Doctoral Thesis

Visual Language Retention:

視覚言語とその保持率分析

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Abstract

Visual Language Retention: Do visual attributes of multimedia utilized in the classroom have an effect on retention?

Multimedia presentation of information in instruction is widely used in many academic and business settings around the world. The multimedia part of this instruction is not only the use of computers, but also includes textbooks with pictures, handouts, videos, etc., anything that uses “multiple” sources of media and multiple perceptions to learn. Today there is a need for a well-defined, wide-spread, and easy to remember definition of visual grammar for presentation software use in the classroom. This research presents the finding of three attributes of this visual grammar, background color, font style and text density. A platform of presentation software was used to test and define these characteristics on student retention in a classroom setting. In addition, this research was conducted in Japan and the USA to ascertain if there is a cross cultural difference in these statistical findings. The results revealed a statistical difference and preference in certain colors, and font styles particular to country specific groups. In addition, results indicated no cultural difference between groups for text density, but revealed a statistically significant result to define an optimum text density with regards to higher retention rates.

Chapter One

Introduction

Chapter 1: Introduction:

Multimedia presentation of information in instruction is widely used in many academic and business settings around the world. The multimedia part of this instruction is not only the use of computers, but also includes textbooks with pictures, handouts, videos, etc., anything that uses “multiple” sources of media and multiple perceptions to learn, for example, using presentation software in the classroom. Some have negatively called presentation software use as “No golden bullet” (Rowcliffe, 2003, p. 74) others have called it the “Viagra of the spoken word”(Blokzijl & Naeff, 2004, p. 70). One of the most popular packages is PowerPoint® made by Microsoft Corporation. Even though it has been ridiculed and negatively joked about, presentation software or PowerPoint® has more than 500 million users, has an average of 30 million presentations performed in one day and some estimates say that 1.25 million presentations take place every hour (Mahin, 2004). Globally, six million educators use this software in the classroom. The average PowerPoint® presentation runs 25 minutes and each slide has about 40 words. Multimedia usage in learning is an extremely powerful and popular academic tool (Parker, 2001; Mahin, 2004).

In my own personal experience, over the past 15 years, when teaching English presentation skills in a second language classroom in Japan, students were required to peer evaluate based on characteristics pertaining to story, physical and visual messages of a speech. When comparing the story (written) and physical message, peer evaluations coincided with the instructors evaluations. However, the instructor noted a significant difference in evaluations concerning the visual message of the student's speech. Especially when presentation software was utilized, these evaluations were opposite of each other.

Because of this continued pattern of mixed visual message evaluations, a question of unique cultural perceptions was considered as an explanation of this difference. This lead to the reading of the Richard Nisbett book, *The Geography of Thought* (2003). Nisbett discovered, through extensive research, cognitive differences between Westerners and East Asians. Could this difference, noted by Nisbett (2003) also be observed between evaluations of Japanese student presentations and their American instructor? Further research, at that time, revealed a lack of statistically based observations concerning these differences were noted in the classroom. There were many "How to" books available to give advice, but no real concrete proven results to practically use in the classroom. In addition, was this difference noted for computer users and cross-cultural situations in business or diplomacy where presentations are becoming the de facto standard in speeches?

In 2014 the author conducted a survey (see Appendix 1) asking university and secondary educators from the USA and Japan questions pertaining to presentation software use in the classroom. Sixty six percent answered positively when asked if their design considerations included retention. In contrast, of the educators that answered yes, expressions such as readability, clear and visually appealing were noted in only 11 of the 24 affirmative responses as characteristics considered to have an effect on retention of information taught using presentation software as a teaching tool. Almost half did not expand on their design considerations. In addition, some educators were honest and stated that they knew of a design principle, but were unaware of the specifics or the guidelines it contained. This last statement displays a need for a well-defined and wide-spread, easy to remember definition of visual grammar for presentation software use in the classroom.

This study will not argue the effectiveness of using PowerPoint® in the classroom. This is a path of usage that cannot be reversed. Presentation software is here to stay in the classroom and boardroom. However, how we present and design this information will be analyzed and studied for the discovery of cognitive rules, constructions, theories and a defined visual grammar.

Academic research has been slow to record the effects across a wide breadth of visual factors as to the use of presentation software in the classroom. A student in a classroom setting has many cognitive and academic duties to learn the information presented. If, for example, presentation software is utilized, visual, and aural information needs to be processed in the brain along with note taking. Three senses are working and organizing information taught; visually, aurally and haptically. The ultimate goal of a class is to convey as much information as possible that can be retained in a certain amount of time. In addition, when the student leaves the classroom, this information needs to be retained and eventually adapted to situations. The possibility of an overload of information during classroom teaching has been the argument for presentation software's non-usage especially by Dr. Tufte of Yale University in his book *The Cognitive Style of PowerPoint® Pitching Out Corrupts Within* (2006). This author argues the faults of using this kind of multimodality that confuse, bore and ultimately put observers to sleep due to cognitive overload. However, this kind of multimedia use of presentation software is here to stay and is an integral part of educational technology that is widespread. We cannot avoid it.

When presentation software design began as a topic of discussion about 30 years ago, basically the main purpose of usage was for sales presentations (Gaskins, 1984). Recently in 2014, from a local survey of 37 educators in the USA and Japan, presentation software was used in approximately 89% of higher education classrooms. In the academic world, research (Amare, 2006; Axtell, Maddux, & Aberasturi, 2008) has mainly analyzed the effectiveness of using this technology versus the non or alternate use. Today, attributes of this platform are really just starting to be scientifically analyzed across multiple disciplines i.e. psychology, design theory, and human computer interaction.

Text design discussions tend "to focus largely on formatting and readability issues: invoking the use of margins, white space, font styles, color, headings, paragraphing, columns, etc." (Amare & Manning, 2007, p. 57). Here Amare and Manning state that text is just as important as graphics. In addition to defining it as having visual linguistic features, Amare argues, that this visual rhetoric includes the textual rhetoric or specifically a grammar to using text in the presentation design. Including the text attributes; font, background and even the spacing between texts are part of the whole semiotic system. Text has meaning of course, but we can also consider visual attributes that humans are consciously or unconsciously understanding or influenced by. Amare and Manning (2007) uses Pierce's Communication Theory to further define and determine that “text and visuals are closely interwoven” (Amare & Manning, 2007, p. 59). There is a need to create a visual text grammar that will enhance retention of information presented/taught. Just as written grammar is needed to create a logical understanding of information, a “visual rhetoric grammar” must also be discerned and defined. The research for this visual grammar will be accomplished from a learning/education centered point of view and encompass many disciplines and findings to support the hypotheses defined.

In order to explore these basic design factors as part of this visual grammar, the need to build on previous work in the areas of perception theory and cognitive overload theory will be reviewed. Basic perception theory is separated into three parts; visual, aural, and haptic. The “overall percept is strongly dominated by vision” our perceptual information (Shams & Kim, 2010, p. 2). When viewing a presentation, perceptual factors such as use of pictures, number of words per slide, colors used, font styles, for example, have a direct effect on retention.

This research will define three important parts of this visual rhetorical grammar; background color, font style, and text density. These attributes were tested and analyzed to determine if there are particular characteristics that enhance retention of information presented.

This research will prove that different background colors cultivate different emotion and it has an unconscious effect on retention of information. In addition, a cross cultural comparison of these colors will be analyzed and tested to further document Nisbett’s (2003) theories and research.

Font style will be discussed and examined to determine the effects on retention in a classroom setting. This research will also consider the current research on road sign font analysis for readability principles that can be applied in determining the correct font style to use in the classroom to enhance retention of information presented. A cross cultural component was also analyzed across presentations in Japan and the USA for this font style effect.

The third component of this research will test the effects of text density on slides. All too often when participating as an audience member we witness slides that are full of test, some of which are unreadable. As we read along with the presenter speaking, do we retain more, less or the same amount of information as the all too familiar bulleted, key worded information? Is the retention of this text density different across cultures or is this basic function of long and short term memory storage the same across cultures?

This paper will be divided into three distinct parts for research and analysis; background color, font style, and text density. By defining these visual attributes, we can begin to develop and define a visual rhetorical grammar for future use in the classroom and boardroom with statistically proven methods.

Each part of the research included a presentation that ran automatically with a recording and in the audience's native language. Only one attribute was changed across presentations. All research was carried out at universities in the USA and Japan in their respective country languages. A survey was administered after each presentation with written or chosen answers. Some answers were given a point value, so partial answers could be given credit. Statistical analysis was carried out to determine and prove statistically significant differences in retention rates across populations of students.

This paper will answer the question posed above: Is there a visual rhetorical grammar in multimedia presented information used in the classroom and does it affect retention?

Chapter Two

Background Color and Retention

Chapter 2: Background Color and Retention

2.1 **Introduction**

When a person reads a text on paper, on a computer screen, or during a presentation, the words are not the only factor that contribute to comprehension. Reading text on a page contains intrinsic and extrinsic features (Ecker, Zimmer, & Groh-Bordin, 2007a) that bind to the Visual Working Memory (VWM). Extensive research suggests that this binding of features to memory is an automatic and non-cognitive demanding process and that intrinsic features are part of a perceptual unit (Ecker, Zimmer, & Groh-Bordin, 2007a). These intrinsic features are defined as “color, font, or voice of presentation” (Troyer & Craik, 2000, p. 161). There is disagreement over whether background is an intrinsic or extrinsic feature that binds to the meaning of a text; Delvenne and Bruyer (2004) claim it is extrinsic but Ecker, Zimmer, and Groh-Bordin (2007a) and Ecker, Maybery, and Zimmer (2013) claim it to be intrinsic.

For this first stage of attribute analysis, research was conducted to evaluate if the intrinsic or extrinsic features of, in this case, background color have an effect on the retention of information. The platform utilized for these experiments was a Microsoft PowerPoint® presentation in a university classroom setting. Using presentation software in the classroom, particularly university classrooms where class sizes can be over 200, is a very popular and convenient way for professors to highlight information, show graphs and explain data. From a small but important survey on the usage of presentation software in the classroom of an American university it was reported that for professors,

> "approximately 91 percent use PowerPoint® at least some of the time in their courses— 76 percent of instructors use it in between one quarter and three quarters of their class meetings, while 55 percent use it in at least three quarters of their classes"(Hill, Arford, Lubitow, & Smollin, 2012, p. 245).

The experimental presentation in this research detailed an uncommon recipe for oven pancakes with one changing variable, background color. Preliminary tests narrowed down the actual research presentations to five distinct solid colors: blue, dark blue, yellow, green, and white. Black and white lettering was utilized according to the classroom lighting and equipment. In addition, the research was compared and contrasted between two countries, Japan and the United States of America (USA). The original Japanese presentation was translated into English. In both locations, test presentations were performed at multiple locations in multiple university classrooms.

Color is described as having different meanings to different cultures. For example, white in Japan is associated with mourning and death and in the USA white is associated with purity (Aslam, 2006). There are also similar meanings across cultures such as blue. Blue in Japan and the USA is associated with high quality, sincere and trustworthy. (Aslam, 2006) There is research in this area of psychological and sociocultural associations and meanings of color across many disciplines. In addition to the meanings and associations is the emotional response to color and the effects on encoding and retention (Lockley et al., 2006; Suk & Irtel, 2010; Yoto, Katsuura, Iwanaga, & Shimomura, 2007).

The aim of the experiments in this chapter is to examine whether retention is enhanced with particular background colors in particular cultures. After a review of current research and trends in the fields of cognitive psychology, educational psychology and educational multimedia design, the experiment methodology will be described. The data collected will be presented in a percent score of correct data giving partial credit for partial answers. Statistical tests inter-culturally and intra-culturally will be performed to determine the reliability of the data collected.

2.2 **Literature Review and Current Research Findings**

The connection between color and psychology has been researched and discussed across a variety of disciplines and cultures. Ecker, Maybery, and Zimmer (2013, p. 223) claim in their experiments that "shape (the text) and intrinsic color were bound at encoding." In addition, "intrinsic color information was involuntarily activated at retrieval." This literature review will show that background color is therefore part of the visual working memory process. This chapter will take this concept further by suggesting that specific colors have an effect on this binding mechanism and will perform experiments using a typical classroom presentation and changing one variable, background color.

Color perception theory for instructional technology was analyzed by Pett and Wilson, (1996, p. 19). They define color perception by using three categories, "color as physiological, color as psychological, and color and learning." I will address these topics one by one.

2.2.1 Color as Physiological - How We Physically See Color

In the human eye, visible color is detected via the fovea (centralis) (Kolb, Nelson, Fernandez, & Jones, 2015). See Figure 1. Humans have trichromatic color perception. Inside the fovea humans possess three types of photoreceptor cells containing pigments with peak absorption at 419, 531, and 558 nanometers (NM) in the visible spectrum (Figure 2). These perceptual light-sensitive cells, called ‘cones’ are defined by their absorption rate, red (L for long wavelength), green (M for Medium wavelength) and blue (S for short wavelength), that give color information to the brain. These wavelengths are directly related to the wavelength a color emits (Bruce, Green

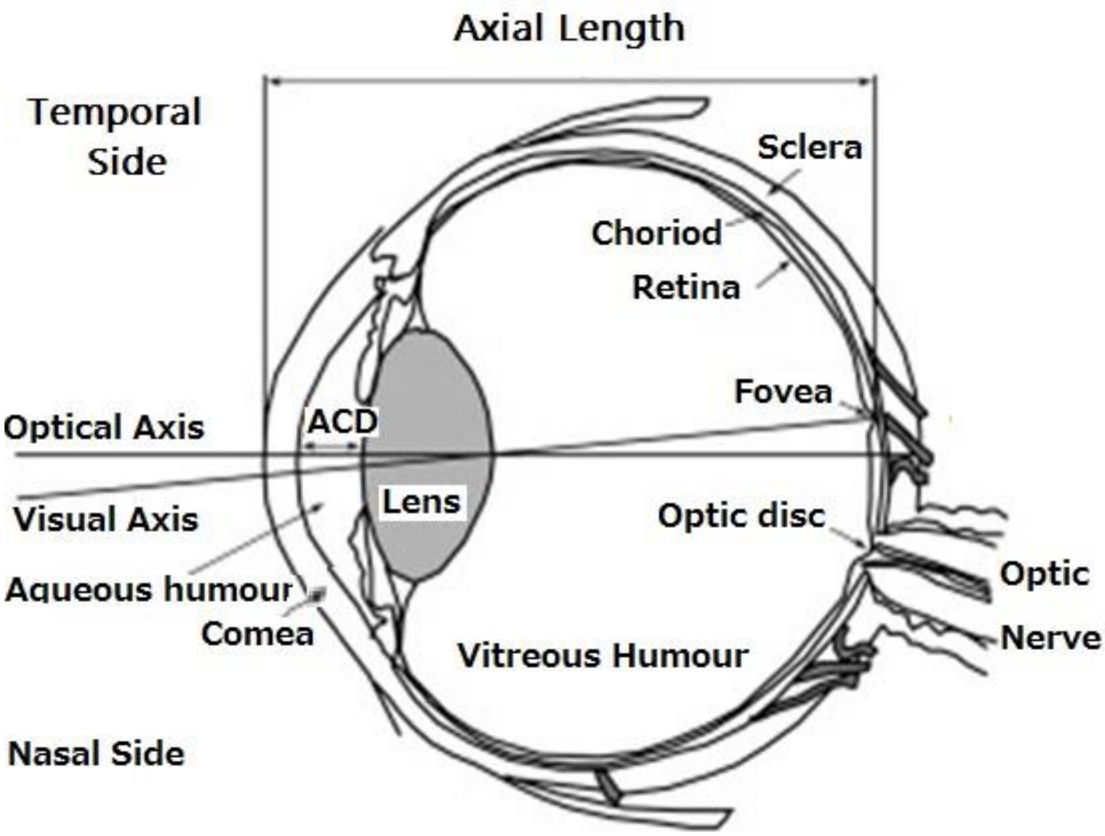


Figure 1. Basic Human Eye Description

(Dragostinoff, Brezna, Lux, Krutzler, & Prinz, 2014, p. 63)

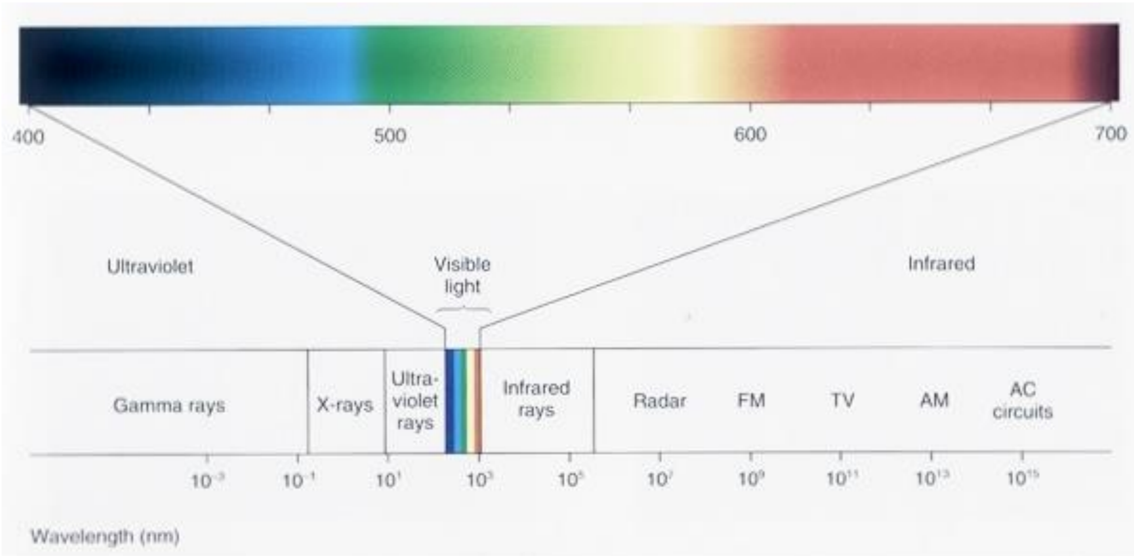


Figure 2. Visible Light Spectrum (Bruce, Green, Georgeson, 2003, p. 21)

& Georgeson, 2003). See Figure 2.

The total number of rods, their function is to detect white-gray-black images, in the human retina (91 million) far exceeds the number of cones; roughly 4.5 million (Purves et al., 2001). In the fovea centralis, density increases almost 200-fold, and the green and red cones are packed tight together. (See Figure 3-left). By population, about 64% of the cones are red-wavelength sensitive, about 32% green wavelength sensitive, and about 2% are blue wavelength sensitive (Hecht, 1929). The blue cones are mostly found outside the fovea (See Figure 3- right). The difference in the strength of signals received from the three kinds of cones allows the brain to differentiate many different colors (Knoblauch & Shevell, 2001).

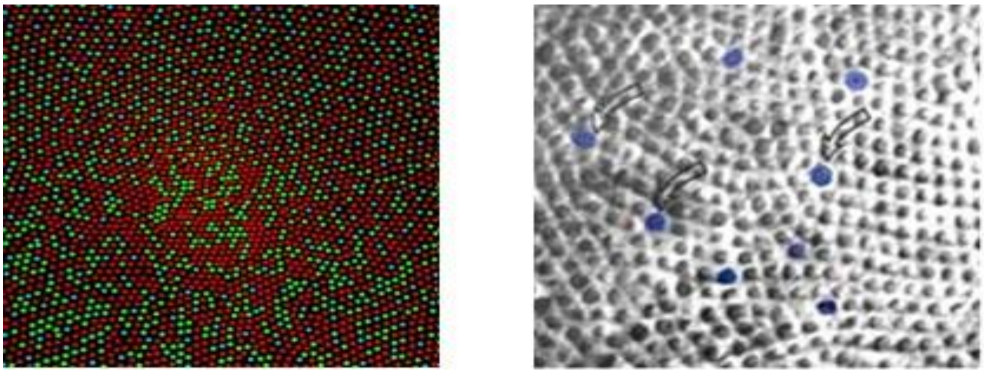


Illustration of the Color Cones Actual Fovea with Blue Cones

Figure 3. Color Cones in the Human Eye (www.rit-mcsl.org)

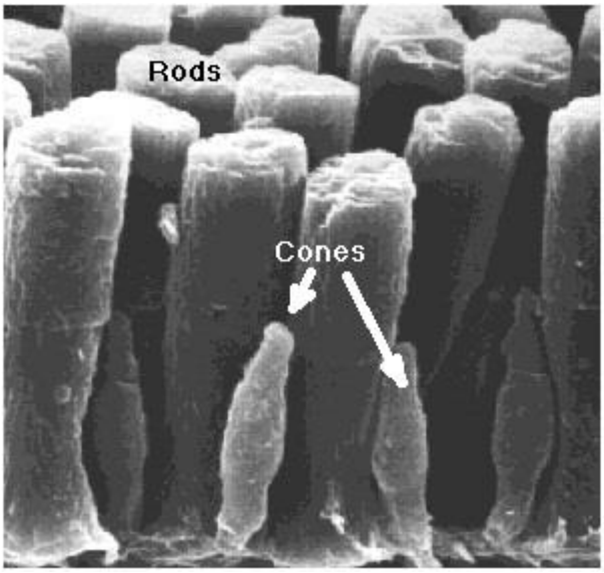


Figure 4. Picture of Actual Cones and Rods in the Retina (users.rcn.com)

The cones are surrounded by the rods (Figure 4). These rods are lined in the retina of the eye and detect white-gray–black images. A black and white picture is exactly what you see using only the rods (Bruce, Vicki, & Green, 2003).

Each color emits a particular wavelength. This color wavelength is a basic science discovery dating back to Newton's theories. Visible light corresponds to a wavelength range of 400-700 nanometers and a color range of violet through red (National Aeronauticcs and Space Administration, 2014). As an example of color reception, light in the orange range of wavelengths (approximately 577 nm to 597 nm) enters the eye and strikes the fovea. Light of these wavelengths would activate both the M (medium) and L (long) wavelength cones, but not equally—the long-wavelength cells will respond more. The difference in the response can be detected by the brain and

Table 1. Absorption of Colors by % of Pigment (Rossotti, 1983, p. 119)

Wavelengths (nm)	*Approximate % of total absorption contributed by pigment*			*Colour*
	Long (Red) A	Medium (Green) B	Short (Blue) C	
420	29	21·5	49·5	violet
460	33	42	25	blue
490	48	48·5	3·5	blue-green
530	57	43	0	green
580	70·5	29·5	0	yellow
600	80	20	0	orange
620	88·5	11·5	0	orange-red
660	95·5	4·5	0	red

associated with the concept that the light is orange. In this sense, the orange appearance of objects is simply the result of light from the object entering our eye and stimulating the relevant kinds of cones simultaneously but to different degrees (Rossotti, 1983). See Table 1 and Figure 5.

The color information absorbed from S, M, or L cones in the fovea is transferred via the optic nerve to the visual dorsal stream and the ventral stream located in the back

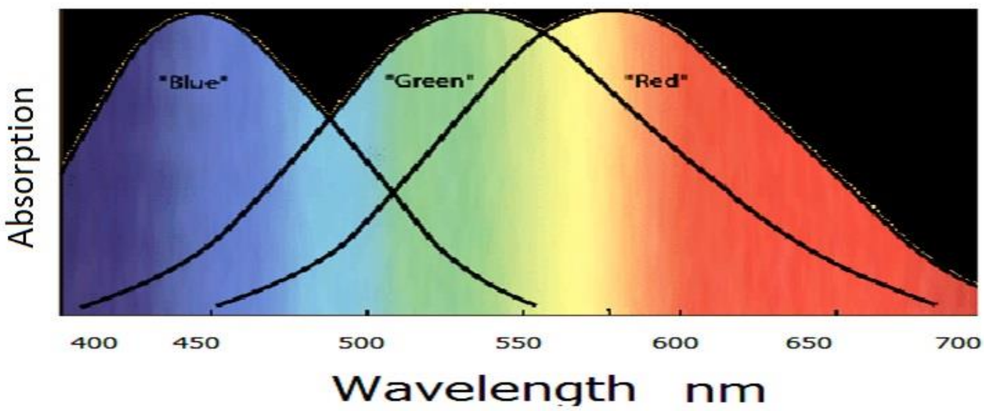


Figure 5. Color Cone Absorption in Humans vs. Wavelength (Williamson & Cummins, 1983)

of the brain where it is defined (Claeys et al., 2004.) Since the human retina has only three types of receptors (cones) that influence color perception, three numerical components are sufficient to describe a color; this is termed the trichromatic theory (Neelamani, de Queiroz, Fan, Dash, & Baraniuk, 2006).

Defining a color in terms of its wavelength is only part of how we define color. Humans perceive color according to at least 5 factors: value, saturation, hue, arousal, and acuity (Valdez & Mehrabian, 1994; Kress & Van Leeuwen, 2002).

Value (brightness) is determined by how much lightness is in a color. Looking at a black and white picture, we see the value. This attribute is independent of the actual color (hue) (Stone, 2008). See Figures 6 and 7.

Saturation (intensity, purity, chroma) is like value but it includes the color. Here we define a color according to how much white (making it pastel-like), grey, (dull) or black (dark) is mixed into the color (Stone, 2008). See Figures 5, 6, and 7.

Hue is defined as the color we actually see, i.e. red, green, etc. A color hue is determined by the wavelength it emits in nanometers (Stone, 2008). See Figures 2, 6, and 7.

The reason for describing the attributes of a color is to introduce how colors are classified into an international standard of reference today. For example, in 1931, the Commission Internationale de l'Eclairage (CIE) standardized a color order system (X-Rite, 2007). Like the first three characteristics of a color (hue, value and saturation), the CIE standard has three numerical values to describe every color. First, the wavelength

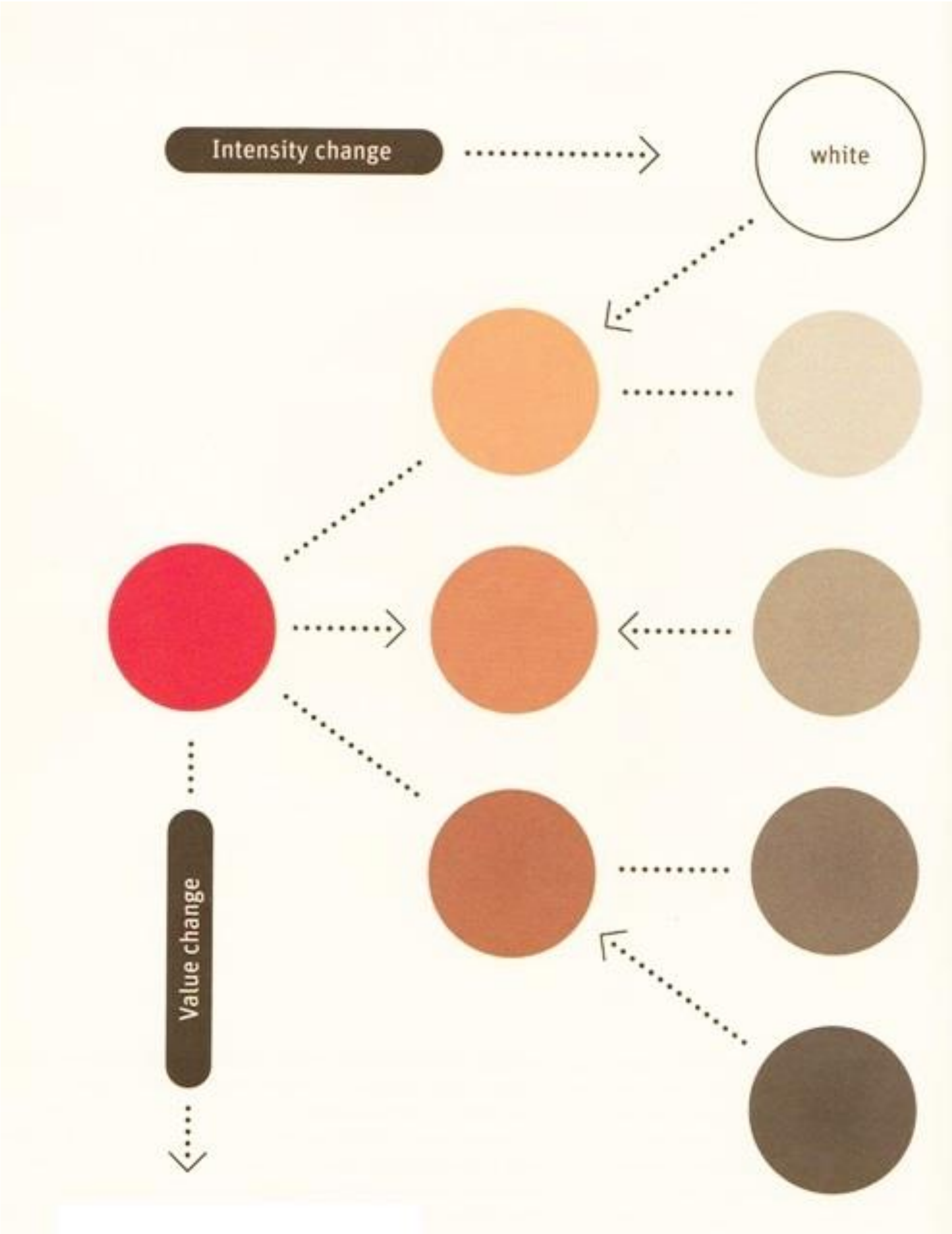


Figure 6. Saturation and Value of Color (Stone, 2008, p. 12)

Figure 7. Hue, Saturation and Brightness of Color (Stone, 2008, p.13)

of a color, the hue.

The last attribute to describe color in the CIE chromaticity scale is a standard observer value. This standard observer "represents how an average person sees color across the visible spectrum"(X-Rite, 2007, p. 11). The CIE Chromaticity Standard put the attributes of a color in an x, y, and z value based on the above three values. This is labeled as the chromaticity coordinates. Going around the upper rounded part of the scale (Spectrum Locus) is the wavelength of a color, hue (from 380 nm to 770 nm)

(Levine & Shefner, 1991). From the center, white, the saturation of the color changes, becomes more saturated, as you move out from that center point. This figure is also used to determine the result of a mixture of colors. Intersecting lines of one color to another and the ratio of one color to another can help a person determine the numerical values for a resulting color.

After many revisions of the 1931 model (Figures 8 and 9), in 1976 the CIELAB scale and CIELCH scales were designed and finalized. These scales provide an easier-

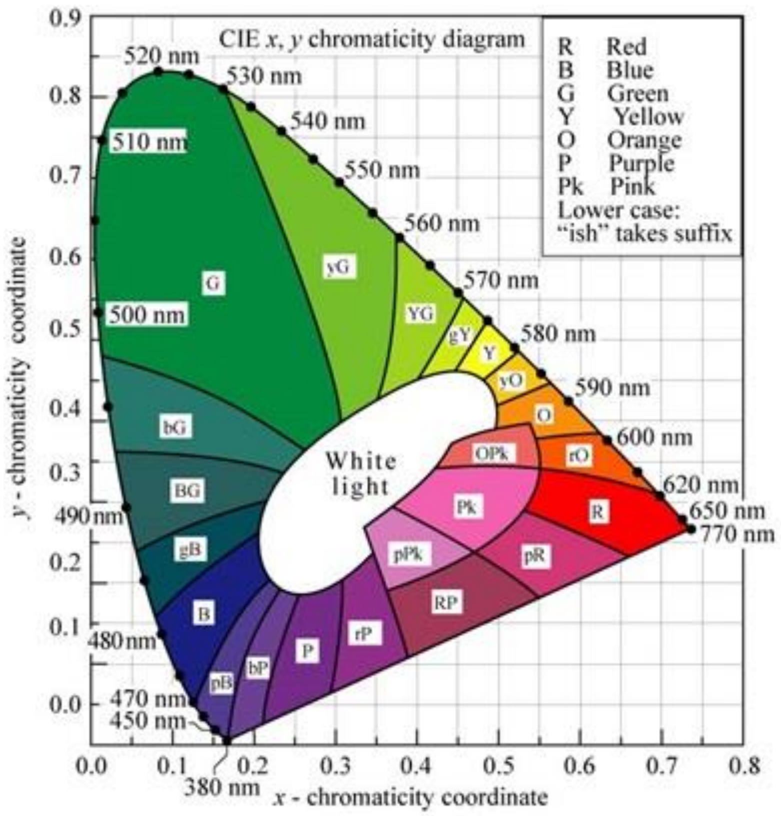


Figure 8. Chromaticity Diagram (Schubert, 2006, p. 303)

to-understand three dimensional representation of a color according to the three attributes stated above. Borrowing from the Munsell Scale (Landa, E., & Fairchild, M. (2005) the CIELAB uses a globe (see Figure 10)., the z axis is the value of a color, the outer edge is the hue and the more a color moves to the center to the edge of the sphere, the more saturated it will become (Landa & Fairchild, 2005). Since 1976, the CIELAB chromaticity scale has been regarded as the standard for color across all industries. At

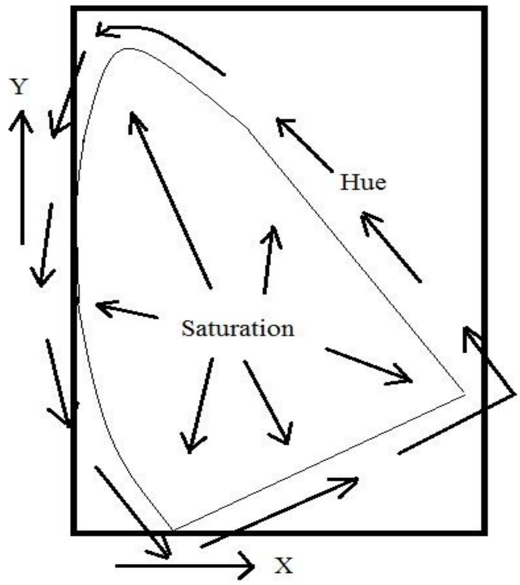


Figure 9. Chromaticity Diagram Explained According to Three Attributes(X-Rite, 2007, p. 11)

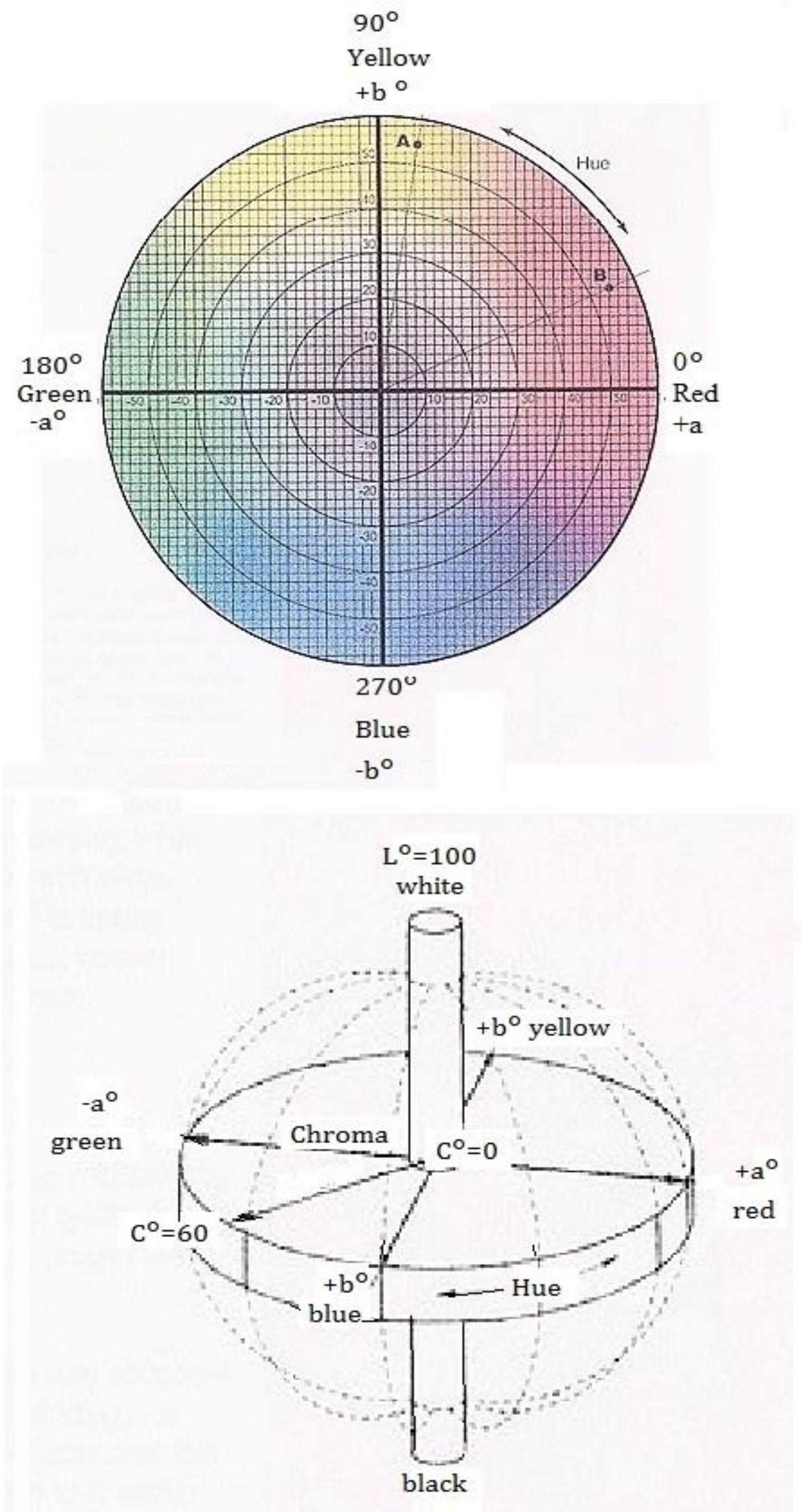


Figure 10. Munsell Scale for Color (X-Rite, 2007, p. 13)

about this same time, computers with color displays were starting to be used in industry. This color scale was utilized as a scale for defining colors on a screen.

The first color computer monitors could not represent all of the colors of the 1931 CIE scale (Ihaka, 2003). During the 1980s, the first monitors displayed only one color and black. When color was introduced, very few colors could be represented. At first, the CIE scale was used as a base for numerically representing characteristics of a color. Since computers run on binary coding principles, a decimal system to represent colors was also devised and is still in use today. This particular decimal system, one of many devised but the most commonly used one today, uses the trichromatic system of the human cone reception characteristics as a base: red, green, and blue primary colors (RGB). This decimal code was established to represent the color attributes based on a combination of the R+G+B characteristics. The numerical representation for each characteristic was 0 to 255. In the binary numbering system used by all computers, a hexadecimal number is a series of eight digits of ones and zeros to represent a number. For example, 00000011 = three and 01100100 = 100. The maximum number that an eight digit binary number can represent is 11111111. This is equal to 255 which represented the full saturation of a color. Zero represents no color. White is 255+255+255 and black is 0+0+0. A good point of reference is Table 1. This figure explains the absorption of the S, M, and L cones according to the wavelength of the hue. This percentage can be extrapolated into a zero to 255 (0% to 100%) system of definition.

The RGB decimal system standard for color representations was adopted by the World Wide Web Consortium (W3C) in 1996 (Stokes, Anderson, Chandrasekar & Motta, 1996). The W3C is an international community that develops standards to ensure long-term growth of the World Wide Web (w3.org, 2014). This organization compiles recommendations for color naming, hex and decimal representations of colors to be used in designing text, backgrounds, borders, and other parts of elements in a document. See Appendix 2, CSS3- Color Module Level 4- 2014.

Arousal: Research has been recorded as far back as 1894 on the consistency of color preferences (Karpowicz-Lazreg & Mullet, 2001). These preferences were rated for their pleasantness scales along with many different kinds of experiments ranging from looking at small squares to room colors to computer screen colors. Results have been mixed at times with varying degrees, situations, and goals of the researchers. However, one common hypothesis for all of the research is to definitively prove a relationship between color and its physiological effects on people. Some colors were shown to have a direct effect on a person's heart rate, alpha or delta brain waves (Küller et al., 2009; Tuch, Bargas-Avila, Opwis, & Wilhelm, 2009; and Valdez & Mehrabian, 1994). Others have shown a correlation with creativity and mood in certain color environments (Küller et al, 2009).

Interference theory has also been associated with arousal. Anderson (2003) describes this phenomenon as the"result from inhibitory control mechanisms recruited to override prepotent responses (Anderson, 2003). Arousal can be considered as an inhibitory control mechanisms. Arousal can determine emotional interference. However, how much arousal is too much to interfere with retention and how much is enough to heighten attention and make the information being presented more salient and thereby retained better? Dresler, Mériau, Heekeren, and Van Der Meer (2009) found that emotional words, bringing about an arousal response, were better re-called and recognized than neutral words.

Acuity: As stated in Schoeff, Lazzeri, Schnelzer, Froschauer, & Huemer (2013), "The eye has a visual acuity threshold below which an object will go undetected. The standard definition of normal visual acuity (20/20 vision.)" The retina can detect patters in a certain visual angle. One degree of this angle contains 60 minutes, a visual angle. The spatial resolution limit is that one degree of a scene is projected across 288 μm of the retina by the eye's lens. It has been discovered that in this area of 288 μm, there are 120 color sensing cone cells packed together (Shoeff et al., 2013). As an example, if more than 120 alternating white and black lines are crowded side-by-side in a single degree of viewing space, the eye will encode this to the brain as a single gray mass.

2.2.1.1 How Does the Eye and Brain Detect Color?

An actual physical reaction is taking place in the eye when a photon of light, being absorbed in the cone of the fovea, can be traced by the chemical reactions leading directly to the brain as electrical signals of the optic nerve. The optic nerve signals are sent to the back of the brain in the occipital (visual) cortex (V1,V2, V3, V4) and extrastriate areas (Goldstein, 1996). (See Figure 11). Evidence has also shown that the visual signals can be activated in the parietal (P) and infero-temporal (IT) lobes. These areas of the brain are distinguished by the kind of visual information being processed. The parietal lobe processes the location of items (where) and the infero-temporal lobe processes the kind of object (what) in visual identification (Levine & Shefner, 1991).

The sections of the occipital cortex have different functions. The V1 has a layering structure, sometimes called the striate cortex (Levine & Shefner, 1991). The V2 receives both large and small detail signals and each section then passes information to

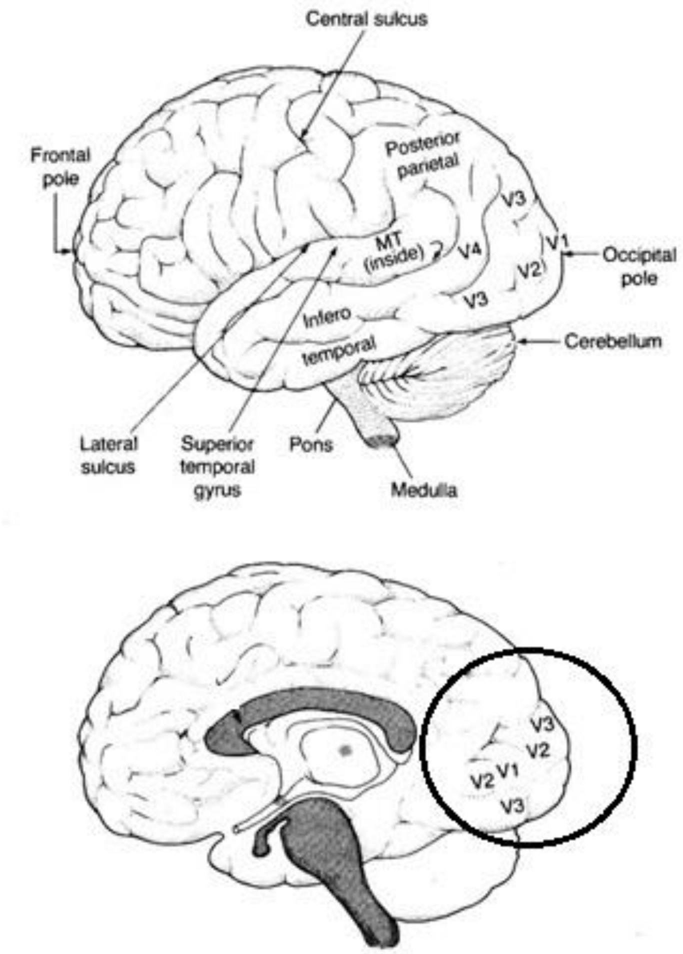


Figure 11. The Visual Message Encoding Areas of the Brain

(Adapted from Levine & Shefner, 1991, p. 107)

the V3 areas. These areas are connected to the V4 (perceiving color) area and the medial temporal (MT or movement) areas eventually ending at the IT (the what area or temporal lobe) areas. The MT area is connected to the parietal pathway that defines the where of a visual message (Goldstein, 2013).

Zeki and Marini (1998, p. 1669) explain a three stage approach in the brain for color processing:

First: Functions of “presence and the intensity of different wavebands of light” in V1 and V2 areas are detected.

Second: The V4 area color indifferent to form is determined by “large scale spatial comparisons and has wavelength selective cells.”

Third: The brain then uses “the results provided by the first two stages and determines object and surface colors.”

Zeki and Marini (1998) determined that the third stage is beyond the V4 complex in the brain. These stages/connections are not one way but are bi-directional and communicate with each other. In 2009, van Leeuwen, Petersson, Langner, Rijpkema and Hagoort, using an fMRI, determined that another area, V4alpha, displayed significant differences in distinctive color perception in addition to the V4 area.

In 2010, Do and Yau carried out an extensive study of the properties of non-image forming vision cells in the fovea and named them ipRGCs, Intrinsic Photosensitive Retinal Ganglion Cells. These cells have many functions and even as of the writing of this research, new types of ipRGC cells with different functions are being discovered (Hannibal et al., 2014). The most exciting discovery, and one that pertains to research on background color and retention, was that of LeGates et al. (2012) and Chellappa et al. (2014). In their research, ipRGCs proved a direct influence of light on cognitive and mood functions and impaired learning. In addition, Chellappa et al. (2014) discovered that prior exposure of light over long periods of time had a direct relation to optimal cognitive brain function.

In light of this new discovery and the yet to be defined full functionality of ipRGCs and color exposure, can this research with colored light exposure be related to the background color of information presented via a projector? Can the different color background of light from a presentation see the same retention results as having a cognitive influence on vision? Can a blue background non-image forming color not related to a picture or diagram with a radiance factor be applied to this research and have an effect on retention?

What does all of the previous research have to do with arousal and color? Science has determined that a physical reaction, chemical and electrical, is involved in the perception of color but, as Zeki and Marini (1998) note, the Helmholtz theory of cognitive systems should be considered when analyzing the effect of color on the brain from a cognitive aspect. Helmholtz stated that color constancy (how we interpret color) is influenced by judgment and learning. Zeki and Marini (1998, p. 1631-1632) go on to state that color perception in the brain can be explained via computational methods but "memory, learning, and judgment are important additional faculties used by the color system.”

From these factors (memory, learning and judgments), humans form an emotional response to color. Suk and Irtel (2010) measured emotional responses to color synchronizing three systems: physiology, behavior, and experience. Physiology responses include skin response, heart rate, blood pressure, and/or EEG measurements. There are many studies measuring these attributes concerning color influence but ones of note include Küller et al. (2008) and Lockley et al. (2006). I will discuss each one for their significance in this discussion.

Küller et al. (2008) used colored rooms (red and blue) to measure EEG alpha and delta waves, and heart rate. EEG alpha waves are an indicator of arousal (low amplitude). Delta waves are an indicator of a sleepy or drowsy state (low frequency means a relaxed state). The results of their experiments showed significant differences ($p = .02$) in emotions and physiology of people placed in one or the other colored rooms. These readings of higher excitement which were stronger in the red rooms. Meaning the alpha waves were higher in the blue room, cortical is less, a person is less aroused.

Finally, Lockley et al. (2006) tested subjects who lived in a room for nine days with ambient (low key) light during wake periods. After a few days of adjustment, the real experiment started on day six when the ambient light was changed to monochromatic (one color) light for 6.5 hours in the center of the 16- hour waking day. During these nine days, a battery of tests were performed, such as EEG recording, sleepiness scale, auditory, drowsiness, and blood tests to measure cortisol and melatonin during key periods, especially when monochrome light was exposed. The monochrome lights used were 555 nm (red) and 460 nm (blue). Results showed a heightened sensitivity to low wavelength light (blue) based on the physiological data retrieved. Low wavelength monochromatic lighting also resulted in an increase in auditory performance (reaction times and reduced lapses). This non-image forming (NIF) color response was also observed and connected to arousal, alertness and performance. NIF color is the use of color not of a specific object, but of an overall color such as a colored light in a room or the background color of a presentation slide. In addition, it was discovered that light had no direct effect on cortisol. Cortisol is an indication of arousal.

The above two examples support the conclusion that physical arousal is observed from non-image forming (NIF) color exposure, whether on paper, a monochromatic light source or background color on a screen which reflects into a darkened room.

Another experiment concerning NIF color was performed by Mackiewicz (2007) using background color. This background color was represented by presentation slides and the effects on test subjects' arousal was recorded. Mackiewicz utilized basic color subjective theory as a basis for testing. This theory suggests warm colors generate different psychological responses than cool colors. Not being culturally specific, she states that warm colors (Such as red, orange, yellow and pink, in the higher part of the visual spectrum) are considered arousing and active and lead to higher levels of anxiety. This level of anxiety was based on the work of Jacobs and Suess (1975). For measurements of these anxiety levels, Jacobs and Suess (1975) administered a State Train Anxiety Inventory at five minute intervals during exposure of a certain color. In addition to the warm colors reactions, cool colors (such as blue, green, and purple, in the lower part of the visual spectrum) were perceived to be peaceful, calm, relaxing, and pleasant. Mackiewicz (2007) concludes that cool colors are likely part of the reason why they are found to be more attractive than warm colors in retail environments. However, Mackiewicz (2007, p. 148) documents a very important aspect concerning color stating that "cross-cultural research on color perception must be considered when examining preference for meaning associated with warm and cool colors preferences." This is an important factor and is a key when analyzing data recorded in this research.

Color also has an influence on behavior. From the Lockley et al. (2006) experiments, performance was used as a criteria to assess the effects of NIF colored light. Küller, Mikellides and Janssens (2009) also tested this aspect of color influence by evaluating creativity and performance when exposed to monochromatic color environments (blue walls and red walls). Subjects were told to perform editing and writing tasks via a desk-top computer. Performance was measured by how many corrections were made and creativity was measured by the number of words, word length, originality, language, disposition, and entertainment value. The editing performance test revealed “no overall difference” in performance between the two colored rooms (Küller, Mikellides & Janssens, 2009, p. 146). However, what was noted was the performance difference in pre-test emotional states. Those that were in a positive mood performed better than those in a negative mood in the red room. Blue had no difference recorded, nor did pretest moods influence, on the performance. There were no overall differences in terms of creativity in the writing samples. Again, the participants’ moods, noted prior to testing, were a factor in grouping and revealed differences in text length in the red room. Participants wrote longer essays in the red room with a negative mood.

Another interesting performance based NIF color experiment was performed by Lichtenfeld, Elliot, Maier and Pekrun (2012). These researchers found a significant difference in color exposure and performance evaluation. In the color cone receptors of the eye, S (440 nm) is at one end of the spectrum and M and L are closely overlapping on the other end of color absorption (see Figure 5). These researchers decided to focus on the color green, in the 500-500 nm M band, and its effect on creativity. Green has an overall different meaning across cultures (Lichtenfeld et al., 2012). The English meaning of the word can be defined as grow and is connected to nature, restfulness, peace and positive evaluation (Adams & Osgood, 1973). Experiments from Lichtenfeld et al. (2012) compared green to white, gray, red, and blue in four experiments. The venue of the experiment was also changed from an on-line setting to a real-world classroom to observe changes based on location and type of color tested. Here participants were given a booklet with information to complete a task. The title page was a certain color that was to be evaluated. The participants looked at this title page for two seconds then turned to the next page that contained the creative experiment. This creative experiment asked the participants to manipulate a geometric figure into as many different objects as possible in a certain time period. The results compared all title page colors (gray, red, and blue) to the green titled page creative task results. Subsequent analysis determined that looking at the green title page prior to the task activity increased creative thinking. The authors also concluded that red exposure prior to the task was linked to negative analytical performance. This result is consistent with previous research results of Elliot and Niesta (2008) and Maier, Elliot, and Lichtenfeld (2008).

From this review, we can see that preference, mood, and feelings, all part of a subjective assessment of color, are viable attributes that prove the physiological effects of color.

2.2.2 Color as Psychological: How Color Influences How We Think and Feel

Emotions and color can be related to aesthetic emotion rather than utilitarian emotion. Utilitarian emotion is emotion felt in actual circumstances such as when you are saddened by a death. Aesthetic emotion is your reaction to something you perceive such as colors, music, or art and is related to cognition research. “Cognition allows us to interpret the world and make sense of it, whereas emotions are more judgmental, assigning positive and negative valences to the environment” (Bonnardel, Piolat & Le Bigot, 2011, p. 70). Evidence has shown that each impact the other. For example, a positive affect toward something broadens the thought processes and enhances understanding, performance and in some cases allows someone to be more calm and flexible (Bonnardel, Piolat & Le Bigot, 2011). Pett and Wilson (1996) state that the psychological aspects of color that are of interest to those that use color in instruction, where retention of material is a priority, can be divided into three broad areas: preference, meaning, and harmony. For this research, the relevance of preference and harmony will be discussed.

2.2.2.1 Color Preference

Color preference research can be dated back to as early as 1894. Overall, many studies from 1941 to 1963 concluded that blue was the most preferred color across races and gender (Guilford, J.P. & Smith, 1959; Karpowicz-Lazreg & Mullet, 2001 cited in Mackiewicz, 2007). There are numerous and varied standardized tests and scales to rate preferences to things perceived.

The first common test to evaluate preference is the General Activation Subscale (How did you feel while doing this task?). This test records responses using a Likert Scale of 1 = felt no reaction to 5 = feeling very strong. Küller, Mikellides, and Janssens (2009) utilized the Human-Environment Interaction Emotional Scale (HEI) in their experiments. These results were categorized into activation (rested/tired, awake/sleepy), orientation (interested/bored), evaluation (secure/anxious, friendly/angry) and control (talkative/quiet, strong/weak). Yoto et al. (2007) used an originally created bi-dimensional scale which contained 10 discrete opposite emotions to choose. Each pair of emotions included a 5-point Likert scale to rate the intensity of those paired emotions. Stone (2001) evaluated mood by using the Multiple Affect Adjective Checklist (MAACL). This scale measures anxiety, depression, hostility, positive affect, and sensation seeking emotions. Each measurement, again, utilized a Likert type scale from 1 to 9 to measure the intensity of the mood factor.

Results utilizing the above scales and tests have had varied results. Hurlbert and Ling (2007) analyzed color preference data in terms of the two dimensions of opponent cone-contrasts: the Long and Medium wavelength axis (from red to blue-green) and the Short wavelength (from violet to yellow-green). The symbols “S,” “M,” and “L” refer to the outputs of short-, medium-, and long-wavelength cone types, respectively. Both males’ and females’ preferences weighted positively on the M-L, meaning that both sexes preferred colors that were more blue/violet to colors that were more yellow/green.

In advertisements and consumer packaging design, color preferences invoke feelings of trust, satisfaction, positive feelings, and persuasiveness (Cyr, Head, & Larios, 2010).

Research has also determined that color feelings and attitudes can also be influenced by a color’s (hue) value and chroma. To review, value is the amount of white in a color and chroma is the intensity (richness) of a color. In the experiments of Gorn, Chattopadhyay, Yi, and Dahl (1997, p. 1397), the use of blue and red with low and high values and chroma in experiments determined that “higher levels of chroma and value influenced feelings of excitement and relaxation, respectively.” These feelings then influence attitudes towards the advertisements tested in the experiments. Even though this research used image forming color, these results relating to the attributes of value and chroma can be considered as contributing to the effects when considering background color and retention. In fact, some examples of value and chroma of consumer packaging in this article referenced the background color of the actual product (Gorn et al., 1997).

Cyr et al. (2010) made a thorough cross-cultural comparison of web sites and color themes. Their research concluded that color appeal, across Canadian, Japanese, and German subjects, resulted in greater satisfaction and trust ($p < .001$). Cultural attitudes pertaining to color meanings also have an influence on attitudes, perception, and retention.

2.2.2.2 Color Meaning

Color meaning is a culturally based interpretation and cannot be generalized (Pett & Wilson, 1996). Experiments in Pett and Wilson’s (1996) research revealed a preference for cool colors versus warm colors. Warm colors are defined as reds and yellows whereas cool colors are defined as greens and blues (Küller et al., 2009). Additional research defined colors using adjectives such as heavy (somber, dull) and light (airy, less heavy). Some colors were also defined with words like “comedy” or “happiness” versus “tragedy” or “sadness” (Pett and Wilson, 1996, p. 23). The list of characteristics associated with the meaning of colors is long and varies widely across cultures. For example, Adams and Osgood (1973), in their study of 23 cultures, used semantic scales to measure evaluation, potency, and activity of colors. Their research determined that perceived warm colors were red and yellow and cool colors were defined as blue and green. To determine the meaning of a color, a culture must first be specified and then the attributes can then be defined and analyzed. Most research is deficient in this area, typically making generalizations about this kind of research by using one population of a certain culture and then extrapolating it to cover a general international audience. For example, look at any PowerPoint® design self-help book on sale. Do colors specified as a “design” criteria take into account the audience culture? Usually that answer is no. Best-selling author Nancy Duarte in her book, *Slide:ology* (2008), states that there are only two factors in choosing a background color for presentation slides, the formality of the event and venue size.

2.2.3 Color and Learning/Retention

Students learning in environments such as a classroom, the home, or even a library are influenced by Non Image Forming (NIF) coloring schemes. Stone (2001, p. 188) measured the impact of study cubicle color on mood, satisfaction, motivation, and performance while studying. Study tasks included reading and math tasks. This research determined that performance for the reading task was lowest for the red environment compared to the math task. The author surmises that red is “more stimulating” therefore distracting attention from the task at hand and leading to lower performance.

2.2.3.1 Retention/Learning

All of the information presented above will be shown to have a relation between each other and together connected in this section. The brain is where all of the information recorded by the photo-receptor cones in the eyes meets. Though research has pointed to the occipital area of the brain as a specific area for visual processing, further research reveals that color perception is not only restricted to this area.

The brain, like any memory system, has three steps or functions: to encode, store, and then to retrieve information (Baddeley, Eysenck , & Anderson, 2009). So far, the discussion of the encoding of color from the retina to the cones to nerves then to chemical and/or electrical connections to the areas of the brain has been discussed. The storing of environmental context non-imaging forming color can be traced, via EEG graphs, as having an effect on many areas of the brain function, from chemical, cortisol levels, to electrical, emotional areas of the brain system. However, to go further in the storing of this information into long term memory, the understanding of the brain and this retention process must be discussed.

Memory is described as being divided into three parts after information is encoded from our senses. The information is then placed in sensory specific memory location(s). For visual color memory, the term iconic memory is used. This iconic memory information is sent to short-term memory which is defined as a "temporary storage of small amounts of material over brief delays" (Baddeley, 2012, p. 5). There is a debate between the time based decay of short-term memory, and/or the limitation of information chunk capacity (how we combine individual items into units and the limitation on the number of units retained), as the reason why information is forgotten due to this type of memory storage. To date, Ricker and Cowan (2014) have determined that time-based decay of information does have an effect on retention in short-term memory. For the capacity of chunked information, the amount of information that can be placed in short-term memory is currently being debated as a valid parameter to define short-term memory limits.   Short-term memory is a simplistic term to describe the temporary storage of information but in 1960, Miller, Galanter, and Pribaum (1960), in Cowan (2008, p. 325), defined a different kind of memory term that “plans and carries out behavior.” The term was labeled working memory. There are still varying opinions of how working memory relates to short-term memory (Baddeley, 2000; Cowan, 2008; and, Engle, 2002). Baddeley (2012) defines working memory as having four parts: an attention controller which comprises a verbal-phonological and visual-spatial loop that feeds into an episodic buffer (central executive) that is working along with short-term memory. For example, memorizing a string of numbers is the job of short term memory, but looking at a picture and determining the meaning and relations of items visually and audibly utilizes working memory. Cowan (2008, p. 325) includes short-term memory in working memory in addition to “other processing mechanisms that help make use of short-term memory.” Engle (2002) defines working memory as only relating to attention-related aspects of short-term memory. For this research the Working memory definition of Baddeley (2000) with the inclusion of a visual spatial component, a phonological loop (plus articulatory) and an episodic buffer will be utilized as a basis of explaining the outcomes of data collected.

2.2.3.2 Visual Working Memory

Visual Working Memory (VWM) is part of the encoding process of a visual message and part of sensory memory. According to Baddeley et al. (2009) , VWM pertains to two parts of a visual message, the what (object memory) and the where (location of an object). Color is included in the object portion of the VWM and deals with identity information. Baddeley et al. (2009) and Delvenne (2005) state that memory for spatial location appears to decline over a period of seconds, while memory for objects does not. As previously mentioned, the occipital area of the brain is where visual memory is located and has certain functions. However, when a task is performed, a series of different inputs activate different parts of the brain for visual and aural directives. For example, Kollndorfer, Furtner, Krajnik, Prayer, and Schöpf (2013) distinctively proved different activations for visual inputs in the brain using fMRI readings. This research proved that an individual area alone does not process visual information but a collection of areas are involved. Allred and Flombaum (2014) state that the research on VWM limits the capacity of colors remembered. They also note that when discussing color and memory, perception must be included in the factors that determine the components and functions of VWM.

Perception and working memory are conceptually distinct. However, “at least in the case of vision, and with respect to color in particular, they,(meaning perception and working memory), appear to be cooperative and considerably inextricable” (Allred & Flombaum, 2014, p. 4). How we see the world and what we think is important is interpreted by our experiences. When we see a color, we automatically have a certain emotion and/or memory associated with this color. This memory is retrieved from long term memory. This automatic function, called “categorization,” is implicit. Regier and Kay (2009, p. 443) note that there are colors within categories that are shared among speakers of the same language. This leads to a type of Whorf-like hypothesis. Whorf believed that language influences thought (Hunt & Agnoli, 1991). Reiger and Kay (2009) state that research has determined that the left hemisphere of the brain is dominant for language. Color (Delvenne, 2005) is processed across both brain hemispheres. Reiger and Kay (2009, p. 439) conclude that half of color perception may be viewed from a “linguistic filter.” In other words, the automatic, implicit categorizing of a color can lead to more in depth processing (more accurate memory) or hinder processing of information (forgetting) (Kelly & Heit, 2014).

In most of the above research, colored objects were the source of tasks in determining color processing in visual working memory and full attention was given by the subjects to these objects. However, if color is manipulated to not be the focus of attention but to be the part of an “inattentional blindness” is there a cognitive effect? Simons and Simons (2000, p. 147) define this phenomenon as stimulus subjects that have an effect but are not of focus or are not consciously aware during perceptional. The environmental context of objects is considered incidental information when the focus is on another part of the picture, for example reading words on a colored background.

When using a colored background as a form of inattentional blindness, the emotional effects of this color on memory must be considered as a factor.

This unawareness of environmental context attributes leads to an automatic reaction that cannot be controlled (Merikle, Smilek, & Eastwood, 2001). This implicit reaction leads to qualitatively different consequences. For example, Isarida and Isarida’s (2007) most significant experiment included alternating two background colors for a word on a computer screen. Twenty-four unrelated words were chosen and students were exposed to these words for three or six seconds. After a distraction task for 30 seconds, the student was asked to freely recall, orally, the items they saw while looking at one of the background colors in the experiment. They were given 60 seconds for recall. The researchers changed background colors for three successive experiments: the same background color, brightness of the color, and repeating the same color then, alternating with another color. Comparing all experiments, statistically significant data was observed for just alternating two colors in a single experiment. However, this experiment provided no context or relation between words or phrases. Just random words and no information that was in a context, such as a story (utilizing working memory). Another random word/color context experiment was carried out by Huchendorf (2007) with no statistically significant results. However, as Huchendorf notes, others have had significant results, opposite to his experiments. In addition, some experiments used calm colors with their non-distracting properties.

Mehta and Rui (2009), in another different kind of experiment, measured inattentional blindness of NIF color on retention as a type of task that required measurements of the effect of motivation on the task accomplished. As a first example, Mehta and Rui (2009, p. 1226) had students perform tasks that were determined to be "approach motivation," (using approach related words such as *adventure.*) and "avoidance motivation," (using words like *prevent*) on three different backgrounds, red, blue, and white. Faster reaction times to the tasks were related to stronger motivation responses. When separating reaction times into color and type of task, statistically significant results were observed. Approach tasks had lower response times with blue backgrounds and avoidance type tasks had lower response times with red backgrounds.

For the white background, no response difference was noted for each type of task. Motivation was determined to be influenced by the background color. In addition to motivation, the type of task under different background color conditions was observed. Two types of tasks, detailed oriented and creative type, were performed. The red background color in this experiment enhanced memory ($p < .02$), pertaining to an increased awareness of details and attention. For the creative task, a higher mean creative score was noted in the blue background task ($p < .01$). Both tests validated the theory that color has an effect on the quality of the response. The overall preference for a color by the participants was blue (66%), even though red had stronger results for half of the experiments. Preference was not a cue for superior cognitive ability pertaining to the kind of task completion.

2.2.3.3 Color and Learning: Summary

Color and learning can be divided into five categories that should be considered when designing materials. These qualities are defined as attention, readability, preference of color, preference related to retention, and retention (Pett & Wilson, 1996).

