	Arial*Norm	0.058
		Arial*Full	-0.058
		Times*Norm	-0.001
		Times*Full	0.001
		Note*Norm	-0.057
		Note*Full	0.0570
Font*Color Intensity	0.0108	Arial*High	-0.0192
		Arial*Low	0.0192
		Times*High	-0.014
		Times*Low	0.014
		Note*High	0.0332
		Note*Low	-0.0332
Font*Letter Case	0.0212	Arial*Up	0.0502
		Arial*Sen	-0.0502
		Times*Up	-0.0614
		Times*Sen	0.0614
		Note*Up	0.0113
		Note*Sen	-0.0113
Bold*Spacing	0.0080	Y*Norm	-0.0175
		Y*Full	0.0175
		N*Norm	0.0175
		N*Full	-0.0175
Bold*Letter Case	0.0036	Y*Up	0.0078
		Y*Sen	-0.0078
		N*Up	-0.0078
		N*Sen	0.0078

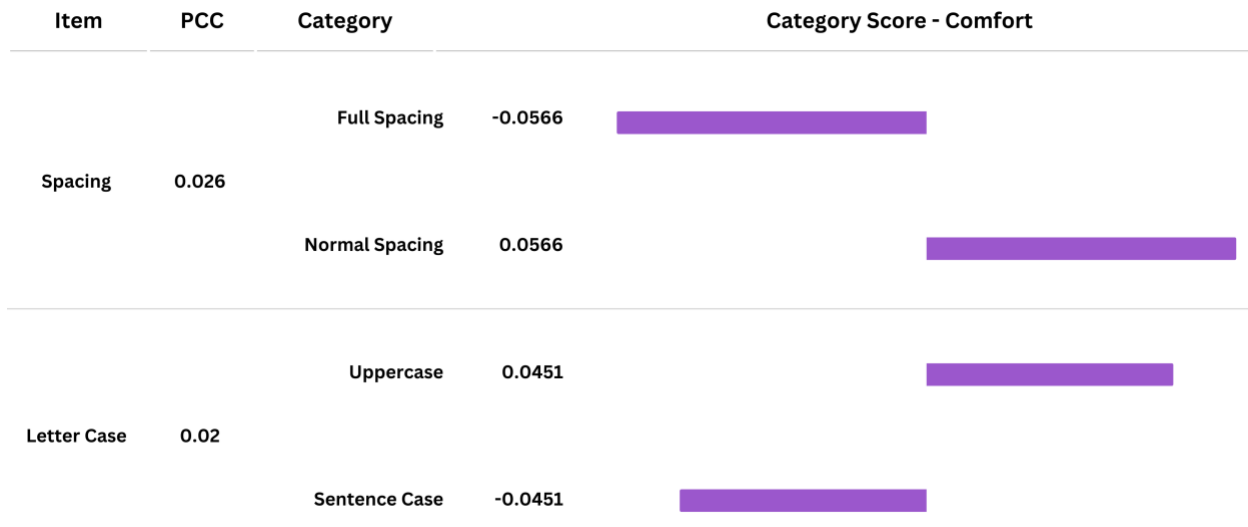


Figure 10. Category Score of Significant Factors- "Comfort"

### Harmony: "Harmonious-Conflicting"

The assessment of harmony reveals the significance of Spacing ( $F(1,8156) = 4.58, p < 0.032$ ), Color Intensity ( $F(1,8156) = 3.93, p < 0.047$ ), Font\*Bold ( $F(2,8156) = 13.74, p < 0.00$ ), Font\*Letter Case ( $F(2,8156) = 4.9, p < 0.008$ ), and Bold\*Letter Case ( $F(1,8156) = 5.71, p < 0.017$ ) were revealed to be significant. Table 7 shows the ANOVA results. The Font and Bold combination exhibit the highest partial correlation, pointing at 0.058. Getting into this category, Times New Roman paired with Boldness stands out with the highest score (category score = 0.1596). The combination of boldness and Times New Roman impart a harmonious vibe, contrasting with the conflicting emotions evoked by non-bold text and Times New Roman font. Noteworthy font coupled with boldness also shows a notable score of 0.152. Non-bold paired with Noteworthy font conveys a harmonious feeling, while the bold variation induces conflicting emotions. Table 8 and Figure 11 present the partial correlation among significant values.



Table 7. ANOVA Results of Ratings on “Harmony”

<b>Factor</b>	<b>DF</b>	<b>Adj SS</b>	<b>Adj MS</b>	<b>F-Value</b>	<b>P-Value</b>
Font	2	9	4.4848	0.93	0.395
Italic	1	14.4	14.3918	2.98	0.084
Bold	1	5.8	5.8192	1.21	0.272
Spacing	1	22.1	22.1267	4.58	0.032*
Color Intensity	1	19	18.9788	3.93	0.047*
Letter Case	1	0.8	0.8259	0.17	0.679
Font*Italic	2	18.3	9.1631	1.9	0.15
Font*Bold	2	132.7	66.3499	13.74	0*
Font*Spacing	2	11.8	5.9188	1.23	0.294
Font*Color Intensity	2	17.4	8.71	1.8	0.165
Font*Letter Case	2	47.3	23.639	4.9	0.008*
Bold*Spacing	1	1	1.0255	0.21	0.645
Bold*Letter Case	1	27.5	27.5476	5.71	0.017*
Error	8156	39381.2	4.8285		
Lack-of-Fit	4	85.2	21.3027	4.42	0.001
Pure Error	8152	39296	4.8204		
Total	8175	39708.7			

Table 8. Partial Correlation Coefficient for Each Factor and Category Score- Harmony

<b>Factor</b>	<b>Partial- Correlation Coefficient</b>	<b>Category</b>	<b>Category Score</b>
Font	0.0151	Arial	0.025
		Times	0.0217
		Note	-0.0468
Italic	0.0191	Y	0.042
		N	-0.042
Bold	0.0121	Y	0.0267
		N	-0.0267
Spacing	0.0237	Norm	0.052
		Full	-0.052
Color Intensity	0.0220	High	- 0.0482
		Low	0.0482
Letter Case	0.0045	Sen	-0.0101
		Up	0.0101
Font*Italic	0.0216	Arial*Y	-0.0532
		Arial*N	0.0532

		Times*Y	0.0618
		Times*N	-0.0618
		Note*Y	- 0.0086
		Note*N	0.0086
Font*Bold	0.0580	Arial*Y	- 0.0076
		Arial*N	0.0076
		Times*Y	0.1596
		Times*N	-0.1596
		Note*Y	-0.152
		Note*N	0.152
Font*Spacing	0.0173	Arial*Norm	-0.0462
		Arial*Full	0.0462
		Times*Norm	-0.0008
		Times*Full	0.0008
		Note*Norm	0.047
		Note*Full	-0.047
Font*Color Intensity	0.0210	Arial*High	-0.0435
		Arial*Low	0.0435
		Times*High	0.0639
		Times*Low	-0.0639
		Note*High	-0.0204
		Note*Low	0.0204
Font*Letter Case	0.0346	Arial*Up	0.0822
		Arial*Sen	-0.0822
		Times*Up	-0.1011
		Times*Sen	0.1011
		Note*Up	0.0189
		Note*Sen	-0.0189
Bold*Spacing	0.0050	Y*Norm	0.0112
		Y*Full	-0.0112
		N*Norm	-0.0112
		N*Full	0.0112
Bold*Letter Case	0.0264	Y*Up	0.058
		Y*Sen	- 0.0580
		N*Up	- 0.0580
		N*Sen	0.058