Attention: This characteristic has been noted to have positive research results pertaining to the use of font color for key concepts. One experiment resulted in better retention overall because key concepts were color coded to bring attention to important information (Wehr & Wippich, 2004).

Readability: This concept can be connected with the physiology of the human eye. Using red lettering can distract or make a word unreadable when used with certain background colors, for example, the color opposite to red on the color wheel, in addition to being opposite in color cones detection wavelength in the fovea, green (Mullen, 1985).

Many times what looks good on a computer display may be difficult to read when projected. Consideration should also be made as to how the presentation will be displayed. A large LCD display or a projector changes the way colors are displayed in a large room which affects the readability of presentation slides.

Color preference has been shown to affect encoding of or distracting from the message of the presenter. Cultural components to the meaning of color and how it is used can detract from the message or concepts the educator is trying to teach. Concerning background colors of PowerPoint® presentations, Apperson, Laws, and Scepansky (2008) found students slightly preferred a colored background (pastel, bright, or dark) to a white background presentation.

Preference and retention have been shown to be related in many examples from research before the computer was utilized as an educational tool. Before the age of computers, transparencies were utilized in aiding learners. Later, colors used in displays and textbooks were determined to capture attention and help students organize material cognitively (Seaman, 1998), which can lead to better retention. Students prefer color pictures and diagrams. They can also use color codes to organize complicated concepts or make relations between new and old information.

Retention has been shown to be improved using colors. Szabo and Hastings (2000) proposed that the many options available (color, graphics, animation, or/and bullet points) to teachers via software programs may benefit retention of information presented to students. In addition, the simple use of chalk and a blackboard is being questioned as research shows that when comparing it to presentation software such as PowerPoint®, retention is improved with the computer alternative for lectures (Gürbüz, Kışoğlu, Erkol, Alaş & Kahraman, 2010). The PowerPoint® lectures were more colorful and were able to help the students organize ideas better.

The influence of background color on text read has physiological and psychological factors that influence encoding which leads to retention. From current research, scientists still have not fully understood the functions of the human eye, especially concerning NIF color and the influence, if any, on physiology, cognitive and /or psychological processes. In addition, the widespread use of digital media today around the world can influence many societies that will perhaps lead to a single kind of perception that will be shared by all cultures in the future. Today, we still have to consider these psychological differences as an influence on how we perceive and filter information in the brain.

For testing the hypothesis of the unattentional effects of color and how it effects l retention, a typical university classroom setting was utilized. A learning environment today, utilizes multimedia as a way to enhance retention of information taught. A common vehicle of multimedia learning is the use of presentation software. The background color of test presentations provides an ideal situation and offers the ability to control certain variables.

2.3 Method

2.3.1 Participants

In the USA: 111 participants from three universities volunteered for this survey and were given a gift card for their participation. These participants are an independent group and did not participate in other experiments in this research. The universities were located in the Metropolitan New York area, and New Hampshire. A mixture of graduate and undergraduate classes were surveyed. 73% lived in the USA their whole life or more than 20 years. In this group, 13.6% lived in the USA their whole life or more than 20 years and their native language was not English. The remaining students that have not lived in the USA their whole life or more than 20 years, ranged from one semester to 19 years in the USA. The background of students varied from departments and ages. Students gave verbal consent and volunteered to participate. Students in the United Stated volunteered and were given $5.00 gift cards for their participation. All were healthy, but were not given tests for color vision.

In Japan: 263 students were from national universities in the Chugoku area of western Japan. Participants volunteered for this survey and were given a snack after the survey in appreciation. Students ranged in ages from 18 to 23 years old. The average age was 18.45 years old.

Participation in this experiment was voluntary and anonymous. No name or identities were collected or recorded. By participating in this experiment, students consented to allowing me to use their survey results in this analysis.

2.3.2 Study Protocol

During each experimental presentation, students were in a classroom typical of their current classes. The classroom was darkened and an overhead projector and a screen or large LCD panels were used. Classroom sizes and subject distances to the screen varied for all groups. Distances ranged from 1 to 4 meters from the screen/ LCD display. The presentation automatically ran with the same voice and timing for all slides viewed for each language. The only variance between presentations was background color and sometimes, where stated, font color. Students were not told of the reason for the test, just that they were helping and would they please fill out a survey after the presentation. Immediately after the test presentation was viewed, a paper survey was distributed to all participants. In this instance, two different versions of a survey were distributed to prevent copying. The researcher tried to use different classroom situations for overall data uniformity and practicality. USA students watched the presentation in English and Japanese students watched the exact same presentation in Japanese. The timing and number of lines and words (characters) were represented identically. The presentation offered a simple cooking recipe, where the amounts of ingredients and cooking methods differed in each country. For example, the USA presentation used ounces and Fahrenheit for cooking measurements. Japan uses milliliters and Centigrade so the Japanese presentation was adjusted accordingly. All data concerning a country-specific system of measurements was adjusted.

2.3.3 Procedure

To test the effect of background color on retention, a practical classroom situation was used. Suk and Irtel (2010) devised experiments using two types of media, glossy colored paper and CRT monitors. The results of their experiments revealed that, "no significant difference in all three dimensions of emotion" and these results support that "color affectivity is consistent within both media" (Suk and Irtel, 2010, p. 74).

A PowerPoint® presentation was designed to present a simple but novel recipe for making "Oven Hotcakes." The presentation, in total, was 3 minutes and 54 seconds. Each slide, across different colored background with the same information, was exactly the same timing for both languages (see Table 2). The scripts also matched exactly with the same topics and headings (see Appendix 3). Each language version used a native speaker to perform the narration. See Appendix 4 for the complete presentation slides. Morphemes were tried to be kept uniform across presentations within reason to reduce the amount of variables across test presentations.

Presentation background colors were determined initially by including background colors from the full visible spectrum with varying value (whiteness in the color) based on previous presentation research and the researcher's practical classroom experience. Initially there were seven colors used in a small scale experiment: blue, dark blue, green, white, yellow, rose, and black. An initial analysis of the data showed that black was met with extreme negativity by the subjects and educators which led to low

Table 2.
Slide Timing and Morphemes per Slide: Japanese and English Versions

Slide Number	Timing per Slide	No. Morphemes English Version	No. Morphemes Japanese Version
1	34 sec	4	3
2	18 sec	16	18
3	16 sec	15	18
4	18 sec	18	19
5	29 sec	17	23
6	15 sec	13	16
7	20 sec	18	21
8	16 sec	14	18
9	24 sec	13	20
10	22 sec	17	21
11	20 sec	12	17
12	11 sec	2	6

retention results. This negativity was a qualitative response to the presentation and was eliminated as a possible background test color. The rose background color did not have over 10 subjects to evaluate and answer surveys. As a result, the data was not valid to include in this report and was not chosen as a possible test condition. Background colors used in the experiments were blue, dark blue, green, white, and yellow. See Appendix 5.

Table 3 represents the hexadecimal values of the background colors (see Appendix 2) used in the five presentations surveyed. The number of subjects per background presentation can be seen in Table 4. For this experiment a two by five experimental is used.

Table 3. Hexadecimal Colors Used for Test Presentations

Background Color	Hexadecimal Color Number		
	Red	Green	Blue
Blue	51	51	204
Dark Blue	0	51	153
Green	102	255	102
White	255	255	255
Yellow	255	255	102

Table 4. Number of Subjects per Color and Language

Background Color	English Presentation	Japanese Presentation
Blue	29	45
Dark Blue	21	59
Green	17	44
White	28	73
Yellow	16	42
Total	111	263

The use of two surveys was employed to deter copying of answers between students (see Appendix 6). Students were instructed to leave a question blank or write “Don’t remember” if they did not know the answer or to write a partial answer if they did not know the complete one. There was no time limit to answering the questions. The survey was based on questions in the order of the information presented, typical of comprehension questions on an exam. Numerical, procedural, nomenclature and sequential type questions were administered.

All presentations (Japanese and English) used black lettering with the exception of the dark blue presentations which used white and the English (USA) blue version, which used white also. For the Japanese presentation, the font style used was “ＭＳ Ｐゴシック” (MS Proportional spacing Gothic) with 54 and 44 font size for titles and 40 font size for information. All characters used “bold weight” for readability purposes. The English presentation used “Arial” because of the clean lettering with no use of serifs. Font sizes for this version were 44 for titles and 40 for information.

Information presented on each slide varied from the title slide with one concept to slides containing two to four items of information. For cultural reasons, recipe amounts and temperatures had to be changed. As a result, grams and centimeters or cups and inches were used for flour, strawberries and pie plate size. Another cultural difference is the use of weights instead of cups for some ingredient measurements, i.e. flour and strawberries. See Appendix 4 for the “How to Make Oven Hot Cakes” presentation slides in English and Japanese.

The survey used was devised to test the retention of subjects immediately after viewing the presentation. Each survey question was constructed to measure a specific kind of memory (see Appendix 7). A points system was designed to determine how to score each answer. For example, the answer for question 4b, “How much flour is used?,” for the Japanese version is 100 grams. In the English version, it is 3/4 cup. For the 100 grams answer, the point value was “1”=1 point, “0”=1, g (or grams) was =1 point. A correct answer of “100 G” = 3 points maximum. For the English version, each correct digit, word and/or symbol was given 1 point for a 4 point maximum for a “3/4 cup” answer.

After all data was collected, calculated, and recorded, the “a” and “b” surveys were found to have different point values in total. Because of this miscalculation, all data was converted into percentages, compared to the maximum value of each survey.

2.4 Results

All surveys collected (Japanese 263 and English 111) were analyzed and answers were graded based on the point system devised (see Appendix 9). As explained above, as “a” and “b” surveys had total point scores of different values, for the first analysis of the data all survey total values were transformed into percentages. The first step was to determine if the data collected were statistically significant. For all but two of the presentation and survey collections, the researcher was present to make sure all room variables, lighting, sound, and screen distance from subjects was fairly consistent. For the two surveys where the researcher was not present, explicit instructions were given to the aides administering the presentation and survey to prevent any conditions that would affect the data collection. All data was analyzed using Microsoft® XLSTAT software Version 2014.4.02, ® Addinsoft 1995-2014 (Registered version). After analyzing each data set (Japanese and English), it was determined that both data sets were parametrically distributed. From this determination, an independent two factor , meaning 2 groups with different members in each group, ANOVA was carried out which determined that the two data sets were significantly different, $p < .05$ (see Appendix 10). After this test was performed, a post-hoc analysis using the Tukey analysis determined the $p = 0.010$. This confirmed the significance of the data and rejection of the null hypothesis.

In the second phase of the analysis each data set was individually analyzed according to the five background colors (blue, dark blue, white, green, yellow). First, each group of particular color scores were analyzed to determine if there were any outliers. Using the Grubbs two-tailed test for outliers, some data contained answers that were determined to not fit into the data set and these were eliminated. In this analysis, the z-scores were determined and any data out of the 2 standard deviation value was eliminated from further statistical analysis. (See Appendix 11) Next, an independent 2-factor ANOVA was performed using the percentage of correct data for each survey. The individual color data sets were first analyzed for parametric attributes to comply with the ANOVA. After this was determined, the ANOVA for the English data revealed a non-statistically significant result. With this result, the null hypothesis cannot be rejected for the English background color group.

For the Japanese background data that was collected, the same procedure of a Grubbs test, z-scores, parametric analysis and ANOVA was followed. Since the data consisted of five independent sets (according to colors), a post-hoc Fisher analysis tests were performed. This was able to be performed because the individuals taking the surveys tests were independent of each other, and the number of groups were small and a statistical significance of 0.005 was determined to be the criteria for using this post-hoc test (see Table 5 and Table 6).

At this point in the data analysis, the English data was found not to be statistically significant so further analysis was halted. The Japanese analysis showed some significance between colors. The next step in the analysis was only on the Japanese data.

Table 5. Overall Mean Results of Japanese Surveys

Background Color	Average Mean (%)	Standard Deviation
Dark Blue	57.09	18.09
White	54.89	19.96
Green	50.17	19.30
Yellow	43.62	17.84
Blue	38.38	17.86

Table 6. Fisher Analysis of Japanese Data Color Groups

Contrast	Difference	Standardized Difference	Critical value	*p* value
Dark Blue vs Blue	16.960	4.205	2.831	0.0001
Dark Blue vs Yellow	11.667	2.836	2.831	0.005
Dark Blue vs Green	6.167	1.520	2.831	0.130
Dark Blue vs White	2.968	0.832	2.831	0.406
White vs Blue	13.992	3.623	2.831	0.000
White vs Yellow	8.699	2.204	2.831	0.028
White vs Green	3.200	0.823	2.831	0.411
Green vs Blue	10.792	2.498	2.831	0.013
Green vs Yellow	5.500	1.251	2.831	0.212
Yellow vs Blue	5.293	1.211	2.831	0.227
Modified significance level:			0.005	

2.4.1 Per Question Analysis of Japanese Data Collected

After the Japanese data was found to be statistically significant, a per question analysis was performed. Individually analyzing each Question, 1 through 9b, they were all determined to be non-parametric (because of not-normal distribution) data results via histograms (see Appendix 13). The skewness of this data distribution can be attributed to factors such as motivation and time of day. Because of this type of data distribution, a Kruskal-Wallis test was performed for each question answer for each background color group (see Appendix 13). From this analysis, question 1 (What is the name of the recipe?), question 3a (How much milk is required?) and 5a/6b (What is the oven temperature?) had *p* values < .004, .001, and .016 respectively. The post-hoc test to apply to these independent, more than two groups, of data is the Mann-Whitney U test for each pairs of data. For example blue vs. dark blue, blue vs. white, blue vs. green, blue vs. yellow, dark blue vs. white, dark blue vs. green, dark blue vs. yellow, white vs. green, white vs. yellow, and green vs. yellow backgrounds. The results for each question are shown in Tables 6, 7 and 8.

Table 7. Question 1 Data Analysis (Nomenclature Result)

Mann-Whitney Tests for Pairs of Colors					
Results ($p < .05$)					
	Green	Blue	Dark Blue	White	Yellow
Green	-	**0.024**	0.404	0.286	0.912
Blue	**0.024**	-	**0.001**	**0**	**0.022**
Dark Blue	0.404	**0.001**	-	0.792	0.316
White	0.286	**0**	0.792	-	0.214
Yellow	0.912	**0.022**	0.316	0.214	-

Table 8. Question 3a Data Analysis (Single Digit Plus Fraction Result)

Mann-Whitney Tests for Pairs of Colors					
Results ($p< .05$)					
	Green	Blue	Dark Blue	White	Yellow
Green	-	**0.001**	**0.012**	0.84	0.076
Blue	**0.001**	-	0.128	0	0.063
Dark Blue	**0.012**	0.128	-	0.012	0.651
White	0.84	**0**	**0.012**	-	0.098
Yellow	0.076	0.063	0.651	0.098	-

Table 9. Question 5a/6b Data Analysis (Three Digit Number Result)

Mann-Whitney Tests for Pairs of Colors					
Results ($p< .05$)					
	Green	Blue	Dark Blue	White	Yellow
Green	**-**	**0.046**	0.691	0.921	0.11
Blue	**0.046**	**-**	**0.005**	**0.017**	0.452
Dark Blue	0.691	**0.005**	**-**	0.784	**0.014**
White	0.921	**0.017**	0.784	**-**	**0.042**
Yellow	0.11	0.452	**0.014**	**0.042**	**-**

**Bold results were found to be significant.

2.5 Analysis of Results

2.5.1 Analysis of Whole Japanese and USA Data Sets

When comparing the data set as a whole (not separating by color), the analysis detected and statistically proved that there are perceptual differences across populations of students from different cultural backgrounds. From the analysis, we can see a pattern of differences between the USA group and the Japanese group with $p < .010$ (See Appendix 10). From this evidence we can deduce that color perception is different across cultures as related to having an effect on retention. To further identify this significance, each group, the USA and Japan group, was analyzed individually to determine if there is any significance connected to a certain color. The results supported the theories of perception and cognition that some aspects of perception are “culturally conditioned” (Kastanakis & Voyer, 2014, p. 425).

The data collected in the USA displayed no statistical significance comparing individual color background sets.(Appendix 12) After closer analysis of the surveys that were collected, it can be seen that the respondents were of mixed native languages and a noticeable percentage had lived abroad for a period of more than one year.

From the 111 USA surveys:

28 spoke another native language other than English	25%
77 spoke more than one language	69%
30 had lived in another country for more than 1 year	27%
18 had immigrated to the USA	16%

As the above data indicates, this is not a homogeneous group of native English language speakers. The data supports the theory that there is no significant retention results for a particular color. This demonstrated that background color has no effect on retention for mixed groups. The mixed groups in this experiment included (22%) non-native English speakers and exposure to other cultures (23%). See Table 10.

This non-statistical result in analysis is also supported by the research of Regier and Kay (2009, p. 439) who state:

> "There is a categorical perception (CP: faster or more accurate discrimination of stimuli that straddle a category boundary) for color, and that differences in color category boundaries between languages predict where CP will occur."

From the 257 Japan surveys:

257 students were Japanese natives	100%
5 had lived in another country for more than 1 year	2%
254 had lived in Japan all of their lives	98%

Language and color do have an effect in the brain and this effect is detectable for the homogenous (Japanese) group. Kay and Regier (2009, p.439) further state that "half of our perceptual world might be viewed through the lens of our native language, and half viewed without such a linguistic filter.” Hence the statistically significant results for the Japanese data collected and the not significant results for the mixed native language group, whose categorical perception is different for at least 25 % of the respondents. In addition, Japanese students had a much lower exposure (2%) to living abroad in another culture as compared to 27% in the USA group.

The question of perceptual changes by exposure to another culture for a determined time is addressed by Kastanakis and Voyer (2014, p. 425) who state that:

> “Differences in perception can drive differences in cognition, both of which shape behavior. Evidence is drawn from many disciplines to provide a structured review of the role of culture in shaping individual perception, which in turn affects the processing of information from the surrounding environment.”

When an individual visits or lives in a foreign country for an extended period of time, their perception changes to adapt to the new environment. The non-significant data in the USA surveys reveals a mixture of respondent perceptions and a perceptual pattern that cannot be clearly determined or defined. Even for reducing the data group to be only native speakers or those that have spent 20 years or more in the USA, the analysis revealed a non-significance for the ANOVA analysis. See Appendix 14. The Japanese data, with the singular culture background of the survey takers, reveals a statistically significant perception pattern that is common in this group.

Table 10. Japanese and USA Data for Language Use and Experience Abroad

Student Background Experience and Language Abilities					
	What is your native language?	What other languages do you speak?	3 or more Languages?	Lived in another country for more than a year?	Have you lived in your this country your entire life?
English (USA)	75% (English) 25% (other)	69% Speak another Language(s) 32% Chinese 25% English Other 21% Spanish 13% French 9%	15.7%	23%	86% (all of their life in the USA)
Japanese Students	100% (Japanese)	59.5% (English) 2.3% (German) 1.9% (French)	10.5%	1.9%	98.4% (all of their life in Japan)

2.5.2 Individual Color Effects on Retention

Since the overall Japanese data was determined to be statistically significant, further analysis determined that some of the background color results were also found to be statistically significant when comparing data results: blue vs. dark blue, yellow vs dark blue, and white vs. blue all had a $p < .05$ value. Table 5 above shows the means of the correct overall Japanese data results per color.

All colors, except the dark blue presentation, utilized black lettering. From the above results, we can determine that the use of a blue background with black letters is not a beneficial design for retention. This pattern can be attributed to the contrast between blue and black and blue and white, the difference being lower than the other patterns used. For example, using hexadecimal color numbering (See Table 3) to configure contrast between background color and lettering we can calculate:

Blue background – Black lettering =| (Red 51-Green 51- Blue 204) – (0-0-0)|= Red 51-Green 51-Blue 204

Dark Blue background – White lettering = | (Red 0-Green 51-Blue153)- (255-255-255)|= Red 255-Green 204-Blue 102

White background – Black lettering =| (255-255-255)-(0-0-0) |= 255-255-255

The above calculations show the highest contrasts; the largest absolute number difference is a dark blue background with white lettering and a white background with black lettering; while the lowest contrast and smallest absolute number difference is that of a blue background with black lettering. Here, contrast is shown to have a significant impact on encoding information. A low contrast combination, blue background with black lettering was too difficult to see and resulted in distractions. In addition, effort to determine the words and a lack of concentration on the subject being presented likely had a direct effect on retention.

The next significant result is from the yellow vs dark blue background analysis. Both presentations had similar contrasts with white lettering used in the dark blue background presentation and black lettering used in the yellow background presentation. The contrasts in colors are as follows:

Dark Blue – White= | (Red 0-Green 51-Blue153) - (255-255-255) |= Red 255-Green 204-Blue 102

Yellow- Black=| (Red255-Green255-Blue102) – (0-0-0)|= Red 255- Green 255- Blue 102

In this instance, contrast as a factor in retention data results and interpretation cannot be considered. Another factor in these results could be because of a cultural interpretation of the color yellow in Japanese society and perceptual responses to this color. From the literature review, blue was observed to be associated with a relaxed state. In the Yoto et al. (2007) research, the colors red, blue and green were observed and studied. Red was detected to be associated with an excited state. Red's hexadecimal codes are Red 255, Green 0, Blue 0 (see Appendix 2). When comparing yellow and dark blue, we can see that yellow's hexadecimal values are closer to the red spectrum than dark blue thereby triggering an aroused, excited state and interfering with retention.

2.5.3 Type of Data Retained and Color Influence

After the overall color analysis of Japanese surveys was performed and statistically proven, a per-question analysis was done to determine if the type of data retained had a significance ($p < .05$) in retention in relation to background color. The results in the Mann-Whitney scores revealed an observed significance in questions 1, 3a and 5a/6b (see Appendix 13). Each question will now be discussed separately.

Question 1 was a nomenclature type of question (What is the name of this recipe?) A significant result was determined for the blue background presentation. Confirming the results above, this can be explained by a contrast in the information presented between background color and the color of the lettering and an overall low score because of this consistent difference. (Appendix 13)

Question 3a was a question that asked for a numerical answer (How much milk is needed?) The answer contained a number and a fraction for the Japanese recipe, 1 and 1/2 cups (see Appendix 13). Green, white, dark blue, and blue background colors revealed significant results in certain combinations. The highest retention score of the information retained (green) and the least information retained (blue) were of note. In addition, white was determined to have significant results when an ANOVA was completed. The significance of the white results can be explained in the use of white in textbooks and other situations where numerical results are presented. White background scores had the same retention score for this individual question for overall retention. In addition to the contrast attributes, white is also the default color of most software for word processing, presentations and spreadsheets. The audience could be expecting or are more familiar with numbers represented with this background color format. The result of green background data retention scores having the highest mean value is a result that needs further analysis. The combination of factors of contrast values, color spectrum nearer to blue and the cultural meaning of the color green, meaning nature, can be considered as a possible basis for the reason for this result.

Question 5a/6b contained a question with a numerical 3 digit number (What is the temperature of the oven?). The means of retention scores were highest in dark blue, white, and green respectively (see Appendix 13). The standard deviations for these data sets were also close, 0.89, 1.16 and 1.19. In addition, statistical significances were noted across all colors in different combinations (see Appendix 13). These results can be explained for dark blue and blue for readability and contrast, but the green result can be associated more closely with the blue spectrum and is consistent with the blue wavelength results.

Overall, from the results of the analysis of the statistically significant data, the following has been determined:

1. There are cultural perceptual differences between encoding and retention, with non-image forming color and text. The observed significant results between the overall Japanese and American results proved this. The statistically significant observance between colors in the Japanese results (homogenous society) and the non- significant difference individual color analysis of the American data (heterogeneous society) also confirmed this theory.
2. Contrast is a key factor in encoding which leads to retention. The higher the contrast, the better the readability / intelligibility and the higher the possible retention. Comparing the means of the data between Japan and the USA, blue with black lettering and blue with white lettering, the Japanese rank of average correct data, blue with black lettering, was in last place compared to the other Japanese background color presentations. The USA data, blue with white lettering, ranked first comparing all of the English means per color.
3. For the Japanese data results, dark blue and white backgrounds with contrasting lettering had better encoding which lead to better retention results

overall.

4. Since the data effects of for the USA background color was not significant, this research cannot definitively determine the most effective background color on retention. However, the average means in this group were as follows, See Table 11 and Appendix 12

Table 11. Overall Mean Results of USA Surveys

Background Color	Average Mean (%)	Standard Deviation
Blue	60.42	23.06
Yellow	55.40	18.77
Dark Blue	54.24	17.41
White	52.24	18.29
Green	49.41	19.00

2.6 Conclusion

This study set out to explore the effects of background color on retention, inter- and intra-culturally. The reasons and motivation for this research is the increasing diversity of classrooms or audiences where the usage of visuals accompanies the presentation of new material. Color usage has been extensively tested and used in advertising psychology but rarely applied to academic learning environments. With the increase of technology in the classroom and the ability for educators to create visuals instead of graphic designers, guidelines for the effects on color usage needed to be studied. This research included literature reviews from a variety of disciplines: physiology, educational psychology, cognitive psychology, cross-cultural psychology, computational linguistics, graphic design, and general psychology. From this literature review, how the human eye perceives color and how the brain encodes visual information, in addition to cross cultural influences, was summarized. This research sought to answer three main questions:

1. Does the way we perceive color influence the encoding of visual information?
2. If color perception does influence this encoding process, are there certain colors that enhance or interfere with this visual encoding process in the brain?
3. Does this color/encoding influence vary across cultures?

2.6.1 Findings

Each question will be addressed individually to synthesize research findings, proven theories and implications for the classroom.

2.6.1.1 Does color perception influence retention?

As noted earlier in this chapter, perception and working memory are conceptually distinct. However, “at least in the case of vision, and with respect to color in particular, they appear to be cooperative and considerably inextricable" (Allred & Flombaum, 2014, p. 4). When we see a color, we automatically have a certain emotion and or memory associated with this color. This automatic function, called "categorization," is implicit (Regier and Kay 2009, p. 443). Regier and Kay (2009, p. 439) also note that there are colors within categories that are shared amongst speakers of the same language and that half of color perception may be viewed through a "linguistic filter." Automatic, implicit categorizing of a color can lead to more in-depth processing (more accurate memory) or hinder the processing of information (forgetting) (Kelly & Heit, 2014). Baddeley (2000) includes color in his design of the visual working memory. When using a colored background as a form of inattentional blindness, the emotional effects of this color on memory are a factor. The perceived unawareness of environmental context attributes leads to an automatic reaction that cannot be controlled (Merikle, Smilek & Eastwood, 2001; Isarida & Isarida, 2007; Huchendorf, 2007; and McConnohie, 1999). Other emotions were noted, as in Mehta and Rui's (2009) motivation experiments with color that validated the theory that color had an effect on the quality of response.

For the research data collected in this chapter, the multi-cultural society, in this case, the American classrooms, contained diverse groups from different backgrounds and experiences, leading to different linguistic filters (See Table 10). Perception influenced by color were diverse but this multi-perception group did not have statistically significant retention scores, （ $p > .3$） supporting the claim that a certain type of perception, is influenced by linguistics and via this linguistic filter, color perception. To support this theory of particular culture specific effects on color perception and retention, the Japanese data collected in this experiment was found to be statistically significant ($p< 0.0001$). This result indicates the possibility that color does have an effect on encoding and the eventual retention of information.

The theoretical implications of this result are very important, especially when teaching or presenting to audiences that are not of the same culture or background as the teacher or presenter. Finding this cultural visual grammar for retention in a specific culture allows design of materials to be culture specific. In the case of multi-cultural societies of people with various experiences, in addition to culture-specific color backgrounds, a standard background can be determined that will not detract from the main information or message that is being presented.

2.6.1.2 If color perception does influence retention, are there certain colors that enhance retention?

The 2005 discovery concerning non-image forming light sensors determined that the brain responds to short wavelength light or blue spectrum light around 470 nm (Foster, 2005; Dacey et al., 2005) and a link to conscious visual perception was established. In the behavioral science area, Iyilikci and Canbeyli (2009) discovered that blue light (468 nm) but not red light (654 nm) exposure had an anti-depressant effect in rats. In 2007, fMRI observations were reported linking blue light exposure to non-visual brain activity that is "related to complex cognitive tasks" (Vandewalle et al., 2007, p. 2792). It was also detected that frontal and parietal areas of the brain were activated during this exposure which has implications for working memory. This research findings support these blue light spectrum brain effects of this exposure and the link to activity in the brain associated with memory function and emotion. In experiments with Japanese students, results were statistically significant for dark blue presentations ($p < .005$). This result in the blue spectrum supports the finding of a non-image forming color having a direct effect on retention producing a creative, relaxed, and alert state of the mind that is more receptive to information.

The theoretical implications of this finding can further the design of multimedia materials in learning. Utilizing the color blue in Japanese classrooms can enhance the environment and not detract from learning. Students can be influenced by intrinsic factors that allow them to concentrate and therefore retain more information. Not only do the results provide guidance with regard to colors that enhance retention but also display what colors to avoid that may cause distraction. Keeping in the blue spectrum and avoiding colors in the opposite end, such as red or yellow, can guide an educator who does not have any graphic design background.

In addition to guidance on multimedia design for educators, the research results could influence the default values of software programs installed on systems today. Even though these default designs could be changed, most educators use factory settings when they begin to design multimedia material. For example, the Microsoft PowerPoint® default setting is a white background in both Japanese and English versions. Templates are available for these software packages and one can ask if these are designed based on research principles or familiarity and pleasantness.

2.6.1.3 Does color perception retention influence vary across cultures?

Mackiewicz (2007, p. 148) states that, "cross-cultural research on color perception must be considered when examining preference for meaning associated with warm and cool colors preferences." Color and culture are mutually inclusive concepts. In the first part of the analysis, it was determined that retention was influenced by background. In addition, further analysis concluded that, for Japanese students, a specific color was significantly effective and even enhanced information retained. Grouping each language as one set, a statistical significance of color was determined, $p < .03$. Other than the physiological factors of contrast (lettering color and background color), intrinsic and cultural factors connected to color influenced the retention of these two culture groups.

The implications of these findings can guide the designer of multimedia materials to not choose specific colors that have different meanings from their audience culture. Through these experiments and presentations, it was determined that a mono-culture has a direct influence. The need arises to construct a visual grammar that is culture specific.

2.6.2 Concluding Comments

In conclusion, the design and increase of use of color in multimedia material in the classroom is now under the control of the educator. This additional tool in the classroom can enhance or detract retention of information by unconscious factors. These factors can be controlled by the designer or educator with the tool of a visual grammar as a guideline. This chapter determined that non-image forming color is one important factor that is significant in its effects. In addition, the increase of diverse student populations and world connectivity puts this factor at the forefront of design criteria. In Japanese mono-culture environments, dark blue was discovered to significantly enhance retention.

For multi-cultural environments, blue spectrum colors had a slightly leading role in retention but were not significant in data analysis. The benefit of this discovery is the beginning of a definition of a visual grammar for diverse and specific populations.

Chapter 3

Font Style and Retention

Chapter 3: Font Style and Retention

3.1 Forward

"Visual word recognition is a remarkable feat. Within a fraction of a second, a pattern of light on the retina is recognized as a word, invariantly over changes in position, size, case and font" (Dehaene, Cohen, Sigman, & Vinckier, 2005, p. 335). The actual function of reading is learned and formed in the brain. Each unique culture and/or language system is responsible for forming the brain matter to recognize and decode glyphs on a page, sign, cell phone or presentation slide. The path in the brain from reading to retaining the information read is a complicated process with many factors affecting the information perceived. As stated in the chapter dealing with background color and retention, intrinsic and extrinsic features bind to a Visuospatial Sketchpad (VSSP) in working memory (Alan Baddeley, 2012). Baddeley (2012) includes a color and shape component in the VSSP. Can the shape component be related to font style? Intrinsic or extrinsic feature, to ignore position, size, case and especially font/typeface as factors in decoding information is often are overlooked effects on the cognition and retention of information read.

Different writing systems also have different encoding processes, in addition to different fonts for their writing systems. Do the same intrinsic retention forming factors extend across writing systems? Do writing systems and fonts have functional or emotional components that contribute or detract from retention?

This chapter will attempt to answer these questions and suggest that particular fonts/typefaces have an effect on the encoding process of reading and retention of the information read. In addition, it will investigate the possibility that this retention effect is distinguishable for different languages, cultures and writing systems.

3.2 Introduction

Interest in different font styles came with the introduction of word processing software and the replacement of the typewriter. This shift in the way written materials are created and read put the control of the typeface chosen for documents in the computer users' hands (literally.) From this change of control of the choice of which font to use in documents, going from professional graphic designers and editors to the common computer user, font analysis and its effect on cognition and retention must be considered and guidelines made based on scientific methods and observations. At the same time, the variety of styles one can choose from is vast, daunting and virtually unlimited. For example, with the Microsoft-Word® 2007 program, the company's website (reference Microsoft's Fonts installed with 2007 Office suites and 2007 Office programs), lists that there are more than 200 different fonts, just for the English version of this program alone.

In educational environments, this expanded choice to use for handouts, textbooks and presentation slides has given teachers a rich and varied tool that can enhance or detract from actual learning. Questions are now being raised as to the effect these font styles and their particular characteristics and personalities have on long term memory. Furthermore, classrooms today are becoming more diverse with many students from different backgrounds, first languages, and cultures. According to United Nations Educational, Scientific and Cultural Organization (UNESCO) Institute of Statistics (UNESCO Statistics, 2014):

> "The rise in internationally mobile students reflects growing university enrolment around the world. In 2012, at least 4 million students went abroad to study, up from 2 million in 2000, representing 1.8% of all tertiary enrolments or 2 in 100 students globally. "

Are there different retention effects across cultures/languages in the classroom with different font styles?

To approach the font/typeface analysis attribute and its effect on retention of the information read, it is necessary to first analyze how the brain processes and detects words. Many theories as to the process from the retinal image and recognition of text in the eye to the visual cortex and eventually the areas responsible for language comprehension and memory, will be discussed in the first sections of this chapter.

Then, to determine if there is a significant font/typeface effect on retention, original research conducted will be offered in the form of surveys conducted by using presentation slides in university classroom settings in Japan and the USA. A short, public directive was shown to groups of American and Japanese university students in their country's language, English or Japanese. A public directive is a sign, brochure, or video seen by the general public stating suggestions, or rules from an organization. For example, a road sign, garbage disposal rules, or a construction warning. The fonts for the presentation slides and corresponding surveys were chosen from a literature study by the author of commonly used fonts that cut across a broad set of font characteristics and common usage in the home countries. After the brief presentation, students were given a short survey to determine the amount of information retained and their attitude towards this public directive. From the survey data gathered, factors such as emotion towards this public directive, common usage of a font and the type of information presented were discovered to have different retention effects in the two different cultures.

3.3 Literature Review and Current Research

3.3.1 How does the brain process reading?

A formal writing system is a recent development in the existence of man's long history (8000 BC for numbers, 3300 BC for writing pictorials/representations) (Dehaene, 2010). The invention of Eye Tracking equipment (Nedeljković, Puškarević, Banjanin, & Pinćjer, 2013) and Magnetic Resonance Imaging (MRI) machines has led to an explosion of research discoveries in the field of how the brain processes reading and how the brain processes this information from the time it hits the eye's retina. These machines and their unique detection capabilities can, in real time and with great accuracy, show how the eye moves when reading text and what happens in the brain when the retina detects a contrast of light and dark and determines whether it is a letter (glyph).

Before going into the details of how the brain processes this information, it is first important to discuss the six types of writing systems that have developed into the modern system of writing today. Daniels (1996) identify the six types of writing systems in the order that they came into usage. See Table 12.

For this discussion and analysis, the logosyllabary, syllabary and alphabet writing systems will be analyzed as they relate to the data collected in the countries surveyed, the USA and Japan.

3.3.2 Processing/Encoding of Words

Research has discovered that the process of reading in the brain is different for different writing systems (Ha Duy Thuy et al., 2004). We will discuss the systems as they apply to this research.

In the logosyllabary system, called kanji for Japanese writing, a logograph (“character”) is sometimes used and read. (Japan utilizes three kinds of writing systems, depending on the age and circumstance of the word being referenced.) These characters have a certain meaning on their own or when they are combined with other characters. The reading of the character itself involves a series of steps which are different from reading the English alphabet. First, the visual orthographic process is utilized, then a concept or meaning is determined and finally the character is phonologically recoded. On the other hand, for syllabary systems, the phonogram (kana: hiragana and katakana in Japanese) in most cases require phonological encoding of the word first and then the lexical meaning is determined. This process is by and large, the opposite of logosyllabary characters. Dehaene et al. (2005) also state that even before any lexical or meaning decoding begins, the brain decodes information passed from the retina of the eye to determine if the visual information is a character/font/kana/letter, etc. There are many perspectives on the processes involved in this basic decoding of letters/

Table 12. The Types of Modern Writing Systems (Adapted from Daniels, 1996, p. 4)

Writing System Type	Description	Languages Used
Logosyllabary (morphosyllabary)	Each character stands for a morpheme and the characters can be used for the sound of the morpheme as well as for its meaning.	Chinese, Japanese kanji
Syllabary	Each character stands for a syllable/ mora.	Japanese katakana and hiragana
Abjad (Semitic-type script)	Each character stands for a consonant.	Syriac, Hebrew
Alphabet (Greek-type script)	Each character stands for a consonant or a vowel.	English, Italian
Abugida (Sanskrit-type script)	each character stands for a consonant accompanied by a particular vowel, usually /a/, and the other vowels (or no vowel) are indicated by consistent additions to the consonant symbols	India, South East Asian languages
Featural	the shapes of characters correlate with phonetic features of the segments they designate	Korean

glyphs/characters.

Craik and Lockhart (1972, p. 279) call this first stage process “shallow processing" where structural (appearance) qualities are decoded and then phonemes are determined. In this very short time, the brain accesses a "letterbox area". See Figure 15 (Dehaene 2010, p. 210).

Dehaene (2010, p. 210) goes on to define this "letterbox area" (left occipital-temporal area of the brain) as the place where pre-lexical representation processing is accomplished. Dehaene bases this claim on previous research (Dehaene, Le Clec'H, Poline, Le Bihan, & Cohen, 2002) noting that visual activation in areas of the brain were invariant for location, font, and size in the visual word form area. See Figure 12.

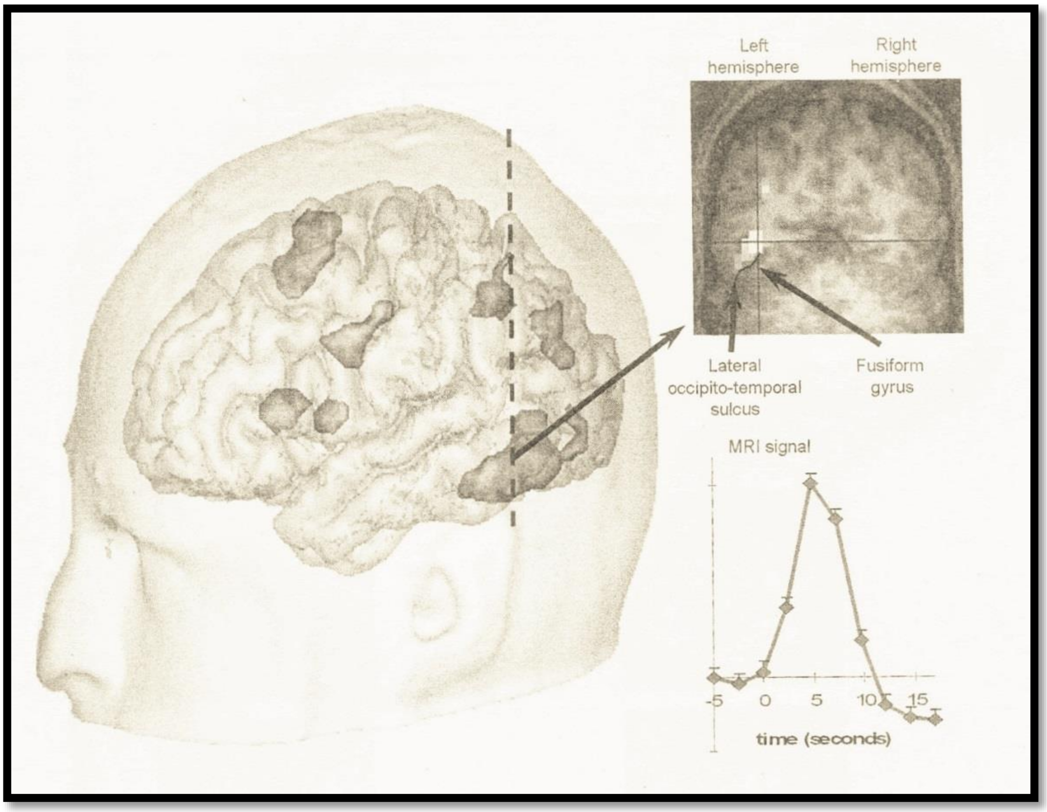


Figure 12. Areas Activated When Reading

Left Lateral Occipito-temporal Sulcus: Brain's Letterbox

(Dehaene, 2010, p. 71)

This particular theory concerning the “letterbox area” is part of the “detection hypothesis” as suggested by Gauthier et al. (2000, p. 495) or basically a visual grammar for reading in the brain. This hypothesis states that when the brain is exposed to a word, the same areas are highlighted with activity irrespective of the word type. Gauthier et al. (2000) based this theory on brain scan (MRIs) results of experiments of reading letters. However, from more analysis, it was discovered that letter-specific areas, in other words, the “letterbox area”, displayed different responses to different, new fonts than to repeated fonts (Gauthier et al., 2000).

Craik and Lockhart (1972) define this shallow processing stage in two steps. The first step is a structural or appearance encoding which includes typeface and physical quantities of the letters. Next is a phonemic encoding of the sounds of the letters and combinations for English. This shallow processing stage information is held in the short-term memory. The next stage in processing text is the deep processing stage that encodes (semantic) meanings of words and relates them to similar words. This part is a kind of meaningful analysis and is more likely stored in long-term memory. We can easily test this theory by asking ourselves if we actually remember the font style of a document we have just read. Most of the time, the answer is no; however, you will probably remember the content of what you have just read.

Research has also proven that once the brain recognizes, on the first appearance, a new font and determines the kind of symbol/character it is, a different processing area in the brain appears until the new font characteristics are learned. Dehaene et al. (2005, p. 335) calls this encoding from the recognition of a letter/character in a particular font to the brain's letter recognition as an "invariance." Nedeljković et al. (2013, p. 18) describe this process of retrieving the letter from memory as a "template-matching model." Another model is for the brain to font tune itself and retain the form representation for each letter it encounters for future use in a memory location (Sanocki, 1988).

Sanocki (1988) has an alternate theory of letter detection and processing. He suggests that once particular letter features are detected, the brain then determines the letter. Sanocki (1988, p. 472) calls this a "descriptions model," it is when the "basic stimulus properties are analyzed and mapped onto the abstract letter identities." We can observe multiple descriptions and terminology for this type of letter detection process in many research articles and books explaining this process (Massaro, Taylor, Venezky, Jastrzembski, & Lucas, 1980; Haber & Schindler, 1981; Nedeljković et al., 2013).

One process that is common to most research on letter detection are the features of a letter and their storage in long term memory (Nedeljković et al., 2013). The

Table 13. Uppercase Letter Features
(Adapted from Haber & Haber, 1981, p. 171)

Features		A	E	F	H	I	L	T	K	M	N	V	W	X	Y	Z	B	C	D	G	J	O	P	R	Q	S	U
Straight	horizontal -	+	+	+	+		+	+								+				+							
Straight	vertical |		+	+	+	+	+	+	+	+	+				+		+		+				+	+			
Straight	diagonal /	+							+	+		+	+	+	+	+											
Straight	diagonal	+							+	+	+	+	+	+	+									+	+		
Curve	closed																+		+			+	+	+	+		
Curve	open V (up/down)																				+						+
Curve	open H (left/right)																	+		+	+					+	
Inter-	(2 meet and can go left or right)	+	+	+	+			+	+					+			+						+	+	+		
Redundancy	cyclic change		+							+			+				+									+	
Redundancy	symmetry	+	+		+	+		+	+	+		+	+	+	+		+	+	+			+					
Discontinuity	vertical	+		+	+	+		+	+	+	+				+								+	+			
Discontinuity	horizontal		+	+			+									+											

Capital Letters Characteristics

+ contains the feature

alphabetic language (English for this experiment) has shared features between letters. See Table 13 from Haber and Haber (1981, p. 171) for features of upper-case letters.

In addition to the template-matching process, a feature detection process is also going on (parallel processing). Once part of a letter/glyph is recognized, the brain uses this detailed feature set to serially encode forms (font) into a grapheme, then a phoneme, and then a word (Sanocki, 1988; Sanocki, 1987). This process is described as a “feature detection model” (Nedeljković et al., 2013, p. 18).

Invariance in the encoding of the English alphabet can be broken down into 20 unique features (Haber & Haber, 1981). When the retina in the eye detects the combinations of these traits, the brain encodes the invariance of the combination to a unique letter. Again, as the brain encounters a font that has been used before, the letter detection process is implicit and the time of actually determining the letter it represents is reduced. The process of invariance has been detected in the brain using fMRI results. Gauthier et al. (2000) detected different areas of the brain being activated for different fonts. This is a clear indication that the brain is sensitive to font information. The time to process a particular letter is based on the “legibility,” “readability,” and “clarity” of a font. However, these are vague terms and there are many different definitions for each of these them.

One more theory noted by Nedeljković et al. (2013) in the processing of a letter/word is the actual shape of the word. This theory must be considered because some font styles such as Copperplate, and Castellar do not contain any letters with descenders (a letter that extends below the common writing line; for example, p, y, q, and g.)

Haber and Schindler (1981) state that, in addition to word shape, the brain also determines a word by the context of that word in a sentence. An experiment of note is from Paap, Newsome, and Noel (1984). Here they recorded mistakes being made when word recognition of the same "shape" word was displayed but even more mistakes were recorded when the "shape" of the word was different. For example: with English words "than-tban-tnan." "Than" and "tban" have the same shape, "tnan" does not. This leads to another theory that of "word superiority effect". Nedeljković et al. (2013, p. 18) hypothesize that at the same time that the brain is determining a letter via its features, the brain is also determining the words around it which helps in the letter detection of the actual word. The context of the word in the sentence and the encoding of the first letters and the shape all happen simultaneously to determine the phonological and lexical meaning of a word.

The process of decoding Japanese kanji is similar but is different in the sequence of decoding in the brain. Here there is no transparency of a spelling system and its relation to speech sounds as thousands of characters and combinations are required to memorize the meaning and then speech sounds (Nakamura, Dehaene, Jobert, Le Bihan, & Kouider, 2005).

Buchweitz, Mason, Hasegawa, & Just (2009), using fMRI results, detected more brain activation areas for kanji than hiragana in the brain. In this case, the right occipito-temporal lobe was activated. This area is associated with visuospatial processing. Hiragana (kana) displayed activation in areas of the brain in the left inferior parietal lobe (LIPL), the right supramarginal gyrus, and the right supplementary motor area (SMA). The LIPL activation indicates that there is an additional demand on phonological coding of words in hiragana, relative to kanji. “The activation of right hemisphere supramarginal gyrus may be a spill-over of activation from the left-hemisphere supramarginal area, which is associated with phonological processing” (Buchweitz et al., 2009, p. 145).

Figure 13 illustrates the basic steps of processing in the brain for letters to meaning, kana to meaning and kanji to meaning (Nakamura et al., 2005).

Dehaene et al. (2005, p. 337) proposed a model for “invariant word recognition”

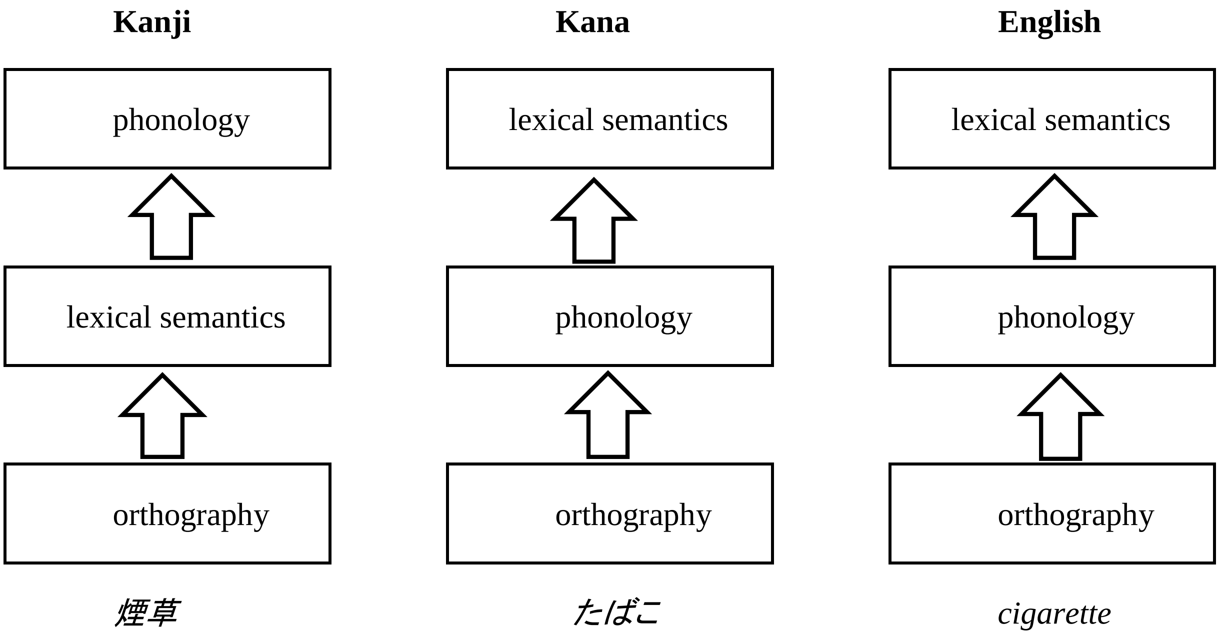


Figure 13. Processing Steps in the Brain for Kanji, Kana and the English Alphabet with Example Words (Adapted From Nakamura et al., 2005, p. 961)

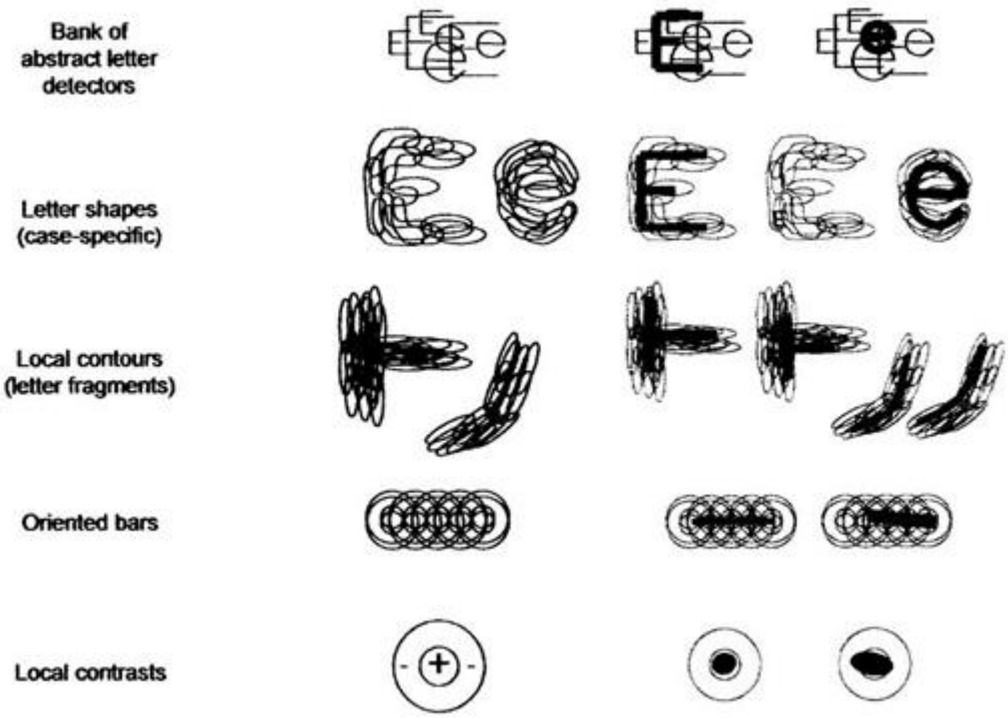


Figure 14. Cortical Networks for Reading (Dehaene et al., 2005, p. 337)

for the orthography area of the brain for processing (Figure 14).This is proposed as a neural code for written words but can also be applied for reading Japanese kanji and kana. Instead of a bank of abstract letter detectors, there is a bank of kana/kanji detectors.

3.3.3 Basic Typography

The goals of designing a typeface font are to be unique and be common at the same time (Sanocki & Dyson, 2012). Interesting to note in Nedeljković et al. (2013, p. 17) report:

> "After a series of empirical findings from the first half of the last century, and a stream of empirical findings in the field of legibility and readability of typefaces, little research has sustained a grounding theory."

Legibility is defined as the fine details of a design of a particular font. Readability is the ability to distinguish which letter it is representing and the layout of whole bodies of text (Poole, 2008; Nedeljković et al., 2013). Nedeljković et al. (2013) stated that there is a clash between psychologists and typographers in the definitions of these terminologies. A typeface/font has to be unique in characteristics such as weight of the lines, angle of the inside space, serifs, x-height, ascender, cap height, to name just a few attributes. For an example of how a typeface is defined, see Figure 15.

One distinct characteristic that separates typefaces into two distinct categories are serifs. Serifs are “small line at the extremities of a main stroke in a type character ” (TheFreeDictionary.com). For this report, serif and sans-serif (no serifs) typefaces are used for the original experiments discussed below. See Figure 16 for examples. Notice the end of the letters T, r, i, p and s in Figure 16. The two examples on the right are serif fonts. The typeface on the left is a sans-serif type. Characteristics, such as serifs, add “a different texture to lines of text” (Samara, 2006, p. 17). See Figure 17 comparing different kinds of serifs.

Serifs versus sans-serifs is still a debated topic with varying results pertaining to readability and legibility (Beymer & Russell, 2008; Arditi & Cho, 2005). One study claims serifs are better for reading and san-serifs are better for large print or type, such as road signs and advertisements (www.microsoft.com, Microsoft® Clear Type Fonts). When designing a typeface, a graphic designer must take into consideration that the human eye is conditioned to read and encode words and not encounter letters/characters that stand out. They must design a style where all glyphs flow together. In an interesting and different line of experiments on the serif and sans serif superiority debate, researchers tracked the eye movements when as the subjects read text. Rather than flowing steadily across the page, the eye makes a series of leaps (called saccades) and pauses (fixations), focusing on discrete groups of words. This action was established as early as 1878 (De Lange, Esterhuizen, & Beatty, 1993), and eliminated the theory that serifs are necessary for efficient reading. Using modern eye-tracking equipment, Beymer & Russell (2008) found no significant differences in reading speed between serif and sans-serif fonts displayed on computer screens. This research made the merits of individual typefaces as a better method to study font differences as they pertain to retention.

As stated in the brain and word encoding section previously, parallel processing was detected as to the shape of words in reading, in addition to individual letter recognition. Even graphic designer Samara states that this shape of the word, rectangle shape for all uppercase and a distinctive shape for lowercase “improves reading, efficiency and understanding” (2004, p. 24).

The topic of the characteristics and features of typography can fill another book; however, for this discussion, only the attributes and characteristics that were subject to variability will be examined and compared for analysis. In addition, each font is specified by five attributes: typeface, weight (bold, regular, lite), slope (regular or italic), width (normal, expanded, condensed), and size (Zramdini & Ingold, 1998). For this research, only typeface was varied and all other attributes were kept constant.

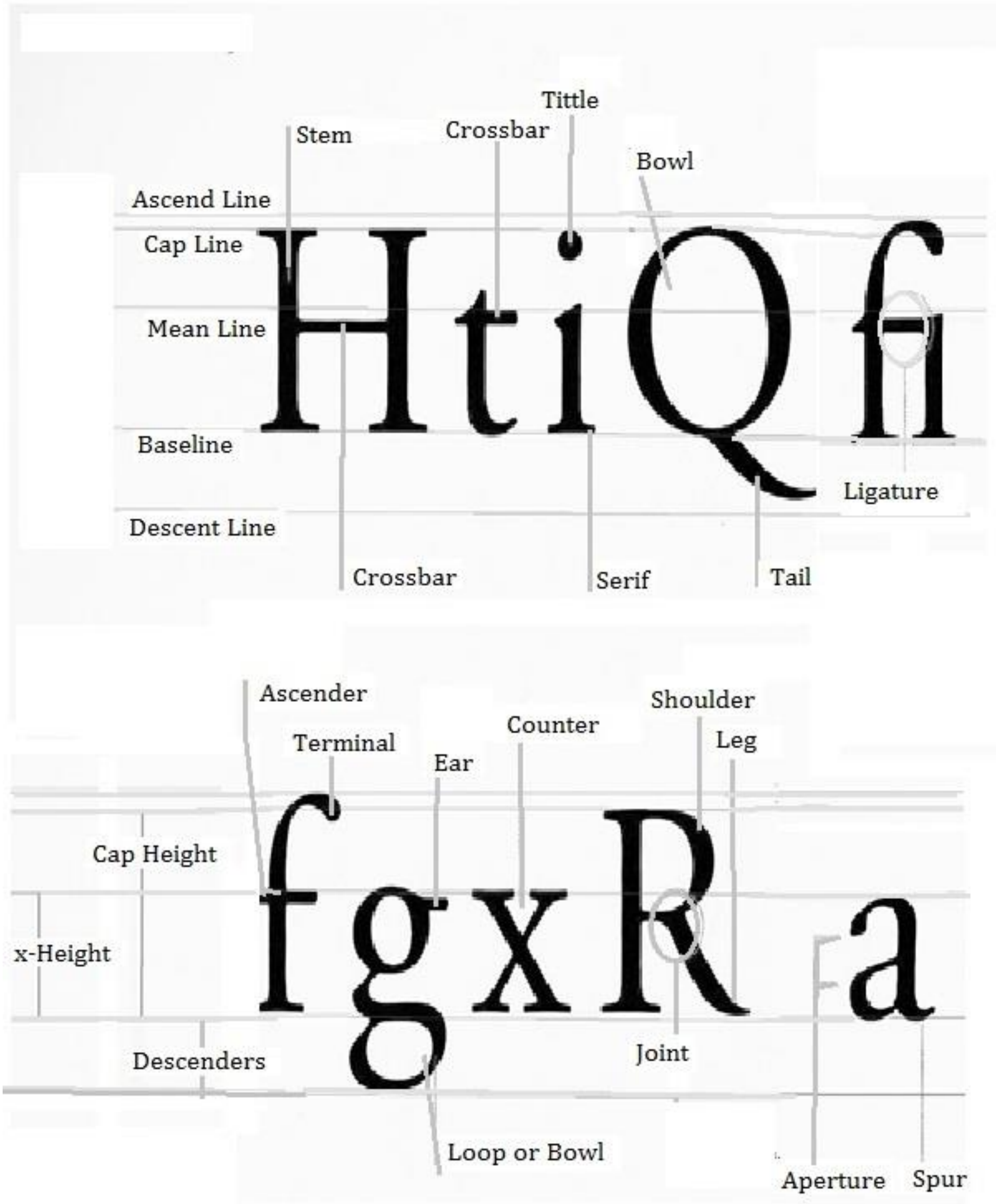


Figure 15. Typeface Characteristics (Adapted from Samara, 2004, p. 16)

Figure 16. Serifs vs. Sans-Serifs (Samara 2006, p. 28)

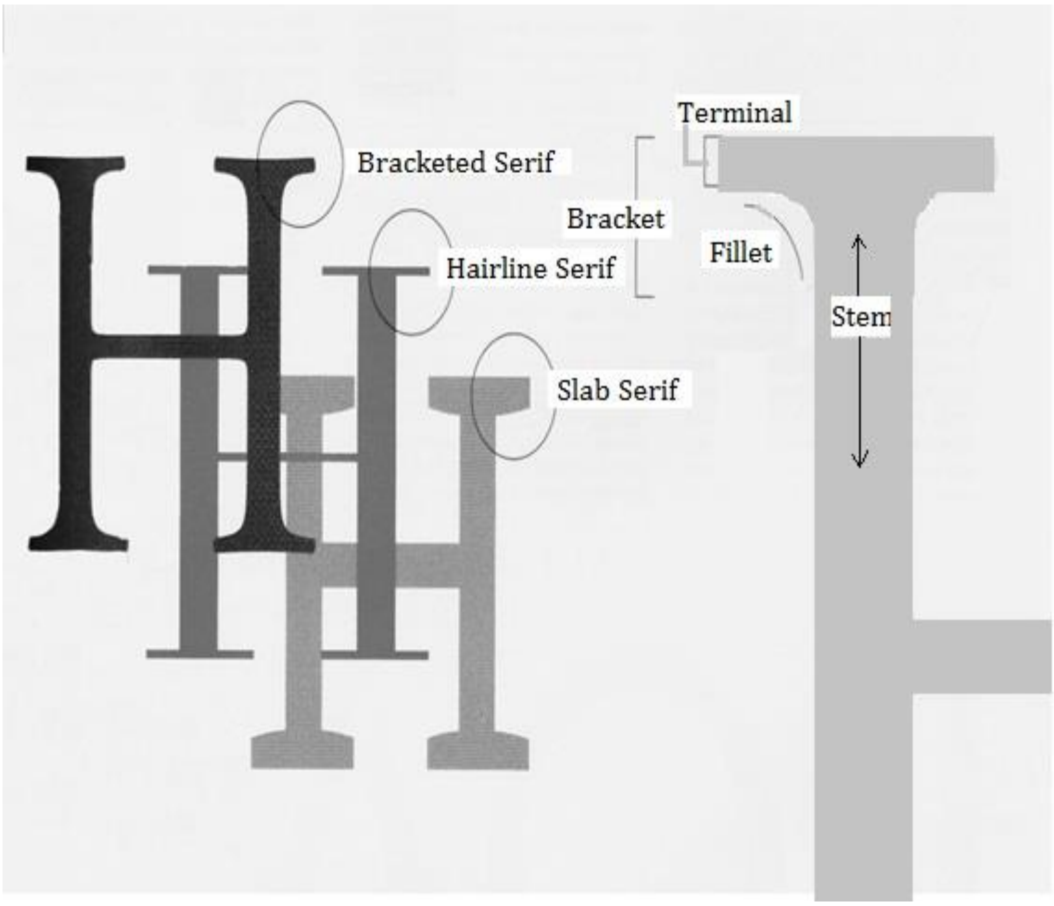


Figure 17. Serif Designs (Adapted from Samara, 2004, p. 17)

Figure 18. Comparison of Japanese Font Styles
(Adapted from Morisawa Co., 2015a)

For Japanese fonts, basically the same criteria hold for serif and sans-serif fonts. Particular to Japanese fonts, there are five basic categories to choose from; Ming Cho (明朝), Gothic (ゴシック), Textbook (教科書), Block (真書), and flowing /semi-cursive (Morisawa Co., 2015a). See Figure 18.

Min-Cho style is one of the most commonly used typefaces in Japan (Morisawa Co., 2015a). It is a serif font that is found in most newspapers. Gothic style is a sans-serif font that has uniform strokes and can be seen on signs. Textbook style is a thin stroke sans-serif font used in school textbooks. Block style is a serif font that imitates woodblock carving. Flowing/semi-cursive font style looks more like handwriting with some strokes being connected.

Today, the general public receives a large amount of readable material from digital devices; however, up until about 15 years ago, the font used for this digital surface was still the type used on paper. The clarity of fonts in some cases was not the same as its use on paper and varied across these digital devices. As a result, in 1998, Microsoft® introduced a new way to display fonts on a computer screen called ClearType®. These fonts are clearer and are more readable with changes in subpixel intensity (Microsoft Corp., 2002).

Tyrrell, Pasquale, Aten, and Francis, (2001) and Chaparro, Shaikh, and Chaparro (2006) demonstrated that ClearType® showed significantly more accuracy at identifying English words when compared to non-ClearType® fonts. In January 2007, Microsoft introduced a new “ClearType® Font Collection” that contains six typefaces for Romanized languages: Calibri (sans-serif), Corbel (sans-Serif), Candara (sans-serif), Cambria (serif), Constantia (serif) and Consolas (sans-serif). Each font was designed for a particular environment such as print, small print, computer screen, email, magazines, web design, and book publishing (Microsoft Corp., 2007). It is interesting to note that nowhere in the Microsoft documentation are the new ClearType® fonts recommended for use in presentations. (Microsoft Corp., 2007).

For Japanese, only one new ClearType® font was developed using this new subpixel rendering technology. The name of this font is Meiryo (Microsoft Corp., 2015). This font is a sans-serif type with even strokes that is considered a “Japanese” version of the Verdana font style. See Figure 19 for an example.