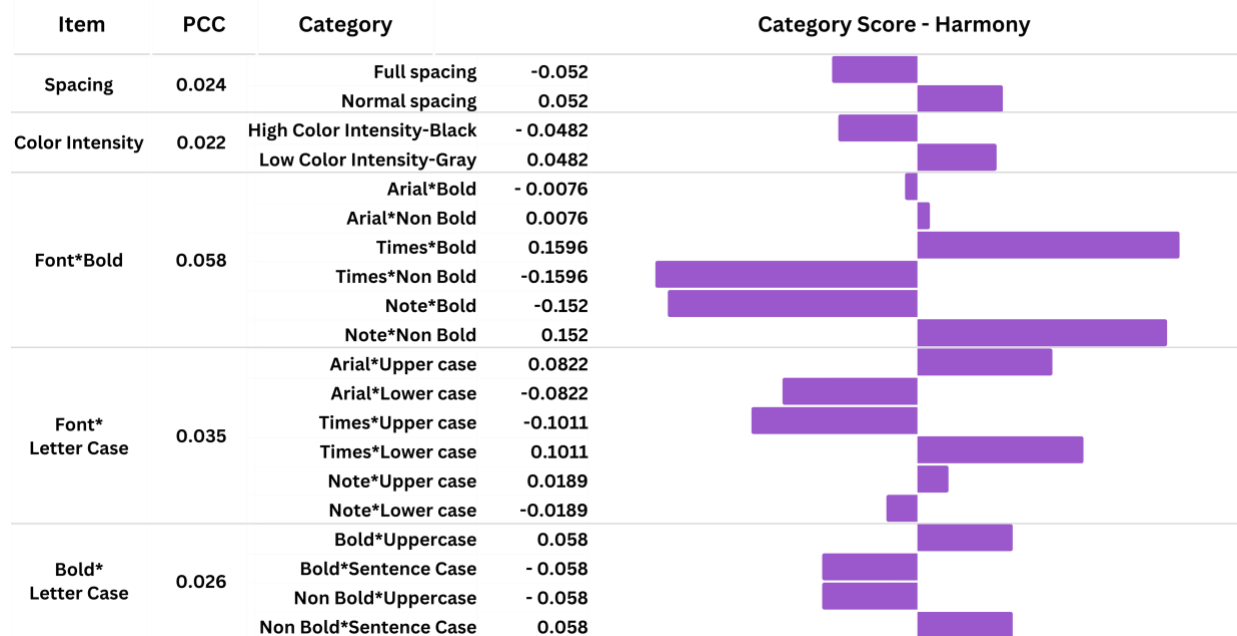


Figure 11. Category Score of Significant Factors- "Harmony"

### Happiness: "Happy-Sad"

Significant factors influencing the happiness include the Font\*Letter Case ( $F(2, 8173) = 8.43, p < 0.00$ ) and the Bold\*Letter Case ( $F(1, 8173) = 6.14, p < 0.013$ ). Times New Roman font paired with sentence case elicits happiness with a category score of 0.143, while the same font with uppercase conveys a sad emotion. Detailed results are demonstrated in Table 9, Table 10, and Figure 12.

Table 9. ANOVA Results of Ratings on "Happiness"

Factor	DF	Adj SS	Adj MS	F-Value	P-Value
Font	2	9	4.4872	0.84	0.43
Italic	1	7.9	7.8796	1.48	0.224
Bold	1	2.6	2.6043	0.49	0.484
Spacing	1	18.1	18.1408	3.41	0.065
Color Intensity	1	9.8	9.8279	1.85	0.174
Letter Case	1	0	0.0138	0	0.959

Font*Italic	2	8.9	4.4403	0.83	0.434
Font*Bold	2	3.8	1.8967	0.36	0.7
Font*Spacing	2	6.2	3.1004	0.58	0.559
Font*Color Intensity	2	25.2	12.5842	2.36	0.094
Font*Letter Case	2	89.7	44.8683	8.43	0*
Bold*Spacing	1	12.1	12.0617	2.27	0.132
Bold*Letter Case	1	32.7	32.6888	6.14	0.013*
Error	8173	43505.2	5.323		
Lack-of-Fit	4	21.2	5.3044	1	0.408
Pure Error	8169	43484	5.323		
Total	8192	43731.2	5.323		

Table 10. Partial Correlation Coefficient for Each Factor and Category Score- Happiness

Factor	Partial- Correlation Coefficient	Category	Category Score
Font	0.014	Arial	0.0011
		Times	0.0399
		Note	-0.0411
Italic	0.013	Y	0.031
		N	-0.031
Bold	0.008	Y	0.0178
		N	-0.0178
Spacing	0.020	Norm	0.0471
		Full	-0.0471
Color Intensity	0.015	High	-0.0346
		Low	0.0346
Letter Case	0.000	Sen	-0.0013
		Up	0.0013
Font*Italic	0.014	Arial*Y	-0.0347
		Arial*N	0.0347
		Times*Y	0.0442
		Times*N	-0.0442
		Note*Y	-0.0094
		Note*N	0.0094
Font*Bold	0.009	Arial*Y	-0.0121
		Arial*N	0.0121
		Times*Y	0.0302
		Times*N	-0.0302

		Note*Y	-0.0181
		Note*N	0.0181
Font*Spacing	0.012	Arial*Norm	-0.0386
		Arial*Full	0.0386
		Times*Norm	0.0238
		Times*Full	-0.0238
		Note*Norm	0.0148
		Note*Full	-0.0148
Font*Color Intensity	0.024	Arial*High	-0.036
		Arial*Low	0.036
		Times*High	0.0782
		Times*Low	-0.0782
		Note*High	-0.0422
		Note*Low	0.0422
Font*Letter Case	0.045	Arial*Up	0.1035
		Arial*Sen	-0.1035
		Times*Up	-0.1433
		Times*Sen	0.1433
		Note*Up	0.0398
		Note*Sen	-0.0398
Bold*Spacing	0.017	Y*Norm	0.0384
		Y*Full	-0.0384
		N*Norm	-0.0384
		N*Full	0.0384
Bold*Letter Case	0.027	Y*Up	0.0632
		Y*Sen	-0.0632
		N*Up	-0.0632
		N*Sen	0.0632



Figure 12. Category Score of Significant Factors- "Happiness"

### Modernness: "Modern-Dated"

As described in Table 11, factors contributing to the perception of "Modern-Dated" that are significant include Font ( $F(2, 8174) = 5.82, p < 0.003$ ), Italic ( $F(1, 8174) = 7.95, p < 0.005$ ), and Font\*Letter Case ( $F(2, 8174) = 6.08, p < 0.002$ ). Font coupled with Letter Case has the highest partial correlation (0.039), with the Times New Roman and Letter Case combination scoring the most. Times New Roman paired with Uppercase implies a dated mood (-0.114), while sentence case suggests a modernized mood (0.114). Followed by font and letter case combination, font alone demonstrates a high partial correlation of 0.038, with Noteworthy font evoking a more dated mood (category score = -0.1189) and Arial exuding a modern impression (category score = 0.0725). Each item's correlation coefficient can be found in Table 12 and Figure 13.

Table 11. ANOVA Results of Ratings on “Modernness”

<b>Factor</b>	<b>DF</b>	<b>Adj SS</b>	<b>Adj MS</b>	<b>F-Value</b>	<b>P-Value</b>
Font	2	58.8	29.3946	5.82	0.003*
Italic	1	40.1	40.1029	7.95	0.005*
Bold	1	2.9	2.8725	0.57	0.451
Spacing	1	15.4	15.3954	3.05	0.081
Color Intensity	1	1.5	1.4855	0.29	0.587
Letter Case	1	1.9	1.8872	0.37	0.541
Font*Italic	2	21	10.5094	2.08	0.125
Font*Bold	2	4.7	2.3438	0.46	0.628
Font*Spacing	2	12.1	6.0653	1.2	0.301
Font*Color Intensity	2	15.6	7.7879	1.54	0.214
Font*Letter Case	2	61.4	30.7027	6.08	0.002*
Bold*Spacing	1	8.8	8.8391	1.75	0.186
Bold*Letter Case	1	0	0.0063	0	0.972
Error	8174	41248.4	5.0463		
Lack-of-Fit	4	55.7	13.9343	2.76	0.026
Pure Error	8170	41192.6	5.0419		
Total	8193	41492.4			