The ultimate goal is perceptual fluency(Alter & Oppenheimer, 2009). This perceptual fluency is enabled by the legibility and readability of a font. This type of fluency is measured by the amount of effort it takes to read something and some predict,

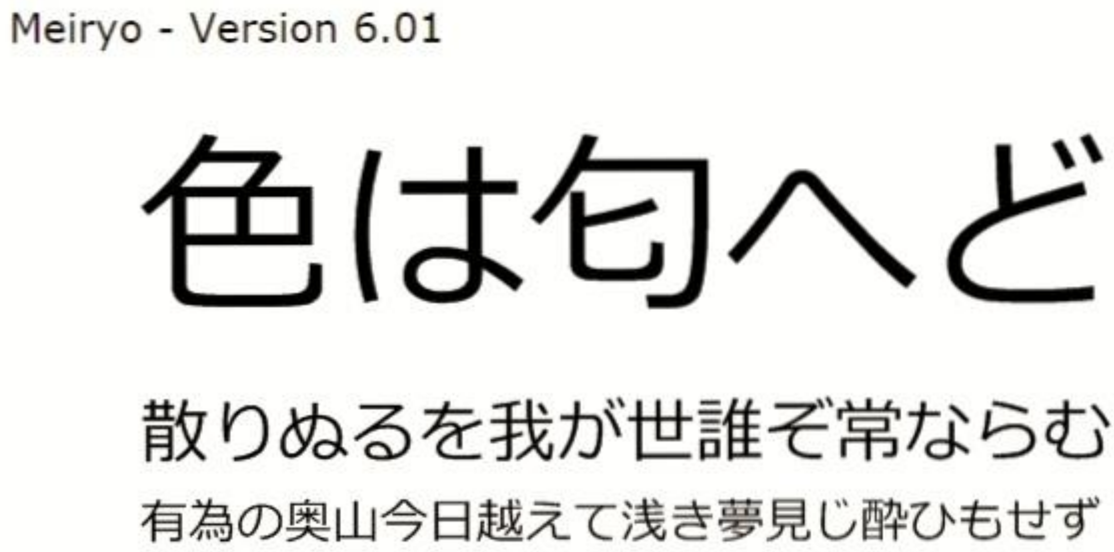


Figure 19. Meiryo Font Sample (Microsoft Corp., 2015)

affects motivation and retention (Song & Schwarz, 2008). However, does the legibility and type of font utilized depend on the vehicle of the written information? Examples can be a menu (Wang, 2012), an information memo (Gasser, Boeke, Haffernan, & Tan, 2005), a computer screen (Larson, 2007), a tablet computer (Larson, 2007), or a presentation (Mackiewicz, 2006). For the experiments in this research, a presentation is utilized to test the legibility of typefaces in conditions where text is read at a distance.

This distance legibility factor is also a very important part of street and highway sign design. In America and Japan, over the past 20 years, highway signs are being changed to include new legible and readable fonts. This type of font designed for legibility at distances must be considered when using and choosing fonts for presentation design and will be one of the fonts we use later for testing of information retained.

In the USA, when driving on highways, the growing elderly population perceived signs as hard to read. Highway engineers designed a new font that was approved in 2004 for US highway use (Garvey, Pietrucha, & Meeker, 1997). The new Clearview® font was tested and designed to be legible at distances, at high speeds and at night. When driving, the contrast of the letter shape, proportional spacing, for example, is often causing our eyes to not recognize or confuse letters. To illustrate, please refer to Figure 20 where the two words Road and Road are displayed in two different font styles. As you can see, the words on the left can be read as "Rood" instead of "Road" at night or at a far distance.

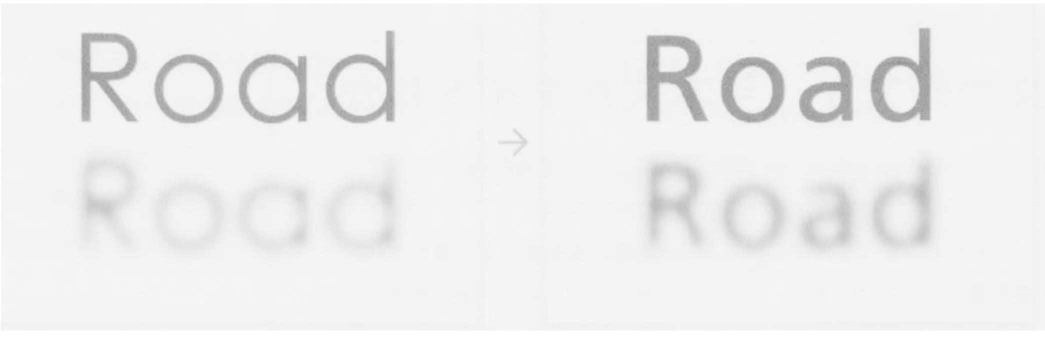


Figure 20. Fonts Seen at a Distance (伝わるデザイン)

In addition, at night when reflective paint is used on the letters, a word can appear as one white stream in a kind of blob-like character. This effect is called "halation" (See Figure 21).

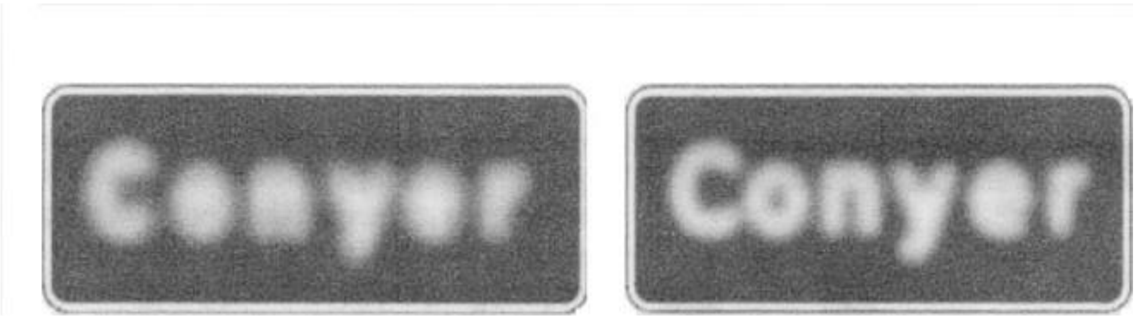


Figure 21. Halation between Highway Gothic and Clearview ® Fonts (Gowda, 2010, p. 13)

After tests were performed and modifications made in the design process of the Clearview ® font, a driver's legibility increased reading this font styled sign by up to 29 percent in day time and night time (Meeker, 1989). Figure 22 demonstrates the differences in the Highway Gothic font (the old typeface used on American highways) and the new Clearview® font. Notice that more area is exposed inside the round areas, the "counter" in typology terminology.

In Japan, the same kind of research was performed by the West Expressway and East Expressway companies. With the same issue of an aging population driving on roads and the increasing availability of more legible fonts, Japan decided to change the type of font used on the national highway system. All national highway signs in

Figure 22. Comparison of Highway Gothic and Clearview® Fonts

(Burgoyne, 2005, p. 50)

Japan contain Japanese characters and Romanized alphabet. The original Japan Highway characters had been hand brushed and so were not uniform (East Japan Highway Company Ltd. (東日本高速道路株式会社), Japan Highway Company Ltd. (日本高速道路株式会社,) & West Japan Highway Company Ltd. (西高速道路株式会社), 2011). The highway departments decided to adopt a commercial digital font. One unique characteristic of the new font chosen was the object enhancement of strokes. After extensive tests with different types of fonts, the Hiragino font was determined to be more legible at longer distances than three other fonts (Nau, Typebank, and Shin-go). The Hiragino font was visible for an average of 30 more meters than the currently used font (東日本高速道路株式会社 et al., 2011). Figure 23 displays the differences in the fonts analyzed.

Figure 23. Japanese Highway Fonts compared

(East Japan Highway Company Ltd. (東日本高速道路株式会社), Japan Highway Company Ltd. (日本高速道路株式会社,) & West Japan Highway Company Ltd. (西高速道路株式会社), 2011, p. 9)

3.3.4 Typeface, Personality and Usage

The processing area for fonts in the brain and legibility are important areas to be considered and discussed. However, typefaces are often described with adjectives in the

USA. See the next section for examples and research results.This implies that there is a tone or feeling attached to the design. This area of research is also a consideration with font style and retention because emotion has a direct link to memory (Mather & Sutherland, 2009).

3.3.3.1 English Typefaces and Tone

Another consideration when choosing a font is the personality or emotion that a font is perceived to have. In an interesting but not very scientific experiment, a writer for the New York Times wrote an essay on July 9th, 2012 asking “Are you an Optimist or a Pessimist?” (Morris, 2012a). At the end of his op-ed, Morris asked if the reader thought that the claim in the article was true or false. In addition, he asked the reader if he/she was confident in their conclusion. The writer, Errol Morris, arranged for this essay to be displayed on the newspaper’s web site in a different typeface each time someone accessed that essay. The author chose six fonts: Baskerville, Computer Modern, Georgia, Helvetica, Comic Sans and Trebuchet. More than 45,000 people clicked on this web page and answered the two questions with very interesting results. Most respondents who saw the essay in Baskerville (a serif font) believed the claim was true ($p < .0068$) and the Comic Sans had the lowest rate of disagreement (Morris

2012a). This experiment was not scientific or carried out in a controlled environment, but it showed how the general public (English readers) can react to different fonts (Morris, 2012b; Morris, 2012c).

Another font/emotion connection example that Morris notes is when the Higgs boson particle was discovered and announced. A person from CERN made public relations digital announcement using the Comic Sans typeface (Morris, 2012c). Not only was the science news a popular topic, but the use of a “looked down upon” font also made the news because of the use of this font for a scientific public announcement (Byford, 2012, par 1). Emotion in fonts has to be considered when analyzing the effect on retention because of the unconscious, implicit effect on emotion, similar to background color and memory in the previous chapter.

Emotions unconsciously influence, in this case via a typeface, because of cultural conditioning (Kastanakis & Voyer, 2014). Typography has a role in the rhetorical act of meaning–making (Brumberger, 2003). However, does this emotion-font connection apply to all fonts in all languages?

For English typography, (Tsonos & Kouroupetroglou, 2007, p. 447) state, “Emotions and the emotional state of the reader depend on document structure, layout and text formatting.” As far back as 1923 in Poffenberger and Franken’s research, “ A

Study of the Appropriateness of Type Faces," researchers used adjectives to define the personality or effect of a particular typeface. Lewis and Walker (1989, p. 243) also call this characteristic a "typographical allusion of the capacity of a typestyle to connote meaning over and above the primary meaning which is linguistically conveyed by words." In addition, Shaikh, Chaparro, and Fox (2006, p. 11) reported that "users consistently attributed personalities to fonts displayed" in their research survey. This factor must be included in the discussion of retention since emotions have an effect on retention (see previous chapter for the discussion on emotion and retention.)

Shaikh, Chaparro, and Fox (2006) found that their font research could be divided between three types of font characteristics, serf, sans-serif, and monospace, pertaining to personality. They go one step further and explain fonts at the pixel level. For example, when describing the serif font "Constantina," they note with sharp triangular serifs, longer ascenders (the vertical space above the middle line) and longer descenders (the vertical line below the bottom line) (See Figure 15). This font was determined to have strong results in the descriptors, "creative" and "exciting." The serif font "Cambria," according to Microsoft®, is the new Times New Roman and scored very similarly to this font. For san-serif fonts, analyzed at the pixel level, the Microsoft ClearType® fonts have a smaller x-height and a lighter color compared to other sans-serif fonts (Microsoft Corp., 2002). These are attributes that give a “neutral” tone to a text.

Table 14 is a chart comparing research on fonts and their readability, legibility, personality, and preference made by the author. Though it is not all encompassing, the studies covered a wide variety of measurements and materials used for experiments, on screens, presentation slides and medicine warning labels. The purpose of this comparison it to determine the most common fonts used across platforms and to choose a font set for this thesis’ experiment that can be related to a larger font-user base and a commonality between descriptions.

One perception that is consistently mentioned and tested in research with font and personality/emotion is appropriateness (Bernard, Mills, Peterson, & Storrer, 2001; Mackiewicz, 2003; Mackiewicz, 2007; Doyle & Bottomley, 2004). Since fonts were determined to have personality, the appropriate font must be chosen for the right situation. Jaffe (2014, p. 1) states that “typefaces convey their own meanings and elicit their own emotions independent of the words they spell out.” For example, Mackiewicz (2003) examined technical writing samples and students’ perceptions of the tone attributes of certain typefaces. Her findings were determined using five different typefaces: Script, Courier New, Lucinda Console, Helvetica and Comic Sans. Helvetica

Table 14. Comparison of Font Research Platforms and Test Conditions

Comparison of Font Research across Different Research Platforms and Test Conditions							
		Mackiewicz 2007 ** Used demographics data sets presentation slides	Bernard et al 2001 ** used dictionary written texts for testing, computer screen	Shaikh 2006, 2009 , computer screen , nonsense text **	Brumberger (2003) **	Silver, Braun 1993, warning lables on medicine **	Shaikh, Chaparro and Fox 2006 on-line survey, rate font samples,
Serif		Professional rated		Most legible			stable, polite, mature, formal, assertive, attractive, elegant, practical
	Garamond	Less professional	-	-	-	-	-
	Times New Roman	*	Lowest in Personality, least youthful and fun, most business-like	#3 Traditional, #1 Stable	direct	#2 Readability score	Stable, conformist, mature, unimaginative, dull
	Souvenir Lt	*	-	-	-	-	-
	Bookmand Old Style	*	-	-	-	-	-
	Lubalin Graph BLK	Less professional, Less comfortable to read	-	-	-	-	-
	Courier New (mono-spaced)	-	least elegant, 2nd most business-like	Looks cheapest, ranked lowest of most scores compared to serif fonts, legible, #2 sad	-	-	Plain , most extreme settings of personality types
	Georgia	-	*	#2 Traditional	-	-	*
	Goudy Old Style	-	*	-	-	#3 Readibility score	-
	Century Schoolbook	-	*	-	-	-	-
	Calisto	-	-	Most legible	-	-	-
Clear Type	Cambria	-	-	#3 Stable	-	-	*
	Centaur	-	-	*	-	-	-
	High Tower Text	-	-	*	-	-	-
	Lucinda Bright	-	-	*	-	-	-
	Perpetua	-	-	*	-	-	-
	Poor Richard	-	-	*	-	-	-
Clear Type	Constantina	-	-	#1 Traditional	-	-	More attractive, creative, exciting, elegant, feminine, unstable, rebel, youthful
Sans-Serif				legible			All purpose fonts, compared to monospace, more casual and informal
	Gill Sans	-		-	-	-	-
	Futura Bk	Less professional		-	-	-	-
	Arial / Helvetica	*	Most preferred	#3 All purpose #2 Stable,	direct	#1 readibility score	*
	Tahoma	*	Faster to read, 2nd most preferred	-	-	-	-
	Verdana	Less attractive	-	Legible	-	-	assertive, sad, dull, unattractive, plain
	Agency FB	-	-	#3 Assertive Bold, #3 sad	-	-	-
	Comic Sans	-	Most youthful and fun, 2nd most preferred	#5 Happy / Funny, #2 Casual	-	-	-
	Berlin Sans	-	-	strong, legible	-	-	-
Clear Type	Calibri	-	-	#1 All purpose	-	-	*
	Century Gothic	-	-	#2 All purpose	-	-	happy, exciting, attractive, elegant, passive
Clear Type	Consolas (monospace)	-	-	*	-	-	Plain , rated more happy, creative, atrtractive and elegant than courier New
	Lucinda Console	-	-	Ranked overall highest compared to all sans serif fonts, legible	-	-	-
	Incised 901 Lt BT	-	-	Ranked overall lowest for all sans serif fonts, mostly negative (below the mean) legible	-	-	-
	Bouhaus Md BT	-	-	-	friendly	-	-
Clear Type	Corbel	-	-	-	-	-	*
Clear Type	Candara	-	-	-	-	-	*
	* included in the research criteria with no significant results	- means "not included in the research criteria"	** Significant results	monospace = letter and space between letters are the same			

(Arial is similar, (Kole, 2013)) was perceived as the most professional and Comic Sans was perceived to be “sloppy, childish and not good for business” (Mackiewicz, 2003, p. 214-215). In addition, an elegant font, Script, was noted to not be appropriate for technical information.

Factors such as “open”, “easy to read”, “no modeling” (thick to thin variations of the stroke), “proportional spacing” (letters have the same width with varying spacing between letters) and “does not copy another form of common modes of writing” (like script or handwriting) were recommended as good advice for technical documents, presentations or readings on screen (Mackiewicz, 2003, p. 217-220).

Through this discussion we can conclude that English typeface fonts have personality and may affect the tone of writing irrespective of any actual textual meaning.

3.3.3.2 Japanese Typefaces, Personality and Usage

There is conflicting data regarding Japanese fonts and any emotional component attached to a typeface. Iwahara & Hatta (2004) performed experiments to determine if the selection of typeface could facilitate and convey the emotion of an email. Their results showed that a font choice cannot convey a sender’s (or receiver’s interpretation of) emotional semantic information contained in an email. However, in an analysis of the packaging of a product and typeface design, Mukai (2014) applied English typeface classifications of emotions in a survey to determine if these indicators can be applied to nine typeface designs for Japanese people. The results were weak but the author concluded that people have "common cognitions of impressions regarding typeface design and product characteristics" (Mukai, 2014, p. 1509).

Another research study of note is by Caldwell (2013) who utilized a systemic approach to understanding emotions for Romanized languages developed by Amare and Manning (2012). He adopted this scale to measure emotional responses to Japanese typefaces. The experiment consisted of subjects reading a text fragment and rating the emotion of the font. It was concluded that the emotional response to Japanese typefaces is consistent with the principles described by Amare and Manning (2012). These principles described by Amare and Manning (2012, p. 2) were *agitated, stimulated, diverted, unrested, amused, rested, calmed, organized, focused, determined, concerned, and challenged*. These principles of emotion can be linked with the typographical characteristics of contrast, variety, form, and pattern. Within this set, three groups of emotions are determined: (agitated, stimulated, diverted, unrested) = agitated; (amused, rested, calmed, organized) = amused; and, (focused, determined, concerned and challenged) = focused. In the Caldwell (2013) study, fifty subjects were presented with 40 samples of various Japanese typefaces that were grouped into five types: seal script (篆書, tensho), clerical script (隷書, reisho), semi-cursive (行書, gyousho), Mincho (明朝) and cursive (証書, shousho). Each subject chose three of the above emotion principles to describe the text fragment. The results of this survey determined that these responses were consistent with the emotional categorizations for Romanized alphabet fonts developed by Amare and Manning (2012). This experiment, though interesting, places the subjects in a false situation as typeface alone is described without any context or meaning. As previous discussions state, font style can change the tone of a text and cause heightened emotional responses to non-appropriate use. That is the practical usage of a font when determining its effect.

3.3.3.3 Perceptional Set and Font Style

In addition to typeface characteristics and tone, perception has an influence in how words are read. A perceptual set is defined as something that has four factors: expectations, emotional state, culture, and motivation (Hardeep, Kaur, & Shergill 2012). We can relate each of these principles to font and typeface effects on the brain.

First, for expectations, have we seen this font before? For a certain situation, is there an expected font style or characteristic? If yes, then the brain has already font tuned to this and can concentrate on encoding the letters/characters into a word or meaning. In addition, no emotional response is initiated and the brain is in a relaxed state and ready to learn.

Second, emotional state, here, as noted by graphic artist, in a BBC radio program, Neville Brody "The choice of a font will tell you how you'll react emotionally to the information before you've even read it" (Peacock, 2005). Romanized fonts have been given adjectives to describe their attributes. For example, the "Impact" font has been described as "assertive" and "bold" (Shaikh et al., 2006, p. 4).

Many experiments have determined that there is a link between emotion and a font. For example, Caldwell (2013) displayed different Japanese font styles in a text with a neutral meaning and had the subjects rank the emotional cues from this font that had the same word, but different font styles. If context is part of the emotional content of a font then how can a subject really determine the tone of a text using a particular font in an artificial setting? If a technical presentation used Comic Sans font, most of an American audience may not be confident in the speaker's speech because of the unprofessional tone of Comic Sans (Brumberger 2003) On the other hand, if an elementary school teacher used Comic Sans in a classroom to explain a concept, the tone and context would cultivate different emotions. Situation and appropriateness in context is very important.

The third part of a perceptual set is culture. Culture defines what font is appropriate and when it should be used. As an example, there is a Japanese font style named “Textbook” style (Morisawa 2015a). This font was designed to be used for textbooks according to Japanese national standards.

The last part of a perceptual set is motivation. Font has been determined to affect a student’s motivation to study different materials and some texts that are difficult to read may discourage some students. This is defined as “disfluency” (Song & Schwarz, 2008; Diemand-Yauman, Oppenheimer, & Vaughan, 2011).

3.3.4 Conclusion and Summary of Literature Review

In summary, there are many factors relating to typeface’s effect on retention. First, the brain was discovered to have a “letterbox area” in the brain for processing fonts and font tunes to these glyphs/letters. See Figure 12. The process of English letter recognition is complex and involves many parallel processes; these include letter characteristics encoding, word form encoding, and the influence of surrounding words. When the brain decodes Japanese kanji, the process of recognition is in reverse order of hiragana and the alphabet, where lexical meanings are realized before phonological encoding. Second, the legibility of a font also has an effect on retention. If a person can read with no effort at speed, retention is assumed to be expanded. Next,, fonts are also considered to be a work of art and stimulate emotions. In English this emotional component has been proven but in Japanese, the research results are not as conclusive. Finally, perceptual set factors can also influence how information is retained according to the factors of : expectation, emotional state, culture and motivation.

3.4 Method

3.4.1 Participants

In the USA: 57 participants from two universities volunteered for this survey and were given a gift card for their participation. These participants were not the same as the previous experiment. The universities were located in the Metropolitan New York area. A mixture of graduate and undergraduate classes were surveyed. The background of students varied from departments and ages (18-50 years old) with an average age of 22 years old. There were 33 females and 24 males. Two students had lived in Japan previously but were not native Japanese students.

In Japan: 212 students were from a national university in Okayama, Japan.

These participants were not the same as the previous experiment. Participants volunteered for this survey and were given a snack after the survey in appreciation. The student population consisted of first- and second-year students (18-20 years old), from different departments. There were 138 males and 74 females. All but one student was a native of Japan.

Participation in this experiment was voluntary and anonymous. No name or identities were collected or recorded. By participating in this experiment, students consented to allowing me to use their survey results in this analysis.

3.4.2 Procedure

Students were told they were to see a public directive from Japan (see Appendices 15, 18, and 19) and then be given a survey as to how much they had remembered from the slide presentation. They were not aware of the real purpose of this survey. After the presentation, students were immediately given the survey (see Appendices 16 and 17). Classrooms were equipped with LCDs and projectors. Students sat from two to six meters from the screen for both countries' classrooms.

The presentation was designed to be in the native language of the country. See Appendices 18 and 19. Country specific measurements were used, centimeters and kilograms for Japanese and inches and pounds for English. Timings, lines and words (characters) were represented identically. There were 17 slides and the total time of each slide was kept constant across presentations with a total presentation length of 12 minutes and 37 seconds. See Table 15.

Table 15. Font Presentation, Slide timings, English Morphemes and Japanese Morphemes on the Slide

Slide Number	Timing	No. Morphemes English Version	No. Morphemes Japanese Version
1	0:04	8	11
2	0:24	10	13
3	0:29	24	28
4	0:20	19	20
5	1:17	47	48
6	0:38	22	19
7	0:58	20	22
8	1:02	24	23
9	0:40	23	24
10	0:53	8	8
11	1:00	28	29
12	1:17	35	29
13	0:43	28	29
14	1:15	24	25
15	0:17	22	28
16	0:26	21	30

All pictures were identical across both language presentations (see Appendices 18 and 19) and each presentation was prerecorded by a native of that country. After the presentation started, the recording advanced in precise order with the slides automatically. The only changing variable was the font style between experiments. See script in Appendix 15. After the presentation was viewed, students were immediately given a survey to answer.

One survey was created and translated into the language of the location of the test. Each survey was printed using the same font style as the information presented in the presentation to avoid any interference from different emotions or the tone of the presentation changing with a different font tone. See Appendices 16 and 17. The survey contained 10 recall questions, eight were a write the answer and two were true/false types. Of the 10 questions: two were procedural questions, one was verbal only information that was not on the actual presentation slide, four required numerical answers, one was an opinion of the presentation, and two were nomenclature questions. Students were instructed to leave the space blank or write “Don’t remember” if they did not know the answer or to write a partial answer if they did not know the complete one. There was no time limit when answering the questions. Each answer was given a corresponding numerical value and partial credit was given for partially correct answers.

See Appendices 20 and 21. The recall test was chosen because it does not provide clues to the answers in the form of possible response choices. This is especially important given that the test was administered so soon after the participants finished watching the presentation. A recall survey is harder than a recognition test and more accurately represents how students retrieve and retain information (Gasser et al., 2005). See Appendices 16 and 17.

The title of the presentation was “A Foreigner’s Guide to Household Waste Disposal in Akitakata City” (See Appendices 18 and 19). This information was based on a very complicated garbage disposal procedure in the countryside, 50 kilometer north east of Hiroshima city in Japan. This procedure is unique, even in Japan, and no student had prior knowledge of this city or the unique procedures. Prior to the presentation, the researcher asked the subjects if anyone has ever lived in this city or was familiar with this garbage collection system. All students answered that they have not lived in this city or knew of their garbage collection procedures.

The USA version tested four kinds of font typefaces based on popularity, emotion, sans-serif, the current US Highway font (Clearview®/Road Geek) and similarity to Japanese fonts. The Clearview® font set was very expensive and the researcher found a similar font, Road Geek, at a fraction of the cost for this test. The

USA/English fonts tested were: Arial (similar to Helvetica), Comic Sans, Clearview® (Road Geek) and Verdana. All fonts were sans-serif. Arial (Helvetica) and Comic Sans are two of the most popular fonts used today in the USA. Popular in use (Chapman, 2011) and popular in conjuring up emotional responses (Byford, 2012). Verdana was chosen because of its sharp edges, legibility and similarity in style of the Meiryo MS ClearType Japanese font (https://www.microsoft.com).

The Japanese version tested seven kinds of typefaces based on popularity, Japanese style groups, proportionality, functionality, and the current Japanese National Highway font used today. The Hiragino font used on National Japanese highways was also prohibitive in cost and a related font, HG-Maru Gothic was found to be similar and less expensive. The fonts tested were: Meiryo (Microsoft ClearType font), MS-Gothic (sans-serif, non-proportional spacing), MS-Mincho (popular for newspapers in Japan, serif, mono-proportioning), HG-Maru Gothic (Hiragino replacement, rounded and sans-serif), MSP-Gothic (proportional spacing, same as MS-Gothic), HG-Gyuosho hon (script style), and Aqua (handwriting style, simple, rounded edges, similar to a Comic Sans style). See Table 16 for the number of subjects for each test presentation.

3.5 Results

All data were analyzed using Microsoft® XLSTAT software Version 2014.4.02, Copyright Addinsoft® 1995-2014 (Registered version). Using the Grubbs Test (over 2 standard deviations,) it was determined that the Japanese data contained eight outliers which were omitted from the final analysis.

3.5.1 Scoring of Surveys

A point system was devised to determine how to score each answer (Appendix 20/21). For example, in question 6 of the survey, "When is waste paper collected?" the correct

Table 16. Number of Subjects per Font Style

Font Style English	English Presentation	Font Style Japanese	Japanese Presentation
Arial	6	MS- Gothic	35
Comic Sans	16	Aqua	26
Road Geek	13	HG-Maru Gothic	45
Verdana	22	Meiryo	30
		MS-Mincho	23
		MSP-Gothic	22
		HG-Gyousho hon	23
Total	57		204

answer was, 2^{nd} and 4^{th} Wednesday in English and 第2と第4水曜日 in Japanese. For a correct, complete answer a score of 5 was given. For the English version, an answer of

“2”, “4”, “2 times”, or “day” was given one point for each. For a “Wednesday” answer, two points were given. For example, if an answer of “2nd and 4th Tuesday of each month” was written, it was scored three points. For the Japanese answers, each answer was evaluated using a similar point system of the English surveys . An example of an answer of 水曜日,土曜日 (Wednesday, Saturday) would be given two points for the correct Wednesday answer but no points for the Saturday answer.

3.5.2 Analysis of Whole Data Sets (All Japanese and All English as Two Independent Groups)

Analyzing each data set as a whole (204 Japanese survey results and 57 English survey results), it was determined that both data sets were parametrically distributed, see Appendix 22. From this determination, a two- way independent ANOVA was carried out using the XLSTAT® macros-enabled program for MS-Excel® 2013. This analysis determined that the two variables, Japanese data and English data, were statistically significant, $p < .05$. See Appendix 22. After this test was performed, a post-hoc analysis using the Tukey analysis determined $p = .014$. This confirmed the significance of the data sets and rejected the null hypothesis. The null hypothesis, meaning that the variables, Japanese data collected and English data collected, are not random and are determined to have a pattern of differences. Thereby, proving this collection of data is not by chance. Since the two variables were determined to be significant, each data group was analyzed intra-culturally, between each font type presentation.

For USA data analysis (Appendix 22), a Newman-Keuls (SNK) analysis of the difference between categories found significant effects between font styles. See Table 17.

When analyzing each font style, the significance of the Arial font in the USA data is surprising and not very reliable as this font group contained only six subjects and cannot be considered to be an independent data set to definitively determine significance. A data set of ten or more subjects would make the data results more reliable. For this reason, only the Comic Sans and Verdana sets will be analyzed further.

For the Japanese data analysis (Appendix 28), a Bonferroni test was used to determine significance between the categories (fonts). No data comparisons were found to be statistically significant, $p < .05$.

Per question data analysis can be found in Appendices 23, 24, 25, 26, and 27. The survey given to the subjects contained different types of questions requiring certain types of data answers. See Appendices 16 and 17.

3.5.3 USA per Question Data Analysis

Significant results to a particular question answer were noted comparing Verdana and Comic Sans. This statistical significance highlights a possible connection of these typefaces and the factors that surround them.

Table 17. Summary of Font Data Results (Means and Significant Findings)

The Mean Scores of Correct Data: English Version (n=57)		
	Mean	SD
Arial (Helvetica)	23.33	3.2
Comic Sans	20.69	4.1
Clearview (Road Geek)	18.39	4.1
Verdana	16.36	3.3

Statistical significance was found for: English Version

Arial vs. Verdana	$p < 0.001$
Arial vs. Road Geek	$p < 0.025$
Comic Sans vs Verdana	$p < 0.002$

The mean scores of correct data: Japanese Version (n=204)

	Mean	SD
Aqua (n=26)	22.31	3.8
MSP-Gothic (n=22)	21.41	6.6
HG-Gyousho hon (n=23)	20.70	3.5
Meiryo (n=30)	20.37	4.9
MS-Gothic (n=35)	20.00	4.9
Mincho (n=23)	19.91	4.5
HG-Maru Gothic (Hiragino) (n=45)	19.91	5.4

The Comic Sans presentation was to an undergraduate Chinese language class, with an average age of 22 years. The room size was five meters by five meters and students were between two and five meters from the projector screen. The room was located in the basement with minimal sunlight.

The Verdana presentation was a graduate Speech Pathology class with an average age of 27 years. The room size was four meters x ten meters and students were between one to four meters from the projector screen. The room was located on the second floor in an inner room with no windows.

3.5.3.1 Question #3 True/False: $p < .0001$ (Appendix 24)

This true / false question: Recyclables category contains hair dryers, answer pertained to the classification of a hair dryer being a recyclable item. See script Appendix 15. The mean values of the results were: Comic Sans = 1.00 = False and Verdana = 0.364. All results for the Comic Sans were correct. The survey itself was different for Question number 3. Referring to Table 18, the information to answer this question was not in order of information given. Most questions followed the order of the information given but this question was out of sequence.

The term “Hair dryer” was not used or written in the presentation but the term "small electrical appliances" was. Also, on slide 13 a picture of a hair dryer was observed by the students. Hair dryers are common in size and shape for both countries, so a cultural misunderstanding is not a factor.

Since the actual word "hair dryer" was not written, we can conclude that the effects of a salient font, Comic Sans, which generated an arousal and heightened attention contributed to the awareness of the picture on the presentation slide.

3.5.3.2 Question #5: Procedural Question (How should you dispose of a milk carton?) Appendix 26

This question required understanding a detailed procedure for disposing of a cardboard milk carton. The script states, "For cartons, such as milk or juice cartons, you must rinse and flatten each carton and place them in the 'kamipakku' (Japanese for paper carton), designated bag. You can usually put about 25 flattened cartons in one bag." The presentation slide had only a picture of a flattened Japanese quart size milk carton, along with other items in that category. (See Appendices 18 and 19, slide number 7). The answer was determined by grading key concepts, "rinse/flatten/put in special carton bag." The mean data is as follows: Comic Sans 2.11 and Verdana 1.50. The maximum score was four. The Comic Sans group had a 15 percent better recall of

Table 18. Font Per Question Data Analysis

Question Analysis for Siginificant Data Sets					
English : Comic Sans+ Verdana			Japanese: Aqua+ MaruGo		
	p	Data Type	Significant / Not Significant	Tests Performed	Answer Located
Question #1:What is the name of the city that the presentation was made for?					Slide #1,2,17
English	0.625	non-parametric	NS	Wilcox, Mann-Whitney	
Japanese	0.292	non-parametric	NS	Wilcox, Mann-Whitney	
Question #2:How many categories of garbage separationis explained?					Slide #3
English	0.12	non-parametric	NS	Wilcox, Mann-Whitney	
Japanese	0.416	non-parametric	NS	Wilcox, Mann-Whitney	
Question #3:Recyclables category includesd hair dryers? (T / F)					Slide #13
English	0.0001	non-parametric	S	Wilcox, Mann-Whitney	
Japanese	0.45	non-parametric	NS	Wilcox, Mann-Whitney	
Question #4: What is the maximum length of most garbage collected?					Slide # 5,12,15
English	0.197	non-parametric	NS	Wilcox, Mann-Whitney	
Japanese	0.18	non-parametric	NS	Wilcox, Mann-Whitney	
Question #5: How should you dispose of a milk carton?					Slide #7
English	0.021	parametric	S	T-test, z-Test	
Japanese	0.232	non-parametric	NS	Wilcox, Mann-Whitney	
Question #6: When is waste paper collected?					Slide #5
English	0	parametric	S	T-test, z-Test	
Japanese	0.226	non-parametric	NS	Wilcox, Mann-Whitney	
Question #7: What kind of bottle has a deposit?					Slide #11
English	0.62	non-parametric	NS	Wilcox, Mann-Whitney	
Japanese	0.044	non-parametric	S	Wilcox, Mann-Whitney	
Question #8: How much is a large burnable garbage bag, in yen?					Slide #12
English	0.889	non-parametric	NS	Wilcox, Mann-Whitney	
Japanese	0.834	non-parametric	NS	Wilcox, Mann-Whitney	
Question #9: For non-combustable garbage, what is the maximum weight for each					Slide #13
English	0.067	non-parametric	NS	Wilcox, Mann-Whitney	
Japanese	0.086	non-parametric	NS	Wilcox, Mann-Whitney	
Question #10: Car batteries are considered hazardous waste and should be brought back to the store you bought it at? (T / F)					Slide #16
English	0.61	non-parametric	NS	Wilcox, Mann-Whitney	
Japanese	0.386	non-parametric	NS	Wilcox, Mann-Whitney	
Question #11: Do you recycle like this town? Do you like it?					
English	0.004	parametric	S	T-test, z-Test	
Japanese	0.157	non-parametric	NS	Wilcox, Mann-Whitney	

these procedures. Again, we can attribute this better retention to the arousal and heightened awareness of information presented with the use of the Comic Sans font.

Milk is a common drink in the USA and Japan. In addition, both countries have quart size cartons. The novelty is in the disposal. In New York City, milk cartons are considered recyclable as in Akitakata City, however a special color bin instead of a special bag is required. No previous knowledge of this procedure can be attributed to the scores.

3.5.3.3 Question #6: Procedural Question (When is waste paper collected?)

Appendix 26

The question, "When is waste paper collected?" is also a procedural question, such as question 5. The answer was two times a month and a particular day, 2nd/4th Wednesday. The conditions of disposal in Japan are similar to the USA but without the detailed restrictions of weight of bundles of newspaper (New York City Dept of Sanitation).

The means for each font are as follows: Comic Sans: 3.50 and Verdana: 1.59. The maximum value was five. The Comic Sans subjects did statistically significant better, 38% better on recall of this information.

From the statistically significant values recorded for the Comic Sans font and procedure questions numbers 5 and six, we can attribute a heightened retention in procedures when using the Comic Sans font.

3.5.3.4 Question #11: Attitude Toward this Survey (Do you recycle like this town? Do you like this procedure?) Appendix 27

The purpose of this question, “Do you recycle like this town? Do you like it?” is to measure if the font determined the tone of the presentation and the survey. Positive comments were given a +1 score, neutral comments 0, and negative comments -1. The mean results were very interesting, Comic Sans: -0.69 and Verdana: 0.

The strong negative emotional connotation toward the use of this font drew heightened arousal which then produced the highest level of retention of all the surveys in the USA group. This arousal, with heightened awareness of the font in the presentation, could have produced a response for retention since the attention of the audience is generated from the Comic Sans font usage.

3.5.4 Japan per Question Data Analysis

Significant results to a particular question answer were noted comparing Aqua and HG-Maru Gothic font types. This statistical significance highlights a possible connection to these typefaces and the factors that surround them.

The Aqua presentation was to an undergraduate English as a foreign language class with an average age of 18.5 years. The survey was conducted in the morning at 9:00 a.m. The room size was approximately ten meters by six meters and students were between two to seven meters from the projector screen. The room was located in the lower level with sunlight, darkened by blinds.

The HG-Maru Gothic presentations consisted of two undergraduate English as a foreign language classes with an average age of 19 years. The room size was ten meters by six meters and students were between two to six meters from the projector screen. The room was located where there was sunlight and it was darkened by blinds.

Only one question in the Japanese data set was determined to have a statistically significant result.

3.5.4.1 Question #7: Nomenclature Question (What kind of bottle gets a deposit?) Appendix 23

The question; “What kind of bottle gets a deposit?” was presented on slide number 11, about two thirds of the way through the presentation. This contained a special notification about the return of a 10 yen deposit for Japanese sake bottles. Most students in the Japanese group were not of drinking age, 20 years old and after the presentation some were overheard expressing surprise at this information. A deposit on all drink cans and PET bottles is common in New York but not in Japan. The novelty of the information may have caught the attention of the students.

The means of this question are very interesting, Aqua: 1.50 and HG-Maru Gothic: 1.04. The maximum answer was given a two. The results for Aqua were 23% higher than HG-Maru Gothic. The Aqua higher retention results can be attributed to the novelty of getting money back and the novelty of the font style being used. Both generating a higher level of arousal and but enough to heighten awareness and not interfere with encoding and retention.

3.6 Discussion and Further Analysis

Overall, the data collected between the Japanese and the USA groups were determined to be statistically significant comparing 2 groups and not font style, with an ANOVA. (See Appendix 22). This was an important first step in the realization that not only was the data collected statistically significant between cultures, but that valid individual font differences were recorded. Kanji/hiragana and the Romanized alphabet systems are obviously different but the cognitive processes of reading are the same, just in a different manner. Both writing systems have a font, a grammar, and a phonological unit associated to the glyph and meaning. Some fonts are similar, for example Verdana in English and Meiryo in Japanese. The question remains, is cognition and perception of certain fonts the same across all cultures?

Utilizing the factors in the perceptual set defined by Hardeep, Kaur and Shergill (2012), the data results can be analyzed.

Expectations: In both Japan and the USA, reading and writing begins in the first grade. The reading of textbooks influences how we perceive a font in understanding. As we grow older and are exposed to different fonts in the world around us, we adapt to expecting certain font styles for certain situations as stated in the example above about the usage of Comic Sans for a technical presentation or in an elementary school classroom. Student's expectation of the correct font to be used could heighten their motivation and make them more aware of certain information. This can explain the Comic Sans and Aqua high retention and significant data results.

Emotional state: As reported in the literature review, fonts are considered to be part of the tone of a text. In the USA, the Comic Sans presentation cultivated an interesting response from the students. Before the presentation, it was not revealed what the actual purpose was. The students were told to help in the evaluation of this public service information for foreigners living in Japan. After the presentation and collection of surveys, the students were asked if they could understand the test purpose of the survey and data collection. The only group that guessed correctly was the group of subjects exposed to the Comic Sans presentation. The strong emotional connotation toward the use of this font drew heightened responses and the highest level of retention of all the surveys in the USA group. In Japan, the use of Aqua, a childish uneven font style was chosen as a disfluent typeface, but in contrast, returned the highest retention rates of all surveys with significant results.

Question 11 on the survey asks the subjects if they practiced this kind of garbage sorting and if they liked this method of disposing of their trash. The results for the statistically significant observed font groups, Comic Sans and Verdana, revealed a negative response (mean -0.69, maximum is -1) for the Comic Sans group compared with a neutral response for the Verdana (mean =0.00) group. The Comic Sans cultivated a strong negative emotional response to the information presented therefore heightening awareness and retention.

For the Japanese surveys, comparing Aqua and HG-Maru Gothic fonts, the means were 0.15 for Aqua (SD=0.77) and -0.15 for HG-Maru Gothic (SD=0.95).

These readings were very close, indicating a neutral response across the data set. This finding is in agreement to the conclusion of Iwahara and Hatta's (2004) results. This research analyzed Japanese email messages and determined that the senders' font selection did not convey emotional information clearly. In addition, the reverse also had the same results for the addressee understanding the emotional tone via the font selected by the sender. Japanese emotional connection to font style was recorded as neutral.

Culture: From the analysis of the data gathered, we can determine that culture does shape the English usage of fonts in society. Emotional qualities are associated with them and are looked upon in some academic circles as art. In Japan, calligraphy or *shodo* in Japanese is an art in itself and is very specialized. Fonts are used for specific situations, just as in America. However, as the research has shown, no heightened attention was indicated in these findings. The high retention score of the Japanese Aqua font can be considered to be a "kawaii" or cute form of public announcement commonly found in Japan. Usually signs for public directives, for example construction or government departments have child-like cute characters to represent them and enforce their policy. For example,

> "'Pipo-kun, is the mascot of the Tokyo Metropolitan Police Department. With big ears to hear the voice of the people and an antenna to detect trouble,

Pipo-kun appears on posters, in videos and safety campaigns to prevent crime. The Tokyo Fire Department and The Japanese Self Defense Force also have mascots designed to soften their image and win the hearts and minds of the public" (Yamaguchi, 2008, par.6).

The posters in Figure 24 contain messages in fonts that are mainly sans-serif and rounded. Figure 24 shows some examples of subway manners posters. The font

Figure 24. Public Directives from the Tokyo Metro Subway (Tokyo Metro, 2013)

characters are thin, san-serif, rounded and not very edgy. There are two to three types of fonts on one poster, and it uses bold weights. This message is not very stern or official, but funny or even child-like with the characters used. This effect and the disfluency effect could have influenced the heightened emotion and awareness of the brain to produce the highest retention rates in the Japanese experimental group.

Early research of retention of read materials related it to fluency. Fluency, measured in words read per minute, was used to register how legible the typeface is on a page. Increased fluency is believed to relate to the retention of material read. This legibility/fluency theory lead to the utilization in the test presentations to include the highway font types in the Japan and the USA in the test presentations. Since the test vehicle was a presentation, using a font specifically designed to be seen at a distance should offer optimal fluency conditions in order to read the slides and lead to better retention. From the data analyzed, this theory was not observed as a factor in retention. For the USA presentation using the Road Geek (Clearview®) font, the mean retention score observed was 18.39. (See Table 16) This font was ranked third out of the four fonts tested. For the Japanese retention mean scores, the highway font was represented by the HG-Maru Gothic (Hiragino), a mean of 19.91 was determined. This retention rate was ranked *last* out of seven font types that were tested which suggests that legibility and fluency are not the only factors in the retention of information.

Motivation: Students were given an option to join in this study. Those that chose to watch the presentation and fill out a survey were rewarded with a snack, in the Japanese classes and a $5.00 Starbucks gift card in the USA classrooms. This displayed a motivation and interest in participating in this research. In addition, though not specifically measured, recycling in general is a very popular topic in society today. The way this city recycles is an extreme case and some students found it interesting and daunting to the reality of what is actually required to save the environment.

3.6.2 Trends in Information Retained

The most interesting results from the statistical analysis of the per question scores (Appendices 23, 24, 25, 26 and 27) came from the statistical significance of two questions for the USA data regarding the retention of procedural information. For both questions five and six, the findings indicated that the Comic Sans presentation scored higher than the Verdana one. The curved, sans-serif form of Comic Sans and the emotional impact generated by the students could have affected the emotional component. Being salient, emotions heightened along with general interest in the subject of recycling in general attributed to these findings. Though the standard deviations were large (see Appendix 25) this result deserves further research and discussion.

3.7 Conclusion

This study set out to explore if font style has an effect on retention of material presented in multimedia settings. Results showed that For Japanese speakers and their use of font, statistically significant results could not be confirmed concluding that font style is not a factor in the encoding and retention of information presented via multimedia. However, the English results revealed statistically significant findings leading to the belief that font and the encoding of information are dependent variables. Those results are relevant to today's use of electronics in the classroom and can be applied to situations using multimedia as a source of instruction. Up until recently, font styles were carried over from print sources and digitally re-mastered to be read from an LCD screen or projector. The clarity of the font was not up to the same standard as looking at a printed page. In addition, because control of which font to use in these educational environments was transferred to the educators, font guidelines and usage rules were not usually followed. These guidelines and rules used to be followed by graphic designers or artists. Computer programs gave this control of choosing a font style to the common user, as a result there was an explosion of fonts available for all kinds of multimedia. The criteria for a font to be used was more of a personal choice than one guided by scientific research and statistically proven results.

3.7.1 Findings

Through the literature review and research, it was discovered that font style usage and attitudes are different between the USA and Japan. A data analysis determined that the results collected were statistically significant and were in need of a deeper analysis. This in-depth analysis could contribute to the beginning of a visual grammar of fonts and retention.

3.7.1.1 USA (English) Data Findings

In the USA, font styles have strong personalities and expectations are high as to which font to use for a particular situation which sets the tone of a document and creates certain attitudes toward the information. From the results of the data analysis, it was found that there were more significant statistical findings comparing data sets of different fonts. In addition, attitudes towards the information were influenced the font that has been described as “ sloppy,” “childish,” and “not professional” (Mackiewicz, 2003, p. 214-215). The research results supported these findings with heightened emotional component associated with the Comic Sans font and a higher level of retention observed but with a lower attitude score. This hard-to-read font can also be associated with the disfluency findings of Diemand-Yauman et al. (2011). Hard-to-read fonts caused a heightened attention and an increase in the encoding level, which in turn leads to higher retention of printed information.

This research also contributed to the expansion of additional factors related to retention. Fluency and encoding are not the only factors to measure retention. One of the test fonts, Road Geek, is used as a Highway font and is proven to have increased and superior visibility at far distances (Garvey et al., 1997). However, the results of the test data set in this research utilizing this font style as a test variable, did not reveal any superiority of information retained.

From the list of factors in a perceptual set, “expectations” were shown to also have the greatest influence on information retained in the USA data. Even though the number of participants was low (under 10) the Arial font had the highest retention rate. Arial or Helvetica, its close cousin, is a font most used for public transportation directives in the New York City area (Shaw, 2008), where the testing took place. This familiarity of use in the environment and expectations related to public directives could have an influence on judgement of information.

The findings support that some disfluency, expectation and attitude toward a font effects retention of information and can be added to the list of guidelines of fonts to be utilized in educational environments.

3.7.1.2 Japanese Data Findings

In Japan, font style has been shown in research findings to have an emotional tone in font styles (Caldwell, 2013); however, this emotion is directed differently as to the expectations of when and where to use a particular font. Japanese culture has a deep rooted interest in and practice of calligraphy. A majority of students in Japanese public schools start learning this craft at an early age. This designer's eye makes their citizens more experienced and adept to choosing an appropriate font. Typeface designs and styles are deep rooted and a variety of choices are not as vast as their English counterparts. Japanese fonts have a specific usage in certain situations. For example, the MS-Gothic font is the most widely used font in Japanese newspapers. There is a font style named textbook style for the nationalized educational system. These fonts have a purpose and do not cultivate the emotional properties that were observed in the USA test locations.

The emotional, legible, or disfluency components observed in the USA data were not statistically observed in the Japanese data sets. Only the strongest retention font Aqua and the lowest retention score font, HG-Maru Gothic displayed statistical results ($p < .05$), a statistically significant difference. In addition, if you calculate the difference in the mean retention scores, Aqua –HG-Maru Gothic = 22.31-19.91= 2.40 delta as compared to the USA delta mean scores of Arial – Verdana = 6.97, the USA score is double the difference in retention values. We can conclude from this result that the Japanese font style is not always directly related to retention of information. The novelty of the aqua font with a cute, childlike appearance, is a form of disfluency or attributed to a salient characteristic, that can be related to the expectation of the "kawaii" factor or heightened awareness of the public directive in this experiment. (Yamaguchi, 2008).

3.7.2 Theoretical Implications/Concluding Comments

Utilizing the statistically significant data findings of the USA data, we can observe an emotional component in the connection between font use and retention. Strong emotions effect retention, such as the case with the Comic Sans findings. From this observation, we can add a component to Baddeley's (2012) model of visual working memory.

Baddeley designed a flow of information from perception to working memory

(2012). See Figure 25. Combining this diagram and the statistical results of the data collected, font recognition can be added to the process of shape perception and connected to a specific area in the brain for this type of visual processing. However, this encoding of typeface is a parallel process and must include an emotional component to the flow of information to the central executive. The episodic buffer combines the forms and cues of word/character recognition and then adds the articulatory portion of the phonological loop and/or lexical meaning retrieval from long term memory. In addition, before this word recognition, at a pre-lexical level, interference can occur (Baddeley, 2012). From the information retrieved and analyzed from the USA test presentations, this interference can be caused by legibility, emotion, distraction and/or expectation of a particular font used in a particular context and can be diverse in its effect across cultures. Confirming Dresler, Mériau, Heekeren, and Van Der Meer (2009) research that found emotional words, bringing about an arousal response, were better re-called and recognized than neutral words Arousal does have some retention benefits.

There are many factors that influence the retention of information presented in educational environments using multimedia. This chapter attempted to define a visual grammar with respect to retention and font style. With the increasing and widespread use of digital multimedia resources in the classroom, guidelines based on statistically significant results and research are required. This study presented a cross cultural comparison with information and results of retention from presentations with differing font styles. The results noted that USA students react with strong emotions to fonts that are not considered appropriate for educational environments. Some emotions can distract and interfere with retention. In contrast, some font styles can heighten awareness of information and in turn lead to better retention.

Japanese students are neutral to font style and have slight expectations to the type of information being presented and relation to the type of font utilized. When designing multimedia materials, it is important to carefully consider the cultural background of fonts that students are exposed to as well as the information being presented in order to maximize retention of information.

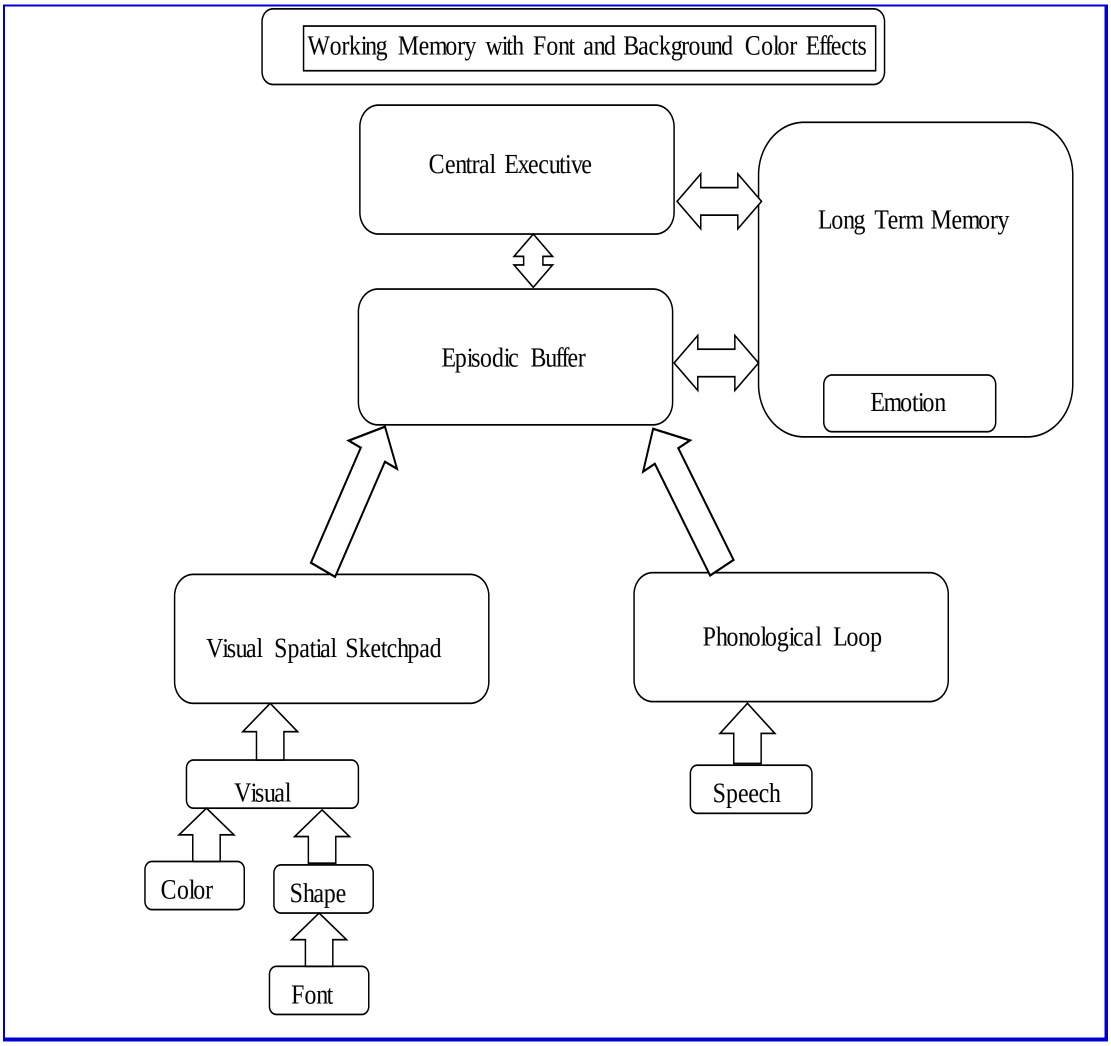


Figure 25. Adaptation of Baddeley's Flow of Information from Perception to Working Memory (2012, p. 23), (Emotion and Font Perception were added.)

Chapter 4

Text Density and Retention

Chapter 4: Text Density and Retention

4.1 Introduction

"Multimedia instruction refers to presentations involving words and pictures that are intended to foster learning" (Mayer, 2009, p. ix). The multimedia part of this instruction is not only the use of computers. This also includes textbooks with pictures, handouts, videos, etc., anything that uses "multiple" sources of media for learning. The science of learning and the science of instruction have been subjects of psychology for 100 years (Mayer, 2008). Recently, over the past 30 years, there has been a renewed interest in these sciences with the introduction of the computer into the classroom. When constructing instructional materials, background color and font style are considered as the first step to design for maximum cognitive processing. However, how the information is actually displayed on a page, slide, or animation in the chosen media and how this information is retained by the learner also needs to be considered for principles followed for maximum retention.

The thesis question for this section of the study concerns the number of words on a page of a multimedia presentation with a verbal message. Is there an optimum number of words, morphemes, or “chunks” of information on this slide to produce an optimal retention of information? This optimum number will be just before the threshold cognitive overload begins, enhance the encoding and retain information for retrieval. From experiences as a presentation teacher at the university level, student generated slides to accompany their presentations had a range of observations from almost no text on a slide to the whole script on a screen. In addition, this research will determine if retention of this optimum number of words on a slide is variable or consistent across cultures.

The rationale in determining the optimum number will help in devising guidelines for educators on how to quantitatively present information and avoid cognitive overload. There are many “how to” books that claim six words and six lines on a page is best (Zimmerman & Zimmerman, 2007). These books and consultants use these numbers as a guideline but, upon further investigation, it has not been based on statistically significant data results. Supporting this “rule” or leading to better guidelines is the goal of this study.

In the first half of this chapter, I will discuss the capacity of visual working memory and theories associated with this value. The theories of cognitive psychologists on retention and multimedia design will be analyzed and compared for commonalities in research paradigms. In addition, recent research on cognitive overload of visual and verbal parallel messages and the implications on the benefits and obstruction of information being maintained and placed into long term memory will be discussed. Cognitive theories and a cross-cultural component to this theory will be tested and analyzed for differences in retention based on Japanese character lengths, morphemes and "chunk" theory (Cowan, 2000, p. 87).

In the second half of this chapter, I will discuss my own original research and data collection based on a test presentation that varied the number of words on a presentation slide. Students in Japan and the USA were presented with an automated PowerPoint® slide show and were given a simple true/false survey to test information retained. This method of collecting data is based on common usage of this style of classroom use of multimedia in a university setting. This section will seek to determine the limitations of the visual design of multimedia information that is supported by an aural message. In addition, to also determining if there is a difference in this quantitative amount of information between cultures for maximum and optimum retention.

4.2 Literature Review and Current Research

To address the theories, effects and principles involved in the retention of facts, concepts, procedures, strategies and beliefs (Mayer & Wittrock 2006, taken from Mayer 2009), we must first examine the construction of the working memory and the components involved in processing knowledge into long term memory.

Knowledge that we acquire and learn is separated into primary and secondary knowledge. Leahy and Sweller (2011) state that the knowledge we acquire in schools or educational settings is secondary knowledge. Primary knowledge is information we acquire after centuries of evolution which is biologically primed in our brain (Geary, 2007). Geary (2007) claims that to process these two different kinds of knowledge requires two different areas of cognition. The reason for this distinction is to specify that the research in this chapter will pertain to secondary knowledge. Examples of secondary knowledge are culture specific skills that are “competencies acquired through formal or informal training” (Geary, 2007, p. 3). The processing of primary knowledge uses systems that operate more or less automatically and are below conscious awareness in humans, like the fight or flight reaction that is intrinsic in humans.

4.2.1 Chunking and Propositions

As presented in the previous chapter, Baddeley, Eysenck, and Anderson’s (2009) model of working memory has many components and channels. See Figure 25

. The importance in the design of instructional material information is to make sure that it is encoded and processed into short term memory, then held in the long term memory. This perceptual information is processed and passed to perceptional channels inside the working memory and is then sent to systems that integrate this information which (hopefully) forward it to long term memory. Baddeley, Eysenck, and Anderson (2009) described working memory as having four main parts, the visual spatial sketch pad, (VSSP), the phonological loop (articulatory loop), the episodic buffer, and the central executive. The working memory has a limiting capacity. For example, when remembering numbers, research has shown that the working memory is only able to retain six to seven digits (Morey & Cowan, 2004). However, the working memory "is likely to be shorter for words" (Baddeley, Eysenck, & Anderson, 2009, p. 39). Baddeley, Eysenck, and Anderson (2009) go on to state that the performance of the working memory is limited also by the number of 'chunks' that are processed. This information concerning the capacity limit is also addressed by Cowan (2000) and Nikolić and Singer (2007) who state that humans are unable to hold more than seven items of new information and can probably process no more than four chunks. These are vague terms that are open to different interpretations. Kintsch and Keenan (1973) called these items or chunks, "propositions." Propositions or chunks are a basic unit of memory for text according to the content and meaning which consist of a term and one or more arguments. An example sentence from Kintsch and Keenan (1973) is “Romulus, the legendary founder of Rome, took the women of the Sabine by force” (p. 59). This sentence has four propositions, (1) Romulus took women by force, (2) Romulus was founder of Rome, (3) Romulus was legendary and (4) Sabine Women. The reasons for using this guide for determining the capacity limits of memory is because the brain does not remember text verbatim, but decodes as to the content/meaning of each chunk (Kintsch & Keenan 1973).

4.2.2 Working Memory Sub-Systems

Research has shown that perceptual processes in the Working Memory are combined/integrated in the episodic buffer. When listening and reading simultaneously, which perceptual processes have more priority or is all of the information processed equally? In addition, what are the capacities of these processes before they overload the episodic buffer and the information is not retained in long term memory and forgotten?

The term “buffer” is defined in computer terms as a storage area where calculations are stored before they are sent to the processor. Computers, like the human brain, have a capacity which limits the retaining of some information sent to it. This overflow is lost information if it is not processed fast enough by the processor (Central Executive in working memory). The Merriam-Webster Online dictionary (2015) defines "buffer" as "a temporary storage unit, *especially* one that accepts information at one rate and delivers it at another." Without the Episodic Buffer, the signals from the VSSP, and Phonological Loop systems can overwhelm the brain. It is actually a regulator of information to the brain so that the processor (Central Executive) can process this information into LTM. See Figure 25. Mayer (2009) has a similar theory, but a different configuration of the Working Memory.

While concentrating on the visual and auditory systems, the "sounds," "images," "verbal model," and "pictorial model" portions of Figure 26, can be related to Baddeley's episodic buffer. To reiterate, the episodic buffer combines the forms and cues of word/character recognition then adds the articulatory portion of the phonological loop and/or lexical meaning retrieval from long term memory. The Mayer and Moreno (2010) "integrating" system can be related to the central executive region of Baddeley, Eysenck, and Anderson's (2009) working memory diagram (Figure 25). The central executive is said to have four functions (Baddeley, 2012): (1) to focus attention, (2) to divide attention between two streams, (3) to switch between tasks, and (4) to interface with the long term memory. The central executive, like the "integrating"

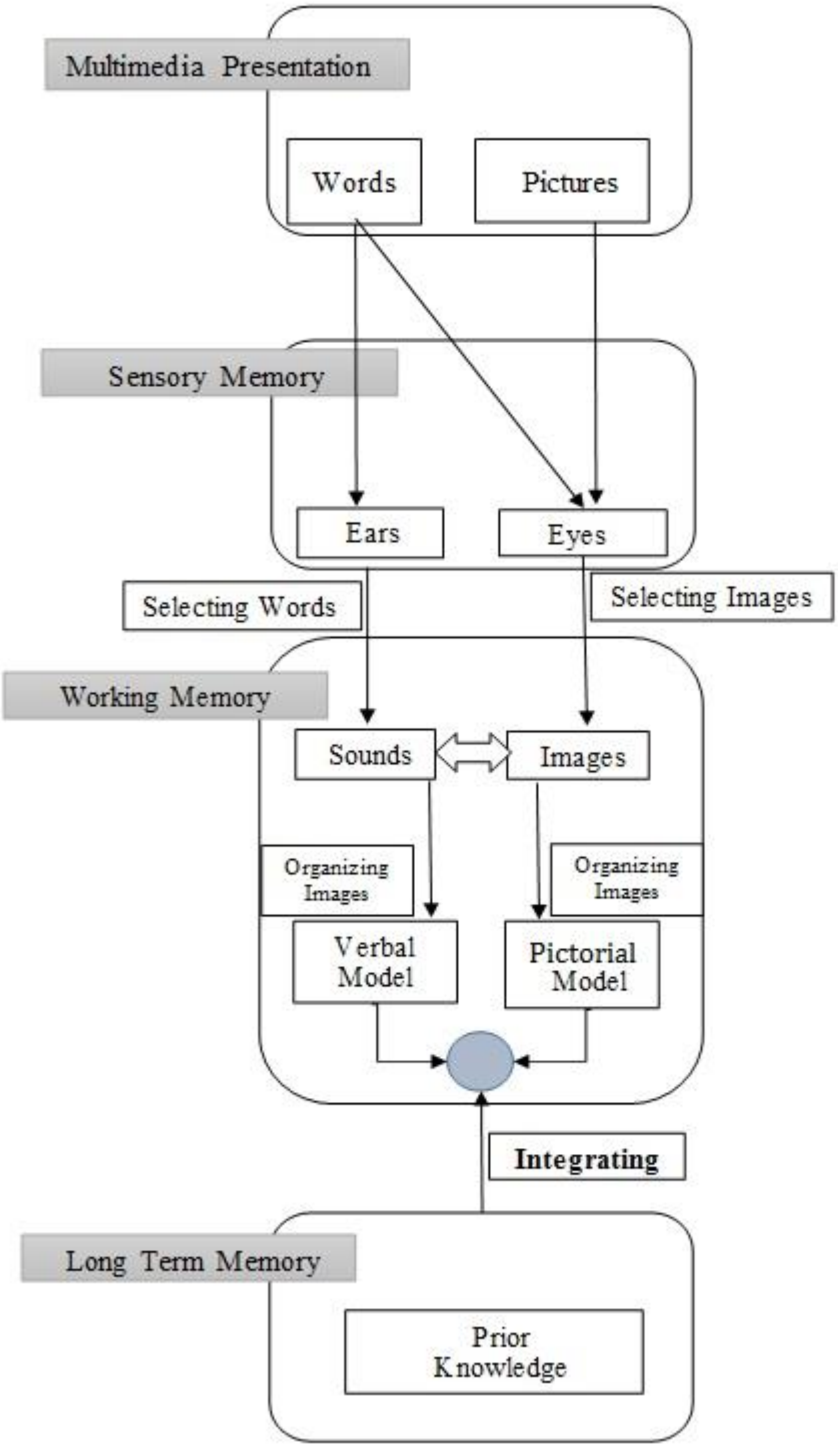


Figure 26. Cognitive Theory of Multimedia Learning
(Adapted from Mayer & Moreno, 2010, p132)

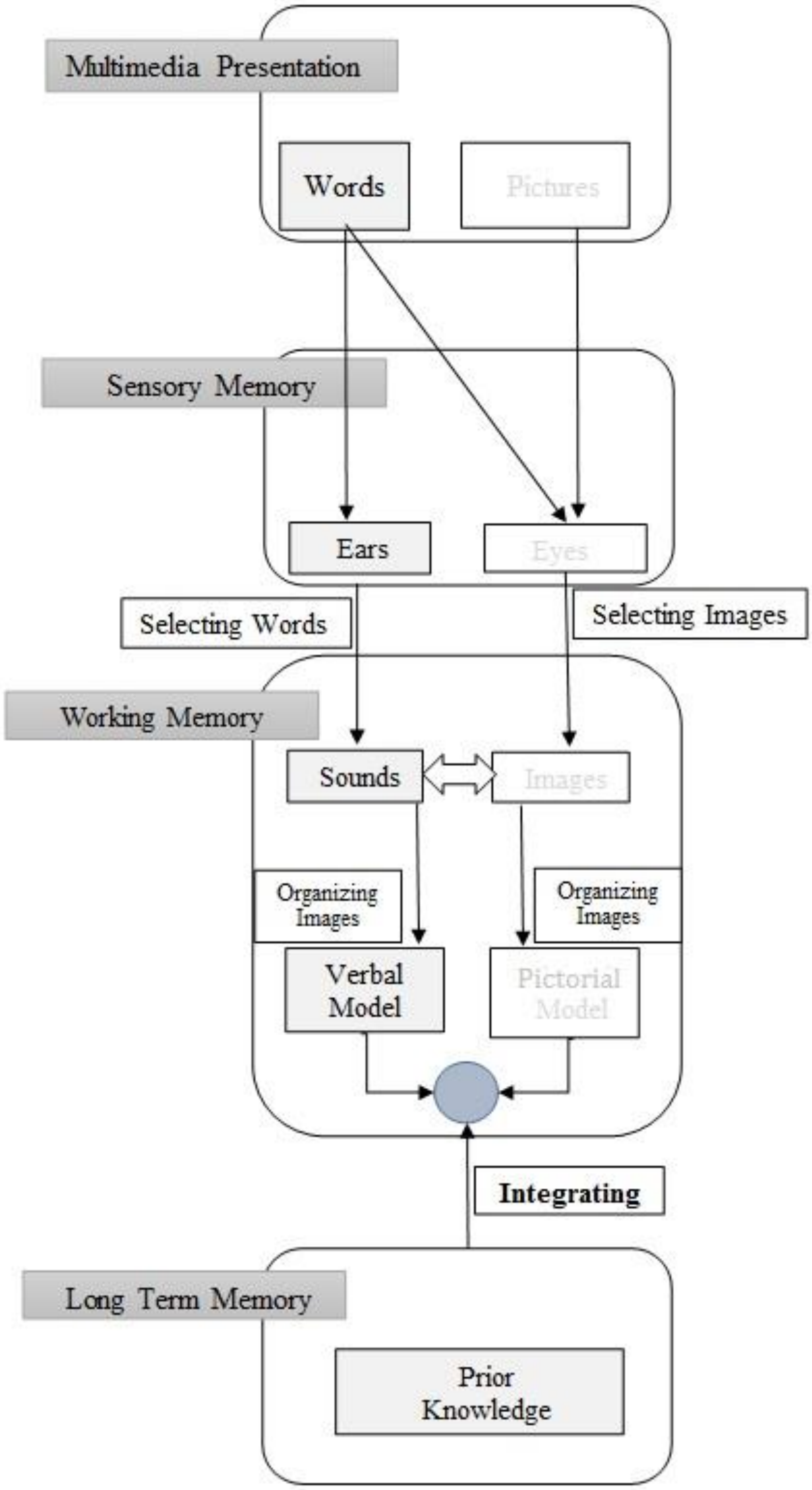


Figure 27. Processing of Spoken Words
(Adapted from Mayer, 2009, p. 77)

system of Mayer and Moreno's (2010) model, is a "purely attentional system with no storage capacity" (Baddeley, 2012, p. 14). The small dot in Figure 26, as a representative of this integrating system, does not do justice to the importance of this step in Mayer and Moreno's (2010) model and the attention it deserves.