Table 12. Partial Correlation Coefficient for Each Factor and Category Score- Modernness

<b>Factor</b>	<b>Partial- Correlation Coefficient</b>	<b>Category</b>	<b>Category Score</b>
Font	0.038	Arial	0.0725
		Times	0.0463
		Note	-0.1189
Italic	0.031	Y	0.07
		N	-0.07
Bold	0.008	Y	-0.0187
		N	0.0187
Spacing	0.019	Norm	0.0433
		Full	-0.0433
Color Intensity	0.006	High	-0.0135
		Low	0.0135
Letter Case	0.007	Sen	-0.0152
		Up	0.0152
Font*Italic	0.023	Arial*Y	-0.0607
		Arial*N	0.0607

		Times*Y	0.0633
		Times*N	-0.0633
		Note*Y	-0.0026
		Note*N	0.0026
Font*Bold	0.011	Arial*Y	-0.0022
		Arial*N	0.0022
		Times*Y	0.0303
		Times*N	-0.0303
		Note*Y	-0.0281
		Note*N	0.0281
Font*Spacing	0.017	Arial*Norm	0.052
		Arial*Full	-0.052
		Times*Norm	-0.0399
		Times*Full	0.0399
		Note*Norm	-0.0121
		Note*Full	0.0121
Font*Color Intensity	0.019	Arial*High	-0.0376
		Arial*Low	0.0376
		Times*High	0.0611
		Times*Low	-0.0611
		Note*High	-0.0235
		Note*Low	0.0235
Font*Letter Case	0.039	Arial*Up	0.0957
		Arial*Sen	-0.0957
		Times*Up	-0.1139
		Times*Sen	0.1139
		Note*Up	0.0182
		Note*Sen	-0.0182
Bold*Spacing	0.015	Y*Norm	0.0328
		Y*Full	-0.0328
		N*Norm	-0.0328
		N*Full	0.0328
Bold*Letter Case	0.000	Y*Up	0.0009
		Y*Sen	-0.0009
		N*Up	-0.0009
		N*Sen	0.0009



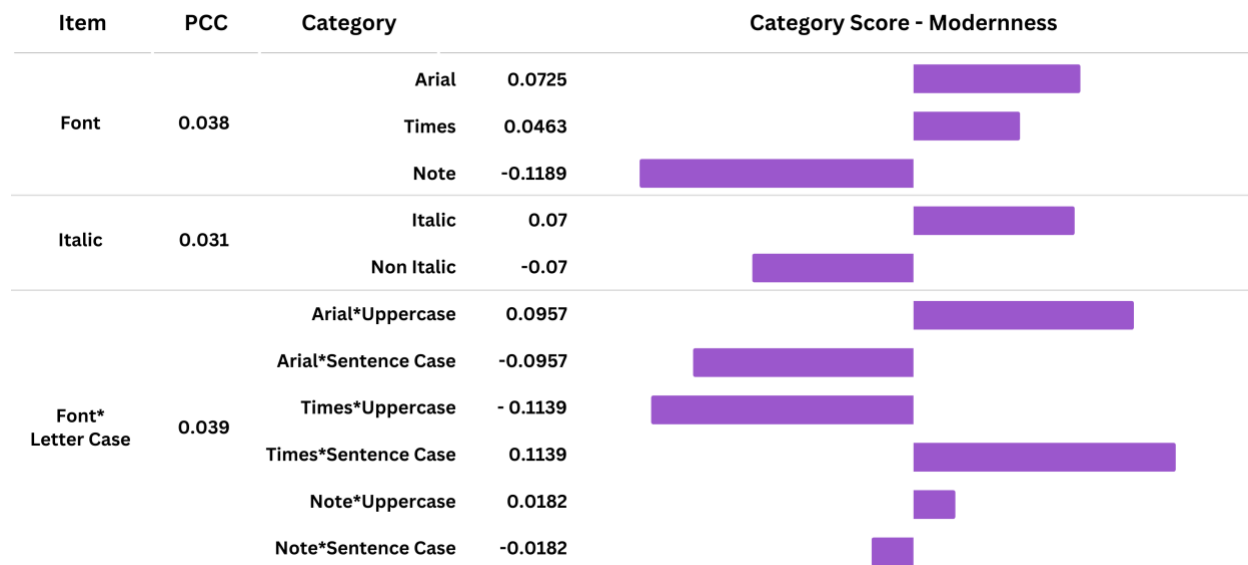


Figure 13. Category Score of Significant Factors- "Modernness"

### Confidence: "Confident-Afraid"

In exploring the "Confident-Afraid" spectrum, Font ( $F(2, 8135) = 3.94, p < 0.02$ ), Font\*Spacing ( $F(2, 8135) = 14.07, p < 0.00$ ), and Font\*Color Intensity ( $F(2, 8135) = 3.46, p < 0.031$ ) are revealed as significant factors, as depicted in Table 13. Arial coupled with normal spacing shows the most confident feelings (category score = 0.1789), while Arial font coupled with full spacing elicits feelings of fear (category score = -0.1789). The partial correlation coefficient of each item within the confidence spectrum is shown in Table 14 and Figure 14.

Table 13. ANOVA Results of Ratings on “Confidence”

<b>Factor</b>	<b>DF</b>	<b>Adj SS</b>	<b>Adj MS</b>	<b>F-Value</b>	<b>P-Value</b>
Font	2	39.5	19.731	3.94	0.02*
Italic	1	9.4	9.3815	1.87	0.171
Bold	1	0.2	0.2436	0.05	0.825
Spacing	1	6	6.0243	1.2	0.273
Color Intensity	1	2.1	2.1088	0.42	0.517
Letter Case	1	2.6	2.5695	0.51	0.474
Font*Italic	2	0.5	0.2672	0.05	0.948
Font*Bold	2	4.7	2.3595	0.47	0.624
Font*Spacing	2	141	70.4775	14.07	0*
Font*Color Intensity	2	34.7	17.355	3.46	0.031*
Font*Letter Case	2	23.6	11.8055	2.36	0.095
Bold*Spacing	1	0	0.0112	0	0.962
Bold*Letter Case	1	0	0.0361	0.01	0.932
Error	8135	40760.1	5.0105		
Lack-of-Fit	4	56.3	14.0785	2.81	0.024
Pure Error	8131	40703.8	5.006		
Total	8154	41024.1	5.0105		

Table 14. Partial Correlation Coefficient for Each Factor and Category Score- Confidence

<b>Factor</b>	<b>Partial- Correlation Coefficient</b>	<b>Category</b>	<b>Category Score</b>
Font	0.031	Arial	0.0356
		Times	0.0616
		Note	-0.0972
Italic	0.015	Y	0.0339
		N	-0.0339
Bold	0.002	Y	-0.0055
		N	0.0055
Spacing	0.012	Norm	-0.0272
		Full	0.0272
Color Intensity	0.007	High	0.0161
		Low	-0.0161
Letter Case	0.008	Sen	0.0178
		Up	-0.0178
Font*Italic	0.004	Arial*Y	-0.0113
		Arial*N	0.0113

		Times*Y	0.0041
		Times*N	-0.0041
		Note*Y	0.0072
		Note*N	-0.0072
Font*Bold	0.011	Arial*Y	-0.0309
		Arial*N	0.0309
		Times*Y	0.0278
		Times*N	-0.0278
		Note*Y	0.003
		Note*N	-0.003
Font*Spacing	0.059	Arial*Norm	0.1789
		Arial*Full	-0.1789
		Times*Norm	-0.0456
		Times*Full	0.0456
		Note*Norm	-0.1333
		Note*Full	0.1333
Font*Color Intensity	0.029	Arial*High	0.0582
		Arial*Low	-0.0582
		Times*High	0.0329
		Times*Low	-0.0329
		Note*High	-0.0911
		Note*Low	0.0911
Font*Letter Case	0.024	Arial*Up	-0.0646
		Arial*Sen	0.0646
		Times*Up	0.0671
		Times*Sen	-0.0671
		Note*Up	-0.0025
		Note*Sen	0.0025
Bold*Spacing	0.000	Y*Norm	-0.0012
		Y*Full	0.0012
		N*Norm	0.0012
		N*Full	-0.0012
Bold*Letter Case	0.000	Y*Up	0.0021
		Y*Sen	-0.0021
		N*Up	-0.0021
		N*Sen	0.0021

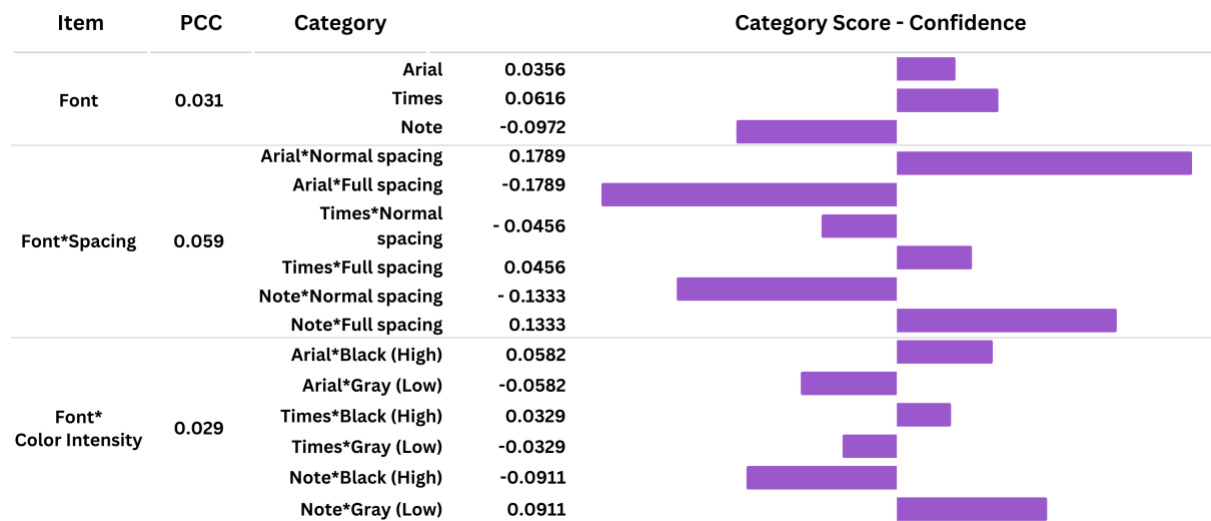


Figure 14. Category Score of Significant Factors- "Confidence"

### Preference: "Like-Dislike"

Lastly, the research extends its investigation beyond individual emotions, exploring the broader spectrum of user preferences. Considering general preference, Italic ( $F(1, 8201) = 4.63, p < 0.031$ ), Spacing ( $F(1, 8201) = 12.53, p < 0.00$ ), Font\*Italic ( $F(2, 8201) = 5.32, p < 0.005$ ), Font\*Letter Case ( $F(2, 8201) = 6.41, p < 0.002$ ) emerge as significant factors which are presented in Table 15. Spacing and the combination of font and letter case exhibit similar partial correlations of about 0.002. Among them, normal spacing is favored with a score of 0.087, while the most preferred combination is Times New Roman font with sentence case (category score = 0.108). Conversely, there is a dislike trend for Times New Roman with uppercase letters. Table 16 and Figure 15 illustrate specific partial correlation coefficients to each category item.

Table 15. ANOVA Results of Ratings on “Preference”

<b>Factor</b>	<b>DF</b>	<b>Adj SS</b>	<b>Adj MS</b>	<b>F-Value</b>	<b>P-Value</b>
Font	2	3.8	1.8968	0.38	0.681
Italic	1	22.8	22.8118	4.63	0.031*
Bold	1	2.9	2.9063	0.59	0.443
Spacing	1	61.8	61.7668	12.53	0*
Color Intensity	1	0.3	0.3237	0.07	0.798
Letter Case	1	0	0.0057	0	0.973
Font*Italic	2	52.5	26.2383	5.32	0.005*
Font*Bold	2	3.9	1.9329	0.39	0.676
Font*Spacing	2	1.6	0.8016	0.16	0.85
Font*Color Intensity	2	4.1	2.0451	0.41	0.66
Font*Letter Case	2	63.1	31.573	6.41	0.002*
Bold*Spacing	1	13.2	13.1748	2.67	0.102
Bold*Letter Case	1	0.5	0.4586	0.09	0.76
Error	8201	40419.8	4.9286		
Lack-of-Fit	4	34.7	8.6632	1.76	0.134
Pure Error	8197	40385.2	4.9268		
Total	8220	40649.9	4.9286		

Table 16. Partial Correlation Coefficient for Each Factor and Category Score- Preference

<b>Factor</b>	<b>Partial- Correlation Coefficient</b>	<b>Category</b>	<b>Category Score</b>
Font	0.000	Arial	0.008
		Times	0.0214
		Note	-0.0294
Italic	0.0006	Y	0.0527
		N	-0.0527
Bold	0.000	Y	-0.0188
		N	0.0188
Spacing	0.0015	Norm	0.0867
		Full	-0.0867
Color Intensity	0.000	High	-0.0063
		Low	0.0063
Letter Case	0.000	Sen	-0.0008
		Up	0.0008
Font*Italic	0.0013	Arial*Y	-0.0382
		Arial*N	0.0382

		Times*Y	0.1112
		Times*N	-0.1112
		Note*Y	-0.073
		Note*N	0.073
Font*Bold	0.000	Arial*Y	-0.0291
		Arial*N	0.0291
		Times*Y	0.023
		Times*N	-0.023
		Note*Y	0.0061
		Note*N	-0.0061
Font*Spacing	0.000	Arial*Norm	0.0171
		Arial*Full	-0.0171
		Times*Norm	0
		Times*Full	0
		Note*Norm	-0.0171
		Note*Full	0.0171
Font*Color Intensity	0.000	Arial*High	0.0268
		Arial*Low	-0.0268
		Times*High	0.0011
		Times*Low	-0.0011
		Note*High	-0.0278
		Note*Low	0.0278
Font*Letter Case	0.0016	Arial*Up	0.1063
		Arial*Sen	-0.1063
		Times*Up	-0.1083
		Times*Sen	0.1083
		Note*Up	0.0021
		Note*Sen	-0.0021
Bold*Spacing	0.000	Y*Norm	0.04
		Y*Full	-0.04
		N*Norm	-0.04
		N*Full	0.04
Bold*Letter Case	0.000	Y*Up	-0.0075
		Y*Sen	0.0075
		N*Up	0.0075
		N*Sen	-0.0075

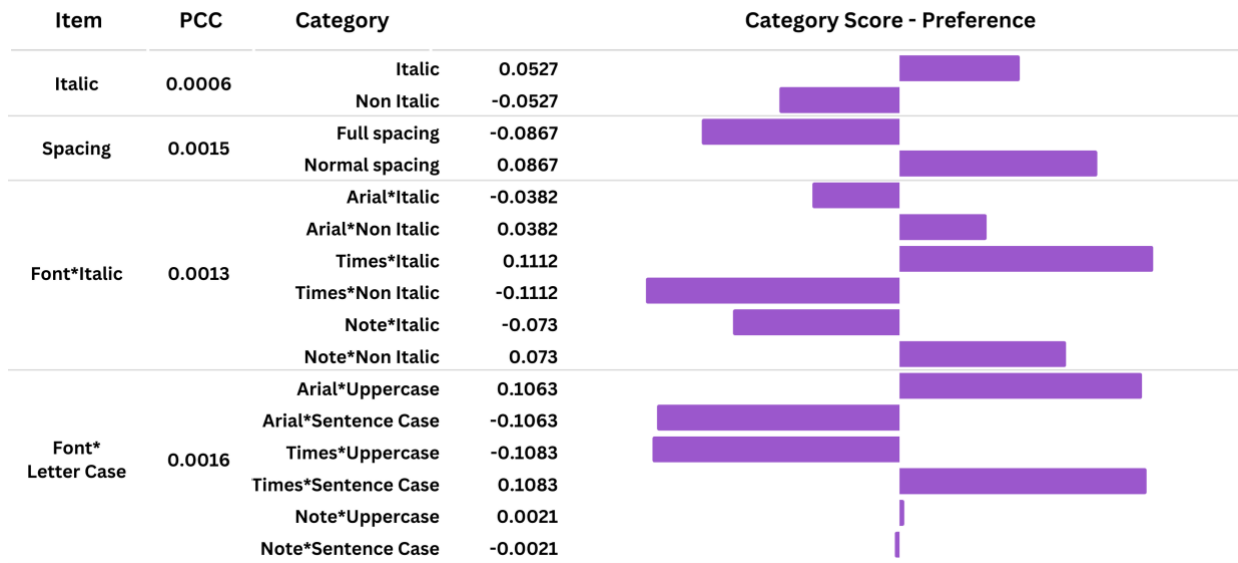


Figure 15. Category Score of Significant Factors- "Preference"