When a human is exposed to sounds, the auditory portion of working memory is accessed and the information is processed (Figure 27). However, when a person sees an image, picture, or animation, the information is processed from the eyes, then encoded as images in the working memory. From there it is determined to be an image as opposed to a word, the pictorial model then sends this information to the integrating system that accesses the long term memory to assist in encoding this particular visual image. See Figure 28.

The process for reading words utilizes both paths as the visual (images) and articulatory (sounds) processes are activated simultaneously. See Figure 29. For example, when reading a word, the eyes see the letters, pass these images on to the working memory where it is encoded as letters with the corresponding sounds, from the Verbal Model, then all of this verbal (letter sounds) and pictorial (letters) are organized and encoded , with the help of the long term memory to read the meaning of the word read in the integrating system.

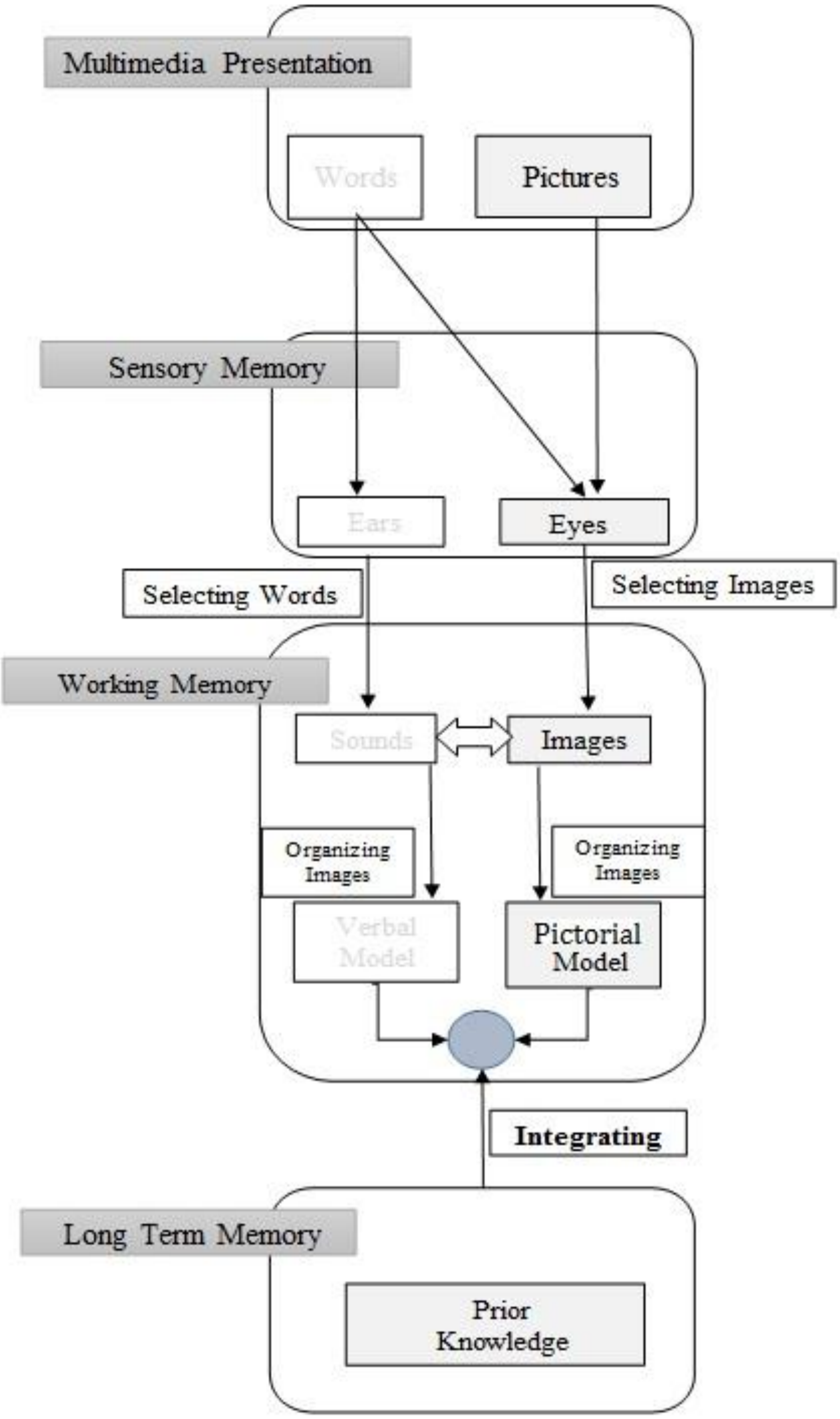


Figure 28. Processing of Images/Pictures (Adapted from Mayer, 2009, p. 77)

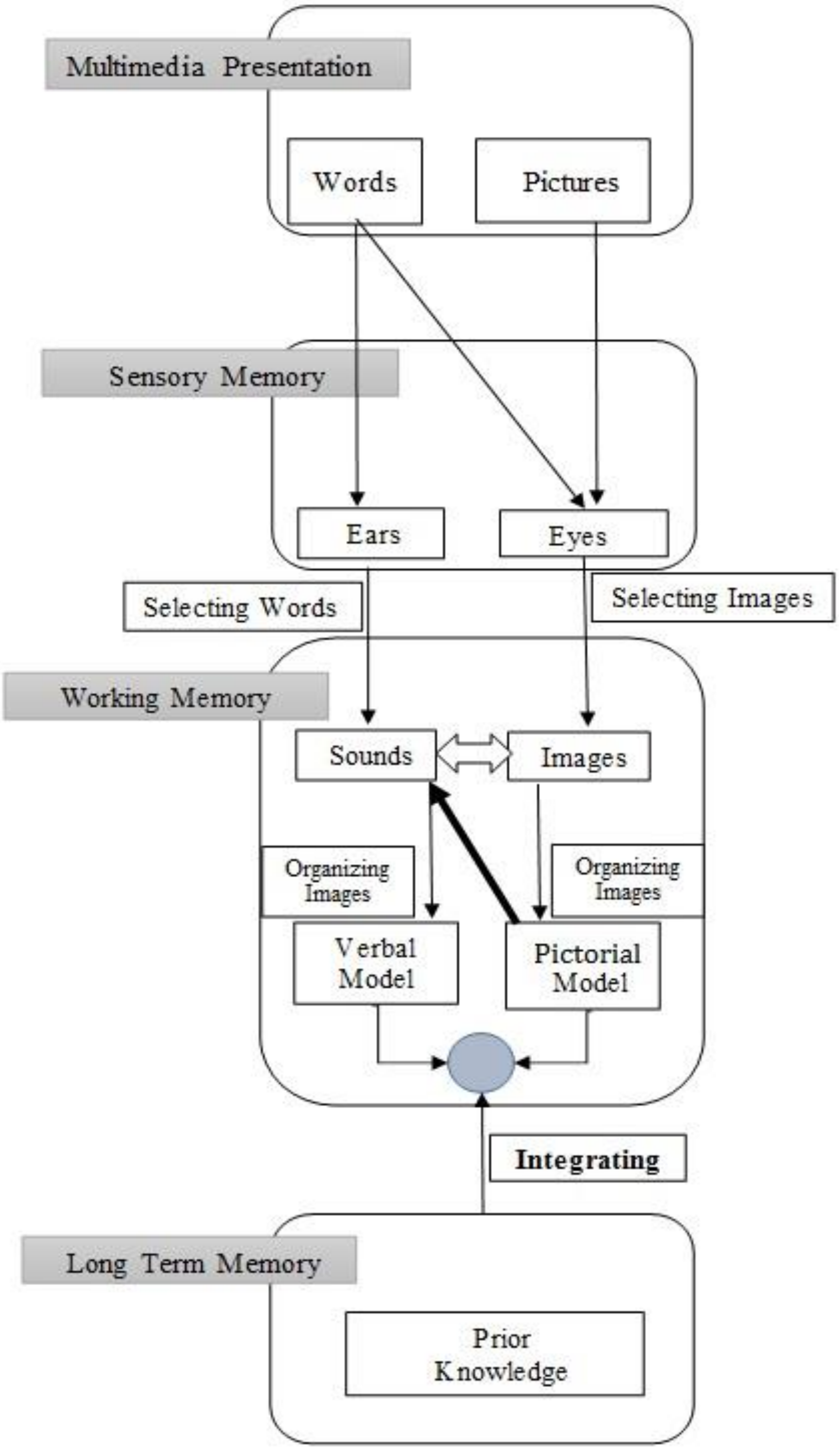


Figure 29. Adaptation of Processing of Spoken Words (Mayer, 2009, p. 77) to Include Processing of Kanji Characters

For Japanese reading of kanji, the process is a little different. As Figure 29 demonstrates, the processing of printed words (Japanese kanji/kana) also takes place mainly in the sounds and verbal model (Mayer, 2009). Japanese kana follows the path of processing English words by sounding out the letter/kana to combine and make words. However, for processing Japanese kanji, there can be a link between the pictorial model and sounds area of working memory. The process of encoding kanji can be reverse of that for Kana in that meaning is initially connected to the kanji and then to the sound of the characters. Figure 29, made by the author, and shows the addition of a link to access the sounds part of working memory after the pictorial model determines the meaning of the character.

The above systems that are separate and distinct for visual and auditory perception signals are called “dual channels” of processing in working memory (Paivio, 1990; Mayer, 2009). In his ground-breaking work, Paivio (1971, 1986) called this basic brain mechanism the “ Dual Channel Theory” in which the brain accesses two channels separately, for example with speech and pictures. Each channel has separate functions, one is used to process words and the other for pictures (Clark & Paivio, 1991). Processing of relaying information from perceptual channels into the episodic buffer and is balanced between these two channels. Twice as much but different information is processed efficiently which leads to deeper learning and storage in long term memory. An example of this theory is the “Modality Effect” that was discovered when testing the Dual Channel Theory. Low & Sweller (2014 p. 147) state “under certain well-defined conditions, presenting some information in visual mode and other information in auditory mode can expand working memory capacity.” This effect can be described in the working memory when the dual channels (Visual and Spoken) are accessed, then at integration or in the episodic buffer, this information is processed more effectively than with redundant text and graphics or with no audible mode of information with the graphic. It was discovered that the accessing of dual channels were found to be superior to visual form only processing of information into long term memory (Leahy & Sweller, 2011). Experiments confirming this theory show that the dual channel effect is superior for retention when visual information and auditory information do not have any distractions from the goal of the task and prior knowledge of basics is known before providing the multi-modal material. Mayer (2009, p. 200) went even further to discover a Modality Principle whereby “people learn more deeply from pictures and spoken words than from pictures and printed words.” Mayer’s theory on this effect is based on evidence gathered by testing subjects via a computer display to learn a scientific principle. This scientific principle, for example, how lightening is formed, is shown with an accompanying explanation. The dual channel, both visual and auditory explanation was recorded as retaining more information that the single channel method (pictures only.)

Why do people learn more from pictures with spoken words? Comparing Figures 30, 31 and 32, we can see that two distinct channels are used for images and spoken words, but there is a crossover and sharing of processing power with written words. As stated previously, working memory has a limited capacity of information that it can process (Baddeley, 1992; Chandler & Sweller, 1991). Here the written word and spoken word are using the same processing areas, i.e. episodic buffer or integrating area, and sometimes, when too much information needs to be processed, will eventually lead to cognitive overload and forgetting. In addition, Clark and Paivio, (1991) state that the verbal processing portion is also involved in an additional load of processing the sequencing of characters (or in this experiment, hiragana) to make words. “Verbal representations are generally processed in a serial or sequential manner” to understand the utterance or sentence written (Clark & Paivio, 1991, p. 151). Though some images might produce a higher than usual activity in processing, verbal representations must sequence at all times thus causing more processing than images.

4.2.3 Cognitive Load Theory: Effects, and Principles

What kinds of information produce this cognitive overload? Is there an optimum, balanced or germane effect? Sweller (2010) and Mayer (2009) devised a Cognitive Load Theory (CLT) that describes this processing of multiple channels across areas of Working Memory into three forms: (1) intrinsic (essential), (2) extraneous, and (3) germane (generative). Sweller (2010) states that these loads depend on the nature of the learning material and instructional design that works together in cognition (Yang, Chang, Chien, Chien, & Tseng, 2013).

Intrinsic/essential load "relates to the inherent complexity of the learning materials and cannot be readily altered by instructional interventions" (Diao & Sweller, 2007, p. 80). This kind of load is decided by how efficiently the elements to be learned (is it new, novel information) interact with each other. Information that has a complex, element interactivity produces a high intrinsic cognitive load because these discreet parts must be processed "simultaneously in working memory while low element interactivity elements can be processed in isolation" (Diao & Sweller, 2007, p. 80). Mayer (2009) relates this load to the complexity of information of the essential material that is learned.

At the same time processing is occurring, extraneous cognitive load may also be processed. This extraneous information has no connection to the goal of instruction and is also dependent on the format of instruction. Extraneous cognitive load "requires learners to engage in unnecessary cognitive activities that do not contribute to schema acquisition and automation" (Diao & Sweller, 2007; Sweller, 2010, p. 80). A schema is defined as the way the brain combines multiple elements of information and treats them as a single idea (element) according to the manner in which it will be used (Sweller, 2010). An example of the processing of schemas by automatically retrieving them from long term memory is the ability to read. When we begin to read English we consciously read letter by letter until we form words. As our reading becomes more advanced and as we read faster, our brains develop reading schemas and automatically access them when reading. The schemas automate the process of letter combinations, forms and meanings. The more we read, the more automatic the reading schemas in our Long Term Memory are, and the faster we can read and comprehend more difficult and complex words.

Germane/generative cognitive load is the actual making of these schemas and storing them in long term memory. This is dependent upon the instruction mechanism and forms of the information presented. Diao and Sweller (2007, p. 80) state, "Efficient instructional designs should be able to reduce extraneous cognitive load and at the same time increase germane cognitive load." Mayer (2010) calls this germane load the most important of all three loads during learning where the organizing and combining of processes are integrated.

The total cognitive load, intrinsic, extraneous and germane, must stay within working memory limits if learning is to take place. Mayer and Moreno (2003) have researched extensively on cognitive load and have devised and defined effects and principles relating to how to *reduce* extraneous processing, *manage* intrinsic/essential processing, and *foster* germane/generative processing. This paper will choose the effects and principles that were tested and develop a definition of these overlapping and slightly different research expressions.

Sweller (2010) defines many types of cognitive effect that can add or detract from learning. Of note is the effect of redundancy. Mayer (2010) defines redundancy as a principle to be considered during multimedia designing of formats. Both Sweller and Mayer agree that this is a form of extraneous cognitive load that must be reduced (Sweller & Kalyuga, 2014).

The redundancy effect/principle states that people learn better from graphics/images/animations and narration than from graphics/images/animations, narration, and text combined. One study claims that whole or part of any text that is repeated from the narration has weakened retention and exerts a significant cognitive load (Kalyuga, Chandler, & Sweller, 1999). Kalyuga, Chandler, and Sweller (1999) looked at the redundancy effect as detrimental to retention as the processing channels are overloaded with extra information. Another researcher (Mayer, 2009) states that too much repeated text leads to cognitive overload, agreeing with Kalyuga et al. (1999), but that a portion of the repeated text may be beneficial in reducing cognitive load and increasing retention or the transfer of knowledge.

The Modality Principle, as defined by Moreno and Mayer (2002, p. 159) along with many other researchers, demonstrated that people “learn more deeply from pictures and spoken words (narration) than from pictures and text only.” Narrated presentations significantly resulted in increased retention compared to the same presentations with no spoken component (Penney, 1989). Mayer (2009) deepened this understanding of modality by defining a “redundancy effect” which refers to “any multimedia situation in which learning from animation/illustrations and narration is superior to learning the same materials presented along with printed text that matches the narration” (p. 125). The negative effect of the text component is what Sweller (2010) defined, but Mayer adds an additional theory called the “Signaling Principle” which counteracts Sweller’s version of the redundancy effect. This principle states that the use of cues to highlight important areas, essential elements or organization of information to be learned, enhances retention. These typographical cues can be actual words, underlining, capitalization, italics, bold face, and color variations of text (Lorch, Pugzles, & Klusewitz, 1995).

The Signaling Principle has been shown to reduce extraneous cognitive load by focusing attention on important information and showing the learner the main or generative information to concentrate on. Extraneous information that can put an extra load on the working memory is reduced by returning attention from the distracting information that will be detrimental to the learner. Ozcelik, Arslan-Ari, and Cagiltay (2010) used eye movement analysis to record where a learner looks when watching instructional videos. Two videos were developed with typographical cues in one and none in the other. The results showed that transfer scores were higher in the signaling/cue video, proving that deep processing had occurred. Student eye fixations were frequently placed on the cues and more time was spent looking at this information. In addition, when the cues accompanied an image, the learners spent more time fixated on the part of the image that the cues signaled. Learners were able to use more of their cognitive processing to concentrate and learn the pertinent information proving the benefits and importance of the Signaling Principle.

Another researched-based principle of effective instructional design is the coherence principle (Fletcher & Tobias, 2005; Mayer, Heiser, & Lonn, 2001; Mayer & Johnson, 2008) . The coherence principle's main focus is the reduction of extraneous material that can lead to extra processing in working memory. It can be broken down into three circumstances (Mayer 2009, p. 89):

1. Learning is improved when interesting but irrelevant words and pictures are excluded from a multimedia presentation
2 Learning is improved when interesting but irrelevant sounds and music are excluded from a multimedia presentation
3. Learning is improved when unneeded words and symbols are eliminated from a multimedia presentation.

Mayer (2009) and Wiebe and Annetta (2008) report on findings when narration is reduced to a summary rather than a long detailed, and quantitative narration. The research in this paper is concerned with the amount of text on a visual, such as a presentation slide and the finding of the limits of these "unneeded" or "irrelevant" words or captions before cognitive overload takes place and hinders retention. For example, how long or short is a caption/cue before it has an effect on cognitive processing? Wiebe and Annetta (2008) used an eye tracking experiments to study where a learner fixates on a slide when narration is present in a presentation. The slides contained an image and text. There were two versions of slides studied with "high density text" and "low density text." Density is defined as the word count on a slide. In the Wiebe and Annetta (2008) experiment, high density had up to 92 words on one slide and low text density had as low as 15 words on a slide. Their research reported that slides with static graphics and low density text held the visual attention of the students when narration was added. Slides that contained high density text were observed to have a significant shift in the amount of time spent on the text and moved attention over to the graphic with narration. The researchers explained that the latter observations may have been due to the increased cognitive load of having to read dense text and listen to redundant narration simultaneously. The learners unconsciously directed their attention to the less cognitively demanding visual. Can a quantitatively measured low dense and high dense text slides be realized? How can this design variable be concretely determined?

One recent interesting discovery in materials design for instructional research has shown the effects of the use of sentence headlines in presentation slides. This research countered the redundancy effect of displaying text that is repeating the narration. Alley and Neeley (2005); Alley, Schreiber, and Muffo (2005); Alley, Schreiber, Ramsdell, and Muffo (2006); and, Garner, Alley, Gaudelli, and Zappe (2009) tested the effects of audience retention utilizing sentence headlines on slides. The specific principle created was called the “assertion-evidence” structure (Garner et al., 2009). Alley and Neeley (2005) started their research by placing a sentence at the top of a presentation slide to direct attention to the specific purpose of the information being presented. In addition to making the presentation purpose and/or argument clear and precise, the structure of the headline sentence included claims (assertions) and warrants (assumptions) (Alley & Neeley, 2005). In another example of the work of Alley, Schreiber, and Muffo (2005), significant results in test scores for the sentence headline slides were determined. The increase of this text dense headline improved retention performance.

Additional findings showed that limiting the sentence headline to two lines improved retention. Here Doumont (2005, p. 69) states that the headline sentence "should include only whatever words or phrases are necessary for the slide to stand on its own, and preferably no long sentences, which would require uninterrupted chunks of exclusive processing time on the part of the audience." Doumont went on to relate this specification of the two line sentence headline to memory "chunking." This concept is from the research of Cowan (2000) that has been discussed in this chapter. Research did not show that excessively dense text headlines cause extra processing in the working memory. The two-line rule was stated as a way to catalog information in the brain (develop schemas) and organize information easily to make coherent mental models

(Garner & Alley, 2013). Without this sentence headline on presentation slides, Garner et al. (2009, p. 341) claim that the topic–subtopic of text structure violates "the principles of signaling by failing to adequately convey relationships between the phrase headline and the content body slide information." In other words, less might not be more in the relationship with text under the sentence headline. The subtopics must be coherent enough to relate back to the headline/topic of the slide. How much text density is enough to not cause cognitive overload?

4.2.4 Culture Forming Brain Structure

In the previous two chapters, we have seen that culture generates emotions to certain environmental factors (background color and font style) which in turn effect the retention of information presented. Can we apply culture effects to the inner processes of working memory and cognitive theory? The testing of the hypothesis that cognitive structures are influenced by culture was investigated by Hedden et al. (2002) who compared elderly and young populations in two countries. The assumption was that the experience of living in a culture should change the brain in the elderly population when comparing their performance with younger generation subjects. The evidence was in favor of the opposite of this hypothesis. Hedden et al. (2002, p. 70) measured visuospatial attributes of working memory and speed of processing and concluded that there were no cross-cultural differences but there were “culture invariant measures within the visuospatial domain.” In more recent research, Park and Gutchess (2006, p. 106) note that there are some differences in cognition that are culture driven, but the “impact of aging on cognitive mechanics is much greater than the impact of culture.” Also the type of cognition, especially “social cognitive/affective, non-social perceptual/attentional and motor systems through cultural practices and experiences” had cultural effects (Han & Ma, 2014, p. 299).

Overall culture specific effects on working memory function were not detected in the previous research’s experimental data. This leads to a unified not separate cultural data sample for text density and retention. This theory is opposite to the cross culture retention effects of the previous two chapter’s experiments.

4.2.5 Summary of Literature Review

Mayer (2009) and Sweller (2010) have developed principles regarding the cognitive effects associated with multimedia design. Cowan’s (2000) chunking theory aids in the design of multimedia not as a definition of the human brain capacity in the amount of discreet, single number of individual items that can be retained, but of the capacity to recall "chunks" of ideas or concepts. Mayer and Moreno (2010) have defined paths of visual and auditory systems in cognitive theory and how this information is stored in working memory. Paivio's (1990) theory is that the visual and aural flows of information are "dual channels" of processing. However, the processing of pictorials, and sounds have separate channels but the reading of words or characters utilizes both channels. The modality principle defines a balance of visual and text information to produce optimum retention of information presented. Mayer (2009) divided cognitive effects into three categories: extraneous, intrinsic, and germane. The extraneous type of load source is the most destructive and must be kept to a minimum (Sweller, 2010).

The effects of modality and redundancy must have a certain threshold between optimum retention and cognitive overload. From the research of Cowan (2000), the chunk/proposition limit is determined to be an average of four. He also states that to measure the capacity of this chunk, one of a number of conditions must be present to designate this number. One of these is when there is an "information overload that limits chunks to individual stimulus" (Cowan, 2000, p. 88). In addition, the recall of this chunk information is also dependent upon how the information presented is related to one another or even linked with a former chunk in long term memory. Prior knowledge can have a link to how many chunks of certain information is retained. This must be kept into consideration when designing a platform to test the optimum conditions for test density.

Doumont (2005) states that each slide should have enough information to stand on its own. However, how many words? Does an excessive long slide title require more extraneous processing leading to an interference or redundancy that causes a reduction in information retained? From the literature review, a concept of the optimum slide can be designed. First, it must contain enough information to stand on its own and be comprehensible, in other words, less is not more even though there is a verbal message simultaneously being broadcasted (Doumont 2005). Second, extraneous words only interfere in the processing of information, the redundancy principle, in other words repeating the exact words as the verbal message interferes with processing and causes cognitive overload (Sweller, 2005). Third, optimum text density to accompany the verbal message contains phrases that support the verbal message, does not promote cognitive overload and enhances retention, is the best design. (Low & Sweller, 2014). Incorporating all three theories, three situations and conditions can be designed.

To begin to design an experiment to evaluate text density and retention, the optimum design criteria has been established, but which causes a reduction in retention, the less/low dense text slide or the high, denser text slide? Is this high density of text on a slide a collective or solitary phenomenon? For collective meaning, is there a difference in retention if a person experiences 10 highly dense text slides or less than 10? Can we mix density in one presentation? What is the definition of text density?

Density of text was defined by Wiebe and Annetta (2008) in their experiments to be in a wide range from 15 to over 90 words. Instead of focusing on the actual number of words / morphemes, the number of propositions should be the focus. This theory is in accordance with the research of Cowan (2000).

The propositions/chunks of textual information should be able to make a concrete idea that supports the verbal message. Depending upon the concept being presented, the text density of the proposition should support the chunk specifically and not be too general in its message. For example, when a verbal message is "He was born in Hawaii in 1961," the visual message possibilities are: "born", 1961", "born 1961", "Hawaii born 1961", or the actual sentence of the verbal message. From the literature review, "born" or "1961" is not a complete chunk of information and might not be specific enough to make the link to a larger chunk in long term memory. The specific information cannot be recalled from these simple one word statements and are too vague. On the other hand, the use of the actual sentence that was in the verbal message is a form of redundancy and causes a possible cognitive overload. The optimal visual message can be "born 1961" or "Hawaii born 1961", depending on the goal of the information being retrieved. Most experiments in this area of research were obtained using scientific information with the explanation of concepts and procedures. Research in other types of non-scientific type of multimedia is not a common platform for testing (Mayer 2009). Research in other genres of non-scientific experiments needs to be explored.

Finally, the theory that culture effects the brain and specifically perception as it relates to retention, has been analyzed in the past two chapters for background color and font style. However, when comparing English and Japanese reading, it was determined that the processes are the same for encoding this information but the sequence of the process is different. See Figure 29. The effect of a specific culture forming these brain structures pertaining to processing of the actual chunk/propositions for visuospatial attributes were found to not have any effect on this basic of function in the brain (Hedden et al., 2002; Han & Ma, 2014). We can thereby assume that culture is not a factor in this process and the capacity and limits of text density to enhance retention and avoid cognitive overload.

4.3 Method

4.3.1 Participants

In the USA: 54 participants from two universities volunteered for this survey and were given a gift card for their participation. These participants were not the same as the previous experiments. The universities were located in the Metropolitan New York area. A mixture of graduate and undergraduate classes were surveyed. The background of students varied from departments and ages, 18 to 54 years old, with an average age of 24 years old. There were 45 females and 9 males.

In Japan: 246 students were from a national university in Okayama, Japan. These participants could have been involved in the previous chapter's experiments. Participants volunteered for this survey and were given a snack after the survey in appreciation. The student population consisted of first- and second-year students (18-21 years old), from different departments with an average age of 19 years old. There were 141 males and 105 females.

Participation in this experiment was voluntary and anonymous. No name or identities were collected or recorded. By participating in this experiment, students consented to allowing me to use their survey results in this analysis.

4.3.2 Procedure

During each experiment presentation, students were in a classroom typical of their current classes. The classroom was darkened, use of an overhead projector and a screen were utilized for all experiments. The presentation automatically ran with the same voice for narration in addition to exact slide timing across all presentations viewed. The only variance between presentations was the text density of the slides. All background colors and font styles were kept constant across all presentation platforms. Students were not told of the reason for the test but just to help and fill out a survey after the presentation. Immediately after the presentation was viewed, a paper survey was distributed to all participants. Students were asked not to discuss or share answers when filling out the forms. In this instance, there was only one version of the true/false survey. USA students watched the presentation in English and the Japan presentations were written in and narrated in Japanese. See Appendices 30 and 31. There were no culture specific values or measurements to change or adjust for the language specific presentations.

To test text density and its effect on retention, a practical classroom situation was devised. A PowerPoint® presentation was designed to present a biography of the 44th President of the United States, Barak Obama. The reason for choosing this topic was twofold. First, not many Japanese students know the background of the President of the United States. In Japan, most politicians are from political family dynasties, such as the Prime Minister of Japan today, Mr Abe. Second, to interest the English participants in this presentation, it included some facts dates and failures of the president that are not common knowledge in the American newspapers today. The purpose was to keep the survey participants motivated and interested. The total presentation time was 6 minutes and 1 second. Each slide was exactly the same timing for both languages and the scripts matched exactly the same topics. See Table 19. In addition, morphemes are noted in Table 19 because it has a relation to the number of words on a slide for the presentation. This information will help in determining if the number of words or the number of propositions is the condition that effects retention or cultivates cognitive load. Each language version of the presentations had a native speaker performing the narration. According to the discussion in the literature section, Cowan (2000) suggested an average of 4 chunks or propositions that can be retained. In addition, the research review has shown that most of the experiments concentrated on the number of words instead of the number of ideas on a slide of a presentation. The criteria that was designed had three conditions specified for optimum retention. First, it must contain enough information to stand on its own and be comprehensible, in other words, less is

Table 19. Morphemes per Slide English and Japanese Text Density Presentations

Morphemes per Slide/ Slide Timings English / Japanese Presentation Comparison							
		# Morphemes / slide					
Slide #	Slide Timing	Simple Presentation		Basic Presentation		Whole Script	
		English	Japanese	English	Japanese	English	Japanese
1	9 sec	11	8	11	8	11	8
2	23 sec	17	13	8	6	51	49
3	1 min 45 sec	8	8	39	25	176	192
4	45 sec	22	22	57	33	84	79
5	45 sec	12	12	43	51	86	90
6	45 sec	18	9	46	49	102	104
7	45 sec	21	20	45	35	114	92
8	45 sec	14	13	26	17	102	87

not more even though there is a verbal message simultaneously being broadcasted (Doumont 2005). Second, extraneous words only interfere in the processing of information, the redundancy principle, in other words repeating the exact words as the verbal message interferes with processing and causes cognitive overload (Mayer 2009). Third, optimum text density to accompany the verbal message contains phrases that support the verbal message, does not promote cognitive overload and enhances retention is the best design. From this criteria and the use of a non-scientific topic, test presentations were designed to determine the optimum conditions for retention.

Text density was divided into three types of presentations. The “Script” presentation contained the entire script as it was narrated in the presentation on the slide. This was to measure the effects of cognitive load with both channels being activated with the same information. The “Basic” presentation contained short phrase text format of information being narrated on the slides. This is to be the “optimum” presentation that should have the highest retention rates recorded. The last type was the “Simple” type of text density per slide. Most slides in the presentation contained one or two key words from the basic presentation. This presentation is the “less is not necessarily more” hypothesis. Information that cannot stand alone by itself and is too vague to create the chunks of memory that can connect with larger chunks in long term memory. This Simple presentation is predicted to have a lower retention rate that the Basic presentation results.

The key words were determined by the number of propositions in the script. Table 20 presents the number of morphemes displayed on each slide for each language and presentation text density type. In addition more detailed morpheme and chunk counts, a character/word count can be seen in Appendix 29. Appendix 29 contains a more detailed of the number of words/characters per line per slide for each type of presentation.

Figure 30 compares the density of slide 6 across the three presentations for the English versions of Simple, Basic and Script presentations. This figure illustrates

Table 20. Propositions / Chunks per Slide for English and Japanese Presentations

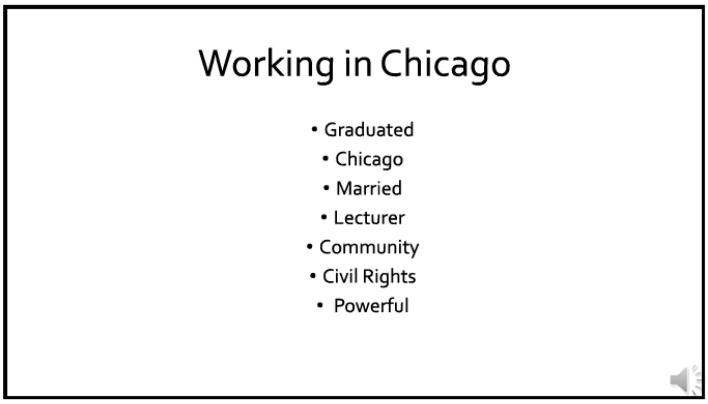
Propositions per Slide/ Slide Timings English / Japanese Presentation Comparison							
		# Propositions / Slide					
Slide #	Slide Timing	Simple Presentation		Basic Presentation		Whole Script	
		English	Japanese	English	Japanese	English	Japanese
1	9 sec	3	3	3	3	3	3
2	23 sec	7	7	4	4	8	8
3	1 min 45 sec	5	5	11	11	34	34
4	45 sec	8	8	11	11	15	15
5	45 sec	5	5	11	11	12	12
6	45 sec	9	9	14	14	18	18
7	45 sec	9	9	15	15	22	22
8	45 sec	4	4	9	9	15	15

the densities of the test presentations. As we can compare from Table 20 and 21, for the Simple, Basic and Script English presentations slide 6 has 9, 14, and 18, respectively propositions and 18, 46 and 102 words, respectively, per slide.

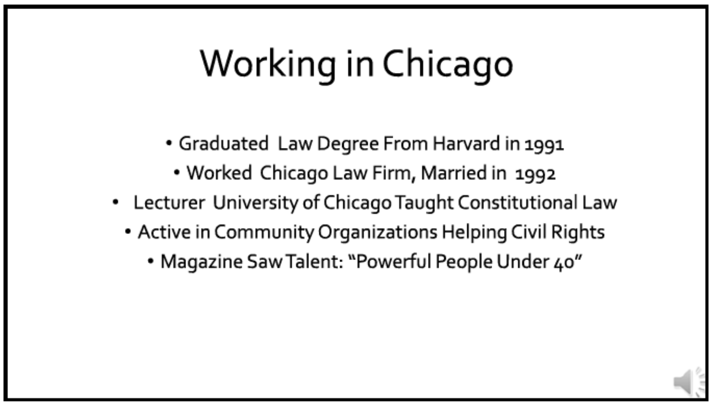
The number of subjects per text density presentation can be seen in Table 21. One survey was developed in a true/false type of questioning format for each language, English and Japanese. The 13 total questions tested student's retention on dates, places, situations, and circumstances. See Appendix 32. Each survey was written in the language of the country where the presentations were being presented, English and Japanese. The students were given the opportunity to give an answer of "Don't Remember" along with true or false. This optional answer revealed the participants' confidence in information that they retained.

Table 21. Number of Subjects per Text Density Presentation

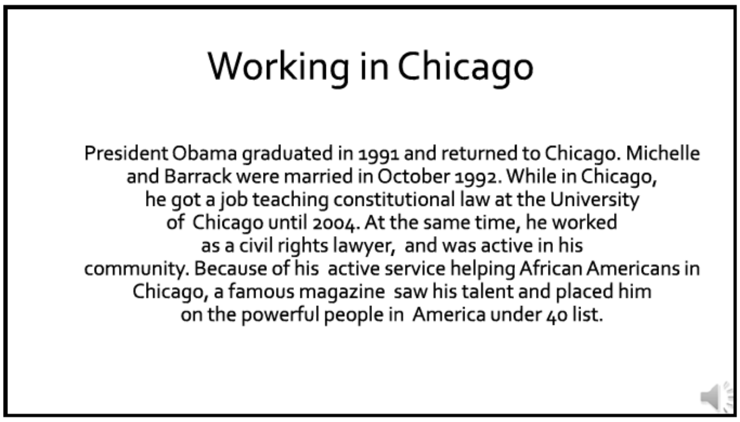
Number of Subjects English / Japanese Presentation Comparison				
	English		Japanese	
	Male	Female	Male	Female
Simple Presentation	8	5	41	36
Basic Presentation	1	20	61	30
Whole Script	0	20	39	38
Totals	9	45	141	104
	54		246	



Simple Presentation Slide 6



Basic Presentation Slide 6



Script Presentation Slide 6

Figure 30. Examples of Three Text Density Presentations of Slide 6

4.4 Results

All surveys collected (Japanese 246 and English 54) were analyzed and sorted into language and presentation categories (Appendices 33 and 34). Surveys were graded on correct questions answered. For example, if a subject answered 10 questions with “True” or “False” and three questions with “Don’t Remember,” the number of correct questions were determined by a percentage of number of actual true or false answered questions answers based on the actual 10 questions answered with true or false, not an overall 13 question set. This was calculated this way to show how much information was correctly retained. The “don’t remember” data results will be discussed and analyzed later in this section.

The first step was to determine if the data collected was parametrically formed and statistically significant. All data was analyzed using Microsoft ®XLSTAT software Version 2015.2.01.17149 , copyright® Addinsoft 1995-2015 (registered version). It was determined that both Japanese and English data sets were parametrically distributed (Appendices 35 and 36) and a Grubbs test for outliers was performed. See Appendix 37. Using the Grubbs two tailed test for outliers, the z-scores were determined and any results that were more than two times the standard deviation of each data set were eliminated from further statistical analysis.

After the outliers were removed, a variance statistical test was performed using a 3 factor ANOVA. See Appendices 38 and 39. This analysis determined that the English data set was not statistically significant, $p < .09$. The Japanese data set displayed a significance, $p < .0001$. See Table 22 for means of the English and Japanese data sets for each type of presentation. Since the English data set was determined not to be statistically significant, further data analysis was halted.

Table 22 Means (%) of English and Japanese Text Density Presentations

	Means of English and Japanese Presentations			
Type of Presentation	English Presentation		Japanese Presentation	
	Average Score	sd	Average Score	sd
Simple Desnity	72.1	12.55	74.92	16.11
Basic Density	81.83	13.5	85.31	10.99
Script Density	80.43	12.32	78.45	15.04

After the Japanese presentation data was determined to be significant, a post-hoc Tukey analysis determined that there was a significant difference between the Basic – Simple ($p < .0001$) and Basic – Script ($p < .005$) and not significant result comparing the Script – Simple presentation results ($p > 0.264$) presentations. This confirmed the significance of the type of presentation and the null hypothesis was rejected.

After the result of the statistically significant Japanese data analysis, a per-question analysis was performed. First, for each question, a summary of the means for each presentation was performed along with an analysis of the “Don’t Remember” responses. After analysis of this data, the following graph and table visualize the trends along with additional data pertaining to each question. Table 23 displays the percent correct data per question per presentation type.

An additional analysis was performed on the Don’t Remember responses, the result of which are displayed in Table 24. We can observe from the graph that Question 4 (Statement: Barak Obama graduated from in High School in 1979, answer: True) had results that were out of the range (two - standard deviations) of the other scores and was considered an outlier. The ambiguity of the question caused many errors. The question pertained to when President Obama became president. He was elected in November but was officially sworn in in January. This question was removed from the overall answers graph. See Table 24 and Table 25.

The answers for each question were either true or false and were recorded as binary 1/0 data which can be determined as non-parametric data sets. Appendix 40 contains all of the linear regression data results per question comparing the three types of presentations. This analysis determined that Questions 1, 3, 8, 9, and 10 returned with statistically significant data ($p < .05$) and Questions 2, 4, 5, 6, 7, 11, 12, and 13 returned

Table 23. % Correct Data per Question per Text Density Presentation

Japanese Data Text Density % Correct Scores per Question per Presentation						
	Simple Presentation	Basic Presentation	Script Presentation	Slide #	Slide Timing	Timing in the Whole Presentation
Question 1	97.33	100	98.68	2	23 sec	0:09-0:32
Question 2	82.09	92	71.2	3	1 min 45 sec	0:32-2:17
Question 3	69.01	82.6	71.21	3	1 min 45 sec	0.32-2:17
Question 4	74	84.5	79.55	3	1 min 45 sec	0.32-2:17
Question 5	51.35	81.6	52.78	4	45 sec	2:17-3:01
Question 6	89.71	93.3	95.89	5	45 sec	3:01-3:46
Question 7	76.39	87.6	84	5	45 sec	3:01-3:46
Question 8	47.62	71.3	69.23	6	45 sec	3:46-4:31
Question 9	73.77	78.9	88.89	7	45 sec	4:31-5:16
Question 10	56.45	79.5	68.12	7	45 sec	4:31-5:16
Question 11	44.44	56.8	50	8	45 sec	5:16-6:01
Question 12	94.7	95.6	92.86	8	45 sec	5:16-6:01
Question 13	98.7	100	95.71	1/8	8 sec	0:00-0:08

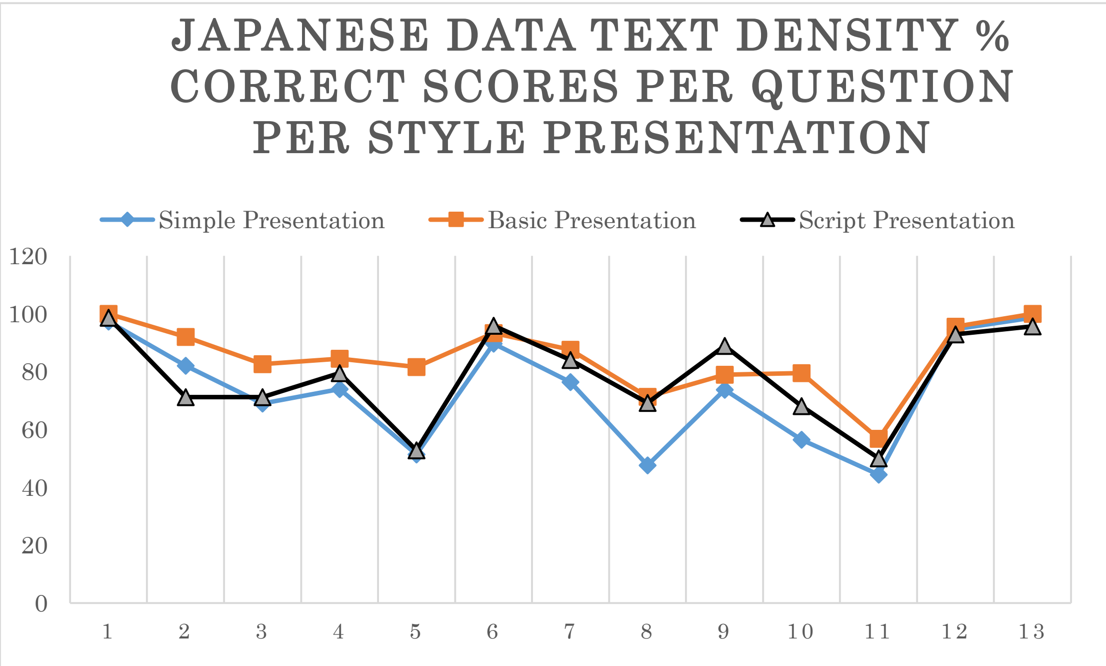


Table 24. % Per question "Don't Remember" Answers Text Density

Japanese Data Text Density						
Number Answered By Question with Don't remember %						
	Simple Presentation	Basic Presentation	Script Presentation	Slide #	Slide Timing	Timing in the Whole Presentation
Question 1	3.85	0	2.56	2	23 sec	0:09-0:32
Question 2	14.1	4.4	6.41	3	1 min 45 sec	0:32-2:17
Question 3	8.97	8.79	15.38	3	1 min 45 sec	0.32-2:17
Question 4	35.9	24.18	43.59	3	1 min 45 sec	0.32-2:17
Question 5	5.13	4.4	7.69	4	45 sec	2:17-3:01
Question 6	12.82	2.2	6.41	5	45 sec	3:01-3:46
Question 7	7.96	2.2	3.84	5	45 sec	3:01-3:46
Question 8	19.23	12.09	16.67	6	45 sec	3:46-4:31
Question 9	21.79	16.48	19.23	7	45 sec	4:31-5:16
Question 10	20.51	14.29	11.54	7	45 sec	4:31-5:16
Question 11	7.69	3.3	2.56	8	45 sec	5:16-6:01
Question 12	5.13	0	10.26	8	45 sec	5:16-6:01
Question 13	1.28	2.2	10.26	1/8	8 sec	0:00-0:08

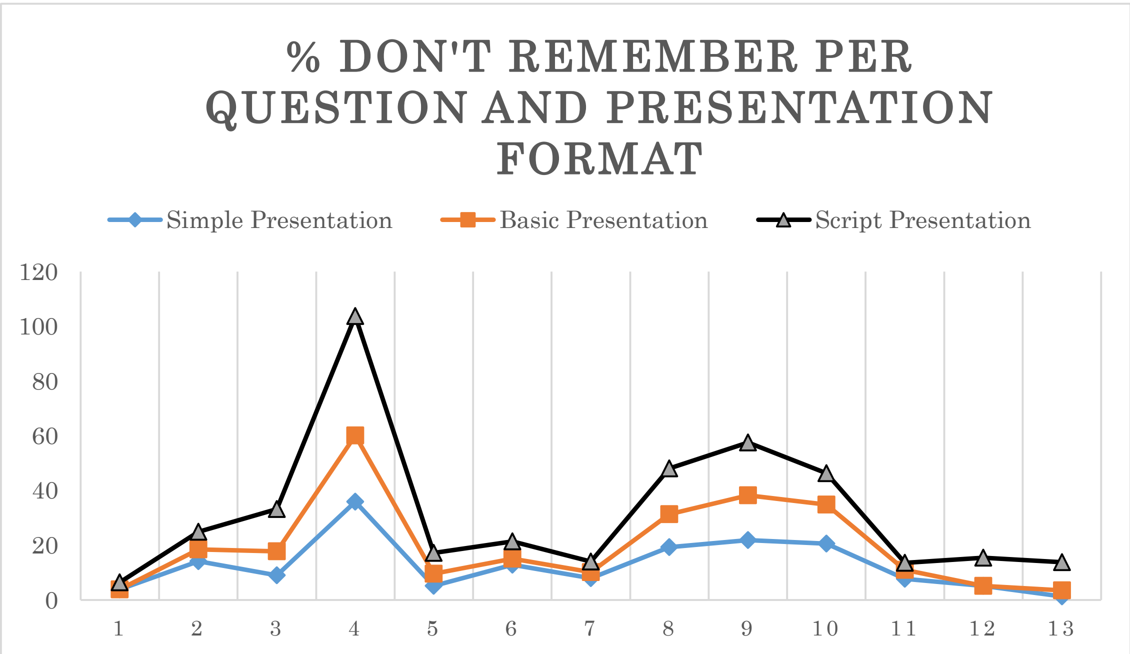
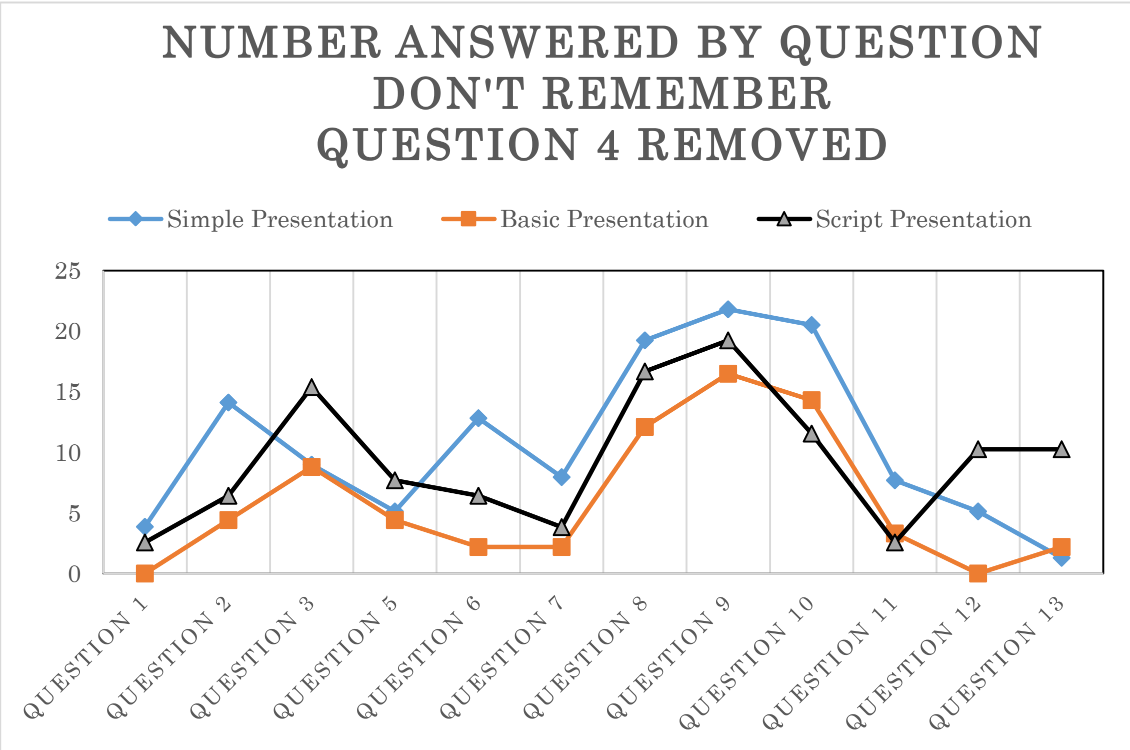


Table 25. % Per question "Don't Remember" Answers (no Question 4) Text Density Presentation

Number Answered By Question with Don't Remember %						
	Simple Presentation	Basic Presentation	Script Presentation	Slide #	Slide Timing	Timing in the Whole Presentation
Question 1	3.85	0	2.56	2	23 sec	0:09-0:32
Question 2	14.1	4.4	6.41	3	1 min 45 sec	0:32-2:17
Question 3	8.97	8.79	15.38	3	1 min 45 sec	0.32-2:17
Question 5	5.13	4.4	7.69	4	45 sec	2:17-3:01
Question 6	12.82	2.2	6.41	5	45 sec	3:01-3:46
Question 7	7.96	2.2	3.84	5	45 sec	3:01-3:46
Question 8	19.23	12.09	16.67	6	45 sec	3:46-4:31
Question 9	21.79	16.48	19.23	7	45 sec	4:31-5:16
Question 10	20.51	14.29	11.54	7	45 sec	4:31-5:16
Question 11	7.69	3.3	2.56	8	45 sec	5:16-6:01
Question 12	5.13	0	10.26	8	45 sec	5:16-6:01
Question 13	1.28	2.2	10.26	1/8	8 sec	0:00-0:08



a statistically non-significant result (p > .05). See Appendix 40.

From the analysis, two groups were made with the questions. Group A contains Questions 1,2,8,9, and 10. This group had answers that were determined to be statistically significant. Group B contains questions 2, 4, 5, 6, 7, 11, 12, and 13. This group had answers that were determined to be significantly not significant. See Table 26 for the question characteristics that will be used in the following analysis and discussion.

4.4.1 Slide Timings and Retention

From the information in Table 26, the slide timings for Group A (significant answers) and Group B (not significant answers), we can see that the average slide time for each group is 50 and 56.8 seconds, respectively. The total presentation is recorded as 362 seconds. This amount includes the title slide which was recorded at 9 seconds. The first slide timing is an outlier from the other timings which average 50.42 seconds. This overall average slide timing is in the range of the average slide timing of Group A and Group B. A higher retention rate therefore cannot be accounted for by a longer or shorter exposure time.

Table 26. Per Question Characteristics and Groupings Text Density

	Japanese Characteristics			Morphemes			Propositions		
	Significant data	Slide #	Slide timing	Simple	Basic	Script	Simple	Basic	Script
Group A	Q1	2	23 sec	13	6	49	7	4	8
	Q3	3	1 min 45 sec	8	25	192	5	11	34
	Q8	6	45 sec	9	49	104	9	14	18
	Q9	7	45 sec	20	35	92	9	15	22
	Q10	7	45 sec	20	35	92	9	15	22
		Average	50 sec	14	30	105.8	7.8	11.8	20.8
	Not Significant data	Slide #	Slide timing	Simple-M	Basic=M	Script-M	Simple-P	Basic=P	Script-P
Group B	Q2	3	1 min 45 sec	8	25	192	5	11	34
	Q4	3	1 min 45 sec	8	25	192	5	11	34
	Q5	4	45 sec	12	12	43	51	86	90
	Q6	5	45 sec	12	51	90	5	11	12
	Q7	5	45 sec	12	51	90	5	11	12
	Q11	7	45 sec	20	35	92	9	15	22
	Q12	8	45 sec	13	17	87	4	9	15
	Q13	1 or 8	45 sec	13	17	87	3	3	3
		Average	56.8 sec	12.25	29.13	109.13	10.88	19.63	27.75

				Place of information on the slide (line #/ total lines)					
	Significant data	Slide #	Type of Information Recalled	Simple	Basic	Script	Simple	Basic	Script
Group A	Q1	2	biographical	2/4	2/4	2/4	0.50	0.50	0.50
	Q3	3	place, biographical	3/5	4/5	9/13	0.60	0.80	0.69
	Q8	6	data, place, job	7/8	5/6	6/9	0.88	0.83	0.67
	Q9	7	job, date	6/7	2/8	2/8	0.86	0.25	0.25
	Q10	7	job	5/7	6/8	5/8	0.71	0.75	0.63
						Average	0.71	0.63	0.55
	Not Significant data	Slide #	Type of Information Recalled	Simple	Basic	Script	Simple	Basic	Script
Group B	Q2	3	biographical	3/5	2/5	5/13	0.60	0.40	0.38
	Q4	3	date, biographical	5/5	5/5	13/13	1.00	1.00	1.00
	Q5	4	biographical	2-3/6	2-3/6	3-4/7	0.33	0.33	0.43
	Q6	5	biographical	2/6	2/6	3/6	0.33	0.33	0.50
	Q7	5	biographical, place	3/6	3/6	3/6	0.50	0.50	0.50
	Q11	7	job, date	7/7	8/8	3/8	1.00	1.00	0.38
	Q12	8	date	4/4	5/5	8/8	1.00	1.00	0.38
	Q13	1 or 8	numerical, job	2/4	2/3 or 2/5	1/2-2/8	0.50	0.67	0.50
						Average	0.66	0.65	0.51
				Line#/Total lines on slide					
							Numerical representation		

4.4.2 Information Order in the Whole Presentation and Retention

Regarding long term memory, there are many theories as to how and why a person retains certain information. One of these theories is the primacy and recency theory. Baddeley (2012, p. 10) explains that the primacy effect:

> "Assumes a limited capacity of excitation that is shared among the sequence of items. The first item is the most strongly activated, the second slightly less, and so forth. At recall, the strongest item is retrieved first and then inhibited to avoid further repetition before going on to the next strongest."

From this effect, question number one can be attributed to this phenomenon. From Table 23, we can observe that the average % correct answers are for question one: Simple presentation has 97.33%, Basic presentation has 100% and Script presentation has 98.68%. Question one is also significant in analysis.

Another effect on retention and slide order is the recency effect. Cowan (2000, p. 105) defines the recency effect on recall as:

> "The result of the use of dual memory mechanisms, with a short-term memory mechanism used only for the last few items (which typically are recalled first)."

This recency effect can be applied to question 13. In the data analysis, this question average correct results were recorded as: Simple presentation has 98.7%, Basic presentation has 100% and Script presentation has 95.71%. Clearly higher than average recall scores of the whole presentation. The average correct score for each presentation was: Simple presentation = 74.92%, Basic Presentation = 85.31% and Script presentation = 78.45 %. See Table 22.

From the range of significant question answers and their location of information on the slide, (slide numbers 2, 3, 6, and 7), we can conclude that the order of information presented has no effect except for the primacy and recency effects of question 1 and question 13. See Table 26.

4.4.3 Information Location Order on a Slide and Retention

Another retention effect is the order of information located on a slide and the possibility of cognitive load occurring if there is too much information to process. For example, a slide that has many words or chunks. Can the recency and/or primacy effect be applied to each slide? From Table 26, the line number and number of lines on the slide is recorded for the two groups, A and B. Each line location was given a numerical value. Comparing the significant group results of this calculation to the non-significant group results, we can see from Table 26 that the results of Group A: Simple presentation is 0.71, Basic presentation is 0.63, and Script presentation is 0.55. For Group B, the average results are: Simple presentation is 0.66, Basic Presentation is 0.65, and Script presentation is 0.51. These results show that information order on the slide does not have an effect on significant or non-significant recall results in this experiment.

4.4.4 Morphemes on a Slide and Retention

From the information on Table 26, the number of Morphemes on a slide associated with the information required to answer a question was sorted. The three presentations varied in number of morphemes per slide because this was one of the criteria in the experiment. The simple presentation had a range of eight to twenty morphemes on a slide. The Basic presentation had a range of six to fifty morphemes on a slide and the Script presentation had a range of eight to ninety morphemes on a slide. Table 26 categorizes the question answers and notes morphemes on a slide according to significant and non-significant results. From Table 27, the average number of morphemes is calculated for each group. Group A had average morphemes per slide for each question as: Simple presentation is 14, Basic presentation is 30, and Script presentation is 105.8. For Group B, the average morpheme results per question per slide is: Simple presentation = 12.29, Basic presentation = 31.57, and Script presentation = 118.57. This data alone does not accurately show the significance of the effects. Calculating the difference and using that number as a percentage of the significant data, we can compare across all three presentation as to the existence of any trends or significant findings.

Table 27 Average Morpheme Count Group A and B and the % of Difference

Morphemes	Simple	Basic	Script
Average Group A	14	30	105.8
Average Group B	12.25	29.125	109.125
Delta	1.75	0.875	-3.325
Delta as a % of Group A result	0.004	0.002	-0.008

The difference in average morphemes per slide as a percentage of the two groups is shown in Table 27is very small and in the same numerical range. Though the average number of morphemes was larger for the non-significant, Group B set. The significant Group A had a larger average morpheme count per slide but by a very small margin. We can conclude by these calculations and comparisons that the number of morphemes on a slide does not effect the significance of the data results.

4.4.5 Effect of Propositions/ Chunks on Retention

From the literature review of this chapter, the concept of how the human brain retains information was discussed. Research of pioneers Baddeley (2012) and Cowan (2000) and the theory of chunks or propositions of information being stored in working memory has been discussed. To apply this theory and the effect on significant and non-significant data collected, the number of ideas or propositions was determined for each slide in each presentation. The slide that contained the answer for each question is also recorded in Table 26. We can see from Table 28 that the average number of propositions for Group A is as follows:

Table 28 Average Proposition / Chunk Count Group A and B and the % of Difference

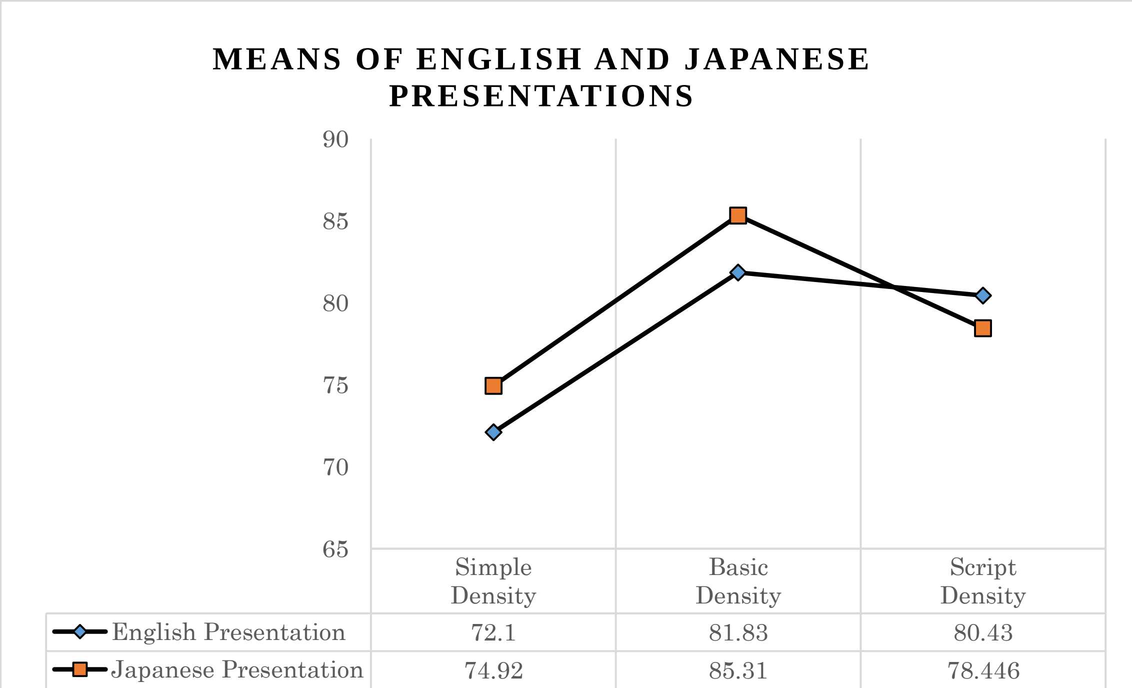
Propositions	Simple	Basic	Script
Average Group A	7.8	11.8	20.8
Average Group B	10.875	19.625	27.75
Delta	-3.075	-7.825	-6.95
Delta as a % of Group A result	-39.423	-66.314	-33.413

From this result, we can observe a significant difference in the number of propositions per slide and the difference between each group. From these calculations, the optimum number of chunks on a slide for maximum retention is between 8 and 21. However, maximum retention was recorded for the basic presentation (See Table 22) was 85.31 %. For the Basic presentation, the average number of propositions for significant results is 12.

4.5 Analysis of Results

A statistical significance was detected for the Japanese set of data. However, the English data per presentation type was not significant but the means of the percent correct data followed the same pattern of results as the Japanese percent correct data. See Figure 31. Concerns arose as to the possibility of prior knowledge influencing and preventing an accurate measure of the density of text on slides for the USA presentations. As we see from Figure 31, comparing the ranking of the Japanese and English over correct average scores display parallel results for the Simple and Basic density presentations. The Script density results were reverse in overall average scores, but when comparing ranking of the three presentation densities, the Script presentation for both data groups ranked second. Prior knowledge does not have an effect on these results because of this intra-group ranking similarities.