The detailed analysis suggests insights into how varied text features influence comfort, harmony, happiness, modernness, confidence, and general preference.

### 3.2.4 Discussion

The current research started with the question of how the text features were related to specific emotions. Identifying six emotion-related semantic pairs and their association with specific text features helps understand which text feature can evoke certain emotional responses. The main findings include the impact of font combined with italics in vibrancy, the influence of spacing on comfort, the nuanced interplay of Times New Roman font and boldness in harmony, the impact of Times New Roman font linked with letter case on happiness and preference, Noteworthy with Italicization to Vibrancy, type of font to modernness, and Arial font with spacing to confidence, which are described in Table 17. From Figure 16 to 22, prototypes were demonstrated to show which text features are related to emotions effectively. Note that for the

example sentences, the default usage of the font was Arial, black colored, and sentence case unless they are explicitly indicated.

The study examined both individual text elements and their interactive effects. The analysis revealed that, among the singular factors, font type, spacing, and italicization exhibit significant associations with emotional responses, specifically impacting three out of seven assessed emotions. Variables such as letter case and color intensity demonstrated discernible effects on specific emotions, albeit to a lesser extent. Notably, the attribute of boldness did not exhibit a substantial correlation with emotional impact when considered in isolation. The study presents intriguing findings upon exploring the interactive influence of text features. The interaction between boldness and letter case and the combination of font type with boldness was observed to affect two out of the seven emotions under study. Such results suggest that while boldness may not independently elicit an emotional response, its combination with other text elements can indeed contribute to an affective experience. The statistical significance of certain factors provides concrete evidence for the influence of these textual elements on emotional responses. This could be applied to circumstances where people want to evoke or produce certain emotions for better communication.



Table 17. The Most Significant Factors and Category Items to Each Emotion

Vibrancy	Vibrant	Noteworthy x Italic
	Lifeless	Noteworthy x Non Italic
Comfort	Comfortable	Normal Spacing
	Uncomfortable	Full Spacing
Harmony	Harmonious	Times New Roman x Bold
	Conflicting	Times New Roman x Non Bold
Happiness	Happy	Times New Roman x Sentence case
	Sad	Times New Roman xx Uppercase
Modernness	Modern	Arial
	Dated	Noteworthy
Confidence	Confident	Arial x Normal Spacing
	Afraid	Arial x Full Spacing
Preference	Like	Times New Roman x Sentence case
	Dislike	Times New Roman x Uppercase

<b>Vibrancy</b>	
<b>Lifeless</b>	<b>Vibrant</b>
←	→
This is a sample phrase.	<i>This is a sample phrase.</i>
<b>This is a sample phrase.</b>	<i>This is a sample phrase.</i>
This is a sample phrase.	<b>This is a sample phrase.</b>

Figure 16. Text Features Related to "Vibrancy" Examples

<b>Comfort</b>	
This is a sample phrase.	This is a sample phrase.
This is a sample phrase.	<b>THIS IS A SAMPLE PHRASE.</b>

Figure 17. Text Features Related to "Comfort" Examples

<b>Harmony</b>	
This is a sample phrase.	<b>This is a sample phrase.</b>
<b>This is a sample phrase.</b>	This is a sample phrase.
THIS IS A SAMPLE PHRASE.	This is a sample phrase.

Figure 18. Text Features Related to "Harmony" Examples

<b>Happiness</b>	
THIS IS A SAMPLE PHRASE.	This is a sample phrase.
This is a sample phrase.	<b>THIS IS A SAMPLE PHRASE.</b>

Figure 19. Text Features Related to "Happiness" Examples


Modernness		
<b>Dated</b>		<b>Modern</b>
This is a sample phrase.	This is a sample phrase.	
THIS IS A SAMPLE PHRASE.	This is a sample phrase.	
This is a sample phrase.	THIS IS A SAMPLE PHRASE.	

Figure 20. Text Features Related to "Modernness" Examples


Confidence		
<b>Afraid</b>		<b>Confident</b>
This is a sample phrase.	This is a sample phrase.	
This is a sample phrase.	This is a sample phrase.	
This is a sample phrase.	This is a sample phrase.	

Figure 21. Text Features Related to "Confidence" Examples


Preference		
<b>Dislike</b>		<b>Like</b>
THIS IS A SAMPLE PHRASE.	This is a sample phrase.	
This is a sample phrase.	THIS IS A SAMPLE PHRASE.	
This is a sample phrase.	<i>This is a sample phrase.</i>	

Figure 22. Text Features Related to "Preference" Examples

## Chapter 4: Conclusions

### 4.1 Conclusion

The current research systematically examines the intricate relationship between text features and human emotions, employing the Kansei Engineering framework. In contrast to prior studies, which often suggested subjective results, this investigation stands out for its objective and precise identification of these associations. The study shows some significant results by utilizing Quantification Theory 1 for analysis and finding the correlation coefficients for each factor.

The findings emphasized the substantial impact of font combinations, specifically Noteworthy font combined with italics, on vibrancy. Additionally, spacing emerges as a significant factor influencing comfort, the interaction between Times New Roman font and boldness is identified as crucial in harmonious emotion. The pairing of Times New Roman font with letter case is shown to impact happiness and preference. Furthermore, Arial font, when combined with spacing variations, significantly influences the perception of confidence, type of font on modernness. One discovery is that combining different font styles with upper or lowercase letters can significantly affect three of the seven emotions studied. Additionally, the choice of font, the use of italics, and the spacing between characters are each linked to three of the emotions. The findings highlight the importance of these text features in influencing how people feel. This research contributes insights to the existing literature by empirically demonstrating the relationship between textual features and human emotions. While previous studies (Choi & Aizawa, 2019; Ho, 2013; Lim, 2022; Mackiewicz & Moeller, 2004) have

acknowledged a general relationship, the current research is distinguished by its empirical identification and quantification of the specific influence of textual elements on emotional responses. To the best of the existing scholarly understanding, this study is the first to describe and verify this complex connection, thus significantly extending the foundational assertions of earlier works. Consequently, the study result could lead to more precise explorations into the mechanisms by which text elements can impact human emotions and set a precedent for subsequent empirical inquiries in the field.

#### **4.2 Limitations and Future Works**

The study aimed to establish a correlation between specific text features and human emotion. However, some limitations were encountered during the investigation.

Firstly, the examination was confined to six text features: boldness, italics, color intensity, letter case, spacing, and font type. This deliberate choice was made to focus exclusively on the modification of typographical elements, excluding additional variables such as underlining or alterations in background color. While this approach provides valuable insights into the impact of specific typographical changes, it inherently limits the scope of factors considered in relation to emotional expression. Furthermore, the study faced challenges derived from the limited number of potential combinations of text features. This constraint was purposely imposed to prevent participant fatigue while completing the online survey. To address this, the research strategically employed a fractional factorial design, examining 24 sample prototypes selected from a total of 96 possible combinations of text features. While this methodological choice allowed for a manageable exploration of the research questions, it inevitably imposed constraints on the comprehensiveness of the study. Also, the quantitative data gained in the

experiment may introduce certain limitations in comprehending the full scope of the results. Without the supplementary insights that qualitative feedback provides, the understanding of the 'why' behind the observed patterns and behaviors remains incomplete. Lastly, this study's participant demographic did not explicitly account for cultural backgrounds, which represents a potential area for enrichment in research design. The inclusion of cultural backgrounds in data could offer additional layers of insight, which could be done for deeper exploration in future research.

In future research, one promising approach can involve conducting interviews that encompass a broader array of text features. This approach would yield more detailed and qualitative data and facilitate a deeper understanding of the intricate relationship between emotion and diverse textual elements. By expanding the text features' scope, future studies could offer a more holistic view of how various typographical choices influence emotional responses in digital communication. Additionally, targeting a broader demographic range that includes varied cultural backgrounds may enhance the understanding of the research topic and ensure findings are more reflective of diverse populations. Therefore, future efforts could leverage stratified sampling methods to ensure inclusivity and enrich the analysis with cultural perspectives. It might also be beneficial to conduct interviews to gain qualitative data, which can provide a deeper insight into the rationale behind people's choices and behaviors. This approach could reveal underlying motivations, constraints, and influences that may not be apparent through quantitative measures alone, thereby offering a more comprehensive understanding of the research topic.

### **4.3 Study Implication**

Current research investigating the relationship between text features and humans holds significant practical implications across several domains, including chat interactions, real-time social media platforms, and text editing tools. By understanding how specific text features correlate with different emotions, it becomes possible to enhance communication in various digital environments.

The possible application could be improving accessibility for Deaf and hard-of-hearing individuals. By integrating automatic speech recognition services capable of accurately conveying speakers' emotions through the manipulation of text features, communication barriers can be reduced, fostering more inclusive and engaging communication. The automatic change of text features aligned with the speaker's emotion in real-time captioning services might enhance contextual understanding. This could be applied in various fields where the ability to adjust the presentation of textual information can significantly impact comprehension and engagement.

## **Appendices**



## Appendix A : First Survey

2/28/24, 3:15 PM

Qualtrics Survey Software



### Block 2

#### Dynamic Text: To identify descriptive terms: Ver. 1\_AB

A questionnaire on users' perceptions of varying text properties. This survey aims to understand common perceptions of the text property feature. Essentially, we will identify the relationship between human emotion and text properties in written communication. In this survey, you need to evaluate your perceived feeling or emotion on each given picture of the text using the semantic scales. This survey is not to evaluate your ability, but to collect your perception of text design features.

Please type your email below.

CONSENT: For the purposes of this study, we will not reveal any of your identifying information to the public. Only a designated faculty advisor and research assistant will have access to this information. After the study is concluded, your personal data will be deleted. Due to University of Michigan policies, we only can accept participants who are 18 years of age or older. If you consent to these terms, please check the box below.

- I am 18 years of age or older and I consent to be apart of this study
- Other

### Background Questions

Thank you for your participation in this survey. Before we proceed, we would like to gather some basic background information. These questions will assist us in better understanding the characteristics of our survey respondents and analyzing the results effectively. Please rest assured that all your information is strictly confidential and will be used solely for research purposes. Your participation in this survey is voluntary, and

[https://umich.qualtrics.com/Q/EditSection/Blocks/Ajax/GetSurveyPrintPreview?ContextSurveyID=SV\\_0BAwX0Ki5NcaTEG&ContextLibraryID=UR\\_3gY80...](https://umich.qualtrics.com/Q/EditSection/Blocks/Ajax/GetSurveyPrintPreview?ContextSurveyID=SV_0BAwX0Ki5NcaTEG&ContextLibraryID=UR_3gY80...) 1/5

you can skip any questions you do not wish to answer. We appreciate your cooperation.

Let's get started!

What is your age?

What is your gender?

- Male
- Female
- Non-binary
- Prefer not to say

Are you comfortable reading and writing in English?

- Yes
- No
- Other

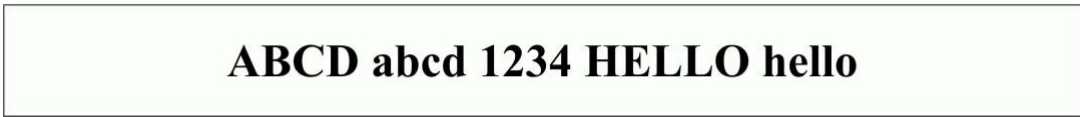
Please rate your perception of the text design depicted in the photograph below according to the adjectives provided in each question, regardless of the meaning of the text.

**Drawrof nexo gnivird tpek tub yltniaug detca seibmoz dedaj**

Dangerous	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Safe
Sad	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Happy
Ugly	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Beautiful
Afraid	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Confident
Uncomfortable	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Comfortable
Complicated	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Simple
Unpredictable	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Predictable
Intense	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Calm
Artificial	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Natural
Serious	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Playful

Terrifying	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Exciting
Weak	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Strong
Rejective	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Acceptive
Awful	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Nice
Boring	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Attractive
Dated	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Modern

Please rate your perception of the text design depicted in the photograph below according to the adjectives provided in each question, regardless of the meaning of the text.



Discouraged	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Encouraged
Unsure	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Certain
Static	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Dynamic
Hateful	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Adorable
Conflicting	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Harmonious
Difficult	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Easy
Inhumanity	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Sympathetic
Rigid	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Flexible
Unreliable	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Reliable
Lifeless	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Vibrant
Indifferent	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Curious
Common	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Unique
Hostile	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Friendly
Isolated	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Open
Passive	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Active
Pessimistic	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Optimistic

Please rate your perception of the text design depicted in the photograph below according to the adjectives provided in each question, regardless of the meaning of the text.



Dangerous	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Safe
Sad	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Happy
Ugly	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Beautiful
Afraid	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Confident
Uncomfortable	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Comfortable
Complicated	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Simple
Unpredictable	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Predictable
Intense	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Calm
Artificial	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Natural
Serious	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Playful
Terrifying	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Exciting
Weak	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Strong
Rejective	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Acceptive
Awful	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Nice
Boring	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Attractive
Dated	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Modern

Please rate your perception of the text design depicted in the photograph below according to the adjectives provided in each question, regardless of the meaning of the text.



Discouraged	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Encouraged
Unsure	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Certain
Static	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Dynamic
Hateful	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Adorable
Conflicting	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Harmonious
Difficult	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Easy
Inhumanity	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Sympathetic
Rigid	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Flexible
Unreliable	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Reliable
Lifeless	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Vibrant
Indifferent	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Curious
Common	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Unique
Hostile	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Friendly

2/28/24, 3:15 PM

Qualtrics Survey Software

Isolated	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Open
Passive	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Active
Pessimistic	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Optimistic

**Block 1**



## Appendix B : Second Survey

2/28/24, 3:16 PM

Qualtrics Survey Software



### Block 6

Welcome to our online survey!

Thank you for taking the time to participate. Your feedback is important to us as it helps us enhance our studies. We value your honest responses.

This survey aims to explore how people perceive text properties in written communication and their emotional responses. You will be shown various text pictures and asked to evaluate the emotions or feelings they evoke using semantic scales. This survey does not assess your abilities, but rather collects your perceptions of text design features. Please indicate your consent by checking the box below if you agree to participate in this survey.

CONSENT: Your privacy is significant to us. As part of this study, we will ensure that none of your identifying information is disclosed publicly. Only a designated faculty advisor and research assistant will have access to your data, which will be deleted once the study is completed. Please note that participation is limited to individuals aged 18 years or older, in

[https://umich.qualtrics.com/Q/EditSection/Blocks/Ajax/GetSurveyPrintPreview?ContextSurveyID=SV\\_d4rkqPzdNc6fMW&ContextLibraryID=UR\\_3gY80...](https://umich.qualtrics.com/Q/EditSection/Blocks/Ajax/GetSurveyPrintPreview?ContextSurveyID=SV_d4rkqPzdNc6fMW&ContextLibraryID=UR_3gY80...) 1/16

compliance with University of Michigan policies. If you agree to these terms, kindly check the box below.