Figure 31. Means of English and Japanese Text Density Presentations



Analysis of the results pertained only to the statistically significant data set, the Japanese results. The USA results were found not to be significant unfortunately. This may be due to the small population of participants. The Japanese participants were almost five times the USA survey population, 246 Japanese to 54 USA participants.

The overall results can be related to the Signaling Principle. This principle states that cues help in the forming of schemas which leads to better retention of information.

In addition, pacing and timing were often compared during the integration of data to initiate schema development. However, too few cues can influence the presenting of the material and retention by the audience. It is possible that students finished reading the simple slides with the fewer characters/morphemes ahead of the narration. Connections could not be made in unison with the verbal material displayed. Other experiments have tested the timing of text appearing on the slide at the same time the narration is covering that topic. For example, Bucher and Nieman (2012) described two types of slide design in a presentation. The first is a static text slide, where all of the information was displayed at once and the other type was one of dynamic text slides which faded in information units incrementally. For static text slides, it was noticed from observing eye patterns that subjects first read the whole text on the slide and then turned their attention to the narration. In the dynamic text slides, subjects divided their attention equally between the slides and the speaker thus managing "coherence" between the verbal and visual mode via synchronization (Bucher & Neimann, 2012).

The Script presentation did not contain complex scientific calculations. Most experiments and research, especially Mayers and Moreno's (2010) research, concerning "Extraneous Cognitive Load" experiments were accomplished via science or technical presentations. The research for this thesis was carried out using a biographical themed, social science presentation. Information was sequenced and did not concern complex processes, calculations or theories. Long Term Memory did not require the deep learning of transfer skills. The script written on the slide may have not reached a threshold of cognitive load. Though subjects retained more information via the Basic presentation, the Script information was not as complex. Prior knowledge of the information presented was more of an issue with the English presentation, but as we can see a similar pattern results occurred with the Japanese presentations. Both trends in correct data were very similar.

An analysis of the per question data revealed typical recency and primacy retention issues, meaning that one usually remembers the first and last piece of information. Questions 1, 12, and 13 contained information that was repeated and given at the end and beginning of the presentation. Both of these questions revealed a very high retention score, 94.18% for Question 1 (Japanese data), 94.12% for Question 12, and 98.25% for Question 13 (Japanese data).

Questions 8, 9 and 10 displayed different patterns that sometimes did not fit in with the overall results. See Figure 32. In addition, these questions had statistically significant results. Each question will be discussed in detail.

Question 8 was “ Barak Obama was a civil rights lawyer in Chicago in 1991.”

(クオバマは１９９１年にシカゴで公民権専門の弁護士を務めていた.)　The

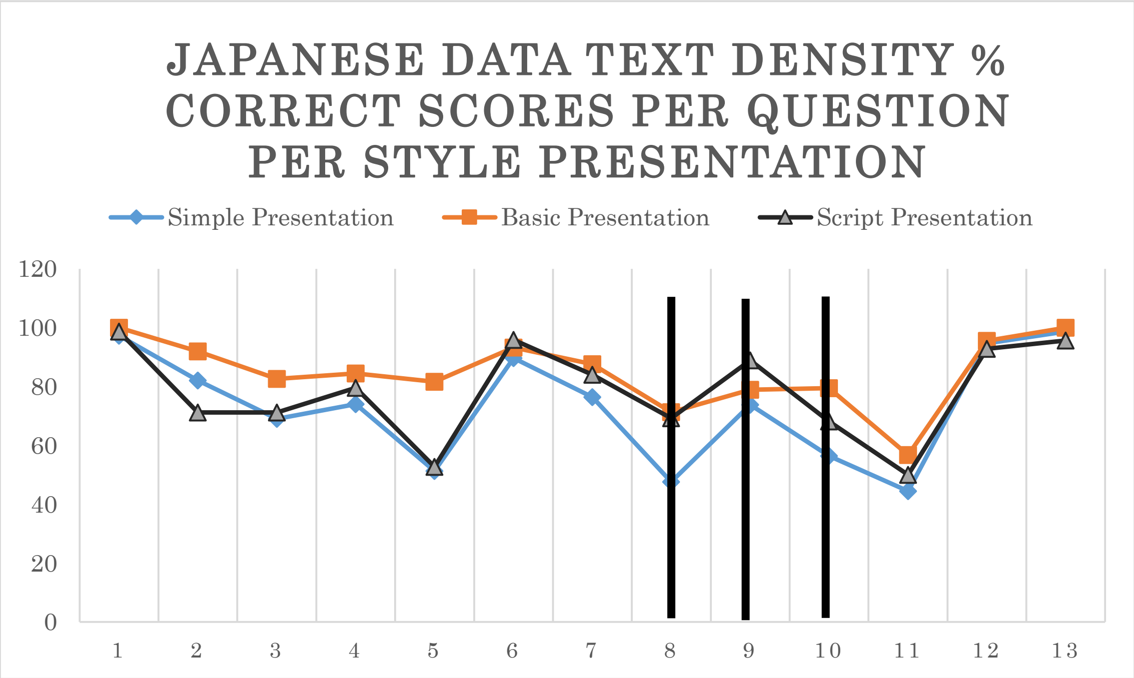


Figure 32. Percent Correct Data Mean Scores (Questions 8, 9, and 10)

correct answer is true. The average retention scores for the three Japanese presentations were: Simple presentation 47.62%, Basic presentation 71.3%, and Script presentation 69.23%. Why is there such a big difference between the Simple presentation and the other two presentations retention scores? The narration and Script presentation stated, “かれが同時に、彼は公民権専門の弁護士として働き、彼のコミュニティで積極的に活動しました.” (At the same time, he worked as a civil rights lawyer.). The

Simple Presentation displayed “シカゴ 憲法 コミュニティ” (Chicago, Constitution, Community). The Basic Presentation displayed “コミュニティ組織で積極的に公民権を支援”(Actively support the civil rights community organization.) We can observe that the Basic presentation (a display of a list-like basic, unconnected phrases and/or single words,) did not have the signaling or cues to support this information to be included in this schema to be put into long term memory. Narration by itself was not enough to allow the information to be integrated in the central executive. The cognitive overload could have also only prioritized information that had cues to support the information that was narrated.

Question 9 was “Barack became a State senator in 1997. (バラクは１９９７年に州の上院議員になった,)” The answer is true. The average retention scores for the three Japanese presentations were Simple presentation 73.8%, Basic presentation 78.9%, and Script presentation 88.9%. The Script presentation had the highest retention scores. Here terminology can be considered as a possible cause of the unusual results. The Basic presentation displayed, “1997 年州上院議員に初当選”(First elected as a 1997 State Senator.) The Simple presentation displayed, “上院議員”(Senator.) In English there are certain terminology for State Senator, congressman, Federally elected official, and Senator. The term “Senator” can be vague and not precisely specify exactly what kind of senator. In Japan the terminology is slightly different. Since no year was written next to the “Senator” cue on the Simple presentation, students could have been confused since below this term, on the same slide was displayed, “上院議員… (Congressman…).” The term for an elected official/lawmaker is **議員**. Also, placement of the “上院議員, Senator” was on top of an 8 line list of vague statements, 上院議員，民主党候補, 2004 年, 3 回，下院議員落選，３年, 2008 年大統領 (Senator, Democratic Party candidate, 2004, 3 times, congressman defeated, 3 years, 2008 President). Even though numbers and sequences are involved, these cues are not comprehensible by themselves. If a subject was distracted when reading the slide at the beginning of the narration, for example, if their attention was diverted, then the supporting, specific detail might not be processed into the Episodic Buffer. This supports the claims of Bucher and Neimann (2012).They stated that the eye starts reading from the top of the slide when all information is displayed at once and can divert or block out when listening to the speech. The Basic and Script slides were very precise and could be read along with the narrator.

Question 10 was “Barack Obama won the election to be a congressman. (バラク・オバマは連邦議会議員選挙に当選した.)” The answer is false. The average retention scores for the three Japanese presentations were Simple presentation = 56.5%, Basic presentation = 79.5%, and Script presentation = 68.1%. The Basic presentation had the highest retention scores. The narration and Script presentation displayed/said “２０００年には連邦議会議員に立候補しますが、落選してしまいました。 (In 2000 he ran for congress (lawmaker) but was defeated)”. The Basic presentation displayed, “下院議員選挙落選” (Congressman election defeated.) Here the Script presentation used different terminology to the Basic and Simple Presentations. Renpo (in Japanese 連邦) can be translated either as congressman or lawmaker, elected official, or federal elected official. Information for Questions 9 and 10 was located on the same slide but their results are quite different. The Basic and Script presentation scores were in a very small range, 78.9% and 79.5%, respectively, but the Simple presentation Question 9 and 10 means, were determined to be 73.8% and 56.5%, respectively. The Script presentation means for Questions 9 and 10 were 88.9% and 68.1%. The slide characteristics were exactly the same the only differences were the kanji characters used (Question 10). We must consider the possibility of the vagueness of the cue.

One other consideration is the additive effect of cognitive load. As we can see from Figure 32, a downward trend in retention is observed from Questions 6 to 11. Where the number of chunks was also increasing between slides 6, 7, and 8. Here the working memory may be overloaded with information. The lack of clear cue support in the Simple presentation, displays the effect of information is being lost or forgotten. However, if we examine the “Don’t Remember” data from Table 24, we can see that the most observed “Don’t Remember” answers were recorded for the questions that produced a statistically significant result, question numbers 8, 9, and 10. Students are probably starting to lose confidence in the information retained and there is the possibility that the effects of cognitive overload can be observed by the uncertainty and lack of confidence in their answers.

4.6 Conclusion/Summary of Results

In conclusion, this study has set out to explore the effects of text density on retention of information utilizing multimedia materials. As stated previously, our intent was to investigate how the information is actually displayed on a page, slide or animation in the media chosen and how this information is retained by the learner and to discover and develop a set of principles for maximum retention.

4.6.1 Findings

The thesis question for this section of the study concerned the number of words on a page of multimedia that is presented in conjunction with a verbal message.

Whether there is an optimum number of words, morphemes or "chunks" of information on a page to maintain the highest retention of information presented and not generate any cognitive load, was analyzed. In addition to searching for this optimum formula, this study also determined that cognitive perception of information is not culturally different.

One of this study's purposes is to determine design guidelines to avoid cognitive overload for multimedia used in educational situations. This research and data collection was based on a test presentation that varied the number of words on a presentation slide.

The research and literature review has determined that cues enhance retention of information. Too many cues, such as in the Script presentation, had a coherence overload effect that can be observed. However, the opposite has also been detected as having an effect on retention with too few cues. The Simple presentation results revealed not enough support for the verbal message indicating that a modality effect cannot be observed. The data results may reflect these coherence and modality effects via the mean results of the Basic, Simple and Script presentations across Japanese and English Presentations. See Table 22.

An analysis of the characteristics of the slide presentations, i.e. slide timing, information presented order, order of information on a slide, morphemes, and propositions, revealed that a distinction was observed for the number of propositions / chunks when comparing data that was statistically significant with data recorded that was not . This discovery along with the highest retention rate of the Basic presentation lead to the conclusion that an average slide proposition length of 12 chunks is ideal for the research presentation.

4.6.2 Theoretical Implications

The per question analysis revealed some interesting results. After a careful comparison of the scripts with the actual kanji characters utilized on the slides, some ambiguity of meaning was found. In the Simple presentation, some cues were very vague, not allowing information to be put into chunks of related concepts, and caused a reduction in recalled information. The results revealed that the type of cue used has a great impact on retention of information. Vagueness leads to confusion and observing the results of the number of "Don't Remember" answers collected. This caused uncertainness in the recall of information. Hence the Script presentation Japanese results ranking second in percent of information retained. Relying solely on the number of cues does not reveal proof of this effect. The slide cue must be carefully considered as a triggering mechanism for detailed information in this type of presentation. Scientific presentations rely upon numbers and concepts for applying to similar situations. This observance revealed, for a social science presentation, that the modality effect has a stronger effect on retention than the redundancy effect.

The literature analysis revealed that for basic cognitive overload, culture does not have an effect. Comparing the USA and Japanese data results revealed the same pattern of correct responses. See Figure 31. When teaching multi-cultural audiences, the Cognitive Theory of Multimedia Learning (Mayer & Moreno, 2010) and Cognitive Load Effects (Sweller, 2010) can be applied to the whole group. Multi-cultural background in the audience will not have be considered in this particular design criteria.

We have observed the Mayers (2009) Signaling Principle in the data results. An example of this is concerning the specific values as to low density and high density text on a slide, simple one or two words, and vague cues do not enhance retention and may confuse the subjects. Using succinct, clear phrases that match the meaning of the narration exactly with no generalizations can contribute to overall increased retention. Placing the whole script as text to be read does not realize optimum retention results and can sometimes detract from the narration and produce a cognitive overload.

Chapter Five

Conclusion

Chapter 5: Conclusion

This research sought to define a visual linguistic grammar divided into three distinct parts for research and analysis pertaining to background color, font style and text density that enhances retention of information. By defining these visual attributes, we can begin to develop a visual linguistic and rhetorical grammar for future use in any kind of setting where the presentation of information is made utilizing multimedia.

In addition to guidance on multimedia design for educators, these results could influence the default values of software programs installed on systems today. Even though these default designs could be changed, most educators use factory settings when they begin to design multimedia material. For example, the Microsoft PowerPoint ® default setting is a white background in both Japanese and English versions. Templates are available for these software packages and one can ask if these are designed based on research principles or familiarity and pleasantness.

This thesis collected statistically significant results to answer the question, "Is there a visual linguistic grammar in multimedia presented information used in the classroom and does it affect retention?"

The results revealed only a small part of factors that influence the answer to the above question:

1. Background color does have an effect on retention for majority mono-culture societies, such as Japan. The statistical results displayed a higher retention of the use of blue shades and font contrast color was found to be a contributing factor

2. Font Style can have an effect on retention. In the USA, individual font styles were found to have a strong emotional component that can detract, if too intense, or heighten retention of information. This was revealed with significant results from the English experiments. Also the Japanese data collected did not reveal the same emotional connection about their unique fonts or have a strong practical usage. The Japanese data was not statistically significant.

3. Text density was calculated to have a significant effect on retention. Text density has many definitions, number of lines of text, sequence of information presented, number of morphemes (words) on a slide type or how many chunks/propositions of information are displayed on a slide. Too few, unrelated propositions, can cause a lack of connecting of ideas into long term memory and too many can lead to cognitive overload. The optimum average chunks for retention was determined to be about 12 per

slide. In addition, the research has discovered that the modality effect is stronger than the redundancy effect from the results.

As the increase of technologies that can be used and adapted in education settings increases, this new area of research has generated further questions to explore. From the results discovered during this research, the following are points to consider for future possibilities and research.

Why was the data from the USA not significant? Can a multi-cultural and diverse population have a specific non-image forming color that enhances retention? What are the factors of this diversity that change color perceptions?

The significance of the Japanese data proves that there is an effect of non-image forming color on perception and retention. However, with the world is becoming a "smaller" place via technology, a new perceptual model of a multi-cultural person will need to be defined and created.

The results of the significance of green background color for certain types of information retained in the Japanese data results cultivates more inquiries. Since the non-image forming color effect has been determined, does the type of information to be retained also have this effect? If a procedure is to be retained or historical information to be memorized, does the color of the background enhance this retention?

Mono-cultural societies, such as Japan, have a specific perception for colors in their societies. Green is a mixture of blue and yellow. Perhaps this blue wavelength made for results that enhanced retention for certain types of information. Further investigation is required on the influence of this background color connected to society. In addition, other cultures need to be investigated and tested, for example European, Middle East and African cultures. America is a melting pot of cultures and languages. Applying this research to other mono-culture societies like Japan will increase the validity of the observation that color perception has a direct influence on language retention.

Concerning font style, one question that was surprising in the data results is the non-statistical data. Calligraphy is such an integral part of Japanese life, the results of this research is a bit confusing. What did the Japanese version of "Comic Sans", aqua have top results. Was it the disfluency or saliency and heightened arousal and enhancement of the information?

The Japanese findings also lead to the influence of encountering a font for the first time. Does the font tuning of the brain lead to better retention? If a presenter changed the multimedia font every class to a unique, uncommon one, would there be a heightened level of retention because students would have to relearn this style before it is font tuned into memory?

There are many fonts being used all over the world. Do British, Australian, or Philippine societies also react the same way as American students to these font styles? Is Comic Sans also the enemy in the United Kingdom?

In addition, static and dynamic slides also need to be compared utilizing the text density presentation. Does information, given aurally and/or visually, in multimedia have to be presented at the same time? If only science presentations have been studied extensively, how is multimedia instruction carried out for non-science subjects like languages or the humanities? The test presentation for text density introduced and surveyed biographical information with results that have implications to the avoidance of cognitive load and forgetting.

The experiments and date gathering lead to more questions and conditions for further research. First, the environment of the test presentation could have been performed in a more controlled environment. Readings and monitors for lighting, luminescence, type of projector used or even the same projector being used for all experiments could provide more accurate readings. Research concerning multimedia use in the classroom usually use a scientific theme to use in the experiments. Providing more data concerning situations utilizing the social sciences or literature based experiments will give a broader base of information as to the type of information stored in visual working or long term memory.

Even though multimedia learning instruction has been used for many years, the computer has brought this subject back to the forefront of educational and learning science. Multimedia does not only mean presentations; it can include e-learning environments, handouts, videos, animations, e-books and textbooks. Providing and passing on novel information to students and having that information processed optimally into long term working memory is a goal of every educator.

The research into this visual linguistic and rhetorical grammar is only the beginning of a variety of factors that can help the user/educator design multimedia that enhances the learning of information in the classroom or in the boardroom.

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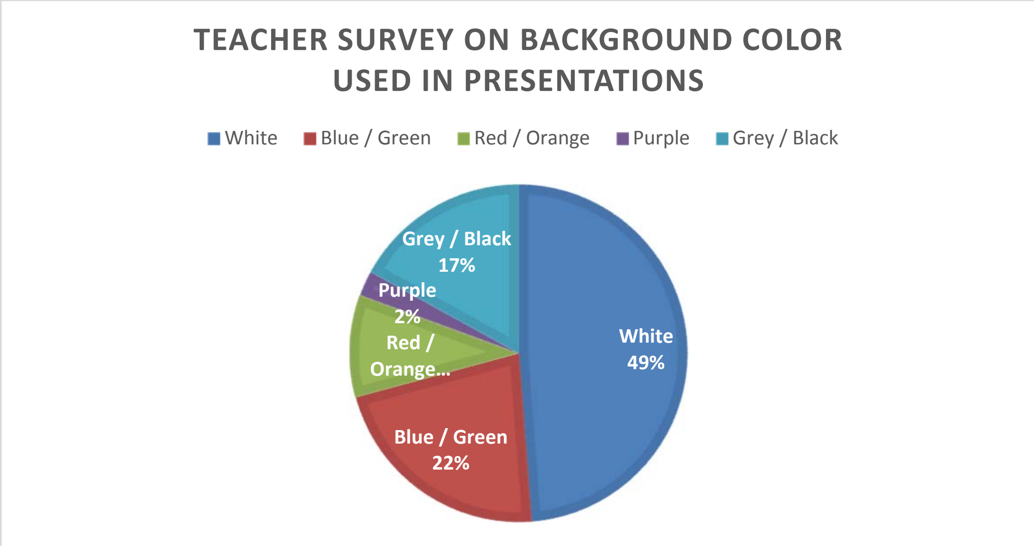
Appendix

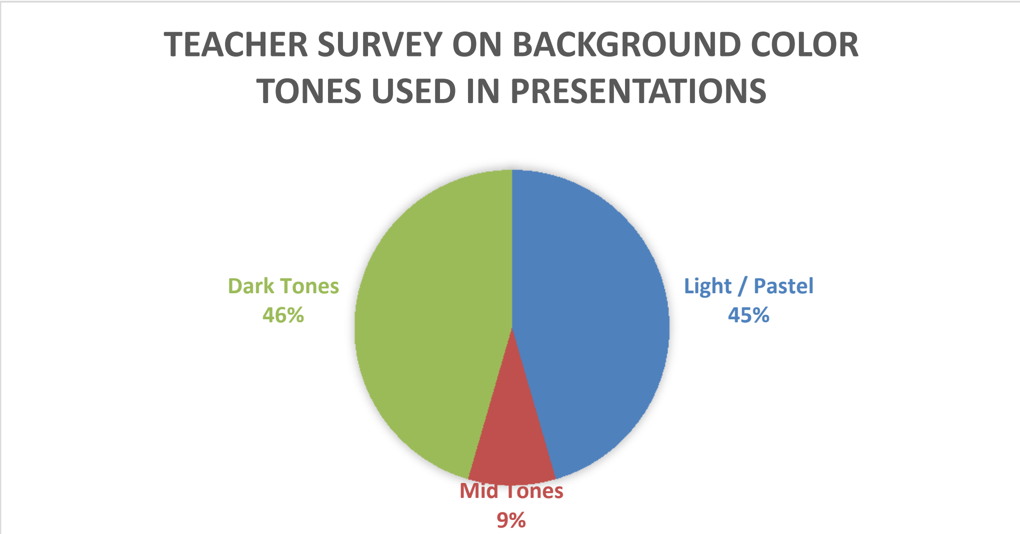
Appendix 1 Teacher Survey May 2015 Question #5 Results

5. When you design a presentation software slide(s) for class,

what background color do you usually use?	White	Blue/ green	Red/ orange	purple	grey/ black	Light/ pastel	Mid tones	Dark tones
White	1							
white	2							
Usually mid-light tones of blue/green		1					1	
White	3							
blue		2						
White	4							
green		3						
vary: usually light grey or blue		4			1	1		
white	5							
purple or dark blue		5		1				1
black or white	6				2			2
white	7							
light blue		6				2		
Dark greys and black.					3			3
pastel color						3		
Dark blue		7						4
white	8							
white, green, light orange	9	8	1			4		
White	10							
white or any light color	11					5		
it varies								
Orange			2					
white	12							
white	13							
white, silver, black or green	14	9			4,5			
White	15							
no color/white	16							
used different colors. One student used black.					6			5
white	17							
White	18							
white	19							
beige, orange, black			3,4		7			
white	20							
Totals:	20	9	4	1	7	5	1	5
	colors n=41					tones n=11		
%	48.8	22	9.8	2.4	17	45.5	9	45.5

Appendix 1 Teacher Survey May 2015 Question Background Colors Utilized





Appendix 2 CSS Color Module Level 4

The following table defines all of the opaque named colors, by giving equivalent numeric specifications in the other color syntaxes.

http://dev.w3.org/csswg/css-color/

Editor's Draft, 22 August 2014

Named	Numeric	Color name	Hex rgb	Hexa-Decimal
		aliceblue	#F0F8FF	240,248,255
		antiquewhite	#FAEBD7	250,235,215
		aqua	#00FFFF	0,255,255
		aquamarine	#7FFFD4	127,255,212
		azure	#F0FFFF	240,255,255
		beige	#F5F5DC	245,245,220
		bisque	#FFE4C4	255,228,196
		black	#000000	0,0,0
		blanchedalmond	#FFEBCD	255,235,205
		blue	#0000FF	0,0,255
		blueviolet	#8A2BE2	138,43,226
		brown	#A52A2A	165,42,42

Appendix 2 CSS Color Module Level 4

		burlywood	#DEB887	222,184,135
		cadetblue	#5F9EA0	95,158,160
		chartreuse	#7FFF00	127,255,0
		chocolate	#D2691E	210,105,30
		coral	#FF7F50	255,127,80
		cornflowerblue	#6495ED	100,149,237
		cornsilk	#FFF8DC	255,248,220
		crimson	#DC143C	220,20,60
		cyan	#00FFFF	0,255,255
		darkblue	#00008B	0,0,139
		darkcyan	#008B8B	0,139,139
		darkgoldenrod	#B8860B	184,134,11
		darkgray	#A9A9A9	169,169,169
		darkgreen	#006400	0,100,0
		darkgrey	#A9A9A9	169,169,169
		darkkhaki	#BDB76B	189,183,107
		darkmagenta	#8B008B	139,0,139
		darkolivegreen	#556B2F	85,107,47

Appendix 2 CSS Color Module Level 4

		darkorange	#FF8C00	255,140,0
		darkorchid	#9932CC	153,50,204
		darkred	#8B0000	139,0,0
		darksalmon	#E9967A	233,150,122
		darkseagreen	#8FBC8F	143,188,143
		darkslateblue	#483D8B	72,61,139
		darkslategray	#2F4F4F	47,79,79
		darkslategrey	#2F4F4F	47,79,79
		darkturquoise	#00CED1	0,206,209
		darkviolet	#9400D3	148,0,211
		deeppink	#FF1493	255,20,147
		deepskyblue	#00BFFF	0,191,255
		dimgray	#696969	105,105,105
		dimgrey	#696969	105,105,105
		dodgerblue	#1E90FF	30,144,255
		firebrick	#B22222	178,34,34
		floralwhite	#FFFAF0	255,250,240
		forestgreen	#228B22	34,139,34

Appendix 2 CSS Color Module Level 4

fuchsia	#FF00FF	255,0,255
gainsboro	#DCDCDC	220,220,220
ghostwhite	#F8F8FF	248,248,255
gold	#FFD700	255,215,0
goldenrod	#DAA520	218,165,32
gray	#808080	128,128,128
green	#008000	0,128,0
greenyellow	#ADFF2F	173,255,47
grey	#808080	128,128,128
honeydew	#F0FFF0	240,255,240
hotpink	#FF69B4	255,105,180
indianred	#CD5C5C	205,92,92
indigo	#4B0082	75,0,130
ivory	#FFFFF0	255,255,240
khaki	#F0E68C	240,230,140
lavender	#E6E6FA	230,230,250
lavenderblush	#FFF0F5	255,240,245
lawngreen	#7CFC00	124,252,0

Appendix 2 CSS Color Module Level 4

		lemonchiffon	#FFFACD	255,250,205
		lightblue	#ADD8E6	173,216,230
		lightcoral	#F08080	240,128,128
		lightcyan	#E0FFFF	224,255,255
		lightgoldenrodyellow	#FAFAD2	250,250,210
		lightgray	#D3D3D3	211,211,211
		lightgreen	#90EE90	144,238,144
		lightgrey	#D3D3D3	211,211,211
		lightpink	#FFB6C1	255,182,193
		lightsalmon	#FFA07A	255,160,122
		lightseagreen	#20B2AA	32,178,170
		lightskyblue	#87CEFA	135,206,250
		lightslategray	#778899	119,136,153
		lightslategrey	#778899	119,136,153
		lightsteelblue	#B0C4DE	176,196,222
		lightyellow	#FFFFE0	255,255,224
		lime	#00FF00	0,255,0
		limegreen	#32CD32	50,205,50

Appendix 2 CSS Color Module Level 4

		linen	#FAF0E6	250,240,230
		magenta	#FF00FF	255,0,255
		maroon	#800000	128,0,0
		mediumaquamarine	#66CDAA	102,205,170
		mediumblue	#0000CD	0,0,205
		mediumorchid	#BA55D3	186,85,211
		mediumpurple	#9370DB	147,112,219
		mediumseagreen	#3CB371	60,179,113
		mediumslateblue	#7B68EE	123,104,238
		mediumspringgreen	#00FA9A	0,250,154
		mediumturquoise	#48D1CC	72,209,204
		mediumvioletred	#C71585	199,21,133
		midnightblue	#191970	25,25,112
		mintcream	#F5FFFA	245,255,250
		mistyrose	#FFE4E1	255,228,225
		moccasin	#FFE4B5	255,228,181
		navajowhite	#FFDEAD	255,222,173
		navy	#000080	0,0,128

Appendix 2 CSS Color Module Level 4

oldlace	#FDF5E6	253,245,230
olive	#808000	128,128,0
olivedrab	#6B8E23	107,142,35
orange	#FFA500	255,165,0
orangered	#FF4500	255,69,0
orchid	#DA70D6	218,112,214
palegoldenrod	#EEE8AA	238,232,170
palegreen	#98FB98	152,251,152
paleturquoise	#AFEEEE	175,238,238
palevioletred	#DB7093	219,112,147
papayawhip	#FFEFD5	255,239,213
peachpuff	#FFDAB9	255,218,185
peru	#CD853F	205,133,63
pink	#FFC0CB	255,192,203
plum	#DDA0DD	221,160,221
powderblue	#B0E0E6	176,224,230
purple	#800080	128,0,128
rebeccapurple	#663399	102,51,153

Appendix 2 CSS Color Module Level 4

		red	#FF0000	255,0,0
		rosybrown	#BC8F8F	188,143,143
		royalblue	#4169E1	65,105,225
		saddlebrown	#8B4513	139,69,19
		salmon	#FA8072	250,128,114
		sandybrown	#F4A460	244,164,96
		seagreen	#2E8B57	46,139,87
		seashell	#FFF5EE	255,245,238
		sienna	#A0522D	160,82,45
		silver	#C0C0C0	192,192,192
		skyblue	#87CEEB	135,206,235
		slateblue	#6A5ACD	106,90,205
		slategray	#708090	112,128,144
		slategrey	#708090	112,128,144
		snow	#FFFAFA	255,250,250
		springgreen	#00FF7F	0,255,127
		steelblue	#4682B4	70,130,180
		tan	#D2B48C	210,180,140

Appendix 2 CSS Color Module Level 4

		teal	#008080	0,128,128
		thistle	#D8BFD8	216,191,216
		tomato	#FF6347	255,99,71
		turquoise	#40E0D0	64,224,208
		violet	#EE82EE	238,130,238
		wheat	#F5DEB3	245,222,179
		white	#FFFFFF	255,255,255
		whitesmoke	#F5F5F5	245,245,245
		yellow	#FFFF00	255,255,0
		yellowgreen	#9ACD32	154,205,50

Appendix 3 English and Japanese Script for Background Color Test Presentation

Slide 1 (34 sec)

Good Morning

And welcome to our presentation.

We would ask you please do not write any notes.

Just listen to the presentation and view the slides.

We hope you will enjoy learning how to make an easy hot cake that you can make right in your oven.

Relax and enjoy and thanks for coming today.

Slide 1

おはようございます

私達のプレゼンテイションへ来て頂をありがとうございます。

メモを取らずにプレゼンテーションを聞きながらスライドをご覧下さい。

ご自宅のオーブンですぐに出来る簡単ホットケーキの作り方をご紹介します。
どうぞ、くつろいで、楽しんで下さい。

Slide 2 (18 sec)

To begin with, here is a list of ingredients that need to be prepared before making the oven hot cakes.

2 tablespoons of brown sugar

Slide 2

はじめにオーブンホットケーキを作(つく)ための材料(ざいりょう)のリストです。

ブラウンシュガー　　大さじ２

Appendix 3 English and Japanese Script for Background Color Test Presentation

1 quarter of a teaspoon of cinnamon	シナモン小さじ 1/4
1 quarter of a cup of butter	バーター　1/3 カップ
Slide 3	Slide 3
1 cup of milk	牛乳　1 と 1/4 カップ
4 medium eggs	卵　4 個
3 quarters of a cup of bread flour	強力粉　100 グラム
Slide 4	Slide 4
1 cup of strawberries	いちご　250 グラム
And some hot cake syrup, about 6 teaspoons	ホットケーキシロップ　約小さじ 6さあ　ホットケーキを作りましょう！
Now let's begin making the hot cakes	

Appendix 3 English and Japanese Script for Background Color Test Presentation

Slide5

In addition to the ingredients, you have to prepare the following

One 9 inch pie plate, glass or metal is fine

2, 2 cup bowls for washing of the strawberries

And a 2 cup capacity blender or mixer

Next as we begin to prepare the batter, preheat the oven to 218 degrees Celsius

This should take about 15 minutes

Slide 5

材料に加えて、次のものを用意して下(して)さい。ガラス製か金属製の23センチメートルのパイ型。

いちごを洗う　500ｍｌのボール　2個。500　m容器のブレンダーかミキサー。生地の10mm準備をはじます。オーブンを210度に予熱して置きます。約(やく)15分(ふん)掛(か)かります。

Slide 6

Next we will prepare the hot Cake batter.

First, add butter to the 9 inch pie plate,

Slide 6

次(つぎ)にホットケーキ生地(きじ)を作(つく)ります。

Appendix 3 English and Japanese Script for Background Color Test Presentation

place it in the oven until the butter is melted, about 5minutes.

Take it out of the oven.

はじめにパイ型にバターを入れ、オーブンで溶けるまで約5分間(かん)温めます。
オーブンから取り出して置きます。

Slide 7

Then for the batter, put milk, eggs and flours in the blender and mix at medium speed until well blended.

After about 1 minute, you should scrape the batter from the sides of the blender and mix for another minute more.

Slide 7

そしてブレンダーに牛乳、卵そして粉類を入れ中位のスピードでよく混ざるまで混ぜます。
約1分後、ブレンダーに付いた生地を擦り落とし、もう1分混ぜます。

Slide 8

After you have finished mixing, pour the batter into the hot buttered pie plate.

After that, sprinkle the pie plate containing the batter, with sugar and cinnamon evenly.

Slide 8

混ぜ終わったら生地を熱いバターが入ったパイ型に注ぎます。
その後生地の入ったパイ型に砂糖とシナモンを均等に振り掛けて下さい。

Appendix 3 English and Japanese Script for Background Color Test Presentation

Slide 9

Put this plate into the hot oven and bake for 20 – 25 minutes or until puffy.

While the oven hot cakes are baking in the oven, wash the strawberries, take off the top leaves and slice them into 3 mm thickness.

Put them in the bowl you prepared earlier.

Slide 9

この型を予熱して置いたオーブンに入れ20分から25分または、膨らむまで焼きます。
オーブンでホットケーキを焼いている間、いちごを洗いへたを落とします。そして3ミリの厚さにスライスします。　そして準備して置いたボールに入れて置きます。

Slide 10

Then take out the pie plate with the hot cake and set aside in a place to cool

When the hot cake has slightly cooled, about 10 minutes, you can place the washed and sliced strawberries on top of the hot cake decoratively in a circular pattern around the edges.

Slide 10

ホットケーキのパイ型を取り出し冷まします。
約10分後ホットケーキがある程度冷めたら、洗いスライスして置いたいちごを縁に沿って円形状に飾ります。

Appendix 3 English and Japanese Script for Background Color Test Presentation

Slide 11

Then, slice a wedge for each person, about one sixth of the pie and pour one teaspoon of syrup on each slice.

Serve and eat with a fork and a knife.

Slide 11

そして　六つに切り分けます。　小さじ1杯ずつシロップを掛けて下さい。
装ってフォークとナイフでお召し上がり下さい。プレゼンテーションを楽しんで頂けたでしょうか。どうぞご自宅で、このレシピにトライしてみて下さい。

Slide 12

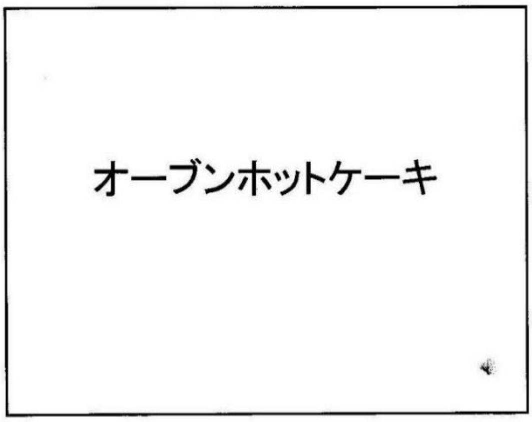
I hope you enjoyed my presentation and will try this recipe at home

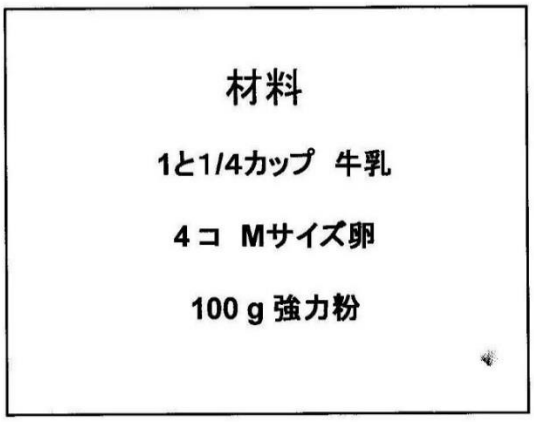
Thank you very much.

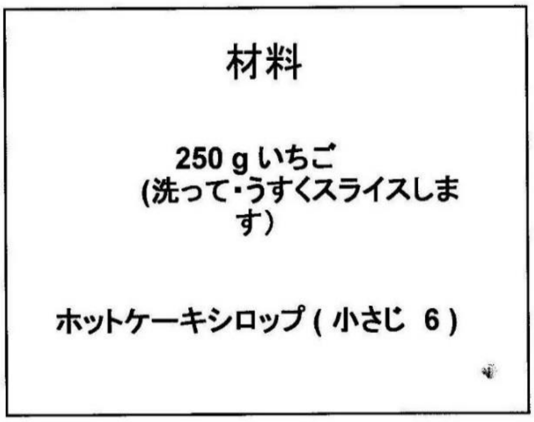
Slide 12

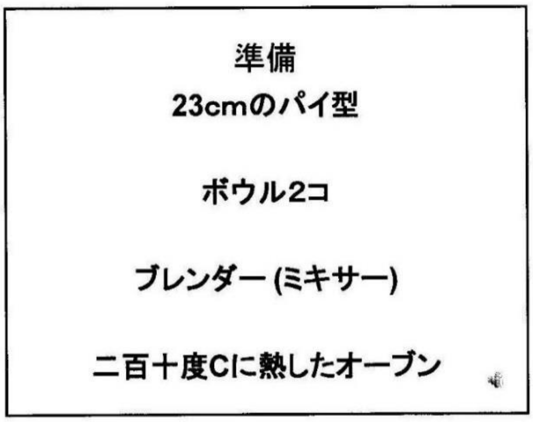
ありがとうございました。

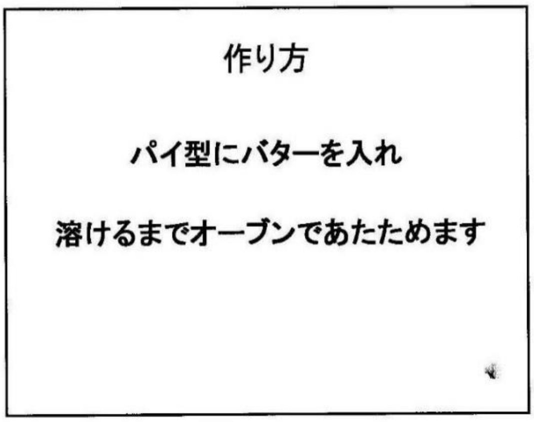
Appendix 4 English and Japanese versions of the Hot Cake Presentations











1

Appendix 4 English and Japanese versions of the Hot Cake Presentations

作り方

生地の準備:

牛乳、卵,小麦粉 をブレンダーに入れ

2分間、まぜます

作り方

生地をあたためたパイ型に入れ

さとうとシナモンをふりかけます

作り方

二十~二十五分間焼きます

いちごを洗って、スライスします

装う時

ある程度さめたら(10分間):

スライスしたいちごをホットケーキ
にのせます

装う時

円形状にかざります

小さじ一杯のシロップをかけます

ありがとうございました！

Appendix 4 English and Japanese versions of the Hot Cake Presentations

Oven Hot Cakes

Ingredients

2 tablespoons Brown Sugar

1/8 teaspoon Cinnamon

1/4 cup Butter

Ingredients

One cup Milk

4 Medium Eggs

Three quarters cup Bread Flour

Ingredients

1 cup Strawberries
(Washed and Sliced Thin)

Hot Cake Syrup (6 teaspoons)

Prepare

9" Pie Plate

2 Bowls

Blender (mixer)

Oven at 350 F°

Instructions

Add Butter to Pie Plate

Place in Oven Until Melted

1

Appendix 4 English and Japanese

Instructions

For the Batter:

Put Milk, Eggs and Flour in Blender

Blend for two minutes

Instructions

Pour Batter into Hot Buttered Plate

Sprinkle with Sugar and Cinnamon

Instructions

Bake for 20-25min.

Wash and Slice Strawberries

Serve

When Slightly Cooled (10 minutes):

Place Sliced Strawberries on Hot Cake

Serve

Decorate in a Circular Pattern

Serve with 1 teaspoon of Syrup

Thank You!

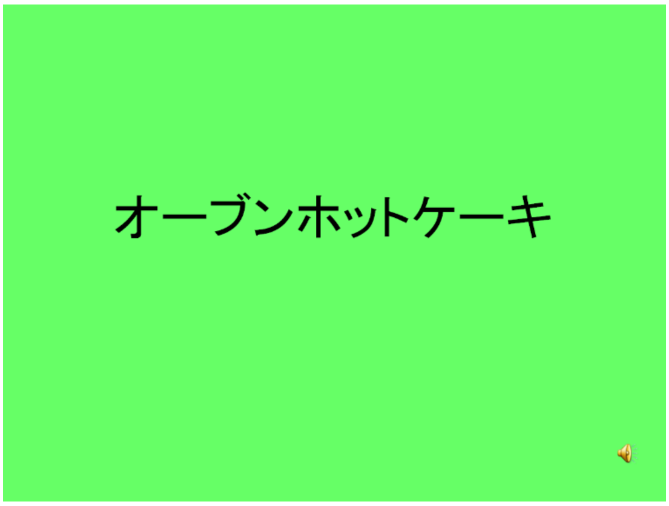
2

Appendix 5 Actual Colors of the Test presentations:

First slide, English and Japanese same background color and lettering shown in Japanese,

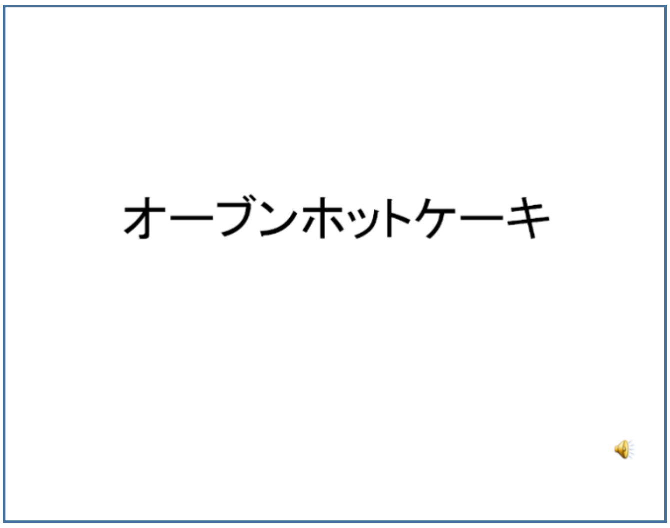
Blue Japanese background presentation used black font, English version used white font*

Dark Blue



Green

Appendix 5 Actual Colors of the Test presentations:



White

Appendix 5 Actual Colors of the Test presentations:

Yellow

Blue (White Lettering English Presentation)

Appendix 5 Actual Colors of the Test presentations:

Blue (Black Lettering Japanese Presentation)*

*Room lighting made it impossible to see black lettering

Appendix 6 English and Japanese Surveys

Participant # ______ Survey a

Thank you for participating in this survey. You help will greatly help me with my doctoral research. After watching and listening to the presentation, please answer the questions. If you do not remember the answer, please write 'Don't Remember'

Thank you! Susan Meiki

What is your native language?

What other languages do you speak?

How long have you lived in Japan?

Please list any other countries that you have lived in for more than 1 year:

Country Length of time lived

1. What is the name of the recipe?
2. How much cinnamon is used?
3. How much milk is needed?
4. How much strawberries are needed?
5. What is the temperature of the oven?
6. Do you add the butter before or after you pour the batter in the pie plate?

Appendix 6 English and Japanese Surveys

7. How long do you blend the batter in total?

8. How long do you bake it for?

9. How much syrup should you serve it with?

Participant # ______ Survey b

Thank you for participating in this survey. You help will greatly help me with my doctoral research. After watching and listening to the presentation, please answer the questions. If you do not remember the answer, please write ‘Don’t Remember’

Thank you! Susan Meiki

What is your native language?

What other languages do you speak?

How long have you lived in Japan?

Please list any other countries that you have lived in for more than 1 year:

Country Length of time lived

1. What is the name of the recipe?

2. How much brown sugar is used?

3. How many eggs are needed?

4. How much cake flour is needed?

Appendix 6 English and Japanese Surveys

5. What is the size of the pie plate?

6. What is the temperature of the oven?

7. Do you add the butter before or after you pour the batter in the pie plate?

8. How long do you blend the batter in total?

9. When do you sprinkle the sugar and cinnamon、after or before baking?

Appendix 6 English and Japanese Surveys

a

この調査（ちょうさ）に、参加して頂き、誠（まこと）にありがとうございます。皆様のご協力は、私の博士課程の研究に大いに活用（かつよう）させていただく所存(しょぞん)でございます。このプレゼンテーションを聞いて、ご覧になったあとで、どうぞ、質問に、お答えください。答えがわからない場合は、'覚えていない'とお書きください。ありがとうございます。

スーザン　明木

あなたの母国語（じこくご）はなんですか？________________

あなたは他にどんな言語を話しますか？________________

あなたはどれくらい、日本に住んでいますか？________________

あなたが1年以上住んでいた、他の国を書き出してください。

国　　　　　　居住（きょじゅう）年数

____

____

____

1. レシピの名前は何でしたか？

2. シナモンはどれくらい、使いますか？

3. 牛乳はどれくらい必要ですか？

4. いちごはどれくらい必要ですか？

5. オーブンの温度は何度ですか？

6. パイ型に生地（きじ）を流し込む前、または、あとにバターを加えますか？

7. 合計でどれ位の時間、生地をまぜますか？

8. どれくらい生地を焼きますか？

9. どれくらいのシロップをかければいいですか？

Appendix 6 English and Japanese Surveys

b

この調査（ちょうさ）に、参加して頂き、誠（まこと）にありがとうございます。皆様のご協力は、私の博士課程の研究に大いに活用（かつよう）させていただく所存(しょぞん)でございます。このプレゼンテーションを聞いて、ご覧になったあとで、どうぞ、質問に、お答えください。答えがわからない場合は、‘覚えていない’とお書きください。ありがとうございます。

スーザン　明木

あなたの自国語（じこくご）はなんですか？ ________________________

あなたは他にどんな言語を話しますか？________________________

あなたはどれくらい、日本に住んでいますか？________________________

あなたが1年以上住んでいた、他の国を書き出してください。

国　　　　　　居住（きょじゅう）年数

____

____

____

1．レシピの名前はなんですか？

2．どれ位のブラウンシュガーが使われますか？

3．何個の卵が必要ですか？

4．どれくらいの薄力粉（はくりきこ）が必要ですか？

5．パイ型のサイズは？

6．オーブンの温度は何度ですか？

7．パイ型に生地（きじ）を流し込む前、または、あとにバターを加えますか？

8．合計でどれ位、生地をまぜますか？

9．砂糖とシナモンをふりかけるのは、ケーキを焼く前か、後かいつですか？

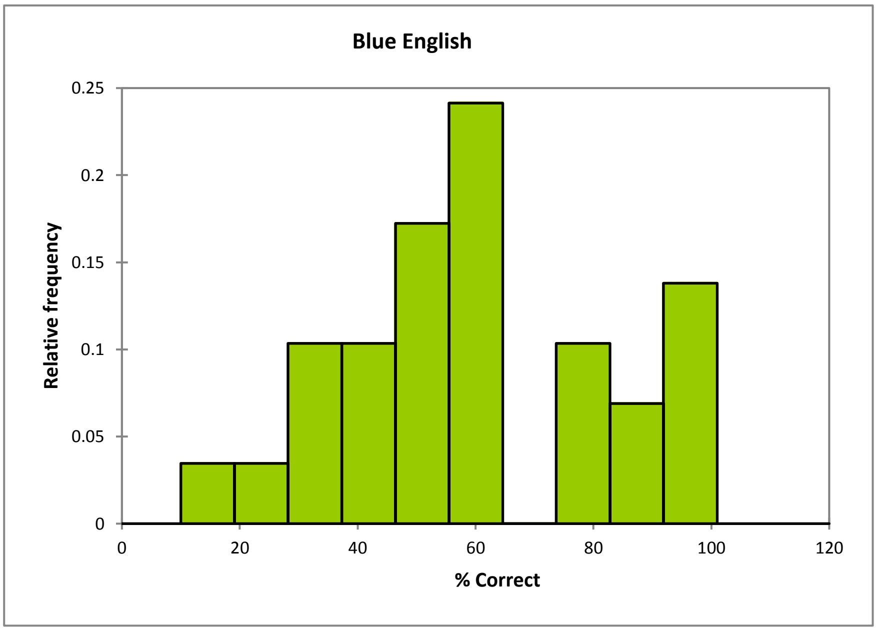
Appendix 7 A and B Survey questions: Types of Questions and Answers

Question Number/ survey version	Question Type	Question	Answer
1 a/b*	Nomenclature	What is the name of the recipe?	Oven Hot Cakes
2a	Numerical, Fractions, nomenclature	How much cinnamon is used?	1/8 Teaspoon
3a	Numerical, single and fraction number	How much milk is needed?	1 and 1/2 cup (Japanese version) 1 cup (English Version)
4a	Numerical, Single Digit	How much strawberries are needed?	1 cup (Number spelled English Version)
5a/6b	Numerical, Three Digits	What is the temperature of the oven?	218C (English Version), 210 C(Japanese Version in kanji)
6 a/7b	Procedural	Do you add the butter before or after you pour the batter in the pie plate?	Before
7a/8b	Numerical, Single Digit, nomenclature	How long do you blend the batter in	2 minutes
8a	Numerical, 2 double digit answers, nomencla	How long do you bake it for?	20-25 minutes
9a**	Numerical, nomenclature	How much syrup should you serve it wi	1 teaspoon per serving or 6 teaspoons total
2b	Numerical, Single digit	How much brown sugar is used?	2 Tablespoons
3b	Numerical, Single Digit	How many eggs are needed?	4 Medium
4b	Numerical, Fraction (English Version), three Digits (Japanese Version)	How much flour is needed?	100 grams (Japanese Version), 1/4 Cup (English Version numbers spelled out)
5b	Numerical, single Digit (English Version), double Digits (Japanese Version)	What is the size of the pie plate?	9 inches (English Version), 23cm (Japanese Version)
8b (English Version), 9b** (Japanese Version)	Procedural	When do you sprinkle the sugar and cinnamon、after or before baking?	after
	*First Question survey	**Last question survey	

BLUE English Data

Summary statistics:

Variable	Observations	Obs. with missing data	Obs. without missing data	Minimum	Maximum	Mean	Std. deviation
Var1	29	0	29	15.790	100.000	60.423	23.465



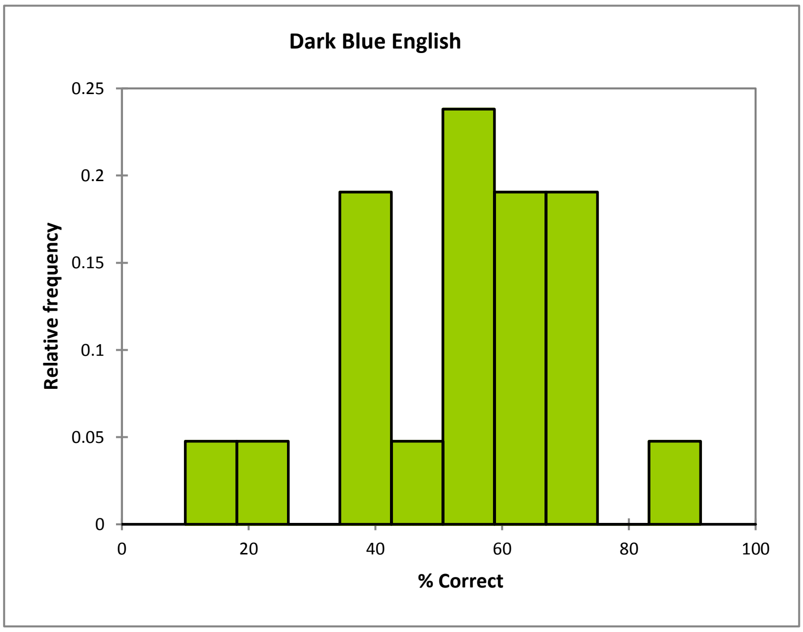
Descriptive statistics for the intervals :

Lower bound	Upper bound	Frequency	Relative Frequency	Density
10	19.1	1	0.034	0.004
19.1	28.2	1	0.034	0.004
28.2	37.3	3	0.103	0.011
37.3	46.4	3	0.103	0.011
46.4	55.5	5	0.172	0.019
55.5	64.6	7	0.241	0.027
64.6	73.7	0	0.000	0.000
73.7	82.8	3	0.103	0.011
82.8	91.9	2	0.069	0.008
91.9	101	4	0.138	0.015

DARK BLUE English Data

Summary statistics:

Variable	Obs.	Obs. with missing data	Obs. without missing data	Minimum	Maximum	Mean	Std. deviation
Var1	21	0	21	15.790	90.320	54.243	17.843



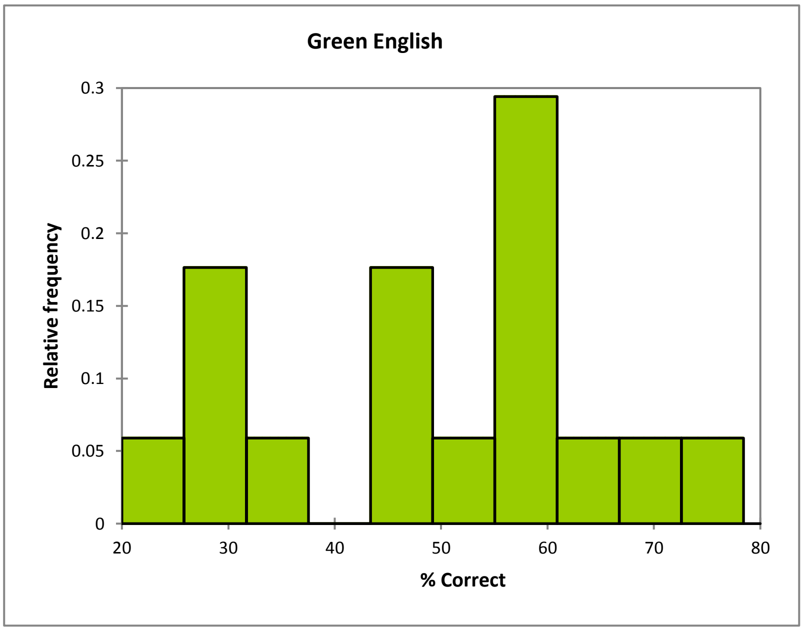
Descriptive statistics for the intervals :

Lower bound	Upper bound	Frequency	Relative Frequency	Density
10	18.132	1	0.048	0.006
18.132	26.264	1	0.048	0.006
26.264	34.396	0	0.000	0.000
34.396	42.528	4	0.190	0.023
42.528	50.66	1	0.048	0.006
50.66	58.792	5	0.238	0.029
58.792	66.924	4	0.190	0.023
66.924	75.056	4	0.190	0.023
75.056	83.188	0	0.000	0.000
83.188	91.32	1	0.048	0.006

GREEN English Data

Summary statistics:

Variable	Obs.	Obs. with missing data	Obs. without missing data	Minimum	Maximum	Mean	Std. deviation
Var1	17	0	17	25.810	77.420	49.405	15.429



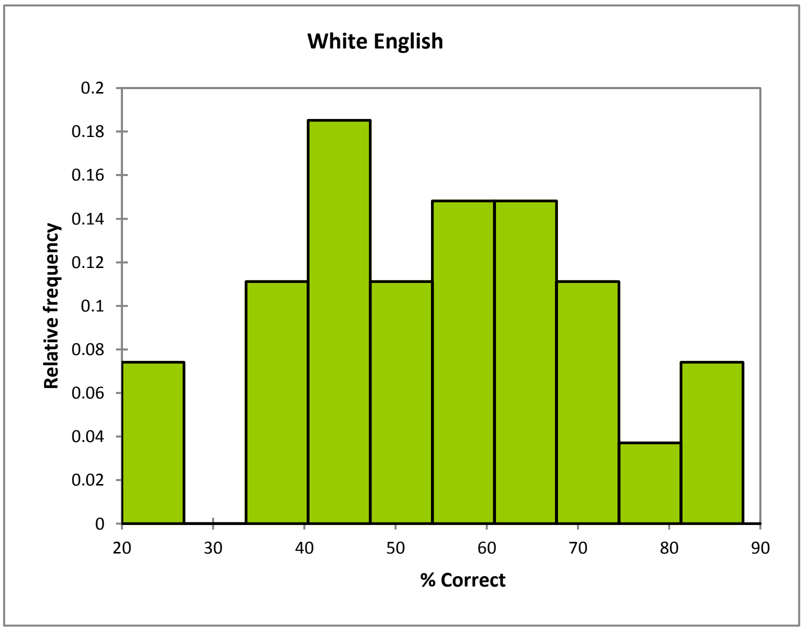
Descriptive statistics for the intervals :

Lower bound	Upper bound	Frequency	Relative Frequency	Density
20	25.842	1	0.059	0.010
25.842	31.684	3	0.176	0.030
31.684	37.526	1	0.059	0.010
37.526	43.368	0	0.000	0.000
43.368	49.21	3	0.176	0.030
49.21	55.052	1	0.059	0.010
55.052	60.894	5	0.294	0.050
60.894	66.736	1	0.059	0.010
66.736	72.578	1	0.059	0.010
72.578	78.42	1	0.059	0.010

White English Data

Summary statistics:

Variable	Obs.	Obs. with missing data	Obs. without missing data	Minimum	Maximum	Mean	Std. deviation
Var1	27	0	27	21.050	87.100	53.977	16.501



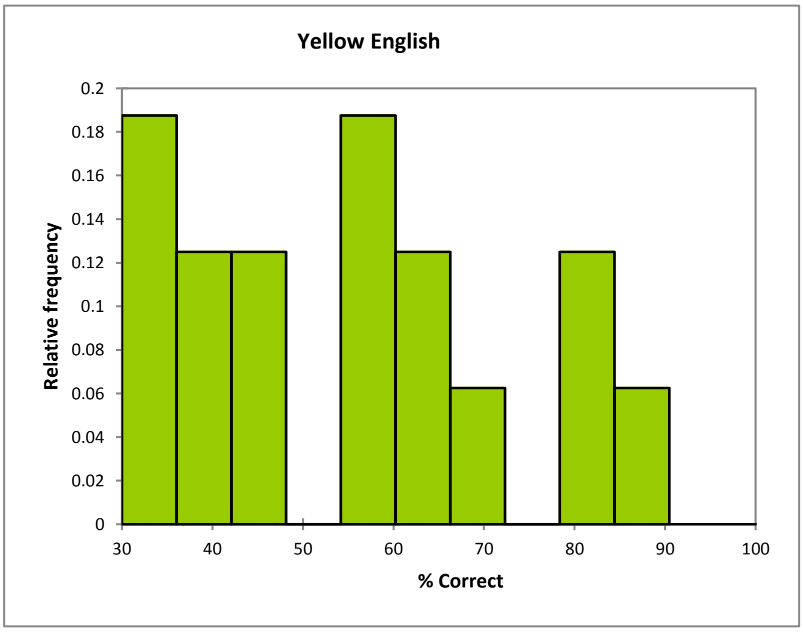
Descriptive statistics for the intervals :

Lower bound	Upper bound	Frequency	Relative Frequency	Density
20	26.81	2	0.074	0.011
26.81	33.62	0	0.000	0.000
33.62	40.43	3	0.111	0.016
40.43	47.24	5	0.185	0.027
47.24	54.05	3	0.111	0.016
54.05	60.86	4	0.148	0.022
60.86	67.67	4	0.148	0.022
67.67	74.48	3	0.111	0.016
74.48	81.29	1	0.037	0.005
81.29	88.1	2	0.074	0.011

YELLOW English Data

Summary statistics:

Variable	Observations	Obs. with missing data	Obs. without missing data	Minimum	Maximum	Mean	Std. deviation
Var1	16	0	16	31.580	89.470	55.400	19.385



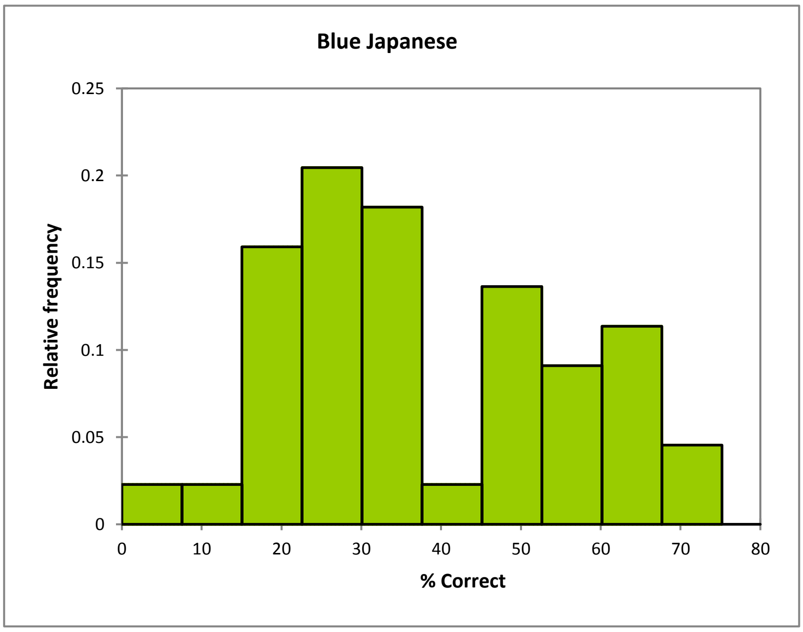
Descriptive statistics for the intervals :

Lower bound	Upper bound	Frequency	Relative Frequency	Density
30	36.047	3	0.188	0.031
36.047	42.094	2	0.125	0.021
42.094	48.141	2	0.125	0.021
48.141	54.188	0	0.000	0.000
54.188	60.235	3	0.188	0.031
60.235	66.282	2	0.125	0.021
66.282	72.329	1	0.063	0.010
72.329	78.376	0	0.000	0.000
78.376	84.423	2	0.125	0.021
84.423	90.47	1	0.063	0.010

BLUE Japanese Data

Summary statistics:

Variable	Obs.	Obs. with missing data	Obs. without missing data	Minimum	Maximum	Mean	Std. deviation
Var1	44	0	44	6.452	74.194	38.377	17.855



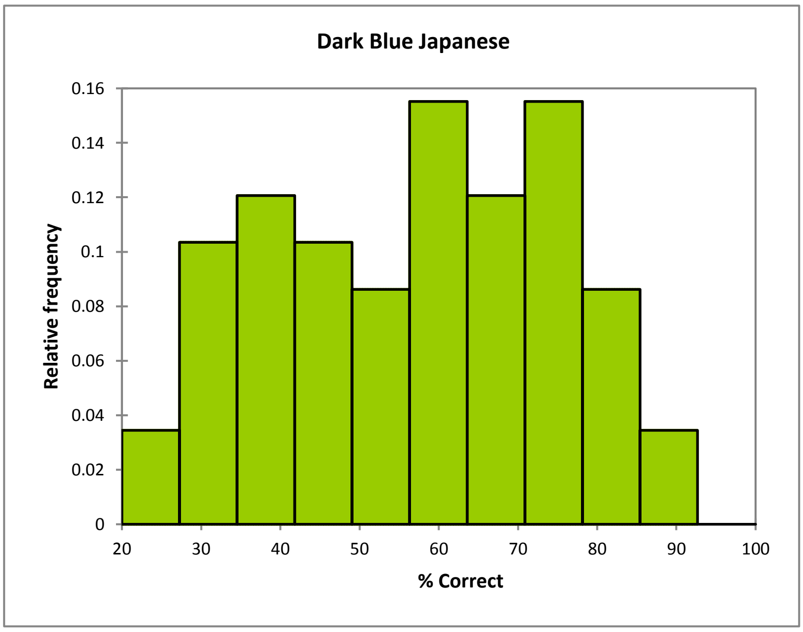
Descriptive statistics for the intervals :

Lower bound	Upper bound	Frequency	Relative Frequency	Density
0	7.519355	1	0.023	0.003
7.519355	15.03871	1	0.023	0.003
15.03871	22.55806	7	0.159	0.021
22.55806	30.07742	9	0.205	0.027
30.07742	37.59677	8	0.182	0.024
37.59677	45.11613	1	0.023	0.003
45.11613	52.63548	6	0.136	0.018
52.63548	60.15484	4	0.091	0.012
60.15484	67.67419	5	0.114	0.015
67.67419	75.19355	2	0.045	0.006

Dark Blue Japanese Data

Summary statistics:

Variable	Obs.	Obs. with missing data	Obs. without missing data	Minimum	Maximum	Mean	Std. deviation
Var1	58	0	58	20.833	91.667	57.091	18.087