- I am 18 years of age or older, and I consent to be a part of this study
- Other

## Block 6

### Background Questions

Thank you for your participation in this survey. Before we proceed, we would like to gather some basic background information. These questions will assist us in better understanding the characteristics of our survey respondents and analyzing the results effectively. Please rest assured that all your information is strictly confidential and will be used solely for research purposes. Your participation in this survey is voluntary, and you can skip any questions you do not wish to answer. We appreciate your cooperation.

**Let's get started!**

What is your gender?

- Male
- Female
- Non-binary

Prefer not to say

What is your age?

If you would like to participate in the random selection for a \$10 gift card, kindly provide your email address below. Please note that 10 people will be chosen as recipients of the gift card. Your email address will be used solely for the purpose of contacting you if you are selected as one of the recipients.

## Block 5

The following questions will present a single-line phrase featuring different types of font design features. Please rate your perception of the text design depicted in the photograph below based on the given adjectives, regardless of the meaning of the text. The image examples are provided for reference.





Please assess your perception of the text design portrayed in the photograph below based on the adjectives provided in each question. It is important to note that your evaluation should focus on the visual aspects, regardless of the meaning of the text.

***This is a sample phrase.***

Lifeless	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Vibrant
Uncomfortable	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Comfortable
Sad	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Happy
Dated	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Modern
Conflicting	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Harmonious

Afraid	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Confident
Dislike	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Like

This is a sample phrase.

Lifeless	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Vibrant
Uncomfortable	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Comfortable
Sad	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Happy
Dated	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Modern
Conflicting	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Harmonious
Afraid	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Confident
Dislike	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Like

*THIS IS A SAMPLE PHRASE.*

Lifeless	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Vibrant
Uncomfortable	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Comfortable
Sad	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Happy
Dated	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Modern
Conflicting	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Harmonious
Afraid	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Confident

Dislike ○ ○ ○ ○ ○ ○ ○ ○ ○ ○ ○ Like

This is a sample phrase.

Lifeless	○ ○ ○ ○ ○ ○ ○ ○ ○ ○ ○	Vibrant
Uncomfortable	○ ○ ○ ○ ○ ○ ○ ○ ○ ○ ○	Comfortable
Sad	○ ○ ○ ○ ○ ○ ○ ○ ○ ○ ○	Happy
Dated	○ ○ ○ ○ ○ ○ ○ ○ ○ ○ ○	Modern
Conflicting	○ ○ ○ ○ ○ ○ ○ ○ ○ ○ ○	Harmonious
Afraid	○ ○ ○ ○ ○ ○ ○ ○ ○ ○ ○	Confident
Dislike	○ ○ ○ ○ ○ ○ ○ ○ ○ ○ ○	Like

*THIS IS A SAMPLE PHRASE.*

Lifeless	○ ○ ○ ○ ○ ○ ○ ○ ○ ○ ○	Vibrant
Uncomfortable	○ ○ ○ ○ ○ ○ ○ ○ ○ ○ ○	Comfortable
Sad	○ ○ ○ ○ ○ ○ ○ ○ ○ ○ ○	Happy
Dated	○ ○ ○ ○ ○ ○ ○ ○ ○ ○ ○	Modern
Conflicting	○ ○ ○ ○ ○ ○ ○ ○ ○ ○ ○	Harmonious
Afraid	○ ○ ○ ○ ○ ○ ○ ○ ○ ○ ○	Confident

Dislike ○ ○ ○ ○ ○ ○ ○ ○ ○ ○ Like

**THIS IS A SAMPLE PHRASE.**

Lifeless	○ ○ ○ ○ ○ ○ ○ ○ ○ ○	Vibrant
Uncomfortable	○ ○ ○ ○ ○ ○ ○ ○ ○ ○	Comfortable
Sad	○ ○ ○ ○ ○ ○ ○ ○ ○ ○	Happy
Dated	○ ○ ○ ○ ○ ○ ○ ○ ○ ○	Modern
Conflicting	○ ○ ○ ○ ○ ○ ○ ○ ○ ○	Harmonious
Afraid	○ ○ ○ ○ ○ ○ ○ ○ ○ ○	Confident
Dislike	○ ○ ○ ○ ○ ○ ○ ○ ○ ○	Like

**최종\_2번째 블럭**

***THIS IS A SAMPLE PHRASE.***

Lifeless	○ ○ ○ ○ ○ ○ ○ ○ ○ ○	Vibrant
Uncomfortable	○ ○ ○ ○ ○ ○ ○ ○ ○ ○	Comfortable
Sad	○ ○ ○ ○ ○ ○ ○ ○ ○ ○	Happy
Dated	○ ○ ○ ○ ○ ○ ○ ○ ○ ○	Modern
Conflicting	○ ○ ○ ○ ○ ○ ○ ○ ○ ○	Harmonious
Afraid	○ ○ ○ ○ ○ ○ ○ ○ ○ ○	Confident

Dislike ○ ○ ○ ○ ○ ○ ○ ○ ○ ○ ○ Like

**This is a sample phrase.**

Lifeless	○ ○ ○ ○ ○ ○ ○ ○ ○ ○	Vibrant
Uncomfortable	○ ○ ○ ○ ○ ○ ○ ○ ○ ○	Comfortable
Sad	○ ○ ○ ○ ○ ○ ○ ○ ○ ○	Happy
Dated	○ ○ ○ ○ ○ ○ ○ ○ ○ ○	Modern
Conflicting	○ ○ ○ ○ ○ ○ ○ ○ ○ ○	Harmonious
Afraid	○ ○ ○ ○ ○ ○ ○ ○ ○ ○	Confident
Dislike	○ ○ ○ ○ ○ ○ ○ ○ ○ ○	Like

*This is a sample phrase.*

Lifeless	○ ○ ○ ○ ○ ○ ○ ○ ○ ○	Vibrant
Uncomfortable	○ ○ ○ ○ ○ ○ ○ ○ ○ ○	Comfortable
Sad	○ ○ ○ ○ ○ ○ ○ ○ ○ ○	Happy
Dated	○ ○ ○ ○ ○ ○ ○ ○ ○ ○	Modern
Conflicting	○ ○ ○ ○ ○ ○ ○ ○ ○ ○	Harmonious
Afraid	○ ○ ○ ○ ○ ○ ○ ○ ○ ○	Confident

Dislike ○ ○ ○ ○ ○ ○ ○ ○ ○ ○ ○ Like

THIS IS A SAMPLE PHRASE.

Lifeless	○ ○ ○ ○ ○ ○ ○ ○ ○ ○ ○	Vibrant
Uncomfortable	○ ○ ○ ○ ○ ○ ○ ○ ○ ○ ○	Comfortable
Sad	○ ○ ○ ○ ○ ○ ○ ○ ○ ○ ○	Happy
Dated	○ ○ ○ ○ ○ ○ ○ ○ ○ ○ ○	Modern
Conflicting	○ ○ ○ ○ ○ ○ ○ ○ ○ ○ ○	Harmonious
Afraid	○ ○ ○ ○ ○ ○ ○ ○ ○ ○ ○	Confident
Dislike	○ ○ ○ ○ ○ ○ ○ ○ ○ ○ ○	Like

This is a sample phrase.

Lifeless	○ ○ ○ ○ ○ ○ ○ ○ ○ ○ ○	Vibrant
Uncomfortable	○ ○ ○ ○ ○ ○ ○ ○ ○ ○ ○	Comfortable
Sad	○ ○ ○ ○ ○ ○ ○ ○ ○ ○ ○	Happy
Dated	○ ○ ○ ○ ○ ○ ○ ○ ○ ○ ○	Modern
Conflicting	○ ○ ○ ○ ○ ○ ○ ○ ○ ○ ○	Harmonious
Afraid	○ ○ ○ ○ ○ ○ ○ ○ ○ ○ ○	Confident

Dislike ○ ○ ○ ○ ○ ○ ○ ○ ○ ○ ○ Like

# THIS IS A SAMPLE PHRASE.

Lifeless	○ ○ ○ ○ ○ ○ ○ ○ ○ ○ ○	Vibrant
Uncomfortable	○ ○ ○ ○ ○ ○ ○ ○ ○ ○ ○	Comfortable
Sad	○ ○ ○ ○ ○ ○ ○ ○ ○ ○ ○	Happy
Dated	○ ○ ○ ○ ○ ○ ○ ○ ○ ○ ○	Modern
Conflicting	○ ○ ○ ○ ○ ○ ○ ○ ○ ○ ○	Harmonious
Afraid	○ ○ ○ ○ ○ ○ ○ ○ ○ ○ ○	Confident
Dislike	○ ○ ○ ○ ○ ○ ○ ○ ○ ○ ○	Like

## 최종\_3번째 블럭

*This is a sample phrase.*

Lifeless	○ ○ ○ ○ ○ ○ ○ ○ ○ ○ ○	Vibrant
Uncomfortable	○ ○ ○ ○ ○ ○ ○ ○ ○ ○ ○	Comfortable
Sad	○ ○ ○ ○ ○ ○ ○ ○ ○ ○ ○	Happy
Dated	○ ○ ○ ○ ○ ○ ○ ○ ○ ○ ○	Modern
Conflicting	○ ○ ○ ○ ○ ○ ○ ○ ○ ○ ○	Harmonious

Afraid	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Confident
Dislike	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Like

# THIS IS A SAMPLE PHRASE.

Lifeless	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Vibrant
Uncomfortable	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Comfortable
Sad	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Happy
Dated	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Modern
Conflicting	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Harmonious
Afraid	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Confident
Dislike	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Like

# This is a sample phrase.

Lifeless	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Vibrant
Uncomfortable	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Comfortable
Sad	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Happy
Dated	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Modern
Conflicting	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Harmonious



Afraid	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Confident
Dislike	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Like

*THIS IS A SAMPLE PHRASE.*

Lifeless	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Vibrant
Uncomfortable	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Comfortable
Sad	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Happy
Dated	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Modern
Conflicting	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Harmonious
Afraid	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Confident
Dislike	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Like

***THIS IS A SAMPLE PHRASE.***

Lifeless	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Vibrant
Uncomfortable	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Comfortable
Sad	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Happy
Dated	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Modern
Conflicting	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Harmonious
Afraid	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Confident

Dislike ○ ○ ○ ○ ○ ○ ○ ○ ○ ○ ○ Like

**This is a sample phrase.**

Lifeless	○ ○ ○ ○ ○ ○ ○ ○ ○ ○ ○	Vibrant
Uncomfortable	○ ○ ○ ○ ○ ○ ○ ○ ○ ○ ○	Comfortable
Sad	○ ○ ○ ○ ○ ○ ○ ○ ○ ○ ○	Happy
Dated	○ ○ ○ ○ ○ ○ ○ ○ ○ ○ ○	Modern
Conflicting	○ ○ ○ ○ ○ ○ ○ ○ ○ ○ ○	Harmonious
Afraid	○ ○ ○ ○ ○ ○ ○ ○ ○ ○ ○	Confident
Dislike	○ ○ ○ ○ ○ ○ ○ ○ ○ ○ ○	Like

**최종\_4번째 블럭**

*THIS IS A SAMPLE PHRASE.*

Lifeless	○ ○ ○ ○ ○ ○ ○ ○ ○ ○ ○	Vibrant
Uncomfortable	○ ○ ○ ○ ○ ○ ○ ○ ○ ○ ○	Comfortable
Sad	○ ○ ○ ○ ○ ○ ○ ○ ○ ○ ○	Happy
Dated	○ ○ ○ ○ ○ ○ ○ ○ ○ ○ ○	Modern
Conflicting	○ ○ ○ ○ ○ ○ ○ ○ ○ ○ ○	Harmonious
Afraid	○ ○ ○ ○ ○ ○ ○ ○ ○ ○ ○	Confident

Dislike ○ ○ ○ ○ ○ ○ ○ ○ ○ ○ ○ ○ Like

**THIS IS A SAMPLE PHRASE.**

Lifeless	○ ○ ○ ○ ○ ○ ○ ○ ○ ○ ○ ○	Vibrant
Uncomfortable	○ ○ ○ ○ ○ ○ ○ ○ ○ ○ ○ ○	Comfortable
Sad	○ ○ ○ ○ ○ ○ ○ ○ ○ ○ ○ ○	Happy
Dated	○ ○ ○ ○ ○ ○ ○ ○ ○ ○ ○ ○	Modern
Conflicting	○ ○ ○ ○ ○ ○ ○ ○ ○ ○ ○ ○	Harmonious
Afraid	○ ○ ○ ○ ○ ○ ○ ○ ○ ○ ○ ○	Confident
Dislike	○ ○ ○ ○ ○ ○ ○ ○ ○ ○ ○ ○	Like

*This is a sample phrase.*

Lifeless	○ ○ ○ ○ ○ ○ ○ ○ ○ ○ ○ ○	Vibrant
Uncomfortable	○ ○ ○ ○ ○ ○ ○ ○ ○ ○ ○ ○	Comfortable
Sad	○ ○ ○ ○ ○ ○ ○ ○ ○ ○ ○ ○	Happy
Dated	○ ○ ○ ○ ○ ○ ○ ○ ○ ○ ○ ○	Modern
Conflicting	○ ○ ○ ○ ○ ○ ○ ○ ○ ○ ○ ○	Harmonious
Afraid	○ ○ ○ ○ ○ ○ ○ ○ ○ ○ ○ ○	Confident

Dislike ○ ○ ○ ○ ○ ○ ○ ○ ○ ○ ○ ○ Like

THIS IS A SAMPLE PHRASE.

Lifeless	○ ○ ○ ○ ○ ○ ○ ○ ○ ○ ○ ○	Vibrant
Uncomfortable	○ ○ ○ ○ ○ ○ ○ ○ ○ ○ ○ ○	Comfortable
Sad	○ ○ ○ ○ ○ ○ ○ ○ ○ ○ ○ ○	Happy
Dated	○ ○ ○ ○ ○ ○ ○ ○ ○ ○ ○ ○	Modern
Conflicting	○ ○ ○ ○ ○ ○ ○ ○ ○ ○ ○ ○	Harmonious
Afraid	○ ○ ○ ○ ○ ○ ○ ○ ○ ○ ○ ○	Confident
Dislike	○ ○ ○ ○ ○ ○ ○ ○ ○ ○ ○ ○	Like

*This is a sample phrase.*

Lifeless	○ ○ ○ ○ ○ ○ ○ ○ ○ ○ ○ ○	Vibrant
Uncomfortable	○ ○ ○ ○ ○ ○ ○ ○ ○ ○ ○ ○	Comfortable
Sad	○ ○ ○ ○ ○ ○ ○ ○ ○ ○ ○ ○	Happy
Dated	○ ○ ○ ○ ○ ○ ○ ○ ○ ○ ○ ○	Modern
Conflicting	○ ○ ○ ○ ○ ○ ○ ○ ○ ○ ○ ○	Harmonious
Afraid	○ ○ ○ ○ ○ ○ ○ ○ ○ ○ ○ ○	Confident

Dislike           Like

*This is a sample phrase.*

Lifeless	<input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/>	Vibrant
Uncomfortable	<input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/>	Comfortable
Sad	<input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/>	Happy
Dated	<input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/>	Modern
Conflicting	<input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/>	Harmonious
Afraid	<input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/>	Confident
Dislike	<input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/>	Like

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