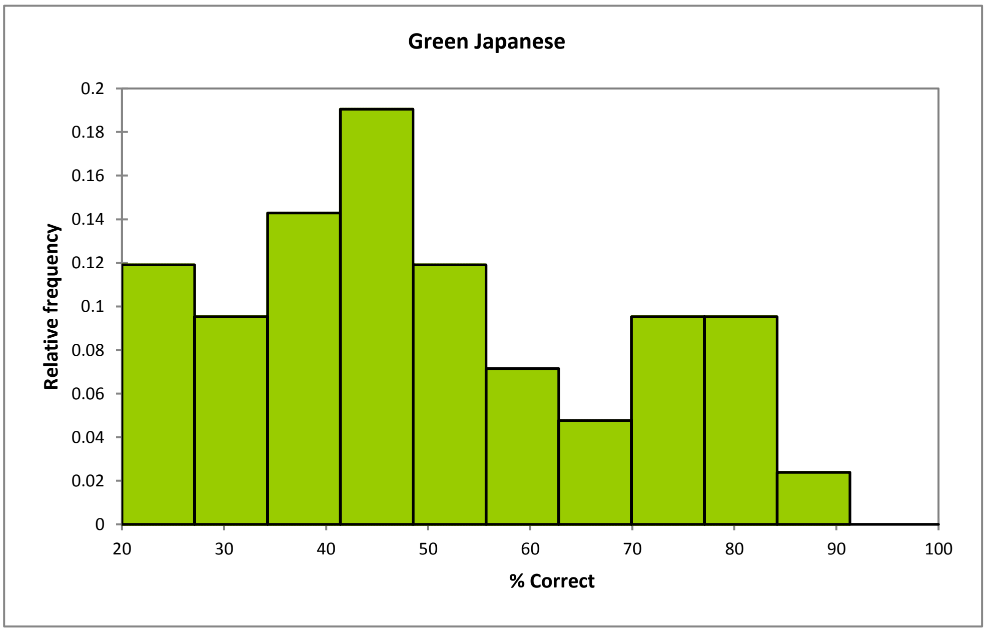
Descriptive statistics for the intervals :

Lower bound	Upper bound	Frequency	Relative Frequency	Density
20	27.26667	2	0.034	0.005
27.26667	34.53333	6	0.103	0.014
34.53333	41.8	7	0.121	0.017
41.8	49.06667	6	0.103	0.014
49.06667	56.33333	5	0.086	0.012
56.33333	63.6	9	0.155	0.021
63.6	70.86667	7	0.121	0.017
70.86667	78.13333	9	0.155	0.021
78.13333	85.4	5	0.086	0.012
85.4	92.66667	2	0.034	0.005

GREEN Japanese Histogram

Summary statistics:

Variable	Observations	Obs. with missing data	Obs. without missing data	Minimum	Maximum	Mean	Std. deviation
Var1	42	0	42	20.833	90.323	50.176	19.300



Descriptive statistics for the intervals :

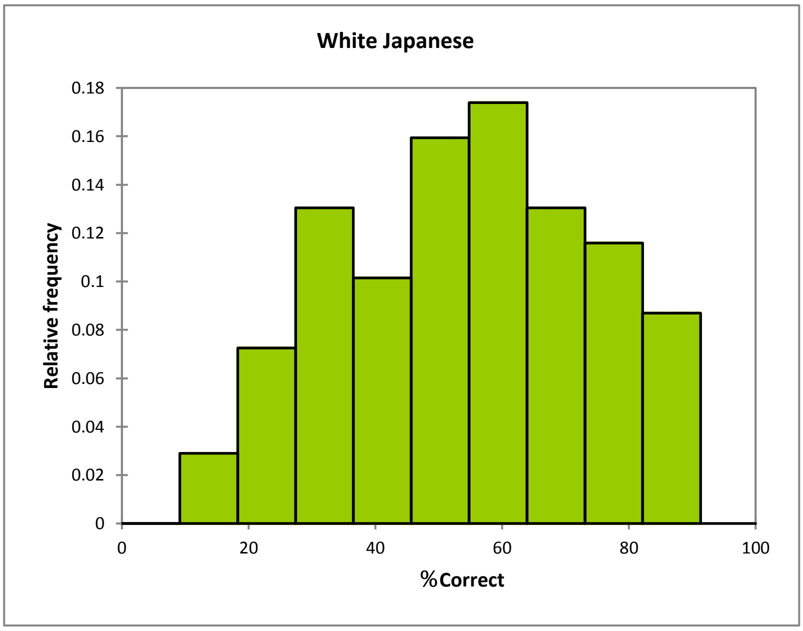
Lower bound	Upper bound	Frequency	Relative Frequency	Density
20	27.13225806	5	0.119	0.017
27.1322581	34.26451613	4	0.095	0.013
34.2645161	41.39677419	6	0.143	0.020
41.3967742	48.52903226	8	0.190	0.027
48.5290323	55.66129032	5	0.119	0.017
55.6612903	62.79354839	3	0.071	0.010
62.7935484	69.92580645	2	0.048	0.007
69.9258065	77.05806452	4	0.095	0.013
77.0580645	84.19032258	4	0.095	0.013
84.1903226	91.32258065	1	0.024	0.003

Appendix 8 English Background Color Data Results

WHITE Japanese Data

Summary statistics:

Variable	Obs.	Obs. with missing data	Obs. without missing data	Minimum	Maximum	Mean	Std. deviation
Var1	69	0	69	9.677	90.323	54.891	19.962



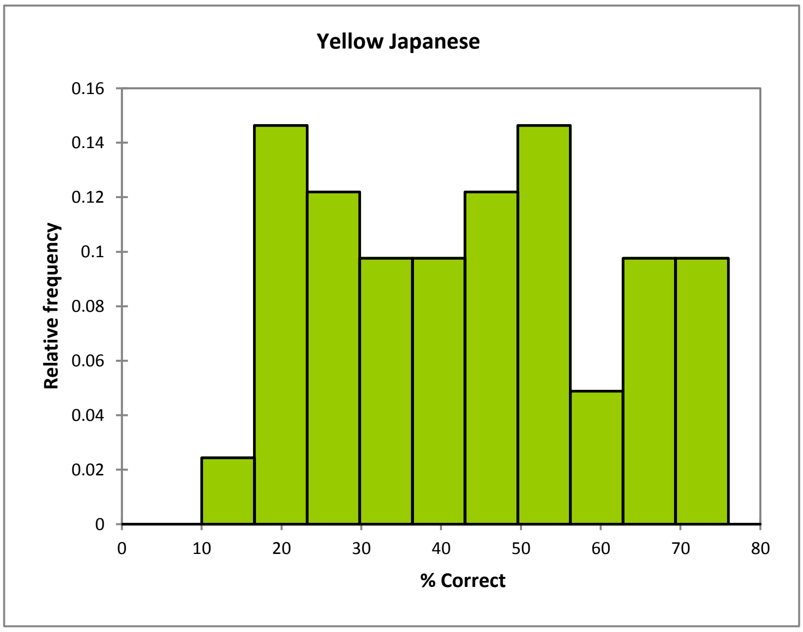
Descriptive statistics for the intervals :

Lower bound	Upper bound	Frequency	Relative Frequency	Density
0	9.132258	0	0.000	0.000
9.132258	18.26452	2	0.029	0.003
18.26452	27.39677	5	0.072	0.008
27.39677	36.52903	9	0.130	0.014
36.52903	45.66129	7	0.101	0.011
45.66129	54.79355	11	0.159	0.017
54.79355	63.92581	12	0.174	0.019
63.92581	73.05806	9	0.130	0.014
73.05806	82.19032	8	0.116	0.013
82.19032	91.32258	6	0.087	0.010

YELLOW Japanese Data

Summary statistics:

Variable	Obs.	Obs. with missing data	Obs. without missing data	Minimum	Maximum	Mean	Std. deviation
Var1	41	0	41	16.129	75.000	43.624	17.841



Descriptive statistics for the intervals :

Lower bound	Upper bound	Frequency	Relative Frequency	Density
10	16.6	1	0.024	0.004
16.6	23.2	6	0.146	0.022
23.2	29.8	5	0.122	0.018
29.8	36.4	4	0.098	0.015
36.4	43	4	0.098	0.015
43	49.6	5	0.122	0.018
49.6	56.2	6	0.146	0.022
56.2	62.8	2	0.049	0.007
62.8	69.4	4	0.098	0.015
69.4	76	4	0.098	0.015

Appendix 9 Point Determination for Answers to Survey Questions

Question 1		
Recipe name?	Japanese Version	English Version
オーブンホット　ケーキ oven hot cake	3	3
ホットケーキ hot cake	2	2
ホット or ケーキ hot or cake	1	1

Question 2a		
How much cinnamon?	Japanese Version	English Version
小さじ 1/4 teaspoon	5	5
小さじ 1/, 小さじ*/4 teaspoon 1/, teaspoon */4	4	4
1/4	3	3
小さじ,1/,/4 teaspoon,1/,/4	2	2
さじ,/,4,1,小 spoon,/,4,1,tea (small in Japanese)	1	1

Question 2B		
How much brown sugar?	Japanese Version	English Version
大さじ 2 tablespoon	3	3
大さじ, さじ2 tablespoon ,spoon	2	2
大, さじ,2 table, spoon,2	1	1

Appendix 9 Point Determination for Answers to Survey Questions

Question 3a		
How much milk?	Japanese Version	English Version
1 と 1/4 カップ cup	3	3
1, カップ(cup), fraction	2	2
1 と 1/4, 1/4 カップ(cup)	1	1

Question 3b		
How many eggs?	Japanese Version	English Version
4M	2	2
4	1	1
M	1	1

Question 4a		
How much strawberries?	Japanese Version	English Version
250 g	4	
250/ 1 cup	3	3
g, 2,5,0 / 1 or cup	2	=1 each variable
200,50	2	
200g, 50g	3	

Appendix 9 Point Determination for Answers to Survey Questions

How much flour?	Japanese Version	English Version
1/4 cup		4
100 g	3	
100	2	
g, 1, 0 1,/,4,cup each	1	=1 each variable

Question 5a and 6b		
Oven Temperature?	Japanese Version	English Version
210C / 218C	3	4
2,1,0,C / 2,1,8,C	=1 each variable	=1 each variable

Question 5b		
Size of pie plate	Japanese Version	English Version
23 cm / 9 "	3	2
23	2	
cm, 2,3 / 9,",inches	=1 each variable	=1 each variable

Question 6a and 7b		
Butter before or after	Japanese Version	English Version
Before	1	1
After	0	0

Appendix 9 Point Determination for Answers to Survey Questions

Question 7a and 8b		
How long blend batter?	Japanese Version	English Version
2 分 minutes	3	2
2 and 分 minutes	=1 each variable	=1 each variable
Question 8a		
How long do you bake?	Japanese Version	English Version
２０—２５分 minutes	4	5
20 or 25	3	2
2,5,0, 分 minutes	=1 each variable	=1 each variable

Question 9a		
How much syrup do you serve?	Japanese Version	English Version
1 小さじ teaspoon	4	3
1, 小、さじ tea, spoon	3	=1 each variable
1,or 小、or さじ tes(small) or spoon	=1 each	

Question 9b		
Sprinkle sugar/cinnamon, before or after baking?	Japanese Version	English Version
前 before	1	1
後 after	0	0

Appendix 10

Analysis of Background color Japan vs. USA Data

Summary statistics:

Variable	Observations	Obs. with missing data	Obs. without missing data	Minimum	Maximum	Mean	Std. deviation
Score	363	0	363	11.111	100.000	50.305	19.303

Variable	Categories	Frequencies	%
Type of Data	Japan	257	70.799
	USA	106	29.201

Regression of variable Score:

Goodness of fit statistics:

Observations	363.000
Sum of weights	363.000
DF	361.000
R2	0.018
Adjusted R2	0.016
MSE	366.816
RMSE	19.152
MAPE	43.531
DW	1.769
Cp	2.000
AIC	2145.459
SBC	2153.248
PC	0.993

Analysis of variance:

Source	DF	Sum of squares	Mean squares	F	Pr > F
Model	1	2465.805	2465.805	6.722	0.010
Error	361	132420.688	366.816		
Corrected Total	362	134886.493			

Computed against model Y=Mean(Y)

Model parameters:

Source	Value	Standard error	t	Pr > |t|	Lower bound (95%)	Upper bound (95%)
Intercept	54.363	1.860	29.223	< 0.0001	50.705	58.021
Type of Data-Japan	-5.732	2.211	-2.593	0.010	-10.080	-1.384
Type of Data-USA	0.000	0.000				

Appendix 10

Analysis of Background color Japan vs. USA Data

Standardized coefficients:

Source	Value	Standard error	t	Pr > |t|	Lower bound (95%)	Upper bound (95%)
Type of Data-Japan	-0.135	0.052	-2.593	0.010	-0.238	-0.033
Type of Data-USA	0.000	0.000				

Type of Data / Tukey (HSD) / Analysis of the differences between the categories with a confidence interval of 95%:

Contrast	Difference	Standardized difference	Critical value	Pr > Diff	Significant
USA vs Japan	5.732	2.593	1.967	0.010	Yes
Tukey's d critical value:			2.781		

Category	LS means	Groups	
USA	54.363	A	
Japan	48.631		B

Type of Data / Fisher (LSD) / Analysis of the differences between the categories with a confidence interval of 95%:

Contrast	Difference	Standardized difference	Critical value	Pr > Diff	Significant
USA vs Japan	5.732	2.593	1.967	0.010	Yes
LSD-value:			3.954		

Category	LS means	Groups	
USA	54.363	A	
Japan	48.631		B

Type of Data / Bonferroni / Analysis of the differences between the categories with a confidence interval of 95%:

Appendix 10

Analysis of Background color Japan vs. USA Data

Contrast	Difference	Standardized difference	Critical value	Pr > Diff	Significant
USA vs Japan	5.732	2.593	1.967	0.010	Yes
Modified significance level:			0.05		

Category	LS means	Groups	
USA	54.363	A	
Japan	48.631		B

Type of Data / Dunn-Sidak / Analysis of the differences between the categories with a confidence interval of 95%:

Contrast	Difference	Standardized difference	Critical value	Pr > Diff	Significant
USA vs Japan	5.732	2.593	1.967	0.010	Yes
Modified significance level:			0.05		

Category	LS means	Groups	
USA	54.363	A	
Japan	48.631		B

Type of Data / Newman-Keuls (SNK) / Analysis of the differences between the categories with a confidence interval of 95%:

Contrast	Difference	Standardized difference	Critical value	Pr > Diff	Significant
USA vs Japan	5.732	2.593	1.960	0.010	Yes

Category	LS means	Groups	
USA	54.363	A	
Japan	48.631		B

Type of Data / Duncan / Analysis of the differences between the categories with a confidence interval of 95%:

Contrast	Difference	Standardized difference	Critical value	Pr > Diff	alpha (Modified)	Significant
USA vs Japan	5.732	2.593	1.960	0.010	0.050	Yes

Category	LS means	Groups	
USA	54.363	A	
Japan	48.631		B

Type of Data / REGWQ / Analysis of the differences between the categories with a confidence interval of 95%:

Contrast	Difference	Standardized difference	Critical value	Pr > Diff	alpha (Modified)	Significant
USA vs Japan	5.732	2.593	1.960	0.010	0.050	Yes

Category	LS means	Groups	
USA	54.363	A	
Japan	48.631		B

Appendix 10

Analysis of Background color Japan vs. USA Data

Type of Data / Benjamini-Hochberg / Analysis of the differences between the categories with a confidence interval of 95%:

Contrast	Difference	Standardized difference	Critical value	Pr > Diff	Significant
USA vs Japan	5.732	2.593	1.967	0.010	Yes

Category	LS means	Groups	
USA	54.363	A	
Japan	48.631		B

Type of Data / Dunnett (two sided) / Analysis of the differences between the control category Japan and the other categories with a confidence interval of 95%:

Category	Difference	Standardized difference	Critical value	Critical difference	Pr > Diff	Significant
Japan vs USA	-5.732	-2.593	1.960	4.333	0.010	Yes

Type of Data / Dunnett (left sided) / Analysis of the differences between the control category Japan and the other categories with a confidence interval of 95%:

Category	Difference	dardized diffe	Critical valu	tical differe	Pr > Diff	Significant
Japan vs USA	-5.732	-2.593	-1.645	-3.637	0.005	Yes

Appendix 11

Dark Blue English Outliers

Summary statistics:

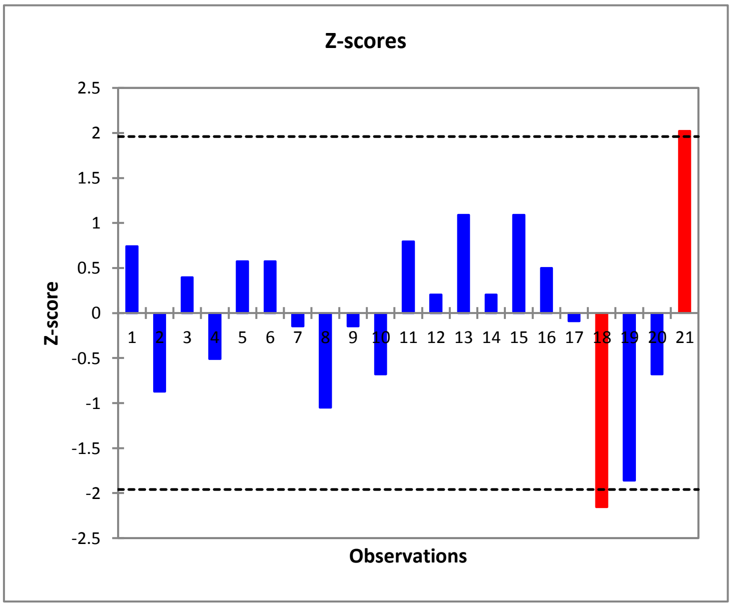
Variable	Obs.	Obs. with missing data	Obs. without missing data	Minimum	Maximum	Mean	Std. deviation
Var1	21	0	21	15.790	90.320	54.243	17.843

Grubbs test for outliers / Two-tailed test:

G (Observed value)	2.155
G (Critical value)	2.734
p-value (Two-tailed)	0.481
alpha	0.05

99% confidence interval on the p-value:
] 0.480, 0.482 [

Test interpretation:
H0: There is no outlier in the data
Ha: The minimum or maximum value is an outlier
As the computed p-value is greater than the significance level alpha=0.05, one cannot reject the null hypothesis H0.
The risk to reject the null hypothesis H0 while it is true is 48.10%.



GREEN English Outliers

Summary statistics:

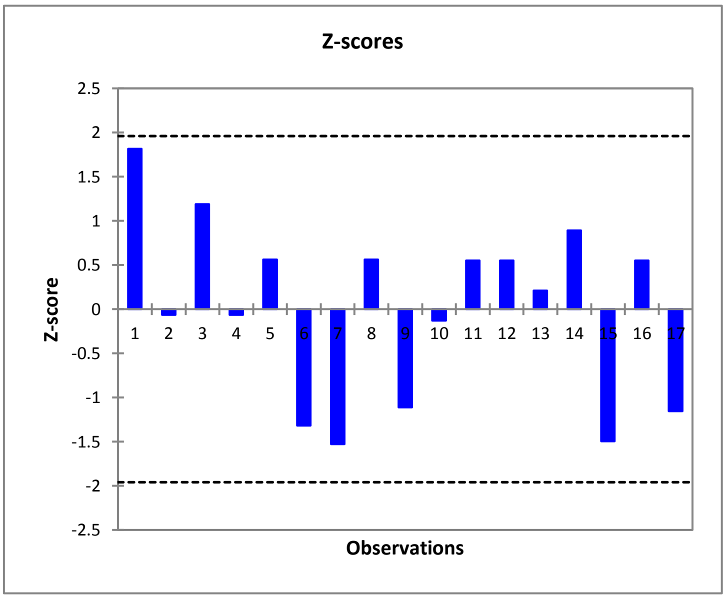
Variable	Obs.	Obs. with missing data	Obs. without missing data	Minimum	Maximum	Mean	Std. deviation
Var1	17	0	17	25.810	77.420	49.405	15.429

Grubbs test for outliers / Two-tailed test:

G (Observed value)	1.816
G (Critical value)	2.622
p-value (Two-tailed)	0.990
alpha	0.05

99% confidence interval on the p-value:
] 0.990, 0.990 [

Test interpretation:
H0: There is no outlier in the data
Ha: The minimum or maximum value is an outlier
As the computed p-value is greater than the significance level alpha=0.05, one cannot reject the null hypothesis H0.
The risk to reject the null hypothesis H0 while it is true is 98.98%.



BLUE Japanese Outliers

Summary statistics:

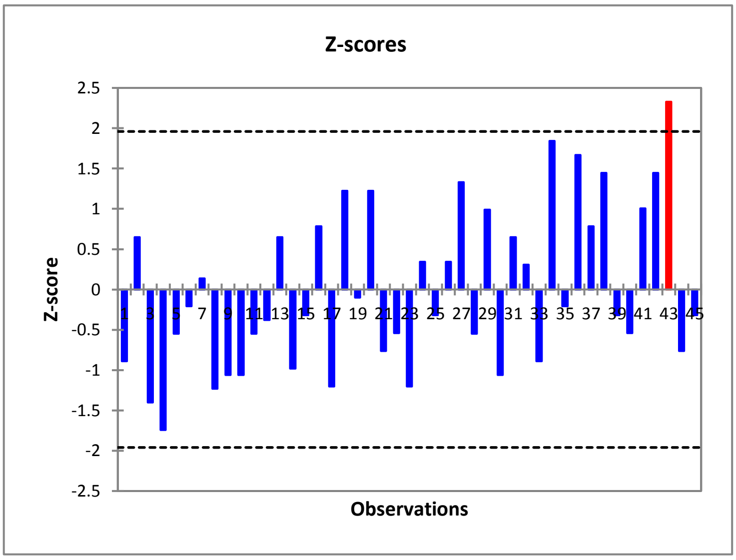
Variable	Obs.	Obs. with missing data	Obs. without missing data	Minimum	Maximum	Mean	Std. deviation
Var1	45	0	45	6.452	83.333	39.376	18.880

Grubbs test for outliers / Two-tailed test:

G (Observed value)	2.328
G (Critical value)	3.085
p-value (Two-tailed)	0.753
alpha	0.05

99% confidence interval on the p-value:
] 0.752, 0.754 [

Test interpretation:
H0: There is no outlier in the data
Ha: The minimum or maximum value is an outlier
As the computed p-value is greater than the significance level alpha=0.05, one cannot reject the null hypothesis H0.
The risk to reject the null hypothesis H0 while it is true is 75.28%.



GREEN Japanese Outliers

Summary statistics:

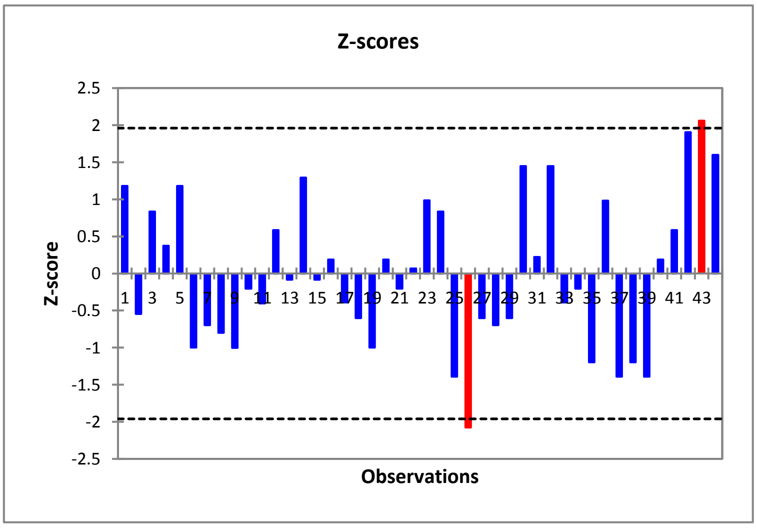
Variable	Obs.	Obs. with missing data	Obs. without missing data	Minimum	Maximum	Mean	Std. deviation
% correct	44	0	44	6.452	93.548	50.168	21.057

Grubbs test for outliers / Two-tailed test:

G (Observed value)	2.076
G (Critical value)	3.076
p-value (Two-tailed)	0.502
alpha	0.05

99% confidence interval on the p-value:
] 0.500, 0.503 [

Test interpretation:
H0: There is no outlier in the data
Ha: The minimum or maximum value is an outlier
As the computed p-value is greater than the significance level alpha=0.05, one cannot reject the null hypothesis H0.
The risk to reject the null hypothesis H0 while it is true is 50.16%.



WHITE Japanese Outliers

Summary statistics:

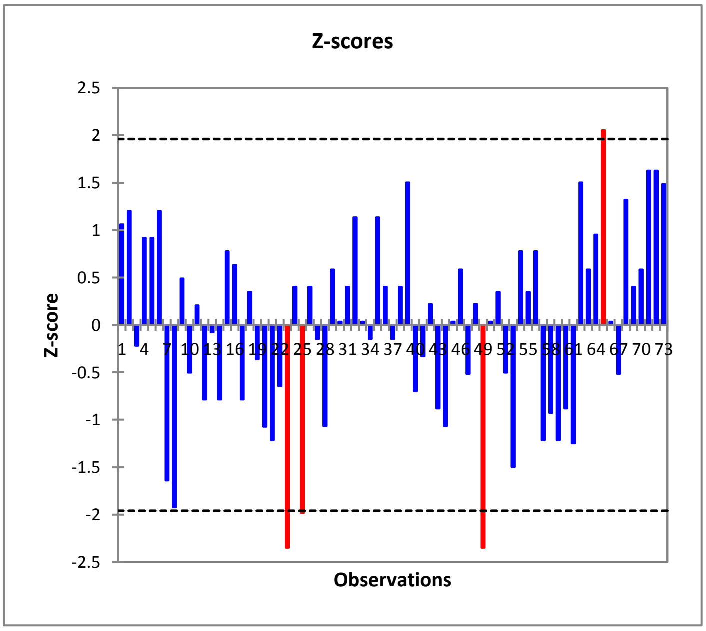
Variable	Obs.	Obs. with missing data	Obs. without missing data	Minimum	Maximum	Mean	Std. deviation
Var1	73	0	73	0.000	100.000	53.368	22.717

Grubbs test for outliers / Two-tailed test:

G (Observed value)	2.349
G (Critical value)	3.273
p-value (Two-tailed)	0.765
alpha	0.05

99% confidence interval on the p-value:
] 0.763, 0.766 [

Test interpretation:
H0: There is no outlier in the data
Ha: The minimum or maximum value is an outlier
As the computed p-value is greater than the significance level alpha=0.05, one cannot reject the null hypothesis H0.
The risk to reject the null hypothesis H0 while it is true is 76.45%.



Yellow Japanese Outliers

Summary statistics:

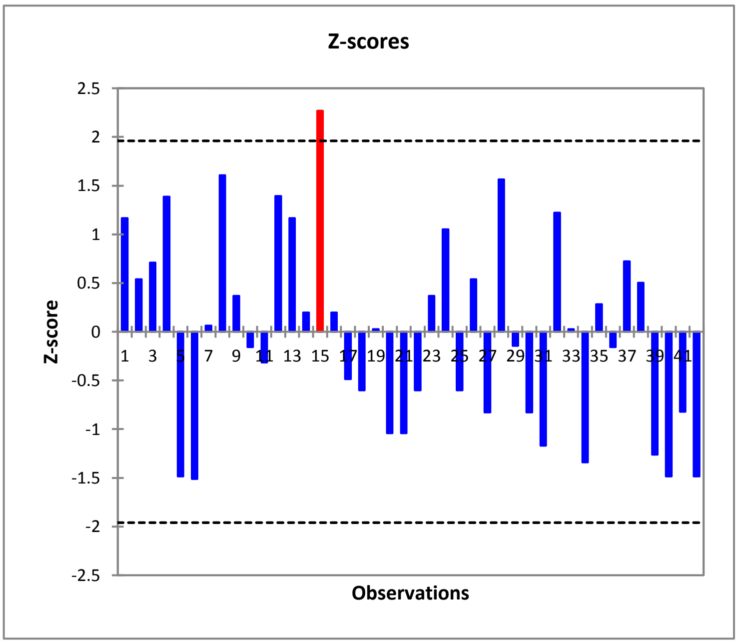
Variable	Obs.	Obs. with missing data	Obs. without missing data	Minimum	Maximum	Mean	Std. deviation
Var1	42	0	42	16.129	87.500	44.668	18.878

Grubbs test for outliers / Two-tailed test:

G (Observed value)	2.269
G (Critical value)	3.057
p-value (Two-tailed)	0.827
alpha	0.05

99% confidence interval on the p-value:
] 0.826, 0.828 [

Test interpretation:
H0: There is no outlier in the data
Ha: The minimum or maximum value is an outlier
As the computed p-value is greater than the significance level alpha=0.05, one cannot reject the null hypothesis H0.
The risk to reject the null hypothesis H0 while it is true is 82.69%.



Appendix 12

ANOVA English Answers

Summary statistics:

Variable	Observations	Obs. with missing data	Obs. without missing data	Minimum	Maximum	Mean	Std. deviation
Y1	111	0	111	5.260	100.000	54.777	19.588

Variable	Categories	Frequencies	%
Q1	Blue	29	26.126
	Dk Blue	21	18.919
	Green	17	15.315
	White	28	25.225
	Yellow	16	14.414

Correlation matrix:

Variables	Q1-Blue	Q1-Dk Blue	Q1-Green	Q1-White	Q1-Yellow	Y1
Q1-Blue	**1.000**	-0.287	-0.253	-0.345	-0.244	0.172
Q1-Dk Blue	-0.287	**1.000**	-0.205	-0.281	-0.198	-0.013
Q1-Green	-0.253	-0.205	**1.000**	-0.247	-0.175	-0.117
Q1-White	-0.345	-0.281	-0.247	**1.000**	-0.238	-0.076
Q1-Yellow	-0.244	-0.198	-0.175	-0.238	**1.000**	0.013
Y1	0.172	-0.013	-0.117	-0.076	0.013	**1.000**

Multicolinearity statistics:

Statistic	Q1-Blue	Q1-Dk Blue	Q1-Green	Q1-White	Q1-Yellow
Tolerance	0.000	0.000	0.000	0.000	0.000
VIF	0.000	0.000	0.000	0.000	0.000

Regression of variable Y1:

Goodness of fit statistics:

Observations	111.000
Sum of weights	111.000
DF	106.000
R2	0.038
Adjusted R2	0.002
MSE	383.000
RMSE	19.570
MAPE	42.644
DW	1.928
Cp	5.000
AIC	665.116
SBC	678.663
PC	1.053

Analysis of variance:

Source	DF	Sum of squares	Mean squares	F	Pr > F
Model	4	1608.005	402.001	1.050	0.385
Error	106	40598.008	383.000		
Corrected Total	110	42206.013			

Computed against model Y=Mean(Y)

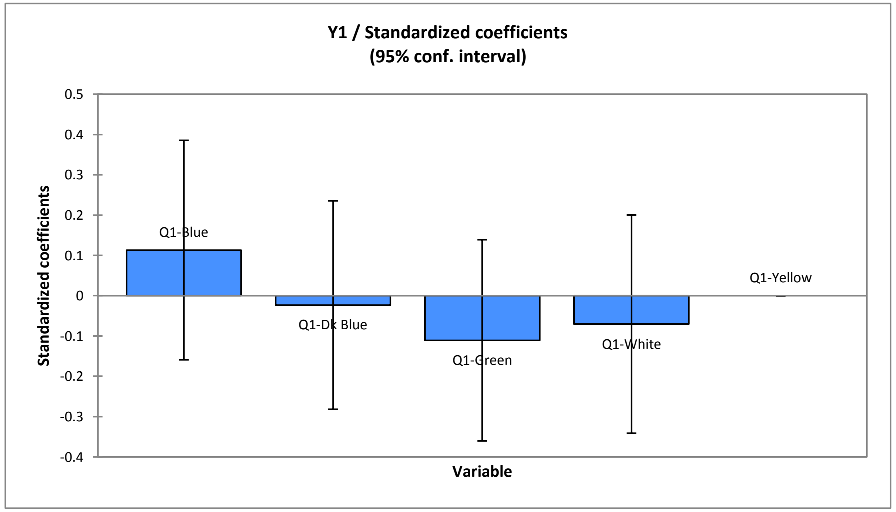
Model parameters:

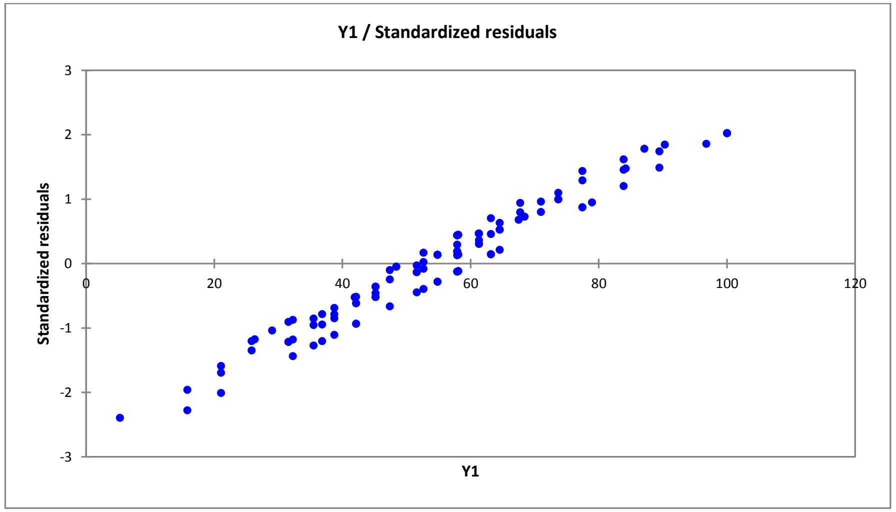
Source	Value	Standard error	t	Pr > |t|	Lower bound (95%)	Upper bound (95%)
Intercept	55.400	4.893	11.323	< 0.0001	45.700	65.100
Q1-Blue	5.023	6.095	0.824	0.412	-7.060	17.107
Q1-Dk Blue	-1.157	6.494	-0.178	0.859	-14.033	11.718
Q1-Green	-5.995	6.817	-0.879	0.381	-19.509	7.520
Q1-White	-3.163	6.133	-0.516	0.607	-15.323	8.996
Q1-Yellow	0.000	0.000				

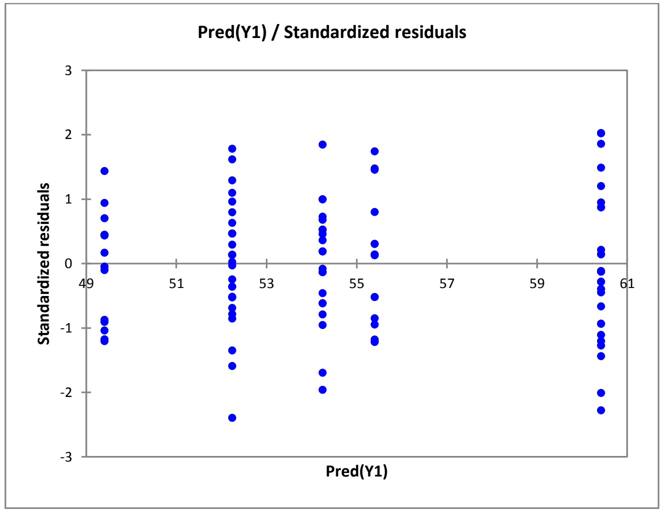
Equation of the model:

Standardized coefficients:

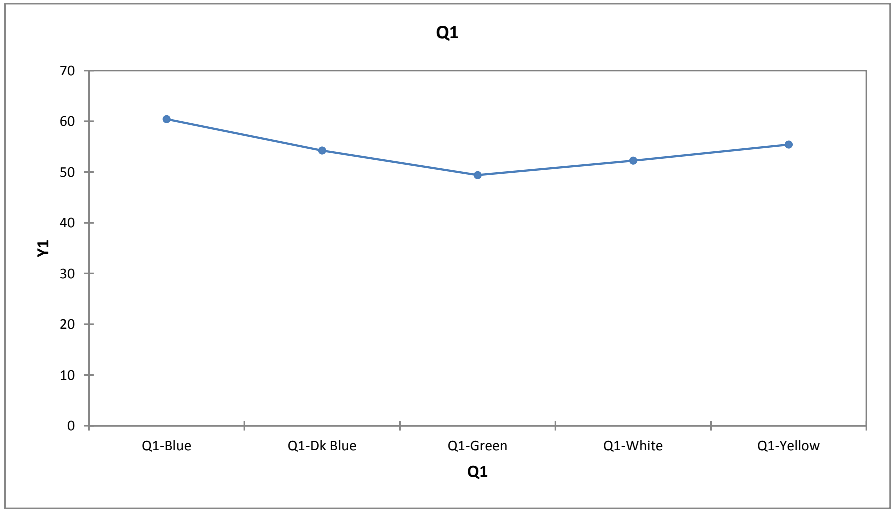
Source	Value	Standard error	t	Pr > |t|	Lower bound (95%)	Upper bound (95%)
Q1-Blue	0.113	0.137	0.824	0.412	-0.159	0.385
Q1-Dk Blue	-0.023	0.130	-0.178	0.859	-0.282	0.235
Q1-Green	-0.111	0.126	-0.879	0.381	-0.360	0.139
Q1-White	-0.070	0.137	-0.516	0.607	-0.341	0.200
Q1-Yellow	0.000	0.000				

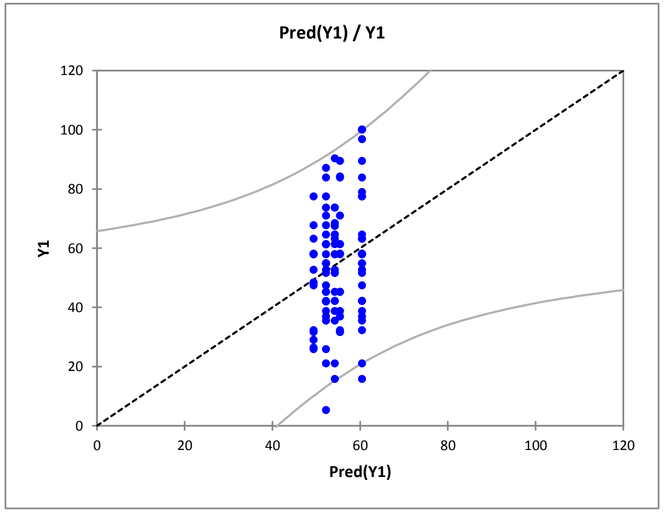






Means charts:



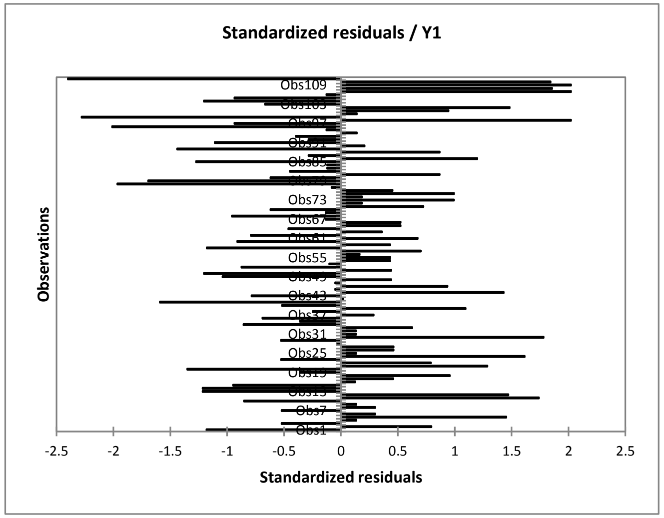


Appendix 12 ANOVA English Answers

Q1 / Tukey (HSD) / Analysis of the differences between the categories with a confidence interval of 95%:

Contrast	Difference	Standardized difference	Critical value	Pr > Diff	Significant
Blue vs Green	11.018	1.843	2.775	0.355	No
Blue vs White	8.187	1.579	2.775	0.514	No
Blue vs Dk Blue	6.181	1.102	2.775	0.805	No
Blue vs Yellow	5.023	0.824	2.775	0.923	No
Yellow vs Green	5.995	0.879	2.775	0.904	No
Yellow vs White	3.163	0.516	2.775	0.986	No
Yellow vs Dk Blue	1.157	0.178	2.775	1.000	No
Dk Blue vs Green	4.838	0.758	2.775	0.942	No
Dk Blue vs White	2.006	0.355	2.775	0.997	No
White vs Green	2.831	0.471	2.775	0.990	No
Tukey's d critical value:			3.925		

Category	Mean	Groups
Blue	60.423	A
Yellow	55.400	A
Dk Blue	54.243	A
White	52.237	A
Green	49.405	A



Q1 / Fisher (LSD) / Analysis of the differences between the categories with a confidence interval of 95%:

Contrast	Difference	Standardized difference	Critical value	Pr > Diff	Significant
Blue vs Green	11.018	1.843	1.983	0.068	No
Blue vs White	8.187	1.579	1.983	0.117	No
Blue vs Dk Blue	6.181	1.102	1.983	0.273	No
Blue vs Yellow	5.023	0.824	1.983	0.412	No
Yellow vs Green	5.995	0.879	1.983	0.381	No
Yellow vs White	3.163	0.516	1.983	0.607	No
Yellow vs Dk Blue	1.157	0.178	1.983	0.859	No
Dk Blue vs Green	4.838	0.758	1.983	0.450	No
Dk Blue vs White	2.006	0.355	1.983	0.723	No
White vs Green	2.831	0.471	1.983	0.639	No
LSD-value:			11.646		

Category	Mean	Groups
Blue	60.423	A
Yellow	55.400	A
Dk Blue	54.243	A
White	52.237	A
Green	49.405	A

Q1 / Bonferroni / Analysis of the differences between the categories with a confidence interval of 95%:

Contrast	Difference	Standardized difference	Critical value	Pr > Diff	Significant
Blue vs Green	11.018	1.843	2.867	0.068	No
Blue vs White	8.187	1.579	2.867	0.117	No
Blue vs Dk Blue	6.181	1.102	2.867	0.273	No
Blue vs Yellow	5.023	0.824	2.867	0.412	No
Yellow vs Green	5.995	0.879	2.867	0.381	No
Yellow vs White	3.163	0.516	2.867	0.607	No
Yellow vs Dk Blue	1.157	0.178	2.867	0.859	No
Dk Blue vs Green	4.838	0.758	2.867	0.450	No
Dk Blue vs White	2.006	0.355	2.867	0.723	No
White vs Green	2.831	0.471	2.867	0.639	No
Modified significance level:			0.005		

Category	Mean	Groups
Blue	60.423	A
Yellow	55.400	A
Dk Blue	54.243	A
White	52.237	A
Green	49.405	A

Q1 / Dunn-Sidak / Analysis of the differences between the categories with a confidence interval of 95%:

Contrast	Difference	Standardized difference	Critical value	Pr > Diff	Significant
Blue vs Green	11.018	1.843	2.859	0.068	No
Blue vs White	8.187	1.579	2.859	0.117	No
Blue vs Dk Blue	6.181	1.102	2.859	0.273	No
Blue vs Yellow	5.023	0.824	2.859	0.412	No
Yellow vs Green	5.995	0.879	2.859	0.381	No
Yellow vs White	3.163	0.516	2.859	0.607	No
Yellow vs Dk Blue	1.157	0.178	2.859	0.859	No
Dk Blue vs Green	4.838	0.758	2.859	0.450	No
Dk Blue vs White	2.006	0.355	2.859	0.723	No
White vs Green	2.831	0.471	2.859	0.639	No
Modified significance level:			0.005		

Category	Mean	Groups
Blue	60.423	A
Yellow	55.400	A
Dk Blue	54.243	A
White	52.237	A
Green	49.405	A

Q1 / Newman-Keuls (SNK) / Analysis of the differences between the categories with a confidence interval of 95%:

Contrast	Difference	Standardized difference	Critical value	Pr > Diff	Significant
Blue vs Green	11.018	1.843	2.775	0.355	No
Blue vs White	8.187	1.579	2.610	0.395	No
Blue vs Dk Blue	6.181	1.102	2.377	0.515	No
Blue vs Yellow	5.023	0.824	1.983	0.412	No
Yellow vs Green	5.995	0.879	2.610	0.816	No
Yellow vs White	3.163	0.516	2.377	0.864	No
Yellow vs Dk Blue	1.157	0.178	1.983	0.859	No
Dk Blue vs Green	4.838	0.758	2.377	0.730	No
Dk Blue vs White	2.006	0.355	1.983	0.723	No
White vs Green	2.831	0.471	1.983	0.639	No

Category	Mean	Groups
Blue	60.423	A
Yellow	55.400	A
Dk Blue	54.243	A
White	52.237	A
Green	49.405	A

Q1 / Duncan / Analysis of the differences between the categories with a confidence interval of 95%:

Contrast	Difference	Standardized difference	Critical value	Pr > Diff	alpha (Modified)	Significant
Blue vs Green	11.018	1.843	2.206	0.355	0.185	No
Blue vs White	8.187	1.579	2.156	0.395	0.143	No
Blue vs Dk Blue	6.181	1.102	2.087	0.515	0.098	No
Blue vs Yellow	5.023	0.824	1.983	0.412	0.050	No
Yellow vs Green	5.995	0.879	2.156	0.816	0.143	No
Yellow vs White	3.163	0.516	2.087	0.864	0.098	No
Yellow vs Dk Blue	1.157	0.178	1.983	0.859	0.050	No
Dk Blue vs Green	4.838	0.758	2.087	0.730	0.098	No
Dk Blue vs White	2.006	0.355	1.983	0.723	0.050	No
White vs Green	2.831	0.471	1.983	0.639	0.050	No

Category	Mean	Groups
Blue	60.423	A
Yellow	55.400	A
Dk Blue	54.243	A
White	52.237	A
Green	49.405	A

Q1 / REGWQ / Analysis of the differences between the categories with a confidence interval of 95%:

Contrast	Difference	Standardized difference	Critical value	Pr > Diff	alpha (Modified)	Significant
Blue vs Green	11.018	1.843	2.775	0.355	0.050	No
Blue vs White	8.187	1.579	2.610	0.395	0.050	No
Blue vs Dk Blue	6.181	1.102	2.610	0.515	0.050	No
Blue vs Yellow	5.023	0.824	2.610	0.412	0.050	No
Yellow vs Green	5.995	0.879	2.610	0.816	0.050	No
Yellow vs White	3.163	0.516	2.576	0.864	0.030	No
Yellow vs Dk Blue	1.157	0.178	2.576	0.859	0.030	No
Dk Blue vs Green	4.838	0.758	2.576	0.730	0.030	No
Dk Blue vs White	2.006	0.355	2.356	0.723	0.020	No
White vs Green	2.831	0.471	2.356	0.639	0.020	No

Category	Mean	Groups
Blue	60.423	A
Yellow	55.400	A
Dk Blue	54.243	A
White	52.237	A
Green	49.405	A

Appendix 12

All Japanese Data ANOVA

Summary statistics:

Variable	Observations	Obs. with missing data	Obs. without missing data	Minimum	Maximum	Mean	Std. deviation
Y1	263	0	263	0.000	100.000	49.715	21.093

Variable	Categories	Frequencies	%
Q1	Blue	45	17.110
	Dark Blue	59	22.433
	Green	44	16.730
	White	73	27.757
	Yellow	42	15.970

Correlation matrix:

Variables	Q1-Blue	Q1-Dark Blue	Q1-Green	Q1-White	Q1-Yellow	Y1
Q1-Blue	**1.000**	-0.244	-0.204	-0.282	-0.198	-0.223
Q1-Dark Blue	-0.244	**1.000**	-0.241	-0.333	-0.234	0.169
Q1-Green	-0.204	-0.241	**1.000**	-0.278	-0.195	0.010
Q1-White	-0.282	-0.333	-0.278	**1.000**	-0.270	0.108
Q1-Yellow	-0.198	-0.234	-0.195	-0.270	**1.000**	-0.104
Y1	-0.223	0.169	0.010	0.108	-0.104	**1.000**

Appendix 12 All Japanese Data ANOVA

Multicolinearity statistics:

Statistic	Q1-Blue	Q1-Dark Blue	Q1-Green	Q1-White	Q1-Yellow
Tolerance	0.000	0.000	0.000	0.000	0.000
VIF	0.000	0.000	0.000	0.000	0.000

Regression of variable Y1:

Goodness of fit statistics:

Observations	263.000
Sum of weights	263.000
DF	258.000
R2	0.081
Adjusted R2	0.067
MSE	415.193
RMSE	20.376
MAPE	49.399
DW	1.722
Cp	5.000
AIC	1590.511
SBC	1608.372
PC	0.955

Analysis of variance:

Source	DF	Sum of squares	Mean squares	F	Pr > F
Model	4	9449.068	2362.267	5.690	0.000
Error	258	107119.757	415.193		
Corrected Total	262	116568.825			

Computed against model Y=Mean(Y)

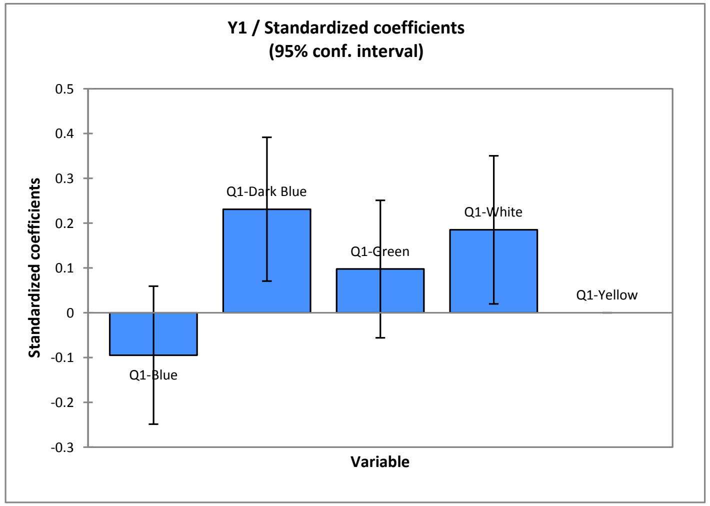
Appendix 12 All Japanese Data ANOVA

Source	Value	Standard error	t	Pr > |t|	Lower bound (95%)	Upper bound (95%)
Intercept	44.668	3.144	14.207	< 0.0001	38.477	50.860
Q1-Blue	-5.293	4.372	-1.211	0.227	-13.902	3.316
Q1-Dark Blue	11.667	4.114	2.836	0.005	3.566	19.768
Q1-Green	5.500	4.396	1.251	0.212	-3.156	14.155
Q1-White	8.699	3.946	2.204	0.028	0.928	16.470
Q1-Yellow	0.000	0.000				

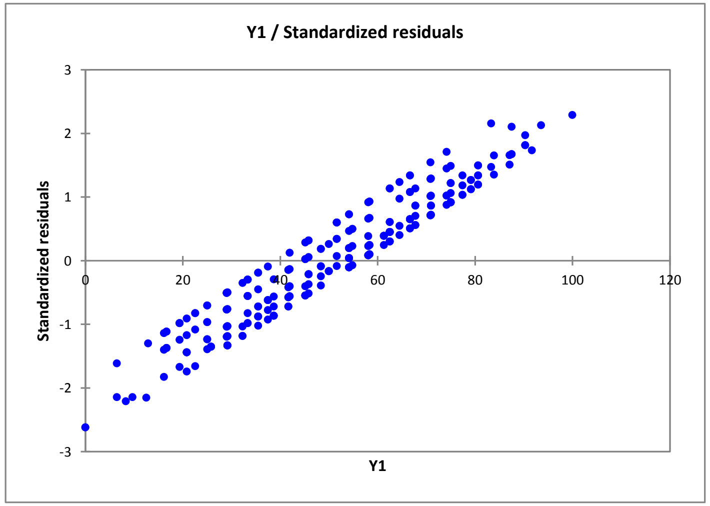
Equation of the model:

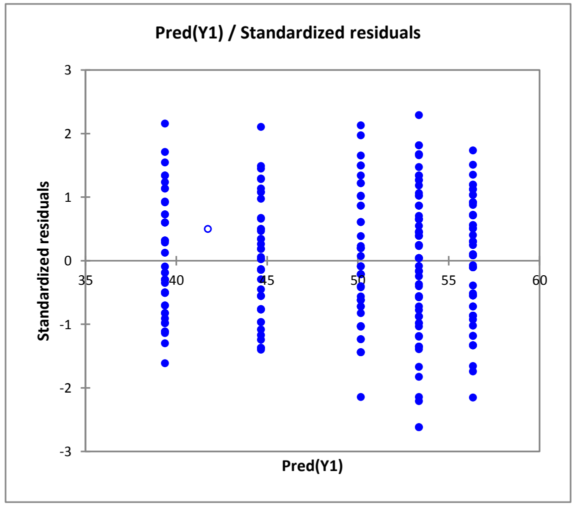
Standardized coefficients:

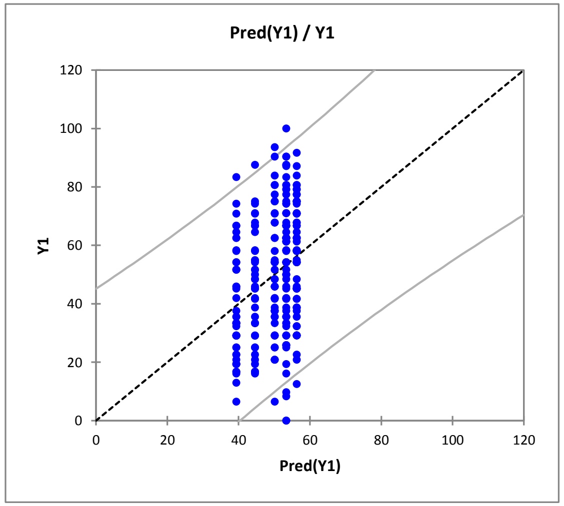
Source	Value	Standard error	t	Pr > |t|	Lower bound (95%)	Upper bound (95%)
Q1-Blue	-0.095	0.078	-1.211	0.227	-0.249	0.059
Q1-Dark Blue	0.231	0.082	2.836	0.005	0.071	0.392
Q1-Green	0.098	0.078	1.251	0.212	-0.056	0.251
Q1-White	0.185	0.084	2.204	0.028	0.020	0.350
Q1-Yellow	0.000	0.000				



Appendix 12 All Japanese Data ANOVA

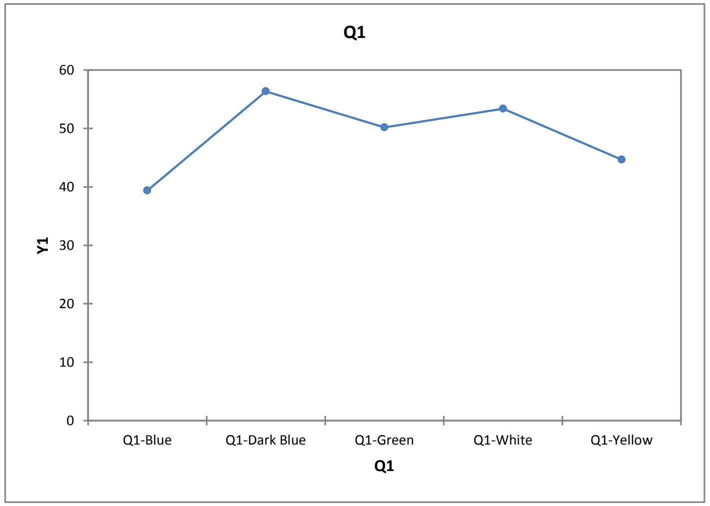


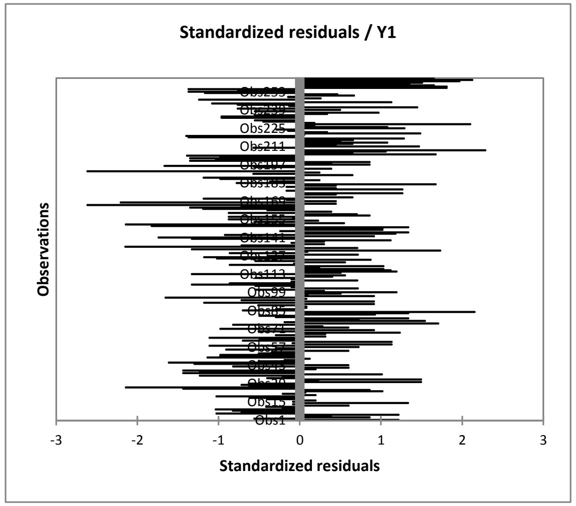




Appendix 12 All Japanese Data ANOVA

Means charts:





Q1 / Tukey (HSD) / Analysis of the differences between the categories with a confidence interval of 95%:

Contrast	Difference	Standardized difference	Critical value	Pr > Diff	Significant
Dark Blue vs Blue	16.960	4.205	2.728	0.000	Yes
Dark Blue vs Yellow	11.667	2.836	2.728	0.037	Yes
Dark Blue vs Green	6.167	1.520	2.728	0.550	No
Dark Blue vs White	2.968	0.832	2.728	0.921	No
White vs Blue	13.992	3.623	2.728	0.003	Yes
White vs Yellow	8.699	2.204	2.728	0.178	No
White vs Green	3.200	0.823	2.728	0.924	No
Green vs Blue	10.792	2.498	2.728	0.091	No
Green vs Yellow	5.500	1.251	2.728	0.721	No
Yellow vs Blue	5.293	1.211	2.728	0.745	No
Tukey's d critical value:			3.858		

Category	Mean	Groups		
Dark Blue	56.335	A		
White	53.368	A	B	
Green	50.168	A	B	C
Yellow	44.668		B	C
Blue	39.376			C

Appendix 12 All Japanese Data ANOVA

Q1 / Fisher (LSD) / Analysis of the differences between the categories with a confidence interval of 95%:

Contrast	Difference	Standardized difference	Critical value	Pr > Diff	Significant
Dark Blue vs Blue	16.960	4.205	1.969	< 0.0001	Yes
Dark Blue vs Yellow	11.667	2.836	1.969	0.005	Yes
Dark Blue vs Green	6.167	1.520	1.969	0.130	No
Dark Blue vs White	2.968	0.832	1.969	0.406	No
White vs Blue	13.992	3.623	1.969	0.000	Yes
White vs Yellow	8.699	2.204	1.969	0.028	Yes
White vs Green	3.200	0.823	1.969	0.411	No
Green vs Blue	10.792	2.498	1.969	0.013	Yes
Green vs Yellow	5.500	1.251	1.969	0.212	No
Yellow vs Blue	5.293	1.211	1.969	0.227	No
LSD-value:			7.824		

Category	Mean	Groups		
Dark Blue	56.335	A		
White	53.368	A		
Green	50.168	A	B	
Yellow	44.668		B	C
Blue	39.376			C

Q1 / Bonferroni / Analysis of the differences between the categories with a confidence interval of 95%:

Contrast	Difference	Standardized difference	Critical value	Pr > Diff	Significant
Dark Blue vs Blue	16.960	4.205	2.831	< 0.0001	Yes
Dark Blue vs Yellow	11.667	2.836	2.831	0.005	Yes
Dark Blue vs Green	6.167	1.520	2.831	0.130	No
Dark Blue vs White	2.968	0.832	2.831	0.406	No
White vs Blue	13.992	3.623	2.831	0.000	Yes
White vs Yellow	8.699	2.204	2.831	0.028	No
White vs Green	3.200	0.823	2.831	0.411	No
Green vs Blue	10.792	2.498	2.831	0.013	No
Green vs Yellow	5.500	1.251	2.831	0.212	No
Yellow vs Blue	5.293	1.211	2.831	0.227	No
Modified significance level:			0.005		

Category	Mean	Groups		
Dark Blue	56.335	A		
White	53.368	A	B	
Green	50.168	A	B	C
Yellow	44.668		B	C
Blue	39.376			C

Appendix 12 All Japanese Data ANOVA

Q1 / Dunn-Sidak / Analysis of the differences between the categories with a confidence interval of 95%:

Contrast	Difference	Standardized difference	Critical value	Pr > Diff	Significant
Dark Blue vs Blue	16.960	4.205	2.824	< 0.0001	Yes
Dark Blue vs Yellow	11.667	2.836	2.824	0.005	Yes
Dark Blue vs Green	6.167	1.520	2.824	0.130	No
Dark Blue vs White	2.968	0.832	2.824	0.406	No
White vs Blue	13.992	3.623	2.824	0.000	Yes
White vs Yellow	8.699	2.204	2.824	0.028	No
White vs Green	3.200	0.823	2.824	0.411	No
Green vs Blue	10.792	2.498	2.824	0.013	No
Green vs Yellow	5.500	1.251	2.824	0.212	No
Yellow vs Blue	5.293	1.211	2.824	0.227	No
Modified significance level:			0.005		

Category	Mean	Groups		
Dark Blue	56.335	A		
White	53.368	A	B	
Green	50.168	A	B	C
Yellow	44.668		B	C
Blue	39.376			C

Q1 / Newman-Keuls (SNK) / Analysis of the differences between the categories with a confidence interval of 95%:

Contrast	Difference	Standardized difference	Critical value	Pr > Diff	Significant
Dark Blue vs Blue	16.960	4.205	2.728	0.000	Yes
Dark Blue vs Yellow	11.667	2.836	2.569	0.024	Yes
Dark Blue vs Green	6.167	1.520	2.344	0.282	No
Dark Blue vs White	2.968	0.832			No
White vs Blue	13.992	3.623	2.569	0.002	Yes
White vs Yellow	8.699	2.204	2.344	0.070	No
White vs Green	3.200	0.823			No
Green vs Blue	10.792	2.498	2.344	0.033	Yes
Green vs Yellow	5.500	1.251	1.960	0.211	No
Yellow vs Blue	5.293	1.211	1.960	0.226	No

Category	Mean	Groups		
Dark Blue	56.335	A		
White	53.368	A	B	
Green	50.168	A	B	
Yellow	44.668		B	C
Blue	39.376			C

Appendix 12 All Japanese Data ANOVA

Q1 / Duncan / Analysis of the differences between the categories with a confidence interval of 95%:

Contrast	Difference	Standardized difference	Critical value	Pr > Diff	alpha (Modified)	Significant
Dark Blue vs Blue	16.960	4.205	2.184	0.000	0.185	Yes
Dark Blue vs Yellow	11.667	2.836	2.133	0.024	0.143	Yes
Dark Blue vs Green	6.167	1.520	2.064	0.282	0.098	No
Dark Blue vs White	2.968	0.832				No
White vs Blue	13.992	3.623	2.133	0.002	0.143	Yes
White vs Yellow	8.699	2.204	2.064	0.070	0.098	Yes
White vs Green	3.200	0.823	1.960	0.411	0.050	No
Green vs Blue	10.792	2.498	2.064	0.033	0.098	Yes
Green vs Yellow	5.500	1.251	1.960	0.211	0.050	No
Yellow vs Blue	5.293	1.211	1.960	0.226	0.050	No

Category	Mean	Groups		
Dark Blue	56.335	A		
White	53.368	A		
Green	50.168	A	B	
Yellow	44.668		B	C
Blue	39.376			C

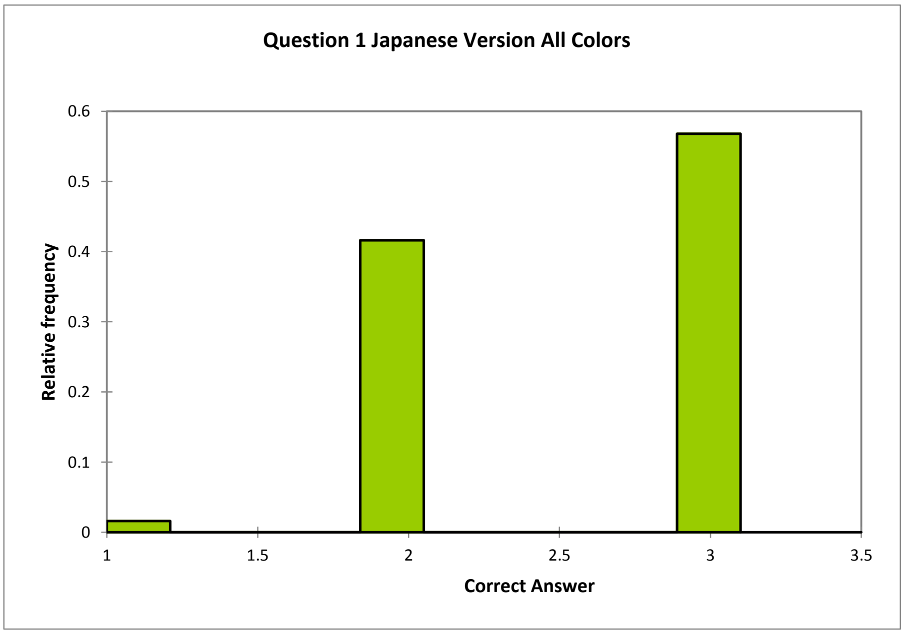
Q1 / REGWQ / Analysis of the differences between the categories with a confidence interval of 95%:

Contrast	Difference	Standardized difference	Critical value	Pr > Diff	alpha (Modified)	Significant
Dark Blue vs Blue	16.960	4.205	2.728	0.000	0.050	Yes
Dark Blue vs Yellow	11.667	2.836	2.569	0.024	0.050	Yes
Dark Blue vs Green	6.167	1.520	2.569	0.282	0.050	No
Dark Blue vs White	2.968	0.832				No
White vs Blue	13.992	3.623	2.569	0.002	0.050	Yes
White vs Yellow	8.699	2.204	2.534	0.070	0.030	No
White vs Green	3.200	0.823				No
Green vs Blue	10.792	2.498	2.534	0.033	0.030	No
Green vs Yellow	5.500	1.251				No
Yellow vs Blue	5.293	1.211				No

Category	Mean	Groups		
Dark Blue	56.335	A		
White	53.368	A	B	
Green	50.168	A	B	C
Yellow	44.668		B	C
Blue	39.376			C

Appendix 13

Question 1 Japanese Version Summary of Statistics



Non-Parametric data distribution

Conducted a Grubbs test and found outliers, they were removed from further data analysis

Kruskal-Wallis test:

K (Observed value)	15.619
K (Critical value)	9.488
DF	4
p-value (Two-tailed)	0.004
alpha	0.05

Multiple pairwise comparisons using Dunn's procedure / Two-tailed test:

p-values:

	Green	Blue	Dark Blue	White	Yellow
Green	1	0.018	0.395	0.280	0.902
Blue	0.018	1	**0.001**	**0.000**	0.025
Dark Blue	0.395	**0.001**	1	0.823	0.328
White	0.280	**0.000**	0.823	1	0.227
Yellow	0.902	0.025	0.328	0.227	1

Bonferroni corrected significance level: 0.005

The is Dunn, Bonferroni tests are very conservative (p 0.005)

Mann-Whitney Tests in pairs of colors.

The results (p<=0.05)

	Green	Blue	Dark Blue	White	Yellow
Green	-	**0.024**	0.404	0.286	0.912
Blue	**0.024**	-	**0.001**	**0.00**	**0.022**
Dark Blue	0.404	**0.001**	-	0.792	0.316
White	0.286	**0.00**	0.792	-	0.214
Yellow	0.912	**0.022**	0.316	0.214	-

All of the Blue Data was significant!

Appendix 13

Question 2a Data Analysis

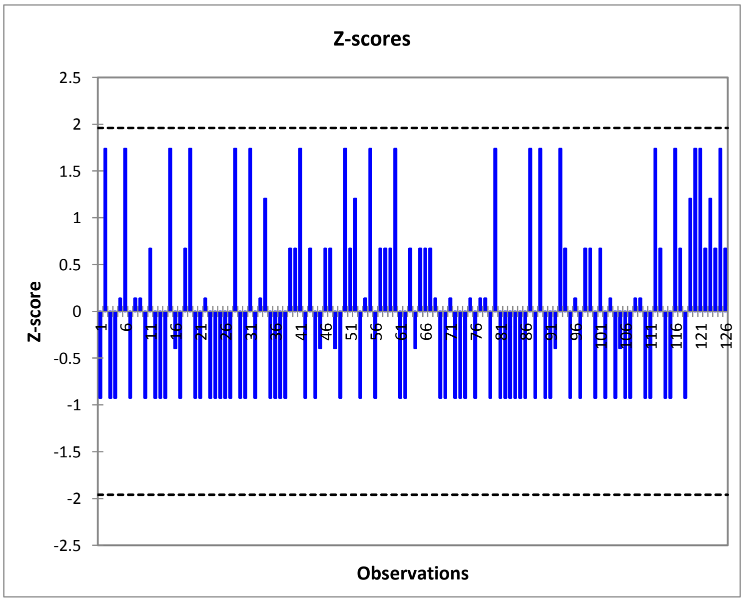
Summary statistics:

TEST For outliers

Variable	Observations	Obs. with missing data	Obs. without missing data	Minimum	Maximum	Mean	Std. deviation
Question 2a	126	0	126	0.000	5.000	1.738	1.877

Grubbs test for outliers / Two-tailed test:

G (Observed value)	1.738
G (Critical value)	3.461
p-value (Two-tailed)	< 0.0001
alpha	0.05



Appendix 13

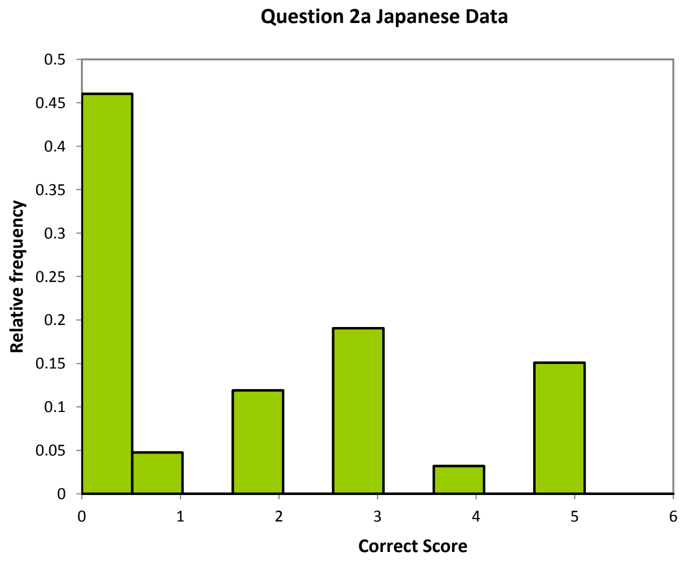
Question 2a Data Analysis

Summary statistics:

Variable	Obs.	Obs. with missing data	Obs. without missing data	Minimum	Maximum	Mean	Std. deviation
Var1	126	0	126	0.000	5.000	1.738	1.877

Descriptive statistics for the intervals :

Lower bound	Upper bound	Frequency	Relative frequency	Density
0	0.51	58	0.460	0.903
0.51	1.02	6	0.048	0.093
1.02	1.53	0	0.000	0.000
1.53	2.04	15	0.119	0.233
2.04	2.55	0	0.000	0.000
2.55	3.06	24	0.190	0.373
3.06	3.57	0	0.000	0.000
3.57	4.08	4	0.032	0.062
4.08	4.59	0	0.000	0.000
4.59	5.1	19	0.151	0.296



Appendix 13

Question 2a Data Analysis

Summary statistics:

Variable	Observations	Obs. with missing data	Obs. without missing data	Minimum	Maximum	Mean	Std. deviation
Green	35	15	20	0.000	5.000	1.800	1.989
Blue	35	13	22	0.000	5.000	1.318	1.937
Dark Blue	35	7	28	0.000	5.000	2.357	1.747
White	35	0	35	0.000	5.000	1.600	1.943
Yellow	35	14	21	0.000	5.000	1.524	1.721

Kruskal-Wallis test:

K (Observed value)	6.196
K (Critical	9.488
DF	4
p-value (Two-tailed)	0.185
alpha	0.05

Question 2a Data Analysis

Significance level (%): 5

Multiple pairwise comparisons using Dunn's procedure / Two-tailed test:

Sample	Frequency	Sum of ranks	Mean of ranks	Groups
Blue	22	1196.500	54.386	A
White	35	2106.500	60.186	A
Yellow	21	1264.000	60.190	A
Green	20	1285.500	64.275	A
Dark Blue	28	2148.500	76.732	A

Table of pairwise differences:

	Green	Blue	Dark Blue	White	Yellow
Green	0	9.889	−12.457	4.089	4.085
Blue	−9.889	0	−22.346	−5.799	−5.804
Dark Blue	12.457	22.346	0	16.546	16.542
White	−4.089	5.799	−16.546	0	−0.005
Yellow	−4.085	5.804	−16.542	0.005	0

p-values:

	Green	Blue	Dark Blue	White	Yellow
Green	1	0.353	0.217	0.672	0.704
Blue	0.353	1	0.023	0.536	0.581
Dark Blue	0.217	0.023	1	0.058	0.096
White	0.672	0.536	0.058	1	1.000
Yellow	0.704	0.581	0.096	1.000	1

Bonferroni corrected significance level: 0.005

Significant differences:

	Green	Blue	Dark Blue	White	Yellow
Green	No	No	No	No	No
Blue	No	No	No	No	No
Dark Blue	No	No	No	No	No
White	No	No	No	No	No
Yellow	No	No	No	No	No

Appendix 13

Question 2b Data Analysis

Summary statistics:

Variable	Observations	Obs. with missing data	Obs. without missing data	Minimum	Maximum	Mean	Std. deviation
Green	38	15	23	0.000	3.000	0.652	1.071
Blue	38	15	23	0.000	3.000	0.957	1.296
Dark Blue	38	8	30	0.000	3.000	1.433	1.382
White	38	0	38	0.000	3.000	1.079	1.323
Yellow	38	17	21	0.000	3.000	0.762	0.831

Kruskal-Wallis test:

K (Observed value)	5.238
K (Critical value)	9.488
DF	4
p-value (Two-tailed)	0.264
alpha	0.05

Question 2b Data Analysis

Significance level (%): 5

Multiple pairwise comparisons using Dunn's procedure / Two-tailed test:

Sample	Frequency	Sum of ranks	Mean of ranks	Groups
Green	23	1329.000	57.783	A
Blue	23	1483.500	64.500	A
Yellow	21	1384.500	65.929	A
White	38	2599.500	68.408	A
Dark Blue	30	2383.500	79.450	A

Table of pairwise differences:

	Green	Blue	Dark Blue	White	Yellow
Green	0	−6.717	−21.667	−10.625	−8.146
Blue	6.717	0	−14.950	−3.908	−1.429
Dark Blue	21.667	14.950	0	11.042	13.521
White	10.625	3.908	−11.042	0	2.479
Yellow	8.146	1.429	−13.521	−2.479	0

p-values:

	Green	Blue	Dark Blue	White	Yellow
Green	1	0.525	0.029	0.261	0.451
Blue	0.525	1	0.132	0.679	0.895
Dark Blue	0.029	0.132	1	0.207	0.184
White	0.261	0.679	0.207	1	0.799
Yellow	0.451	0.895	0.184	0.799	1

Bonferroni corrected significance level: 0.005

Significant differences:

	Green	Blue	Dark Blue	White	Yellow
Green	No	No	No	No	No
Blue	No	No	No	No	No
Dark Blue	No	No	No	No	No
White	No	No	No	No	No
Yellow	No	No	No	No	No

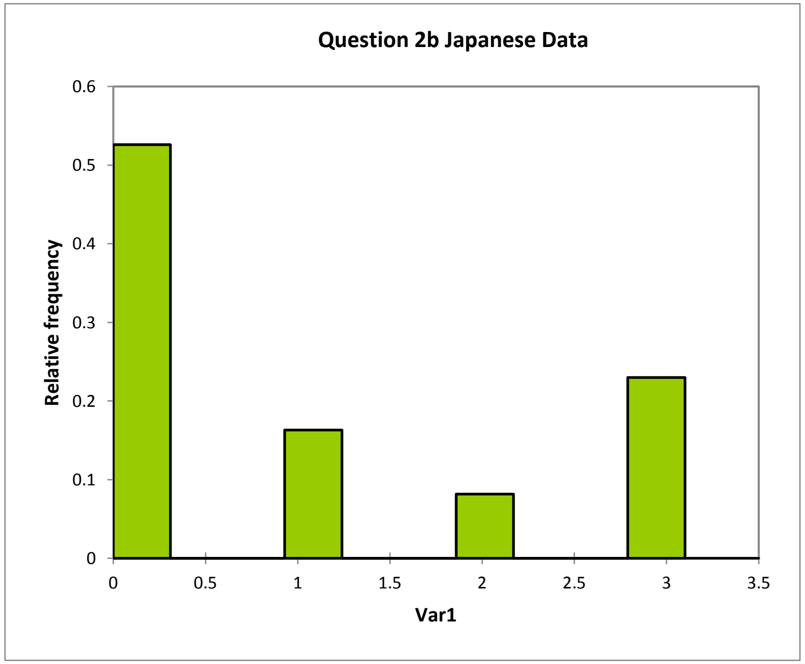
Question 2b Data Analysis

Summary statistics:

Variable	Obs.	Obs. with missing data	Obs. without missing data	Minimum	Maximum	Mean	Std. deviation
Var1	135	0	135	0.000	3.000	1.015	1.240

Descriptive statistics for the intervals :

Lower bound	Upper bound	Frequency	Relative frequency	Density
0	0.31	71	0.526	1.697
0.31	0.62	0	0.000	0.000
0.62	0.93	0	0.000	0.000
0.93	1.24	22	0.163	0.526
1.24	1.55	0	0.000	0.000
1.55	1.86	0	0.000	0.000
1.86	2.17	11	0.081	0.263
2.17	2.48	0	0.000	0.000
2.48	2.79	0	0.000	0.000
2.79	3.1	31	0.230	0.741



Appendix 13

Question 2b Data Analysis

Summary statistics:

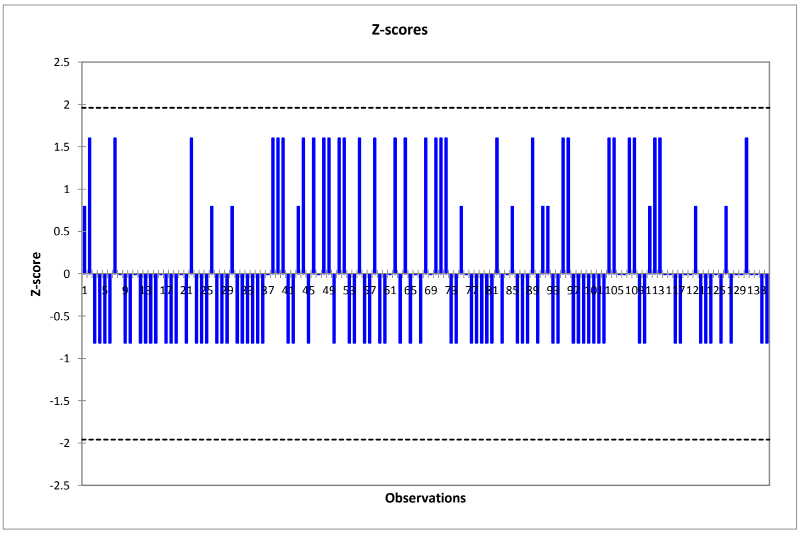
Variable	Observations	Obs. with missing data	Obs. without missing data	Minimum	Maximum	Mean	Std. deviation
Question 2b	135	0	135	0.000	3.000	1.015	1.240

Grubbs test for outliers / Two-tailed test:

G (Observed value)	1.601
G (Critical value)	3.483
p-value (Two-tailed)	< 0.0001
alpha	0.05

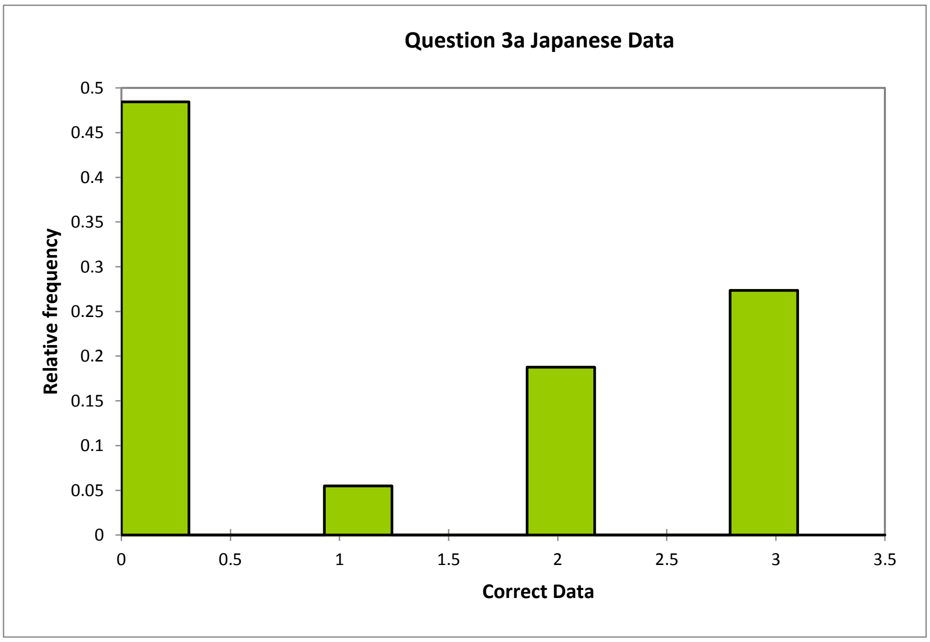
99% confidence interval on the p-value:

Question 2b	G	G(Critical value)	p-value	Step
3.000	1.601	3.483	< 0.0001	1



Appendix 13

Question 3a Japanese Version Summary of Statistics



Non-Parametric data distribution

Conducted a Grubbs test and found no outliers.

Kruskal-Wallis test:

K (Observed value)	17.831
K (Critical value)	9.488
DF	4
p-value (Two-tailed)	0.001
alpha	0.05

Multiple pairwise comparisons using Dunn's procedure / Two-tailed test:

p-values:

	Green	Blue	Dark Blue	White	Yellow
Green	1	0.001	0.016	0.754	0.078
Blue	0.001	1	0.253	0.001	0.121
Dark Blue	0.016	0.253	1	0.016	0.601
White	0.754	0.001	0.016	1	0.098
Yellow	0.078	0.121	0.601	0.098	1

Bonferroni corrected significance level: 0.005

The is Dunn, Bonferroni tests are very conservative (p 0.005)

Mann-Whitney Tests in pairs of colors.

The results (p<=0.05)

	Green	Blue	Dark Blue	White	Yellow
Green	-	0.001	0.012	0.84	0.076
Blue	0.001	-	0.128	0.00	0.063
Dark Blue	0.012	0.128	-	0.012	0.651
White	0.84	0.00	0.012	-	0.098
Yellow	0.076	0.063	0.651	0.098	-

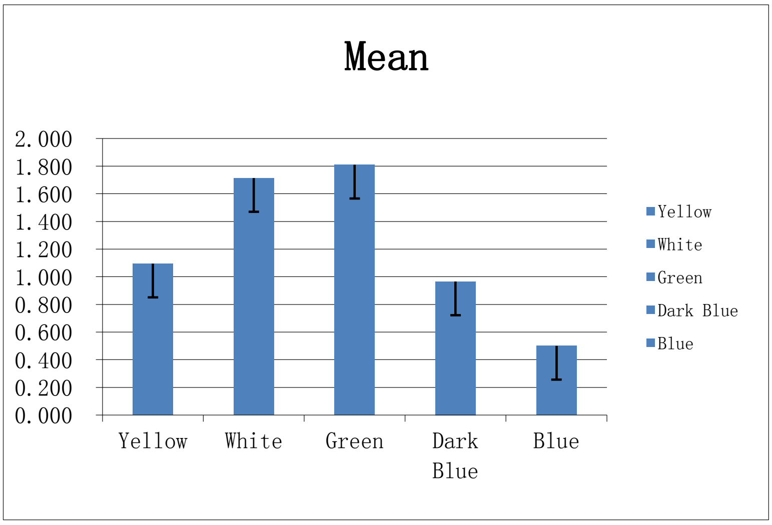
Yellow not significant

Appendix 13

Question 3a Score

Japanese

Color	3	2	1	0	Mean	Number of Surveys	Standard Deviation
Yellow	4	4	3	10	1.095	21	1.19
White	17	4	1	13	1.714	35	1.39
Green	10	3	2	6	1.810	21	1.30
Dark Blue	2	11	0	16	0.966	29	1.10
Blue	2	2	1	17	0.500	22	0.99
						N= 128	



	Mean
Yellow	1.095
White	1.714
Green	1.810
Dark Blue	0.966
Blue	0.500

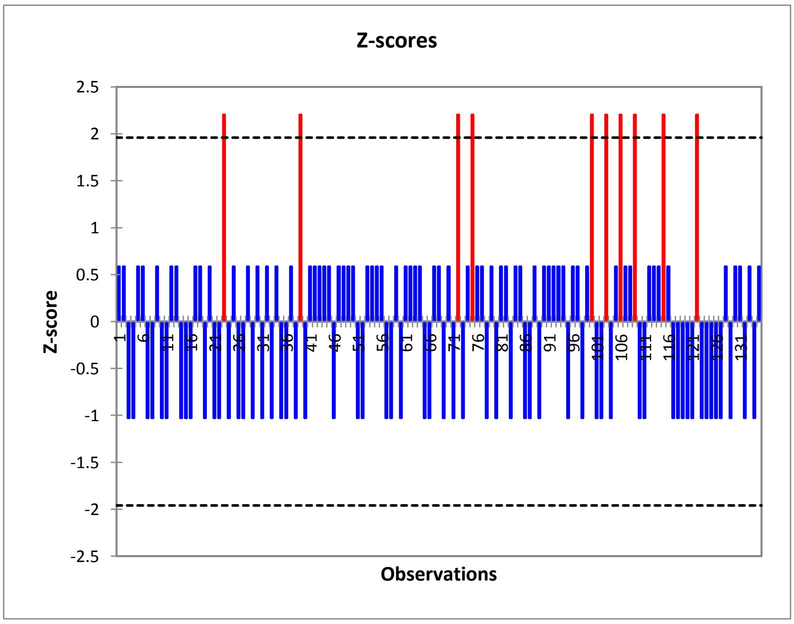
**Green sig v. Blue, Dk Blue
White sig Blue, Dk Blue
Blue sig vs.Green, White
Dk Blue sig vs.Green, White
White sig vs.Blue, Dk Blue

Question 3b Data Analysis

Variable	Observations	Obs. with missing data	Obs. without missing data	Minimum	Maximum	Mean	Std. deviation
Question 3b	135	0	135	0.000	2.000	0.637	0.618

Grubbs test for outliers / Two-tailed test:

G (Observ	2.205
G (Critical	3.483
p-value (T	< 0.0001
alpha	0.05

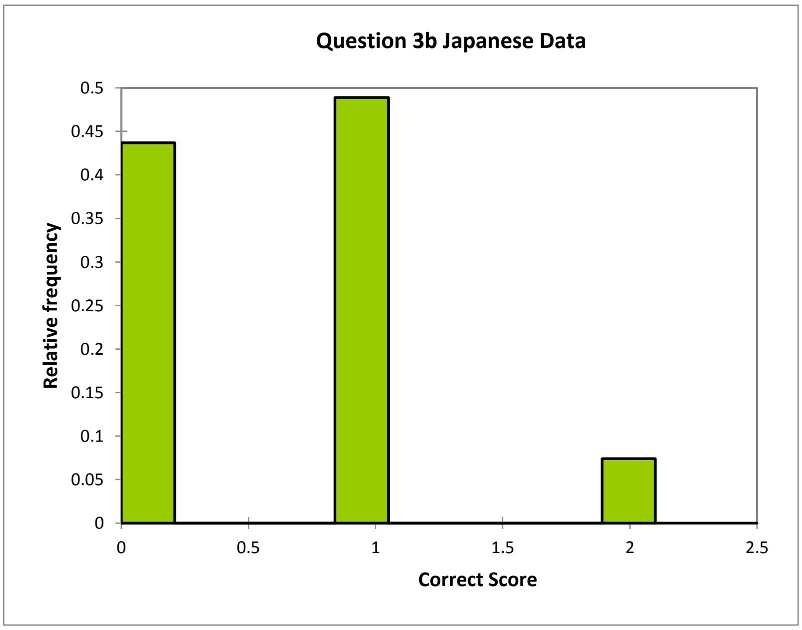


Appendix 13

Question 3b Data Analysis

Summary statistics:

Variable	Obs.	Obs. with missing data	Obs. without missing data	Minimum	Maximum	Mean	Std. deviation
Var1	135	0	135	0.000	2.000	0.637	0.618



Descriptive statistics for the intervals :

Lower bound	Upper bound	Frequency	Relative Frequency	Density
0	0.21	59	0.437	2.081
0.21	0.42	0	0.000	0.000
0.42	0.63	0	0.000	0.000
0.63	0.84	0	0.000	0.000
0.84	1.05	66	0.489	2.328
1.05	1.26	0	0.000	0.000
1.26	1.47	0	0.000	0.000
1.47	1.68	0	0.000	0.000
1.68	1.89	0	0.000	0.000
1.89	2.1	10	0.074	0.353

Appendix 13 Question 4a Data Analysis

Summary statistics:

Variable	Observations	Obs. with missing data	Obs. without missing data	Minimum	Maximum	Mean	Std. deviation
Green	35	14	21	0.000	4.000	1.714	1.821
Blue	35	13	22	0.000	4.000	0.636	1.399
Dark Blue	35	6	29	0.000	4.000	1.379	1.935
White	35	0	35	0.000	4.000	1.914	1.931
Yellow	35	14	21	0.000	4.000	1.190	1.601

Kruskal-Wallis test:

K (Observed value)	6.195
K (Critical value)	9.488
DF	4
p-value (Two-tailed)	0.185
alpha	0.05

Sample	Frequency	Sum of ranks	Mean of ranks	Groups
Blue	22	1123.500	51.068	A
Dark Blue	29	1812.500	62.500	A
Yellow	21	1335.500	63.595	A
Green	21	1460.000	69.524	A
White	35	2524.500	72.129	A

Table of pairwise differences:

	Green	Blue	Dark Blue	White	Yellow
Green	0	18.456	7.024	-2.605	5.929
Blue	-18.456	0	-11.432	-21.060	-12.527
Dark Blue	-7.024	11.432	0	-9.629	-1.095
White	2.605	21.060	9.629	0	8.533
Yellow	-5.929	12.527	1.095	-8.533	0

p-values:

	Green	Blue	Dark Blue	White	Yellow
Green	1	0.065	0.455	0.774	0.558
Blue	0.065	1	0.218	0.018	0.211
Dark Blue	0.455	0.218	1	0.243	0.907
White	0.774	0.018	0.243	1	0.346
Yellow	0.558	0.211	0.907	0.346	1

Bonferroni corrected significance level: 0.005

Significant differences:

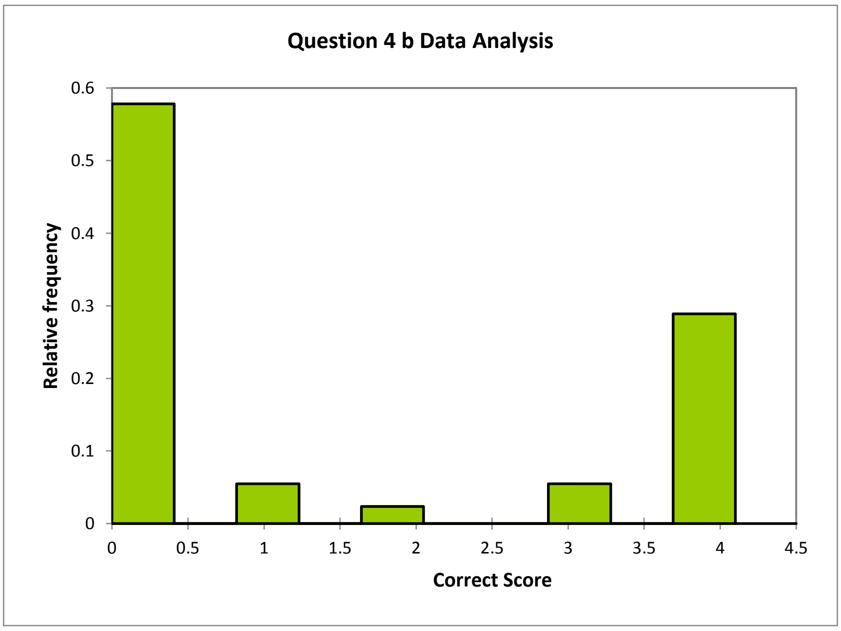
	Green	Blue	Dark Blue	White	Yellow
Green	No	No	No	No	No
Blue	No	No	No	No	No
Dark Blue	No	No	No	No	No
White	No	No	No	No	No
Yellow	No	No	No	No	No

Appendix 13

Question 4a Data Analysis

Summary statistics:

Variable	Observations	Obs. with missing data	Obs. without missing data	Minimum	Maximum	Mean	Std. deviation
Var1	128	0	128	0.000	4.000	1.422	1.808



Descriptive statistics for the intervals :

Lower bound	Upper bound	Frequency	Relative Frequency	Density
0	0.41	74	0.578	1.410
0.41	0.82	0	0.000	0.000
0.82	1.23	7	0.055	0.133
1.23	1.64	0	0.000	0.000
1.64	2.05	3	0.023	0.057
2.05	2.46	0	0.000	0.000
2.46	2.87	0	0.000	0.000
2.87	3.28	7	0.055	0.133
3.28	3.69	0	0.000	0.000
3.69	4.1	37	0.289	0.705

Appendix 13 Question 4b Data Analysis

Summary statistics:

Variable	Observations	Obs. with missing data	Obs. without missing data	Minimum	Maximum	Mean	Std. deviation
Green	37	14	23	0.000	3.000	0.870	1.140
Blue	37	14	23	0.000	3.000	1.000	1.348
Dark Blue	37	9	28	0.000	3.000	1.071	1.245
White	37	0	37	0.000	3.000	1.459	1.304
Yellow	37	16	21	0.000	3.000	1.143	1.276

Kruskal-Wallis test:

K (Observed value)	3.360
K (Critical value)	9.488
DF	4
p-value (Two-tailed)	0.500
alpha	0.05

Sample	Frequency	Sum of ranks	Mean of ranks	Groups
Green	23	1368.500	59.500	A
Blue	23	1432.000	62.261	A
Dark Blue	28	1827.000	65.250	A
Yellow	21	1381.000	65.762	A
White	37	2769.500	74.851	A

Table of pairwise differences:

	Green	Blue	Dark Blue	White	Yellow
Green	0	-2.761	-5.750	-15.351	-6.262
Blue	2.761	0	-2.989	-12.590	-3.501
Dark Blue	5.750	2.989	0	-9.601	-0.512
White	15.351	12.590	9.601	0	9.089
Yellow	6.262	3.501	0.512	-9.089	0

p-values:

	Green	Blue	Dark Blue	White	Yellow
Green	1	0.791	0.562	0.101	0.556
Blue	0.791	1	0.763	0.179	0.742
Dark Blue	0.562	0.763	1	0.277	0.960
White	0.101	0.179	0.277	1	0.345
Yellow	0.556	0.742	0.960	0.345	1

Bonferroni corrected significance level: 0.005

Significant differences:

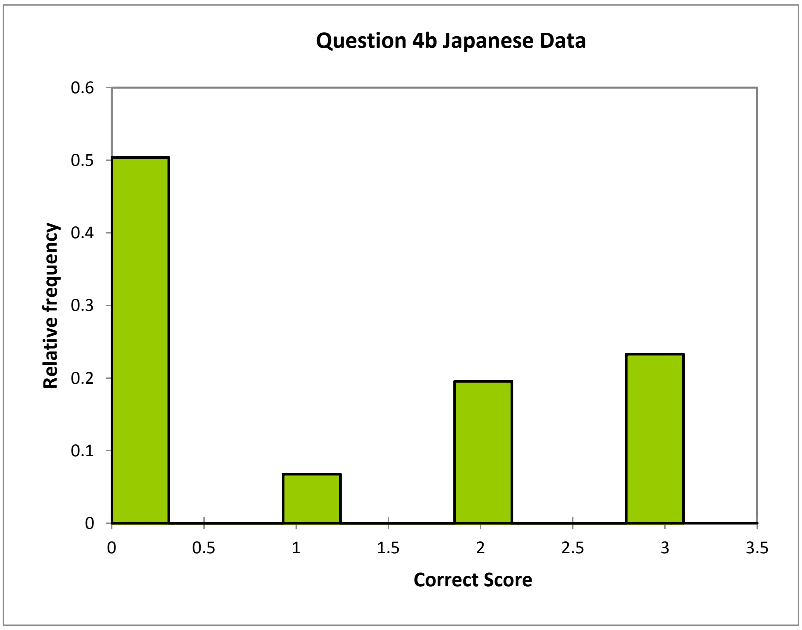
	Green	Blue	Dark Blue	White	Yellow
Green	No	No	No	No	No
Blue	No	No	No	No	No
Dark Blue	No	No	No	No	No
White	No	No	No	No	No
Yellow	No	No	No	No	No

Appendix 13

Question 4b Data Analysis

Summary statistics:

Variable	Obs.	Obs. with missing data	Obs. without missing data	Minimum	Maximum	Mean	Std. deviation
Var1	133	0	133	0.000	3.000	1.158	1.272

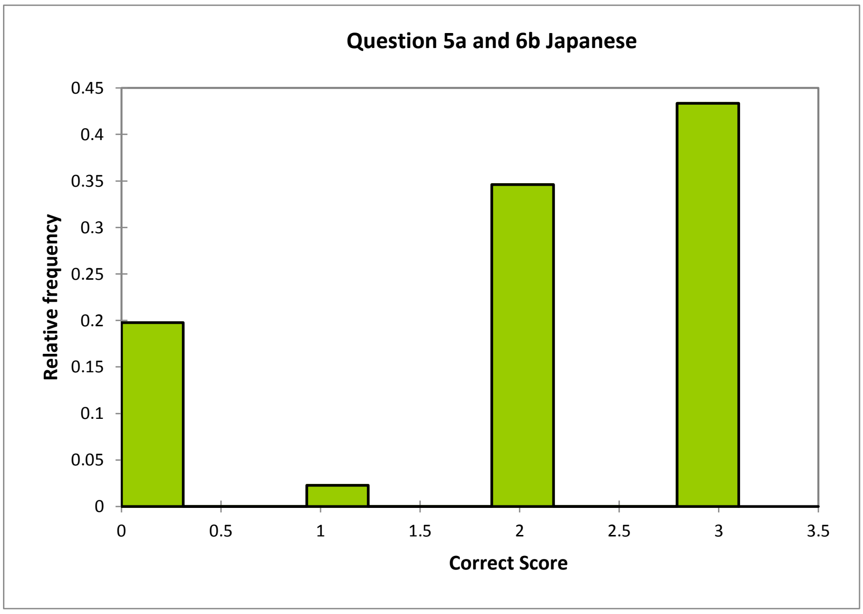


Descriptive statistics for the intervals :

Lower bound	Upper bound	Frequency	Relative Frequency	Density
0	0.31	67	0.504	1.625
0.31	0.62	0	0.000	0.000
0.62	0.93	0	0.000	0.000
0.93	1.24	9	0.068	0.218
1.24	1.55	0	0.000	0.000
1.55	1.86	0	0.000	0.000
1.86	2.17	26	0.195	0.631
2.17	2.48	0	0.000	0.000
2.48	2.79	0	0.000	0.000
2.79	3.1	31	0.233	0.752

Appendix 13

Question 5a and 6b Japanese Version Summary of Statistics



Non-Parametric data distribution   Conducted a Grubbs test and found no outliers.

Kruskal-Wallis test:

K (Observed value)	12.224
K (Critical value)	9.488
DF	4
p-value (Two-tailed)	0.016
alpha	0.05

Multiple pairwise comparisons using Dunn's procedure / Two-tailed test:

p-values:

	Green	Blue	Dark Blue	White	Yellow
Green	1	0.032	0.638	0.888	0.100
Blue	0.032	1	0.006	0.011	0.642
Dark Blue	0.638	0.006	1	0.703	0.026
White	0.888	0.011	0.703	1	0.049
Yellow	0.100	0.642	0.026	0.049	1

Bonferroni corrected significance level: 0.005

The is Dunn, Bonferroni tests are very conservative (p 0.005)

Mann-Whitney Tests in pairs of colors.

The results (p<=0.05)

	Green	Blue	Dark Blue	White	Yellow
Green	-	**0.046**	0.691	0.921	0.110
Blue	**0.046**	-	**0.005**	**0.017**	0.452
Dark Blue	0.691	**0.005**	-	0.784	**0.014**
White	0.921	**0.017**	0.784	-	**0.042**
Yellow	0.110	0.452	**0.014**	**0.042**	-

Significance was mixed all over

Appendix 13 **Question 5b Data Analysis**

Summary statistics:

Variable	Observations	Obs. with missing data	Obs. without missing data	Minimum	Maximum	Mean	Std. deviation
Green	38	15	23	0.000	3.000	1.304	1.428
Blue	38	15	23	0.000	3.000	1.000	1.314
Dark Blue	38	8	30	0.000	3.000	2.033	1.299
White	38	0	38	0.000	3.000	1.658	1.381
Yellow	38	17	21	0.000	3.000	1.429	1.363

Kruskal-Wallis test:

K (Observed value)	8.686
K (Critical value)	9.488
DF	4
p-value (Two-tailed)	0.069
alpha	0.05

Sample	Frequency	Sum of ranks	Mean of ranks	Groups
Blue	23	1232.500	53.587	A
Green	23	1429.000	62.130	A
Yellow	21	1363.500	64.929	A
White	38	2723.500	71.671	A
Dark Blue	30	2431.500	81.050	A

Table of pairwise differences:

	Green	Blue	Dark Blue	White	Yellow
Green	0	8.543	-18.920	-9.541	-2.798
Blue	-8.543	0	-27.463	-18.084	-11.342
Dark Blue	18.920	27.463	0	9.379	16.121
White	9.541	18.084	-9.379	0	6.742
Yellow	2.798	11.342	-16.121	-6.742	0

p-values:

	Green	Blue	Dark Blue	White	Yellow
Green	1	0.424	0.059	0.319	0.798
Blue	0.424	1	0.006	0.059	0.299
Dark Blue	0.059	0.006	1	0.289	0.118
White	0.319	0.059	0.289	1	0.493
Yellow	0.798	0.299	0.118	0.493	1

Bonferroni corrected significance level: 0.005

Significant differences:

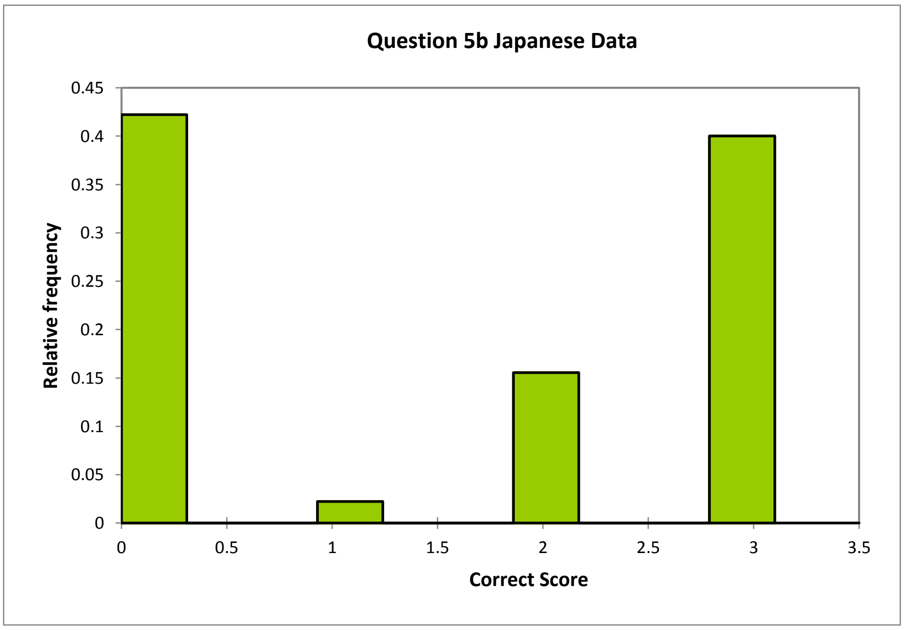
	Green	Blue	Dark Blue	White	Yellow
Green	No	No	No	No	No
Blue	No	No	No	No	No
Dark Blue	No	No	No	No	No
White	No	No	No	No	No
Yellow	No	No	No	No	No

Appendix 13

Question 5b Data Analysis

Summary statistics:

Variable	Observations	Obs. with missing data	Obs. without missing data	Minimum	Maximum	Mean	Std. deviation
Var1	135	0	135	0.000	3.000	1.533	1.381



Descriptive statistics for the intervals :

Lower bound	Upper bound	Frequency	Relative frequency	Density
0	0.31	57	0.422	1.362
0.31	0.62	0	0.000	0.000
0.62	0.93	0	0.000	0.000
0.93	1.24	3	0.022	0.072
1.24	1.55	0	0.000	0.000
1.55	1.86	0	0.000	0.000
1.86	2.17	21	0.156	0.502
2.17	2.48	0	0.000	0.000
2.48	2.79	0	0.000	0.000
2.79	3.1	54	0.400	1.290

Appendix 13 **Questions 6a and 7b Data Analysis**

Summary statistics:

Variable	Observations	Obs. with missing data	Obs. without missing data	Minimum	Maximum	Mean	Std. deviation
Green	73	37	36	0.000	1.000	0.667	0.478
Blue	73	28	45	0.000	1.000	0.511	0.506
Dark Blue	73	14	59	0.000	1.000	0.678	0.471
White	73	0	73	0.000	1.000	0.699	0.462
Yellow	73	31	42	0.000	1.000	0.571	0.501

Kruskal-Wallis test:

K (Observed value)	5.593
K (Critical value)	9.488
DF	4
p-value (Two-tailed)	0.232
alpha	0.05

Sample	Frequency	Sum of ranks	Mean of ranks	Groups
Blue	45	5047.500	112.167	A
Yellow	42	5034.000	119.857	A
Green	36	4752.000	132.000	A
Dark Blue	59	7873.000	133.441	A
White	73	9933.500	136.075	A

Table of pairwise differences:

	Green	Blue	Dark Blue	White	Yellow
Green	0	19.833	-1.441	-4.075	12.143
Blue	-19.833	0	-21.274	-23.909	-7.690
Dark Blue	1.441	21.274	0	-2.635	13.584
White	4.075	23.909	2.635	0	16.218
Yellow	-12.143	7.690	-13.584	-16.218	0

p-values:

	Green	Blue	Dark Blue	White	Yellow
Green	1	0.149	0.912	0.745	0.385
Blue	0.149	1	0.080	0.040	0.560
Dark Blue	0.912	0.080	1	0.807	0.274
White	0.745	0.040	0.807	1	0.173
Yellow	0.385	0.560	0.274	0.173	1

Bonferroni corrected significance level: 0.005

Significant differences:

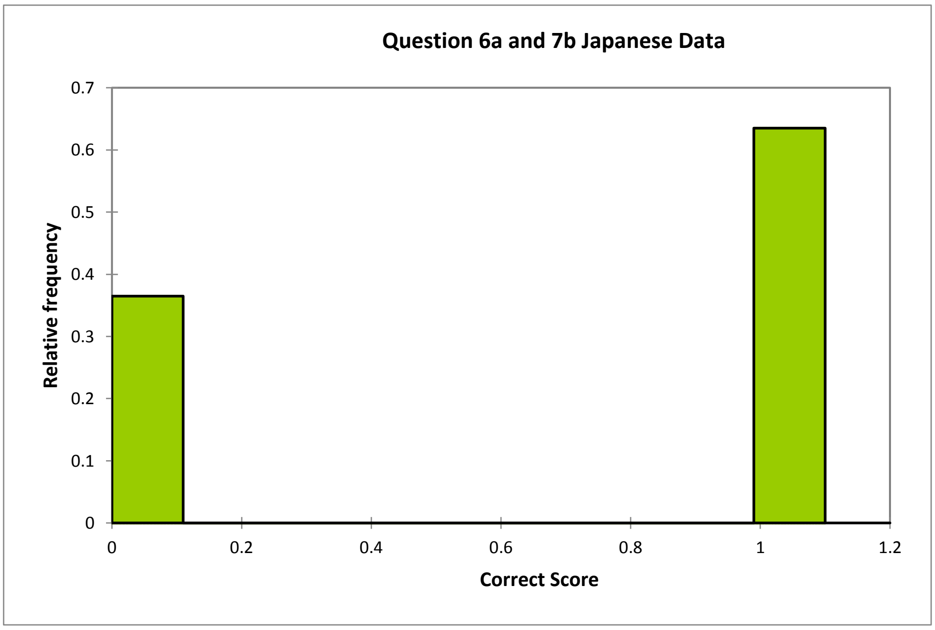
	Green	Blue	Dark Blue	White	Yellow
Green	No	No	No	No	No
Blue	No	No	No	No	No
Dark Blue	No	No	No	No	No
White	No	No	No	No	No
Yellow	No	No	No	No	No

Appendix 13

Questions 6a and 7b Data Analysis

Summary statistics:

Variable	Observations	Obs. with missing data	Obs. without missing data	Minimum	Maximum	Mean	Std. deviation
Var1	263	0	263	0.000	1.000	0.635	0.482



Descriptive statistics for the intervals :

Lower bound	Upper bound	Frequency	Relative frequency	Density
0	0.11	96	0.365	3.318
0.11	0.22	0	0.000	0.000
0.22	0.33	0	0.000	0.000
0.33	0.44	0	0.000	0.000
0.44	0.55	0	0.000	0.000
0.55	0.66	0	0.000	0.000
0.66	0.77	0	0.000	0.000
0.77	0.88	0	0.000	0.000
0.88	0.99	0	0.000	0.000
0.99	1.1	167	0.635	5.773

Appendix 13 Questions 7a and 8B analysis

Summary statistics: Variable	Observations	Obs. With Missing Data	Obs. without missing data	Minimum	Maximum	Mean	Std. deviation
Green	73	29	44	0.000	3.000	1.295	1.391
Blue	73	28	45	0.000	3.000	1.000	1.206
Dark Blue	73	14	59	0.000	3.000	1.508	1.265
White	73	0	73	0.000	3.000	1.110	1.329
Yellow	73	31	42	0.000	3.000	1.310	1.334

Kruskal-Wallis test:

K (Observed value)	5.898
K(Critical value)	9.488
DF	4
p-value (Two-tailed)	0.207
alpha	0.05

Sample	Frequency	Sum of ranks	Mean of ranks	Groups
Blue	45	5430.000	120.667	A
White	73	8915.000	122.123	A
Green	44	5859.500	133.170	A
Yellow	42	5759.000	137.119	A
Dark Blue	59	8752.500	148.347	A

Table of pairwise differences:

	Green	Blue	Dark Blue	White	Yellow
Green	0	12.504	-15.177	11.047	-3.949
Blue	-12.504	0	-27.681	-1.457	-16.452
Dark Blue	15.177	27.681	0	26.224	11.228
White	-11.047	1.457	-26.224	0	-14.996
Yellow	3.949	16.452	-11.228	14.996	0

p-values:

	Green	Blue	Dark Blue	White	Yellow
Green	1	0.407	0.284	0.416	0.797
Blue	0.407	1	0.049	0.914	0.281
Dark Blue	0.284	0.049	1	0.035	0.434
White	0.416	0.914	0.035	1	0.276
Yellow	0.797	0.281	0.434	0.276	1

Bonferroni corrected significance level: 0.005

Significant differences:

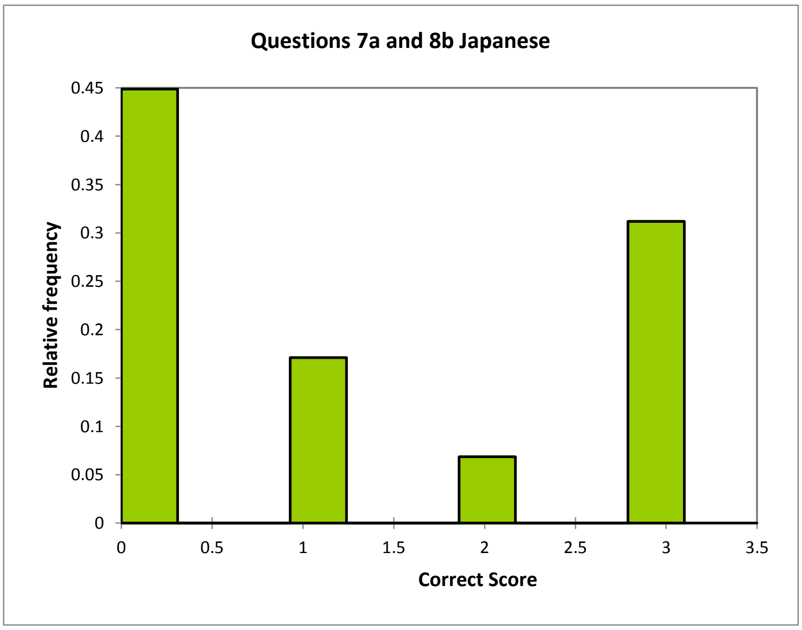
	Green	Blue	Dark Blue	White	Yellow
Green	No	No	No	No	No
Blue	No	No	No	No	No
Dark Blue	No	No	No	No	No
White	No	No	No	No	No
Yellow	No	No	No	No	No

Appendix 13

Questions 7a and 8b Data Analysis

Summary statistics:

Variable	Obs.	Obs. with missing data	Obs. without missing data	Minimum	Maximum	Mean	Std. deviation
Var1	263	0	263	0.000	3.000	1.243	1.308



Descriptive statistics for the intervals :

Lower bound	Upper bound	Frequency	Relative Frequency	Density
0	0.31	118	0.449	1.447
0.31	0.62	0	0.000	0.000
0.62	0.93	0	0.000	0.000
0.93	1.24	45	0.171	0.552
1.24	1.55	0	0.000	0.000
1.55	1.86	0	0.000	0.000
1.86	2.17	18	0.068	0.221
2.17	2.48	0	0.000	0.000
2.48	2.79	0	0.000	0.000
2.79	3.1	82	0.312	1.006

Appendix 13 Question 8a Data Analysis

Summary statistics:

Variable	Observations	Obs. with missing data	Obs. without missing data	Minimum	Maximum	Mean	Std. deviation
Green	35	14	21	0.000	4.000	2.429	1.777
Blue	35	13	22	0.000	4.000	2.000	1.746
Dark Blue	35	6	29	0.000	4.000	2.897	1.543
White	35	0	35	0.000	4.000	2.714	1.725
Yellow	35	14	21	0.000	4.000	2.048	1.564

Kruskal-Wallis test:

K (Observed value)	6.480
K (Critical value)	9.488
DF	4
p-value (Two-tailed)	0.166
alpha	0.05

Sample	Frequency	Sum of ran	Mean of rank	Groups
Yellow	21	1133.500	53.976	A
Blue	22	1196.000	54.364	A
Green	21	1349.000	64.238	A
White	35	2464.500	70.414	A
Dark Blue	29	2113.000	72.862	A

Table of pairwise differences:

	Green	Blue	Dark Blue	White	Yellow
Green	0	9.874	-8.624	-6.176	10.262
Blue	-9.874	0	-18.498	-16.051	0.387
Dark Blue	8.624	18.498	0	s 2.448	18.886
White	6.176	16.051	-2.448	0	16.438
Yellow	-10.262	-0.387	-18.886	-16.438	0

p-values:

	Green	Blue	Dark Blue	White	Yellow
Green	1	0.352	0.387	0.520	0.339
Blue	0.352	1	0.060	0.090	0.971
Dark Blue	0.387	0.060	1	0.779	0.058
White	0.520	0.090	0.779	1	0.087
Yellow	0.339	0.971	0.058	0.087	1

Bonferroni corrected significance level: 0.005

Significant differences:

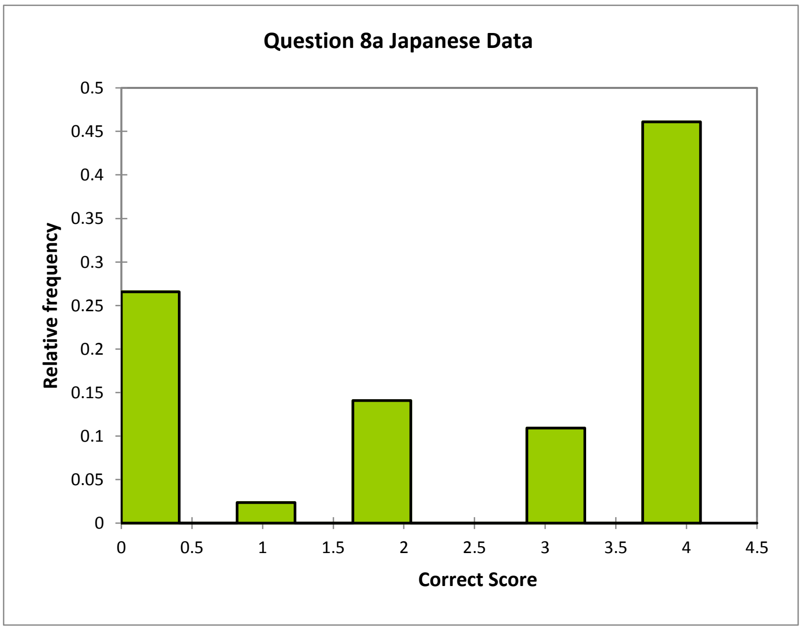
	Green	Blue	Dark Blue	White	Yellow
Green	No	No	No	No	No
Blue	No	No	No	No	No
Dark Blue	No	No	No	No	No
White	No	No	No	No	No
Yellow	No	No	No	No	No

Appendix 13

Question 8a Data Analysis

Summary statistics:

Variable	Obs.	Obs. with missing data	Obs. without missing data	Minimum	Maximum	Mean	Std. deviation
Var1	128	0	128	0.000	4.000	2.477	1.683



Descriptive statistics for the intervals :

Lower bound	Upper bound	Frequency	Relative Frequency	Density
0	0.41	34	0.266	0.648
0.41	0.82	0	0.000	0.000
0.82	1.23	3	0.023	0.057
1.23	1.64	0	0.000	0.000
1.64	2.05	18	0.141	0.343
2.05	2.46	0	0.000	0.000
2.46	2.87	0	0.000	0.000
2.87	3.28	14	0.109	0.267
3.28	3.69	0	0.000	0.000
3.69	4.1	59	0.461	1.124

Appendix 13 Question 9a Japanese Data

Summary statistics:

Variable	Observations	Obs. with missing data	Obs. without missing data	Minimum	Maximum	Mean	Std. deviation
Green	35	14	21	0.000	4.000	2.048	1.658
Blue	35	13	22	0.000	4.000	1.409	1.869
Dark Blue	35	6	29	0.000	4.000	2.034	1.955
White	35	0	35	0.000	4.000	1.257	1.721
Yellow	35	14	21	0.000	4.000	0.905	1.609

Kruskal-Wallis test:

K (Observed value)	7.790
K (Critical value)	9.488
DF	4
p-value (Two-tailed)	0.100
alpha	0.05

Sample	Frequency	Sum of ranks	Mean of ranks	Groups
Yellow	21	1105.500	52.643	A
White	35	2074.500	59.271	A
Blue	22	1363.500	61.977	A
Green	21	1556.500	74.119	A
Dark Blue	29	2156.000	74.345	A

Table of pairwise differences:

	Green	Blue	Dark Blue	White	Yellow
Green	0	12.142	-0.226	14.848	21.476
Blue	-12.142	0	-12.368	2.706	9.334
Dark Blue	0.226	12.368	0	15.073	21.702
White	-14.848	-2.706	-15.073	0	6.629
Yellow	-21.476	-9.334	-21.702	-6.629	0

p-values:

	Green	Blue	Dark Blue	White	Yellow
Green	1	0.236	0.981	0.110	0.038
Blue	0.236	1	0.193	0.767	0.363
Dark Blue	0.981	0.193	1	0.074	0.024
White	0.110	0.767	0.074	1	0.475
Yellow	0.038	0.363	0.024	0.475	1

Bonferroni corrected significance level: 0.005

Significant differences:

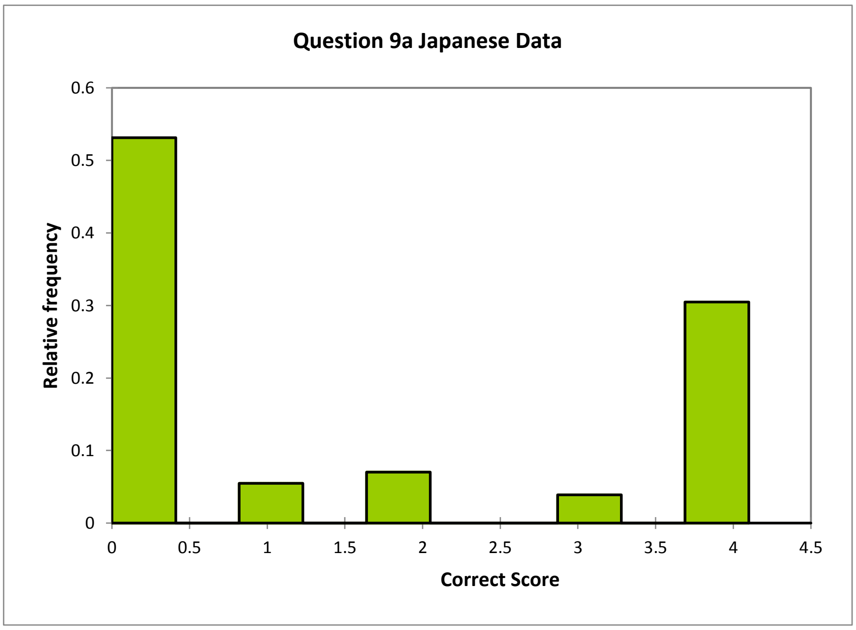
	Green	Blue	Dark Blue	White	Yellow
Green	No	No	No	No	No
Blue	No	No	No	No	No
Dark Blue	No	No	No	No	No
White	No	No	No	No	No
Yellow	No	No	No	No	No

Appendix 13

Question 9a Data Analysis

Summary statistics:

Variable	Observations	Obs. with missing data	Obs. without missing data	Minimum	Maximum	Mean	Std. deviation
Var1	128	0	128	0.000	4.000	1.531	1.801



Descriptive statistics for the intervals :

Lower bound	Upper bound	Frequency	Relative frequency	Density
0	0.41	68	0.531	1.296
0.41	0.82	0	0.000	0.000
0.82	1.23	7	0.055	0.133
1.23	1.64	0	0.000	0.000
1.64	2.05	9	0.070	0.171
2.05	2.46	0	0.000	0.000
2.46	2.87	0	0.000	0.000
2.87	3.28	5	0.039	0.095
3.28	3.69	0	0.000	0.000
3.69	4.1	39	0.305	0.743

Appendix 13 **Question 9b Data Analysis**

Summary statistics:

Variable	Observations	Obs. with missing data	Obs. without missing data	Minimum	Maximum	Mean	Std. deviation
Green	38	16	22	0.000	1.000	0.318	0.477
Blue	38	15	23	0.000	1.000	0.391	0.499
Dark Blue	38	8	30	0.000	1.000	0.400	0.498
White	38	0	38	0.000	1.000	0.342	0.481
Yellow	38	18	20	0.000	1.000	0.200	0.410

Kruskal-Wallis test:

K (Observed value)	2.531
K (Critical value)	9.488
DF	4
p-value (Two-tailed)	0.639
alpha	0.05

Sample	Frequency	Sum of ranks	Mean of ranks	Groups
Yellow	20	1156.000	57.800	A
Green	22	1444.500	65.659	A
White	38	2555.500	67.250	A
Blue	23	1622.000	70.522	A
Dark Blue	30	2133.000	71.100	A

Table of pairwise differences:

	Green	Blue	Dark Blue	White	Yellow
Green	0	-4.863	-5.441	-1.591	7.859
Blue	4.863	0	-0.578	3.272	12.722
Dark Blue	5.441	0.578	0	3.850	13.300
White	1.591	-3.272	-3.850	0	9.450
Yellow	-7.859	-12.722	-13.300	-9.450	0

p-values:

	Green	Blue	Dark Blue	White	Yellow
Green	1	0.606	0.539	0.851	0.421
Blue	0.606	1	0.947	0.695	0.188
Dark Blue	0.539	0.947	1	0.618	0.145
White	0.851	0.695	0.618	1	0.279
Yellow	0.421	0.188	0.145	0.279	1

Bonferroni corrected significance level: 0.005

Significant differences:

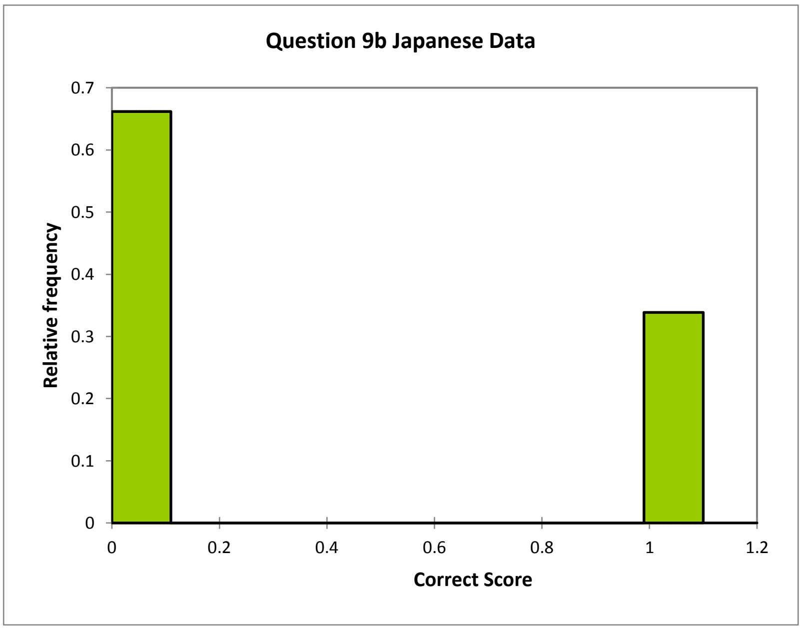
	Green	Blue	Dark Blue	White	Yellow
Green	No	No	No	No	No
Blue	No	No	No	No	No
Dark Blue	No	No	No	No	No
White	No	No	No	No	No
Yellow	No	No	No	No	No

Appendix 13

Question 9b Data Analysis

Summary statistics:

Variable	Observations	Obs. with missing data	Obs. without missing data	Minimum	Maximum	Mean	Std. deviation
Var1	133	0	133	0.000	1.000	0.338	0.475



Descriptive statistics for the intervals :

Lower bound	Upper bound	Frequency	Relative Frequency	Density
0	0.11	88	0.662	6.015
0.11	0.22	0	0.000	0.000
0.22	0.33	0	0.000	0.000
0.33	0.44	0	0.000	0.000
0.44	0.55	0	0.000	0.000
0.55	0.66	0	0.000	0.000
0.66	0.77	0	0.000	0.000
0.77	0.88	0	0.000	0.000
0.88	0.99	0	0.000	0.000
0.99	1.1	45	0.338	3.076

Appendix 13 Question 3b Data Analysis Summary statistics:

Variable	Observations	Obs. with missing data	Obs. without missing data	Minimum	Maximum	Mean	Std. deviation
Data	123	0	123	0.000	1.000	0.528	0.501

Variable	Categories	Frequencies	%
Background Color	Blue	22	17.886
	Dark Blue	27	21.951
	Green	22	17.886
	White	33	26.829
	Yellow	19	15.447

Regression of variable Data:

Goodness of fit statistics:

Observations	123.000
Sum of weights	123.000
DF	118.000
R2	0.056
Adjusted R2	0.024
MSE	0.245
RMSE	0.495
MAPE	44.521
DW	2.200
Cp	5.000
AIC	−167.982
SBC	−153.921
PC	1.024

Analysis of variance:

Source	DF	Sum of squares	Mean squares	F	Pr > F
Model	4	1.712	0.428	1.745	0.145
Error	118	28.939	0.245		
Corrected Total	122	30.650			

Computed against model Y=Mean(Y)

Type I Sum of Squares analysis:

Source	DF	Sum of squares	Mean squares	F	Pr > F
Background Color	4	1.712	0.428	1.745	0.145

Type II Sum of Squares analysis:

Source	DF	Sum of squares	Mean squares	F	Pr > F
Background Color	4	1.712	0.428	1.745	0.145

Type III Sum of Squares analysis:

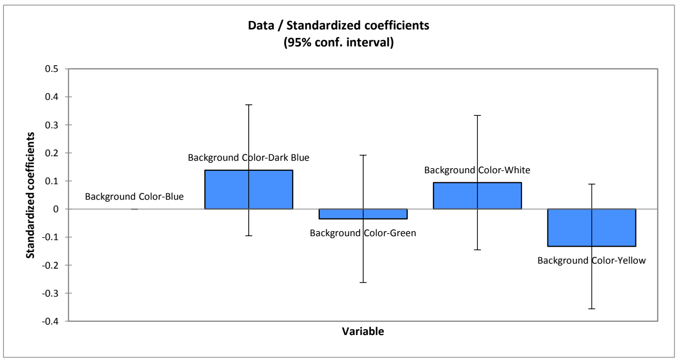
Source	DF	Sum of squares	Mean squares	F	Pr > F
Background Color	4	1.712	0.428	1.745	0.145

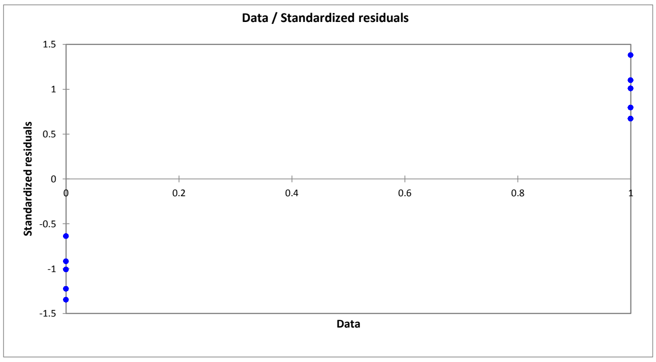
Model parameters:

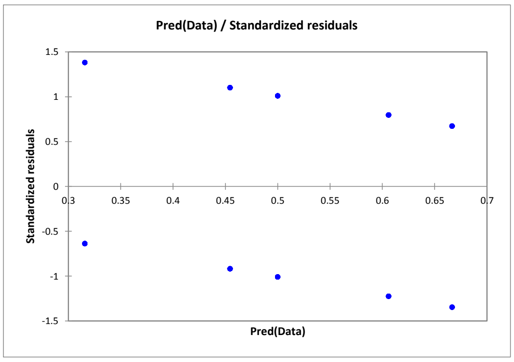
Source	Value	Standard error	t	Pr > |t|	Lower bound (95%)	Upper bound (95%)
Intercept	0.500	0.106	4.736	< 0.0001	0.291	0.709
Background Color-Blue	0.000	0.000				
Background Color-Dark Blue	0.167	0.142	1.172	0.244	−0.115	0.448
Background Color-Green	−0.045	0.149	−0.304	0.761	−0.341	0.250
Background Color-White	0.106	0.136	0.778	0.438	−0.164	0.376
Background Color-Yellow	−0.184	0.155	−1.188	0.237	−0.491	0.123

Appendix 13 Question 3b Data Analysis Summary statistics:

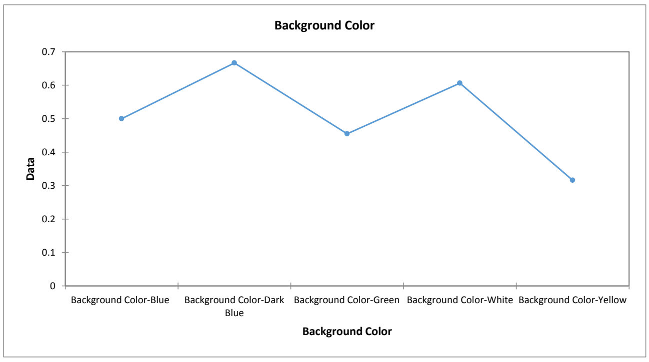
Source	Value	Standard error	t	Pr > |t|	Lower bound (95%)	Upper bound (95%)
Background Color-Blue	0.000	0.000				
Background Color-Dark Blue	0.138	0.118	1.172	0.244	-0.095	0.372
Background Color-Green	-0.035	0.115	-0.304	0.761	-0.262	0.192
Background Color-White	0.094	0.121	0.778	0.438	-0.145	0.334
Background Color-Yellow	-0.133	0.112	-1.188	0.237	-0.356	0.089

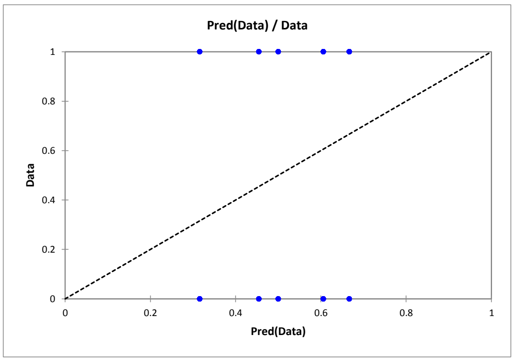






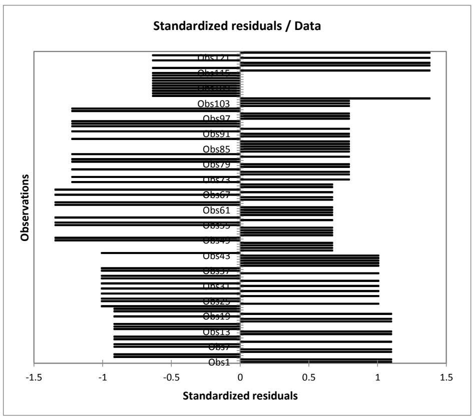
Means charts:





Background Color / Tukey (HSD) / Analysis of the differences between the categories with a confidence interval of 95%:

Contrast	Difference	Standardized difference	Critical value	Pr > Diff	Significant
Dark Blue vs Yellow	0.351	2.366	2.771	0.132	No
Dark Blue vs Green	0.212	1.491	2.771	0.570	No
Dark Blue vs Blue	0.167	1.172	2.771	0.767	No
Dark Blue vs White	0.061	0.472	2.771	0.990	No
White vs Yellow	0.290	2.035	2.771	0.256	No
White vs Green	0.152	1.112	2.771	0.800	No
White vs Blue	0.106	0.778	2.771	0.936	No
Blue vs Yellow	0.184	1.188	2.771	0.758	No
Blue vs Green	0.045	0.304	2.771	0.998	No
Green vs Yellow	0.139	0.895	2.771	0.898	No
Tukey's d critical value:			3.918		



Appendix 13 Question 3b Data Analysis Summary statistics:

Category	Mean	Groups
Dark Blue	0.667	A
White	0.606	A
Blue	0.500	A
Green	0.455	A
Yellow	0.316	A

Background Color / Fisher (LSD) / Analysis of the differences between the categories with a confidence interval of 95%:

Contrast	Difference	Standardized difference	Critical value	Pr > Diff	Significant
Dark Blue vs Yellow	0.351	2.366	1.980	0.020	Yes
Dark Blue vs Green	0.212	1.491	1.980	0.139	No
Dark Blue vs Blue	0.167	1.172	1.980	0.244	No
Dark Blue vs White	0.061	0.472	1.980	0.638	No
White vs Yellow	0.290	2.035	1.980	0.044	Yes
White vs Green	0.152	1.112	1.980	0.269	No
White vs Blue	0.106	0.778	1.980	0.438	No
Blue vs Yellow	0.184	1.188	1.980	0.237	No
Blue vs Green	0.045	0.304	1.980	0.761	No
Green vs Yellow	0.139	0.895	1.980	0.373	No
LSD-value:			0.28		

Category	Mean	Groups	
Dark Blue	0.667	A	
White	0.606	A	
Blue	0.500	A	B
Green	0.455	A	B
Yellow	0.316		B

Background Color / Bonferroni / Analysis of the differences between the categories with a confidence interval of 95%:

Contrast	Difference	Standardized difference	Critical value	Pr > Diff	Significant
Dark Blue vs Yellow	0.351	2.366	2.861	0.020	No
Dark Blue vs Green	0.212	1.491	2.861	0.139	No
Dark Blue vs Blue	0.167	1.172	2.861	0.244	No
Dark Blue vs White	0.061	0.472	2.861	0.638	No
White vs Yellow	0.290	2.035	2.861	0.044	No
White vs Green	0.152	1.112	2.861	0.269	No
White vs Blue	0.106	0.778	2.861	0.438	No
Blue vs Yellow	0.184	1.188	2.861	0.237	No
Blue vs Green	0.045	0.304	2.861	0.761	No
Green vs Yellow	0.139	0.895	2.861	0.373	No
Modified significance level:			0.005		

Category	Mean	Groups
Dark Blue	0.667	A
White	0.606	A
Blue	0.500	A
Green	0.455	A
Yellow	0.316	A

Background Color / Dunn-Sidak / Analysis of the differences between the categories with a confidence interval of 95%:

Contrast	Difference	Standardized difference	Critical value	Pr > Diff	Significant
Dark Blue vs Yellow	0.351	2.366	2.853	0.020	No
Dark Blue vs Green	0.212	1.491	2.853	0.139	No
Dark Blue vs Blue	0.167	1.172	2.853	0.244	No
Dark Blue vs White	0.061	0.472	2.853	0.638	No
White vs Yellow	0.290	2.035	2.853	0.044	No
White vs Green	0.152	1.112	2.853	0.269	No
White vs Blue	0.106	0.778	2.853	0.438	No
Blue vs Yellow	0.184	1.188	2.853	0.237	No
Blue vs Green	0.045	0.304	2.853	0.761	No
Green vs Yellow	0.139	0.895	2.853	0.373	No
Modified significance level:			0.005		

Category	Mean	Groups
Dark Blue	0.667	A
White	0.606	A
Blue	0.500	A
Green	0.455	A
Yellow	0.316	A

Background Color / Newman-Keuls (SNK) / Analysis of the differences between the categories with a confidence interval of 95%:

Contrast	Difference	Standardized difference	Critical value	Pr > Diff	Significant
Dark Blue vs Yellow	0.351	2.366	2.771	0.132	No
Dark Blue vs Green	0.212	1.491	2.606	0.446	No
Dark Blue vs Blue	0.167	1.172	2.374	0.472	No
Dark Blue vs White	0.061	0.472	1.980	0.638	No
White vs Yellow	0.290	2.035	2.606	0.181	No
White vs Green	0.152	1.112	2.374	0.509	No
White vs Blue	0.106	0.778	1.980	0.438	No
Blue vs Yellow	0.184	1.188	2.374	0.463	No
Blue vs Green	0.045	0.304	1.980	0.761	No
Green vs Yellow	0.139	0.895	1.980	0.373	No

Appendix 13 Question 3b Data Analysis Summary statistics:

Category	Mean	Groups
Dark Blue	0.667	A
White	0.606	A
Blue	0.500	A
Green	0.455	A
Yellow	0.316	A

Background Color / Duncan / Analysis of the differences between the categories with a confidence interval of 95%:

Contrast	Difference	Standardized difference	Critical value	Pr > Diff	alpha (Modified)	Significant
Dark Blue vs Yellow	0.351	2.366	2.204	0.132	0.185	Yes
Dark Blue vs Green	0.212	1.491	2.153	0.446	0.143	No
Dark Blue vs Blue	0.167	1.172				No
Dark Blue vs White	0.061	0.472				No
White vs Yellow	0.290	2.035	2.153	0.181	0.143	No
White vs Green	0.152	1.112				No
White vs Blue	0.106	0.778				No
Blue vs Yellow	0.184	1.188				No
Blue vs Green	0.045	0.304				No
Green vs Yellow	0.139	0.895				No

Category	Mean	Groups	
Dark Blue	0.667	A	
White	0.606	A	B
Blue	0.500	A	B
Green	0.455	A	B
Yellow	0.316		B

Background Color / REGWQ / Analysis of the differences between the categories with a confidence interval of 95%:

Contrast	Difference	Standardized difference	Critical value	Pr > Diff	alpha (Modified)	Significant
Dark Blue vs Yellow	0.351	2.366	2.771	0.132	0.050	No
Dark Blue vs Green	0.212	1.491	2.606	0.446	0.050	No
Dark Blue vs Blue	0.167	1.172	2.606	0.472	0.050	No
Dark Blue vs White	0.061	0.472	2.606	0.638	0.050	No
White vs Yellow	0.290	2.035	2.606	0.181	0.050	No
White vs Green	0.152	1.112	2.572	0.509	0.030	No
White vs Blue	0.106	0.778	2.572	0.438	0.030	No
Blue vs Yellow	0.184	1.188	2.572	0.463	0.030	No
Blue vs Green	0.045	0.304	2.352	0.761	0.020	No
Green vs Yellow	0.139	0.895	2.352	0.373	0.020	No

Category	Mean	Groups
Dark Blue	0.667	A
White	0.606	A
Blue	0.500	A
Green	0.455	A
Yellow	0.316	A

Background Color / Dunnett (two sided) / Analysis of the differences between the control category White and the other categories with a confidence interval of 95%:

Category	Difference	Standardized difference	Critical value	Critical differenc	Pr > Diff	Significant
White vs Dark Blue	−0.061	−0.472	2.495	0.321	0.976	No
White vs Yellow	0.290	2.035	2.495	0.356	0.144	No
White vs Green	0.152	1.112	2.495	0.340	0.658	No
White vs Blue	0.106	0.778	2.495	0.340	0.869	No

Appendix 14

English Background Data all speakers lived in the USA 20 years or more or their whole life

Variable	Observations	Obs. with missing data	Obs. without missing data	Minimum	Maximum	Mean	Std. deviation
Y1	75	0	75	15.790	89.470	52.305	17.976

Variable	Categories	Frequencies	%
Q1	Blue	23	30.667
	Dkblue	14	18.667
	Green	9	12.000
	White	16	21.333
	Yellow	13	17.333

Correlation matrix:

Variables	Q1-Blue	Q1-Dkblue	Q1-Green	Q1-White	Q1-Yellow	Y1
Q1-Blue	**1.000**	-0.319	-0.246	-0.346	-0.305	0.117
Q1-Dkblue	-0.319	**1.000**	-0.177	-0.249	-0.219	0.007
Q1-Green	-0.246	-0.177	**1.000**	-0.192	-0.169	-0.204
Q1-White	-0.346	-0.249	-0.192	**1.000**	-0.238	-0.036
Q1-Yellow	-0.305	-0.219	-0.169	-0.238	**1.000**	0.064
Y1	0.117	0.007	-0.204	-0.036	0.064	**1.000**

Multicolinearity statistics:

Statistic	Q1-Blue	Q1-Dkblue	Q1-Green	Q1-White	Q1-Yellow
Tolerance	0.000	0.000	0.000	0.000	0.000
VIF	0.000	0.000	0.000	0.000	0.000

Appendix 14 English Background Data all speakers lived in the USA 20 years or more or their whole life

Regression of variable Y1:

Goodness of fit statistics:

Observations	75.000
Sum of weights	75.000
DF	70.000
R2	0.051
Adjusted R2	-0.004
MSE	324.337
RMSE	18.009
MAPE	36.055
DW	1.998
Cp	5.000
AIC	438.459
SBC	450.047
PC	1.085

Analysis of variance:

Source	DF	Sum of squares	Mean squares	F	Pr > F
Model	4	1208.674	302.168	0.932	0.451
Error	70	22703.614	324.337		
Corrected Total	74	23912.287			

Computed against model Y=Mean(Y)

Model parameters:

Q1 / Tukey (HSD) / Analysis of the differences between the categories with a confidence interval of 95%:

Contrast	Difference	Std. Difference	Critical Value	Pr > Diff	Significant
Blue vs Green	13.015	1.838	2.800	0.360	No
Blue vs White	4.377	0.747	2.800	0.945	No
Blue vs Dkblue	2.902	0.475	2.800	0.989	No
Blue vs Yellow	0.674	0.108	2.800	1.000	No
Yellow vs Green	12.341	1.580	2.800	0.515	No
Yellow vs White	3.703	0.551	2.800	0.982	No
Yellow vs Dkblue	2.228	0.321	2.800	0.998	No
Dkblue vs Green	10.113	1.314	2.800	0.683	No
Dkblue vs White	1.475	0.224	2.800	0.999	No
White vs Green	8.638	1.151	2.800	0.779	No
Tukey's d critical value:			3.96		

Category	LS means	Groups
Blue	55.459	A
Yellow	54.785	A
Dkblue	52.557	A
White	51.083	A
Green	42.444	A

Q1 / Fisher (LSD) / Analysis of the differences between the categories with a confidence interval of 95%:

Appendix 14

English Background Data all speakers lived in the USA 20 years or more or their whole life

Contrast	Difference	Std. Difference	Critical Value	Pr > Diff	Significant
Blue vs Green	13.015	1.838	1.994	0.070	No
Blue vs White	4.377	0.747	1.994	0.458	No
Blue vs Dkblue	2.902	0.475	1.994	0.636	No
Blue vs Yellow	0.674	0.108	1.994	0.914	No
Yellow vs Green	12.341	1.580	1.994	0.119	No
Yellow vs White	3.703	0.551	1.994	0.584	No
Yellow vs Dkblue	2.228	0.321	1.994	0.749	No
Dkblue vs Green	10.113	1.314	1.994	0.193	No
Dkblue vs White	1.475	0.224	1.994	0.824	No
White vs Green	8.638	1.151	1.994	0.254	No
LSD-value:			13.116		

Category	LS means	Groups
Blue	55.459	A
Yellow	54.785	A
Dkblue	52.557	A
White	51.083	A
Green	42.444	A

Q1 / Bonferroni / Analysis of the differences between the categories with a confidence interval of 95%:

Contrast	Difference	Std. Difference	Critical Value	Pr > Diff	Significant
Blue vs Green	13.015	1.838	2.899	0.070	No
Blue vs White	4.377	0.747	2.899	0.458	No
Blue vs Dkblue	2.902	0.475	2.899	0.636	No
Blue vs Yellow	0.674	0.108	2.899	0.914	No
Yellow vs Green	12.341	1.580	2.899	0.119	No
Yellow vs White	3.703	0.551	2.899	0.584	No
Yellow vs Dkblue	2.228	0.321	2.899	0.749	No
Dkblue vs Green	10.113	1.314	2.899	0.193	No
Dkblue vs White	1.475	0.224	2.899	0.824	No
White vs Green	8.638	1.151	2.899	0.254	No
Modified significance level:			0.005		

Category	LS means	Groups
Blue	55.459	A
Yellow	54.785	A
Dkblue	52.557	A
White	51.083	A
Green	42.444	A

Q1 / Dunn-Sidak / Analysis of the differences between the categories with a confidence interval of 95%:

Contrast	Difference	Std. Difference	Critical Value	Pr > Diff	Significant
Blue vs Green	13.015	1.838	2.891	0.070	No
Blue vs White	4.377	0.747	2.891	0.458	No
Blue vs Dkblue	2.902	0.475	2.891	0.636	No
Blue vs Yellow	0.674	0.108	2.891	0.914	No
Yellow vs Green	12.341	1.580	2.891	0.119	No
Yellow vs White	3.703	0.551	2.891	0.584	No
Yellow vs Dkblue	2.228	0.321	2.891	0.749	No
Dkblue vs Green	10.113	1.314	2.891	0.193	No
Dkblue vs White	1.475	0.224	2.891	0.824	No
White vs Green	8.638	1.151	2.891	0.254	No
Modified significance level:			0.005		

Appendix 14

English Background Data all speakers lived in the USA 20 years or more or their whole life

Category	LS means	Groups
Blue	55.459	A
Yellow	54.785	A
Dkblue	52.557	A
White	51.083	A
Green	42.444	A

Q1 / Newman-Keuls (SNK) / Analysis of the differences between the categories with a confidence interval of 95%:

Contrast	Difference	Std. Difference	Critical Value	Pr > Diff	Significant
Blue vs Green	13.015	1.838	2.800	0.360	No
Blue vs White	4.377	0.747			No
Blue vs Dkblue	2.902	0.475			No
Blue vs Yellow	0.674	0.108			No
Yellow vs Green	12.341	1.580	2.632	0.396	No
Yellow vs White	3.703	0.551			No
Yellow vs Dkblue	2.228	0.321			No
Dkblue vs Green	10.113	1.314	2.395	0.392	No
Dkblue vs White	1.475	0.224			No
White vs Green	8.638	1.151	1.994	0.254	No

Category	LS means	Groups
Blue	55.459	A
Yellow	54.785	A
Dkblue	52.557	A
White	51.083	A
Green	42.444	A

Q1 / Duncan / Analysis of the differences between the categories with a confidence interval of 95%:

Contrast	Difference	Std. Diff	Critical Value	Pr > Diff	Alpha	Significant
Blue vs Green	13.015	1.838	2.217	0.360	0.185	No
Blue vs White	4.377	0.747				No
Blue vs Dkblue	2.902	0.475				No
Blue vs Yellow	0.674	0.108				No
Yellow vs Green	12.341	1.580	2.167	0.396	0.143	No
Yellow vs White	3.703	0.551				No
Yellow vs Dkblue	2.228	0.321				No
Dkblue vs Green	10.113	1.314	2.098	0.392	0.098	No
Dkblue vs White	1.475	0.224				No
White vs Green	8.638	1.151	1.994	0.254	0.050	No

Category	LS means	Groups
Blue	55.459	A
Yellow	54.785	A
Dkblue	52.557	A
White	51.083	A
Green	42.444	A

Appendix 14

English Background Data all speakers lived in the USA 20 years or more or their whole life

Q1 / REGWQ / Analysis of the differences between the categories with a confidence interval of 95%:

Contrast	Difference	Std. Diff	Critical Value	Pr > Diff	Alpha	Significant
Blue vs Green	13.015	1.838	2.800	0.360	0.050	No
Blue vs White	4.377	0.747				No
Blue vs Dkblue	2.902	0.475				No
Blue vs Yellow	0.674	0.108				No
Yellow vs Green	12.341	1.580	2.632	0.396	0.050	No
Yellow vs White	3.703	0.551				No
Yellow vs Dkblue	2.228	0.321				No
Dkblue vs Green	10.113	1.314	2.599	0.392	0.030	No
Dkblue vs White	1.475	0.224				No
White vs Green	8.638	1.151	2.375	0.254	0.020	No

Category	LS means	Groups
Blue	55.459	A
Yellow	54.785	A
Dkblue	52.557	A
White	51.083	A
Green	42.444	A

Q1 / Dunnett (two sided) / Analysis of the differences between the control category White and the other categories with a confidence interval of 95%:

Category	Difference	Std. Difference	Critical Value	Pr > Diff	Significant
White vs Blue	-4.377	-0.747	2.507	14.698	0.871	No
White vs Yellow	-3.703	-0.551	2.507	16.858	0.951	No
White vs Dkblue	-1.475	-0.224	2.507	16.523	0.998	No
White vs Green	8.638	1.151	2.507	18.812	0.606	No

Appendix 15 English Script and Slide Timings - Font Presentation

Welcome to Akitakata. We thank you for deciding to live in our city. This presentation will guide you to the practices and schedule of household garbage and waste disposal. If you have further any questions or comments after watching this guide, please do not hesitate to call the Akitakata city sanitation bureau during office hours.

Slide 1 / 24 seconds

Akitakata is located in the northern part of Hiroshima prefecture in the chugoku mountain region. Because we are located in a very rural part of Japan, we are very careful that the waste we generate does not impact the natural beauty of this area. We ask that you follow these rules when disposing of your household garbage.

Slide 2 / 24 seconds

In Akitakata, there are many classifications of household waste and for each, a different procedure and schedule is followed. Over all, there are 5 types of household garbage collected by the city: recyclables, combustibles (trash that can be burned) non-combustibles, hazardous and oversized garbage. We will address each one individually.

Slide 3 / 28 seconds

Recyclables are items that can be used again, either in their original form or processed and remanufactured. Akitakata has 4 categories in this classification: Waste paper, containers and packages, cans and bottles.

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Waste paper includes newspapers, magazines, corrugated boxes, cardboard boxes, paper bags, envelopes or advertisements. Everything must be sorted to the same type of item. For example, only newspapers can be bundled together with string. Each waste paper item must be bundled separately with string, as seen here. Any other type of waste paper, like a plastic cover in the window of an envelope, must be removed before bundled together. Each bundle must be less than 50 cm long and less than 10 kilograms. Any paper that is very dirty must be disposed as a combustible item. Waste paper bundles must have a ‘waste paper’ sticker attached to each bundle. These stickers are issued by the sanitation department for 65 yen each and can be bought at any supermarket or convenience store in Akitakata. Waste paper is collected every second and fourth Wednesday of the month at your neighborhood garbage station.

Slide 5 / 1:17 seconds

Next containers and packages:

Slide 6 / 38 seconds

Appendix 15 English Script and Slide Timings

Containers and packages are classified into 3 categories: cartons, plastic containers and packages and PET bottles. By Japanese law, items made of these materials, must be labeled. For example: cartons have a ‘kamipakku’ symbol, plastic containers have the ‘pura’ symbol and PET bottles have the triangle with the number 1 inside of it. Each category has its own garbage bag and disposal procedure.

For cartons, such as milk or juice cartons, you much rinse and flatten each carton and place them in the ‘kamipakku’ designated bag. You can usually put about 25 flattened cartons in one bag. Each bag can be purchased at your local supermarket or convenience store for 30 yen each. This type of garbage is collected on the first and third Thursday of the month at your neighborhood garbage station.

Slide 7 / 34 seconds

For plastic containers and packages, items such as, instant ramen bowls, food trays, tofu containers, detergent containers, or plastic shopping bags, for example, should be rinsed and all of these type of garbage can be placed in the ‘plastic garbage’ designated bag. Make sure all items in this bag have the ‘pura’ symbol on them. If this symbol is not on the item, then it should be placed in the combustible garbage bag. The plastic garbage bag can be purchased for 30 yen at your local supermarket or convenience store. The bag is quite big and can hold a vast amount of plastic garbage. This type of garbage is collected on the first and third Thursday of the month at your neighborhood garbage station.

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The last type of container and packages garbage is the PET bottle. PET bottles are widely used in Akitakata for soft drinks, beverages, sake , vinegar or soy sauce. The triangle with the number 1 inside designates this type of garbage. All non-glued labels must be removed. The bottle must be rinsed and the plastic cap disposed into the other plastic garbage bag. The PET bottles only are collected using the ‘plastic container’ packaging’ garbage bag. Plastic containers and packages must be in a separate bag and not mixed with the PET bottles. The plastic garbage bag can be purchased for 30 yen at your local supermarket or convenience store. The bag is quite big and can hold a vast amount of Pet bottles. This type of garbage is collected on the first and third Thursday of the month at your neighborhood garbage station.

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The last 2 types of recyclable garbage are cans and glass bottles. Cans made of steel and

Slide 10 / 40 seconds

aluminum are collected. Japanese law requires cans to be labeled with these symbols. All glass bottles are collected, too. When disposing of these items, please remove any labels. Rinse the can or bottle and make sure no solids are left over inside of it. Spray and aerosol cans are accepted. Make sure they are completely empty.

Sake bottles have a deposit value and can be brought to your local sake vendor for a 10 yen return to you. Glass cups or dishes and metal caps should be placed in the non-combustible garbage bag. Specially designated bags are required for disposal of cans and bottles. The garbage bags are available in 2 sizes, small for 50 yen and large for 100 yen. Make sure the bag does not weigh more than 10 kilograms. The can or bottle garbage bag can be purchased at your local supermarket or convenience store. This type of garbage is collected on the second and fourth Thursday of the month at your neighborhood garbage station.

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The next type of garbage to dispose, and the most commonly used bags in Akitakata city, are the combustible or burnable household waste. Any kind of kitchen garbage, left-over food scraps, dirty paper products, disposable diapers, leather products, rubber products, clothing etc. can all be put into one of the designated combustible garbage bags. The garbage bags are available in 2 sizes, small for 40 yen and large for 65 yen. Make sure the bag does not weigh more than 10 kilograms and items inside cannot be more that 50 cm long. This garbage bag can be purchased at your local supermarket or convenience store and this type of garbage is collected twice a week on Tuesday and Friday at your neighborhood garbage station.

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We are halfway there! The forth garbage category is the non-combustibles. This category covers all garbage not mentioned in the other categories previously. Items such as small electrical appliances, electrical cords, household ceramics and glass, razors, fry pans and umbrellas. Anything that cannot fit into the bag must be labeled oversized garbage. The designated bag is the same as the can and glass bottle bag. Items cannot be mixed, for example cans and electrical items are prohibited. Each category garbage item is in one bag, cans together, bottles together, non-combustibles together. The garbage bags are available in 2 sizes, small for 50 yen and large for 100 yen. Make sure the bag does not weigh more than 10 kilograms. This garbage bag can be purchases at your local supermarket or convenience store. This type of garbage is collected on the second and fourth Thursday of the month at your neighborhood garbage station.

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Appendix 15 English Script and Slide Timings

The fifth type of garbage is the hazardous waste garbage. These household items include, batteries, light bulbs and thermometers. Button size batteries and re-chargeable batteries must be returned to the store where they were bought. All electrical appliance stores collect these not accepted items. The designated garbage bag for these things comes in one size and can be purchased for 100 yen and can be purchased at your local supermarket or convenience store. This type of garbage is collected on the first and third Monday of the month at your neighborhood garbage station.

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The last category is the oversize trash. Items over 50 cm long that cannot fit into the non-combustible garbage bag are labeled 'over-size'. Items such as carpets, tables, sofas, furniture, bedding, in addition to electrical items such as sewing machines or yard work equipment can be disposed of. Large household appliances such as TVs, refrigerators, washing machines, air conditioners, personal computers, should be returned to the store where you purchased them. Each item requires an 'over-sized' garbage sticker. These stickers are 400 yen each and can be purchased at your local supermarket or convenience store. Bedding can be combined into groups of 5 and bundled with a string. This type of garbage is collected twice a year on January 15 and June 15 at your local neighborhood garbage station.

Slide 15 / 1:15 seconds

Any other items not mentioned in this presentation, for example car batteries, tires, chemicals, propane tanks, or paint are required, by law, to be accepted by the place where you bought them.

Slide 16 / 17 seconds

We hope this simple explanation will get you started to a smooth transition to everyday life here in Akitakata. If you have any questions or comments please do not hesitate to contact the sanitation office during office hours at the telephone number stated below. Thank you very much.

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Total time = 12 minutes:36 seconds

Appendix 15 Japanese Script and Slide Timings - Font Presentation

ようこそ、安芸高田市へ。私たちの市に住むことにしてくださったことを、うれしく思います。これから、家庭から出るごみを出す方法とスケジュールについてお話しします。この説明を見た後に質問やコメントがありましたら、開庁時間内に安芸高田市役所市民部市民生活課へお気軽にお問い合わせください。

Slide 1 / 24 seconds

安芸高田市は、中国地方の広島県北部にあります。日本のまさに農村地帯に安芸高田市はあるため、私たちはこの地方の美しい自然に影響を与えないように、注意深くごみを捨てなければなりません。ですから、皆さんにも家庭から出るごみを捨てる際には、これからお話しするルールに従っていただくよう、お願いいたします。

Slide 2 / 24 seconds

安芸高田市では、家庭ごみの分類・出し方・スケジュールがいろいろあります。市が収集する家庭ごみは、「資源物（リサイクルできるもの）」「燃えるごみ」「燃えないごみ」「有害ごみ」「粗大ごみ」と、全部で 5 種類あります。これから、それぞれについて、詳しく説明していきます。

Slide 3 / 28 seconds

「資源ごみ（リサイクルできるもの）」は、そのまままた使えるもの・再生して使えるものの両方を含みます。安芸高田市で回収する資源物には、「古紙類」「容器包装類」「カン類」「ビン類」の 4 種類があります。

Slide 4 20 seconds

古紙として出せるものは、新聞紙・雑誌・箱　ダンボール・紙袋・封筒・広告です。これらを出すときには、それぞれ同じ種類のものをそろえてください。例えば新聞紙の場合、新聞紙だけをまとめてひもで束ねます。このように、古紙はそれぞれの種類に分けて、それぞれをひもで束ねてください。封筒についているビニールの窓のように紙ではないものは、束ねる前にすべて取り除いてください。それぞれの古紙の束は、50 センチ以下 10 キロ以下にしてください。汚れている紙は燃えるごみへ出してください。それぞれの古紙の束には、「ごみ処理券 65 円」と書かれたステッカーを付けてください。市民生活課が発行しているこのごみ処理券は、65 円で販売されており、市内のスーパーマーケットやコンビニエンスストアで買うことができます。古紙の回収は毎月第 2 第 4 水曜日です。それぞれの地区のごみ収集所に持って行ってください。

Slide 5 / 1:17 minutes

次に、「容器包装類」です。これらは「紙パック」「プラスチック製容器や包装」「ペットボトル」の 3 種類に分けられます。日本の法律では、どんな素材で作られているのかを表示することが義務付けられています。例えば、紙パックには「紙パック」のマークが、プラスチック製容器や包装には「プラ」のマークが、ペットボトルには三角の中に数字の「1」が書かれたマークが、必ずついています。この 3 種類には、それぞれのごみ袋と出し方があります。

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まず、牛乳やジュースの入れ物である「紙パック」は、中をよく洗ってゆすぎ、開いて乾かし、紙パック専用収集袋に入れてください。一つの袋に約 25 枚入ります。紙パック専用収集袋は市内のスーパーマーケットやコンビニエンスストアで 1 枚 30 円で買うことができます。これらの回収は毎月第 1 第 3 木曜日です。それぞれの地区のごみ収集所に持って行ってください。

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二つ目の「プラスチック製容器や包装」は、カップラーメンの容器や食品トレイ、豆腐の容器、シャンプーや洗剤の容器、レジ袋などです。中をよく洗い、これらは全て「プラスチック製容器包装専用収集袋」に入れてください。この袋に入れるものには全て「プラ」マークがついていることを確認してください。このマークのついていないものは、「燃えるごみ」で出してください。この収集袋は市内のスーパーマーケットやコンビニ

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Appendix 15 Japanese Script and Slide Timings

エンスストアで 1 枚 30 円で買うことができます。この袋はとても大きく、沢山のプラスチックごみを入れることができます。回収は、毎月第 1 第 3 木曜日です。それぞれの地区のごみ収集所に持って行ってください。

「容器包装類」の三つめはペットボトルです。ペットボトルはジュースやお茶などの飲み物、お酒、お酢や醤油の容器として使われています。三角の中に数字の「１」が書かれたマークが付いています。はがれるラベルは取り除き、中をよく洗ってください。キャップは取り外し、プラスチックごみとして出してください。ペットボトルは、ペットボトルだけを集めて、「プラスチック製容器包装専用収集袋」に入れてください。ペットボトルとそれ以外のプラスチックごみを必ず分けて入れ、混ぜないようにしてください。この収集袋は市内のスーパーマーケットやコンビニエンスストアで 1 枚 30 円で買うことができます。この袋はとても大きく、沢山のペットボトルを入れることができます。回収は、毎月第 1 第 3 木曜日です。それぞれの地区のごみ収集所に持って行ってください。

Slide 9 / 1:02 minutes

資源ごみの最後は「カン」と「ビン」です。スチール製とアルミ製のカンは一緒にまとめて袋に入れてください。日本の法律では、スチール製あるいはアルミ製のマークをカンに表示することが義務付けられています。ビンもビンだけをまとめてください。カンとビンに付いているラベルは取り除いてください。中をよく洗い、中に何も残っていないことを確認してください。スプレー缶やカセットボンベのカンも入れることができます。中身を完全に使い切っていることを確認してください。

Slide 10 / 40 seconds

お酒のビンは、近くの酒屋に持って行くと 1 本 10 円で換金することができます。ガラスのコップやお皿、金属のキャップは不燃物として捨ててください。カンとビンは専用収集袋に入れてください。このごみ袋には 2 つの大きさがあります。小さい方は 50 円、大きい方は 100 円です。一つの袋の重さが 10 キロ以上にならないよう気を付けてください。この袋は市内のスーパーマーケットやコンビニエンスストアで買うことができます。回収は、毎月第 2 第 4 木曜日です。それぞれの地区のごみ収集所に持って行ってください。

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次のごみの種類は「燃えるごみ」です。このごみ袋は安芸高田市で最もよく使われているものです。燃えるごみは、台所で出る生ごみ、残飯、汚れた紙製品、紙おむつ、革製品、ゴム製品、布などです。これらは全て一緒に「燃えるごみ専用収集袋」に入れてください。このごみ袋には 2 つの大きさがあります。小さい方は 40 円、大きい方は

です。一つの袋の重さが 10 キロ以上にならないよう、中身の大きさが 50 センチ以上にならないよう、気を付けてください。この袋は市内のスーパーマーケットやコンビニエンスストアで買うことができます。回収は毎週火曜日と金曜日の 2 回です。それぞれの地区のごみ収集所に持って行ってください。

Slide 12 / 1:00 minute

これでやっと半分まで来ました！4 種類目は「燃えないごみ」です。燃えないごみは、これまでの説明に出てきていない全てのごみのことです。例えば、小さな電化製品、電源コード、ガラスや陶器の食器、カミソリ、フライパン、傘などです。燃えないごみ用のごみ袋に入らないものは全て、粗大ごみとして捨ててください。燃えないごみを入れる袋は、「カン」と「ビン」と同じ袋ですが、カンと電化製品を一緒に入れないでください。カンはカンだけ、ビンはビンだけ、燃えないごみは燃えないごみだけと、分別して袋に入れてください。このごみ袋には 2 つの大きさがあります。小さい方は 50 円、大きい方は 100 円です、袋の重さが 10 キロ以上にならないよう、気を付けてください。このごみ袋は市内のスーパーマーケットやコンビニエンスストアで買うこ

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とができます。回収は毎月第 2 第 4 木曜日です。それぞれの地区のごみ収集所に持って行ってください。

5 種類目のごみは、「有害ごみ」、家庭で使われる乾電池、蛍光灯や電球、体温計などです。ボタン電池と充電式電池は家電販売店で回収しています。すべてのお店でボタン電池と充電式電池の回収をしていますので、そこに持って行ってください。有害ごみのごみ袋は 1 枚 100 円です。市内にスーパーマーケットやコンビニエンスストアで買うことができます。回収は毎月第 1 第 3 月曜日です。それぞれの地区のごみ収集所に持って行ってください。

Slide 14 / 43 Seconds

最後の種類は「粗大ごみ」です。これは大きさが 50 センチ以上で、燃えないごみの袋に入らないもののことを言います。例えば、カーペットやテーブル、ソファ、家具、ベッドなど。ミシンなどの電化製品や草刈機も含みます。テレビや冷蔵庫、洗濯機、エアコン、パソコンなどの大型電化製品は購入したお店に回収してもらってください。粗大ごみとして出すものには、一つ一つに「粗大ごみ処理券」を付けてください。この「粗大ごみ処理券」は 1 枚 400 円で、市内のスーパーマーケットやコンビニエンスストアで買うことができます。布団などの寝具はこのグループに入りますので、ひもで結んで出してください。回収は年に 2 回、1 月 15 日と 6 月 15 日です。それぞれの地区のごみ収集所に持って行ってください。

Slide 15 / 1:15 minutes

今回説明できなかった、車のバッテリーやタイヤ、化学製品、プロパンガスのボンベ、ペンキなどは、それぞれ購入したお店で引き取るように法律で定められています。

Slide 16 / 17 seconds

今回の簡単な説明で、皆さんが安芸高田市での日常生活を順調に始められることを願っています。質問やコメントがありましたら、開庁時間内に安芸高田市役所市民部市民生活課へお気軽にお問い合わせください。電話番号はこちらです。

Slide 17 / 26 seconds

ありがとうございました。

Appendix 16 English Survey Arial Font

Garbage Schedule and Disposal Procedure

Please help us determine how much you remember and answer the questions below.
If you remember part of an answer, please write it down. If you do not remember anything, please write DA for "Don't Remember". Thank you.

Gender Male / Female
Age ______________
Have you ever lived in Japan for over 2 weeks? Yes / No

1. What is the name of the city that the presentation was made for?
2. How many categories of garbage separation is explained?
3. Recyclables category contains hair dryers? True / False
4. What is the maximum length（inches）of most garbage collected? For example for waste paper or burnable garbage
5. How should you dispose of a milk carton? (paper not plastic)
6. When is Waste paper collected? (day and frequency?)
7. What kind of bottle has a deposit?
8. How much is a large burnable garbage bag, in yen?
9. For non-combustible garbage, what is the maximum weight for each garbage bag?
10. Car batteries are considered hazardous waste and should be brought back to the store you bought it at? True / False
11. Do you recycle like this town? Do you like it?

Appendix 16 English Survey Comic Sans Font

Garbage Schedule and Disposal Procedure cm

Please help us determine how much you remember and answer the questions below.
If you remember part of an answer, please write it down. If you do not remember anything, please write DA for "Don't Remember". Thank you.

Gender Male / Female
Age ______________
Have you ever lived in Japan for over 2 weeks? Yes / No

1. What is the name of the city that the presentation was made for?
2. How many categories of garbage separation is explained?
3. Recyclables category contains hair dryers? True / False
4. What is the maximum length (inches) of most garbage collected? For example for waste paper or burnable garbage
5. How should you dispose of a milk carton? (paper not plastic)
6. When is Waste paper collected? (day and frequency?)
7. What kind of bottle has a deposit?
8. How much is a large burnable garbage bag, in yen?
9. For non-combustible garbage, what is the maximum weight for each garbage bag?
10. Car batteries are considered hazardous waste and should be brought back to the store you bought it at? True / False
11. Do you recycle like this town? Do you like it?

Garbage Schedule and Disposal Procedure rd

Please help us determine how much you remember and answer the questions below.
If you remember part of an answer, please write it down. If you do not remember anything, please write DA for "Don't Remember". Thank you.

Gender Male / Female
Age ______________
Have you ever lived in Japan for over 2 weeks? Yes / No

1. What is the name of the city that the presentation was made for?
2. How many categories of garbage separation is explained?
3. Recyclables category contains hair dryers? True / False
4. What is the maximum length（inches）of most garbage collected? For example for waste paper or burnable garbage
5. How should you dispose of a milk carton? (paper not plastic)
6. When is Waste paper collected? (day and frequency?)
7. What kind of bottle has a deposit?
8. How much is a large burnable garbage bag, in yen?
9. For non-combustible garbage, what is the maximum weight for each garbage bag?
10. Car batteries are considered hazardous waste and should be brought back to the store you bought it at? True / False
11. Do you recycle like this town? Do you like it?

Appendix 16 English Survey Verdana Font

Garbage Schedule and Disposal Procedure

v

Please help us determine how much you remember and answer the questions below. If you remember part of an answer, please write it down. If you do not remember anything, please write DA for “Don’t Remember”. Thank you.

Gender Male / Female

Age ____________

Have you ever lived in Japan for over 2 weeks? Yes / No

1. What is the name of the city that the presentation was made for?

2. How many categories of garbage separation is explained?

3. Recyclables category contains hair dryers? True / False

4. What is the maximum length（inches）of most garbage collected? For example for waste paper or burnable garbage

5. How should you dispose of a milk carton? (paper not plastic)

6. When is Waste paper collected? (day and frequency?)

7. What kind of bottle has a deposit?

8. How much is a large burnable garbage bag, in yen?

9. For non-combustible garbage, what is the maximum weight for each garbage bag?

10. Car batteries are considered hazardous waste and should be brought back to the store you bought it at? True / False

11. Do you recycle like this town? Do you like it?

Appendix 17 Japanese Survey Aqua Font　　　　aqua

ごみのスケジュールと廃棄手順A
あなたがどれくらい覚えているか、以下の質問にお答えください。
もしあなたが答えの一部を覚えていれば、それを書いてください。また、もしあなたが何も覚えていない場合は、DRと書いてください。ありがとうございます。

性別　　男性　/　女性

年齢＿＿＿＿＿＿＿＿

あなたは今までに2週間以上日本に住んでいたことがありますか？　　はい / いいえ

あなたは、このプレゼンテーションを以前見たことがありますか。　　はい / いいえ

あなたは、安芸高田市に住んでいますか。もしくは以前住んだことがありますか。　はい / いいえ

1、プレゼンテーションで使われた都市の名前は何ですか？

2、いくつのごみ分別について説明しましたか？

3、ヘアドライヤーは、リサイクル品のカテゴリに含まれている．　　O　/　X

4、収集できるゴミの最大の長さは何センチですか？例えば、古紙や可燃ごみについて

5、どのように牛乳パックを処分しますか？　(紙パックで、プラスチックではない)

6、古紙を回収する日は？　(曜日と周期？)

7、どの種類のビンを持っていくと１０円返金されますか？

8、燃えるごみ用の大袋は、いくらですか？

9、燃えないごみ用ごみ袋の最大重量はいくらですか？

10、車のバッテリーは、有害ごみとみなされ、あなたはそれを買った店に戻すべき　　O　/　X

11、あなたはこの町のようにリサイクルをしていますか？あなたがそれを好きですか？

Appendix 17 Japanese Survey Gyou Sha Hon Font

ごみのスケジュールと廃棄手順A　　　　　　　　　　　　　　　　　　　　　HG行書本

あなたがどれくらい覚えているか、以下の質問にお答えください。

もしあなたが答えの一部を覚えていれば、それを書いてください。また、もしあなたが何も覚えていない場合は、DRと書いてください。ありがとうございます。

性別　　男性　/　女性

年齢_____________

あなたは今までに2週間以上日本に住んでいたことがありますか？　　　　はい / いいえ

あなたは、このプレゼンテーションを以前見たことがありますか。　　　　はい / いいえ

あなたは、安芸高田市に住んでいますか。もしくは以前住んだことがありますか。　はい / いいえ

1、プレゼンテーションで使われた都市の名前は何ですか？

2、いくつのごみ分別について説明しましたか？

3、ヘアドライヤーは、リサイクル品のカテゴリに含まれている、　　　　O　/　X

4、収集できるゴミの最大の長さは何センチですか？例えば、古紙や可燃ごみについて

5、どのように牛乳パックを処分しますか？（紙パックで、プラスチックではない）

6、古紙を回収する日は？（曜日と周期？）

7、どの種類のビンを持っていくと１０円返金されますか？

8、燃えるごみ用の大袋は、いくらですか？

9、燃えないごみ用ごみ袋の最大重量はいくらですか？

10、車のバッテリーは、有害ごみとみなされ、あなたはそれを買った店に戻すべき　　O　/　X

11、あなたはこの町のようにリサイクルをしていますか？あなたがそれを好きですか？

Appendix 17 Japanese Survey Maru Go Font

ごみのスケジュールと廃棄手順Ａ　　　HG 行書本

あなたがどれくらい覚えているか、以下の質問にお答えください。

もしあなたが答えの一部を覚えていれば、それを書いてください。また、もしあなたが何も覚えていない場合は、DR と書いてください。ありがとうございます。

性別　　男性　/　女性

年齢____________

あなたは今までに２週間以上日本に住んでいたことがありますか？　　はい / いいえ

あなたは、このプレゼンテーションを以前見たことがありますか。　　はい / いいえ

あなたは、安芸高田市に住んでいますか。もしくは以前住んだことがありますか。　はい / いいえ

1．プレゼンテーションで使われた都市の名前は何ですか？

2. いくつのごみ分別について説明しましたか？

3. ヘアドライヤーは、リサイクル品のカテゴリに含まれている.　　O　/　X

4. 収集できるゴミの最大の長さは何センチですか？例えば、古紙や可燃ごみについて

5. どのように牛乳パックを処分しますか？（紙パックで、プラスチックではない）

6. 古紙を回収する日は？（曜日と周期？）

7. どの種類のビンを持っていくと１０円返金されますか？

8. 燃えるごみ用の大袋は、いくらですか？

9. 燃えないごみ用ごみ袋の最大重量はいくらですか？

10.車のバッテリーは、有害ごみとみなされ、あなたはそれを買った店に戻すべき　　O　/　X

11.あなたはこの町のようにリサイクルをしていますか？あなたがそれを好きですか？

Appendix 17 Japanese Survey Meiryo Font M

ごみのスケジュールと廃棄手順 A

あなたがどれくらい覚えているか、以下の質問にお答えください。

もしあなたが答えの一部を覚えていれば、それを書いてください。また、もしあなたが何も覚えていない場合は、DR と書いてください。ありがとうございます。

性別　　男性 / 女性

年齢________________

あなたは今までに 2 週間以上日本に住んでいたことがありますか？　　はい / いいえ

あなたは、このプレゼンテーションを以前見たことがありますか。　　はい / いいえ

あなたは、安芸高田市に住んでいますか。もしくは以前住んだことがありますか。　はい / いいえ

1. プレゼンテーションで使われた都市の名前は何ですか？

2. いくつのごみ分別について説明しましたか？

3. ヘアドライヤーは、リサイクル品のカテゴリに含まれている.　　O / X

4. 収集できるゴミの最大の長さは何センチですか？例えば、古紙や可燃ごみについて

5. どのように牛乳パックを処分しますか？ （紙パックで、プラスチックではない）

6. 古紙を回収する日は？ （曜日と周期？）

7. どの種類のビンを持っていくと１０円返金されますか？

8. 燃えるごみ用の大袋は、いくらですか？

9. 燃えないごみ用ごみ袋の最大重量はいくらですか？

10. 車のバッテリーは、有害ごみとみなされ、あなたはそれを買った店に戻すべき　　O / X

11. あなたはこの町のようにリサイクルをしていますか？あなたがそれを好きですか？

Appendix 17 Japanese Survey Min Cho Font

MinCh

ごみのスケジュールと廃棄手順 A

あなたがどれくらい覚えているか、以下の質問にお答えください。

もしあなたが答えの一部を覚えていれば、それを書いてください。また、もしあなたが何も覚えていない場合は、DR と書いてください。ありがとうございます。

性別　　男性　/　女性

年齢＿＿＿＿＿＿＿＿

あなたは今までに 2 週間以上日本に住んでいたことがありますか？　　はい / いいえ

あなたは、このプレゼンテーションを以前見たことがありますか。　　はい / いいえ

あなたは、安芸高田市に住んでいますか。もしくは以前住んだことがありますか。　はい / いいえ

1. プレゼンテーションで使われた都市の名前は何ですか？

2. いくつのごみ分別について説明しましたか？

3. ヘアドライヤーは、リサイクル品のカテゴリに含まれている.　　O　/　X

4. 収集できるゴミの最大の長さは何センチですか？例えば、古紙や可燃ごみについて

5. どのように牛乳パックを処分しますか？ （紙パックで、プラスチックではない）

6. 古紙を回収する日は？ （曜日と周期？）

7. どの種類のビンを持っていくと１０円返金されますか？

8. 燃えるごみ用の大袋は、いくらですか？

9. 燃えないごみ用ごみ袋の最大重量はいくらですか？

10. 車のバッテリーは、有害ごみとみなされ、あなたはそれを買った店に戻すべき　　O　/　X

11. あなたはこの町のようにリサイクルをしていますか？あなたがそれを好きですか？

Appendix 17 Japanese Survey MS-Gothic Font

MSG

ごみのスケジュールと廃棄手順A

あなたがどれくらい覚えているか、以下の質問にお答えください。
もしあなたが答えの一部を覚えていれば、それを書いてください。また、もしあなたが何も覚えていない場合は、DRと書いてください。ありがとうございます。

性別　男性　/　女性

年齢_____________

あなたは今までに2週間以上日本に住んでいたことがありますか？　はい / いいえ

あなたは、このプレゼンテーションを以前見たことがありますか。　はい / いいえ

あなたは、安芸高田市に住んでいますか。もしくは以前住んだことがありますか。　はい / いいえ

1. プレゼンテーションで使われた都市の名前は何ですか？

2. いくつのごみ分別について説明しましたか？

3. ヘアドライヤーは、リサイクル品のカテゴリに含まれている.　O / X

4. 収集できるゴミの最大の長さは何センチですか？例えば、古紙や可燃ごみについて

5. どのように牛乳パックを処分しますか？（紙パックで、プラスチックではない）

6. 古紙を回収する日は？（曜日と周期？）

7. どの種類のビンを持っていくと１０円返金されますか？

8. 燃えるごみ用の大袋は、いくらですか？

9. 燃えないごみ用ごみ袋の最大重量はいくらですか？

10. 車のバッテリーは、有害ごみとみなされ、あなたはそれを買った店に戻すべき　O / X

11. あなたはこの町のようにリサイクルをしていますか？あなたがそれを好きですか？

MSP G

ごみのスケジュールと廃棄手順 A
あなたがどれくらい覚えているか、以下の質問にお答えください。
もしあなたが答えの一部を覚えていれば、それを書いてください。また、もしあなたが何も覚えていない場合は、DR と書いてください。ありがとうございます。

性別　　男性 ／ 女性
年齢________
あなたは今までに 2 週間以上日本に住んでいたことがありますか？　　　はい ／ いいえ
あなたは、このプレゼンテーションを以前見たことがありますか。　　　はい ／ いいえ
あなたは、安芸高田市に住んでいますか。もしくは以前住んだことがありますか。　はい ／ いいえ

1. プレゼンテーションで使われた都市の名前は何ですか？

2. いくつのごみ分別について説明しましたか？

3. ヘアドライヤーは、リサイクル品のカテゴリに含まれている.　　　O ／ X

4. 収集できるゴミの最大の長さは何センチですか？例えば、古紙や可燃ごみについて

5. どのように牛乳パックを処分しますか？（紙パックで、プラスチックではない）

6. 古紙を回収する日は？（曜日と周期？）

7. どの種類のビンを持っていくと10円返金されますか？

8. 燃えるごみ用の大袋は、いくらですか？

9. 燃えないごみ用ごみ袋の最大重量はいくらですか？

10. 車のバッテリーは、有害ごみとみなされ、あなたはそれを買った店に戻すべき　O ／ X

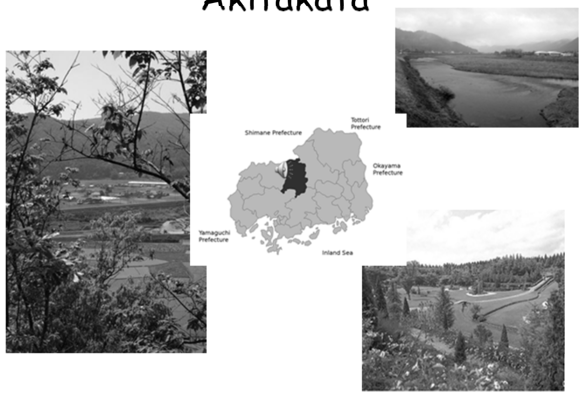
11. あなたはこの町のようにリサイクルをしていますか？あなたがそれを好きですか？

Appendix 18 Comic Sans Presentation

AKITAKATA
安芸高田市

Foreigners Guide
Household Waste Disposal

Akitakata



5 Categories of Collected Garbage

- Recyclables
- Combustibles (burnable)
- Non-Combustibles
- Hazardous
- Oversized

Recyclables

Four Categories

Waste Paper
Containers/ Packages
Cans
Bottles

Recyclables – Waste Paper

- Newspapers
- Magazines
- Boxes
- Cardboard
- Paper Bags
- Envelopes
- Advertisements

Less than 20 inches
Long Less than 22lbs

1 sticker = 65 Yen
2nd and 4th Wednesday

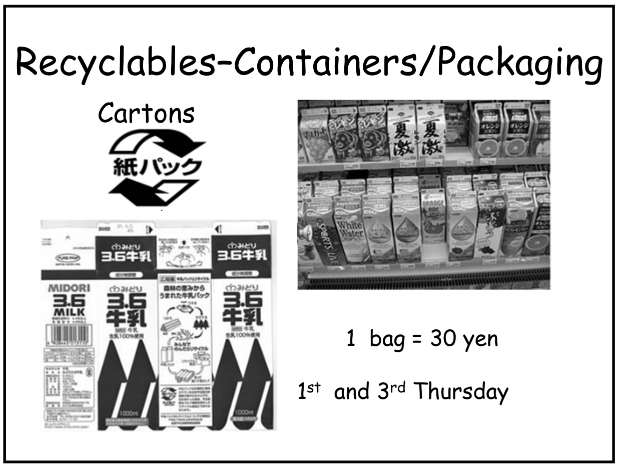
Recyclables–Containers/Packaging

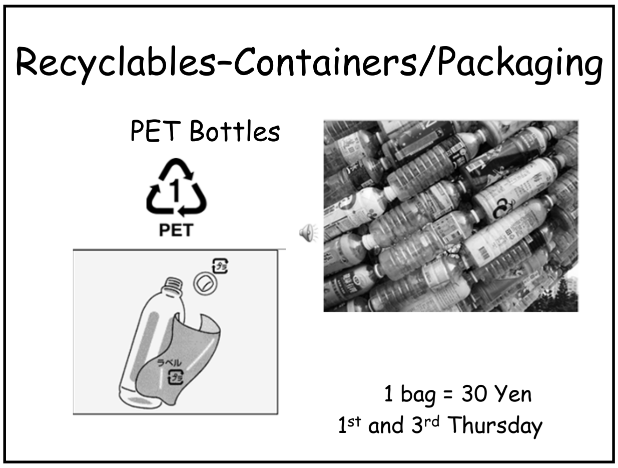
Cartons 紙パック

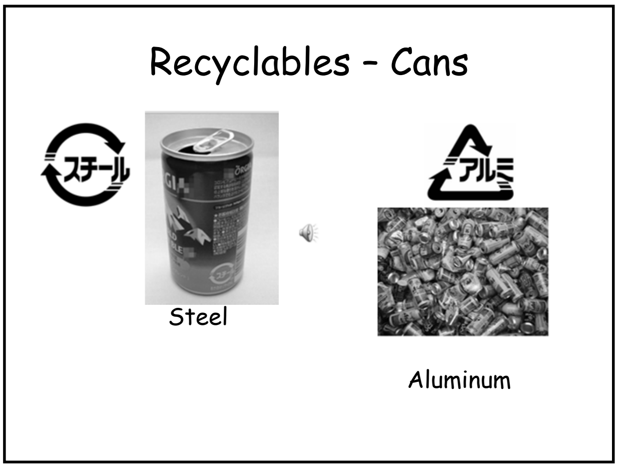
Plastic Containers/ Packages プラ

PET Bottles 1 PET

Appendix 18 Comic Sans Presentation







Appendix 18 Comic Sans Presentation

Non-Combustibles

1 Bag = Small 50 yen / Large = 100 Yen
**Each Bag Weighs Less Than 22lbs
2nd and 4th Thursday

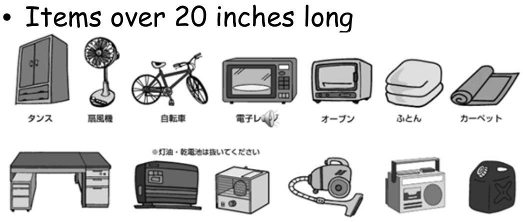
Hazardous Waste

*Most can be brought back to your local electronics store.

1 Bag = 100 yen
1st and 3rd Monday

Oversized Garbage

- Items over 20 inches long



1 Sticker = 400 Yen
January 15 and June 15

All Other Garbage

Return to the store where you bought them.

Welcome to Akitakata

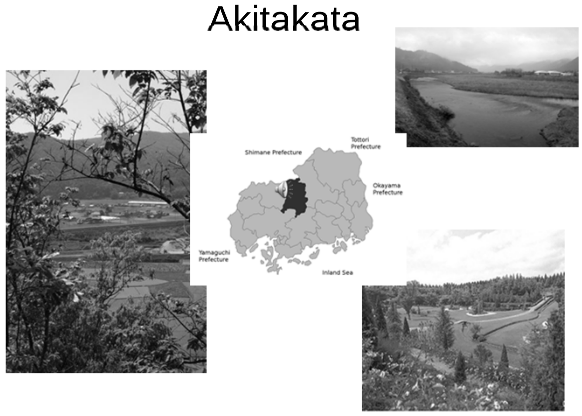
AKITAKATA
安芸高田市

Any Questions?
Call the local Sanitation Department
645-3011

AKITAKATA
安芸高田市

Foreigners Guide
Household Waste Disposal

Akitakata



5 Categories of Collected Garbage

- Recycables
- Combustibles (burnable)
- Non-Combustibles
- Hazardous
- Oversized

Recyclables

Four Categories

Waste Paper
Containers/ Packages
Cans
Bottles

Recyclables – Waste Paper

- Newspapers
- Magazines
- Boxes
- Cardboard
- Paper Bags
- Envelopes
- Advertisements

Less than 20 inches Long
Less than 22lbs

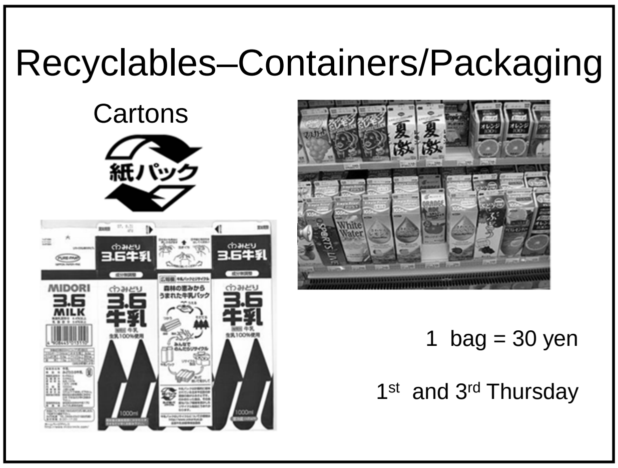
1 sticker = 65 Yen
2nd and 4th Wednesday

Recyclables–Containers/Packaging

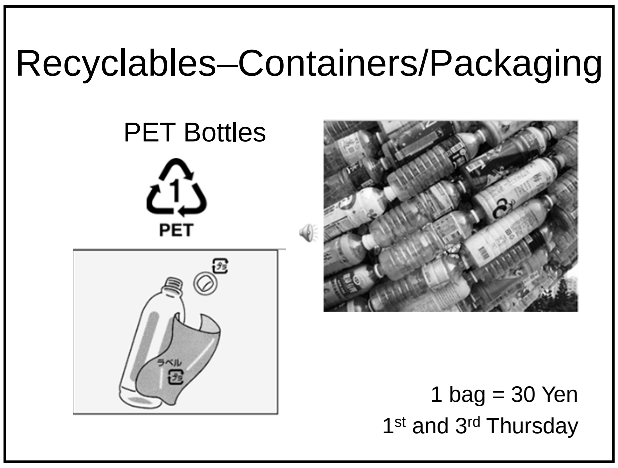
Cartons 紙パック

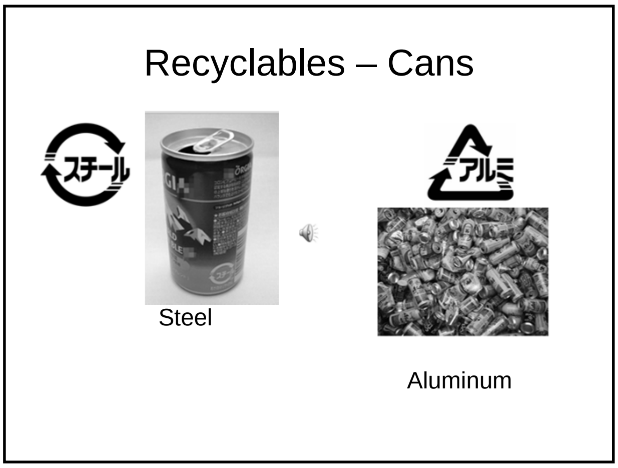
Plastic Containers/ Packages プラ

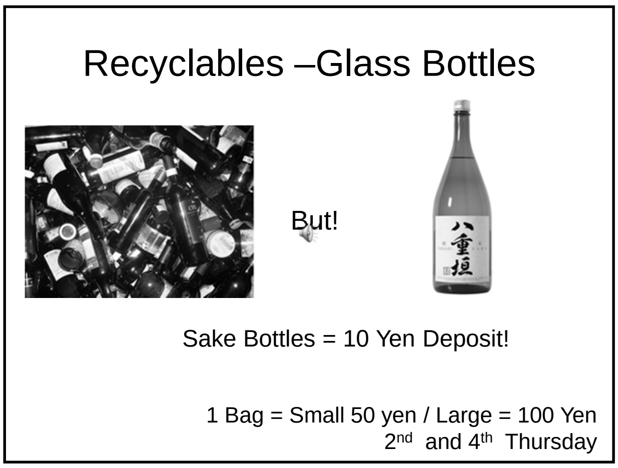
PET Bottles 1 PET

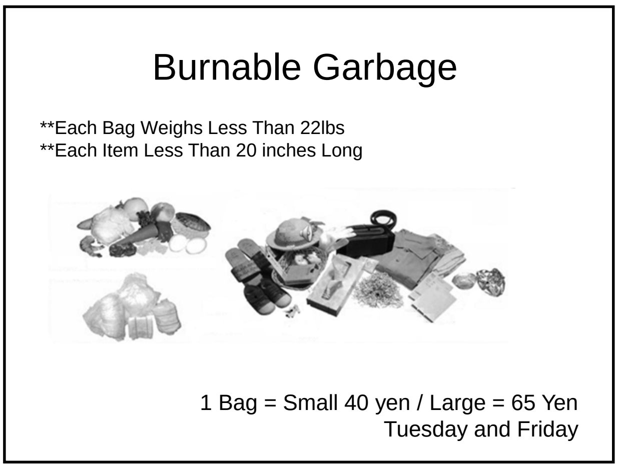

Recyclables–Containers/Packaging
Cartons
1 bag = 30 yen
1st and 3rd Thursday


Recyclables–Containers/Packaging
Plastic Containers / Packaging
1 bag = 30 Yen
1st and 3rd Thursday


Recyclables–Containers/Packaging
PET Bottles
1
PET
1 bag = 30 Yen
1st and 3rd Thursday


Recyclables – Cans
Steel
Aluminum


Recyclables –Glass Bottles
But!
Sake Bottles = 10 Yen Deposit!
1 Bag = Small 50 yen / Large = 100 Yen
2nd and 4th Thursday


Burnable Garbage
**Each Bag Weighs Less Than 22lbs
**Each Item Less Than 20 inches Long
1 Bag = Small 40 yen / Large = 65 Yen
Tuesday and Friday

Appendix 18 Helvetica / Ariel Presentation

Non-Combustibles

1 Bag = Small 50 yen / Large = 100 Yen
**Each Bag Weighs Less Than 22lbs
2nd and 4th Thursday

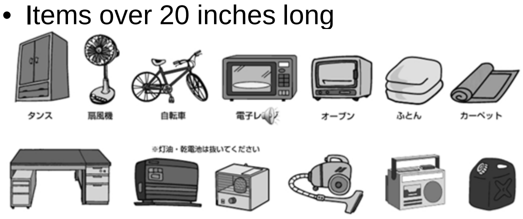
Hazardous Waste

*Most can be brought back to your local electronics store.

1 Bag = 100 yen
1st and 3rd Monday

Oversized Garbage

- Items over 20 inches long



1 Sticker = 400 Yen
January 15 and June 15

All Other Garbage

Return to the store where you bought them.

Welcome to Akitakata

AKITAKATA
安芸高田市

Any Questions?
Call the local Sanitation Department
645-3011

AKITAKATA
安芸高田市

Foreigners Guide
Household Waste Disposal

Akitakata

5 Categories of Collected Garbage

- Recyclables
- Combustibles (burnable)
- Non-Combustibles
- Hazardous
- Oversized

Recyclables

Four Categories

Waste Paper
Containers/ Packages
Cans
Bottles

Recyclables – Waste Paper

- Newspapers
- Magazines
- Boxes
- Cardboard
- Paper Bags
- Envelopes
- Advertisements

Less than 20 inches
Long Less than 22lbs

1 sticker = 65 Yen
2nd and 4th Wednesday

Recyclables–Containers/Packaging

Cartons 紙パック

Plastic Containers/ Packages プラ

PET Bottles 1 PET

Recyclables–Containers/Packaging

Cartons


1bag = 30 yen
1st and 3rd Thursday

Recyclables–Containers/Packaging

Plastic Containers / Packaging

1 bag = 30 Yen
1st and 3rd Thursday

Recyclables–Containers/Packaging

PET Bottles

PET


1 bag = 30 Yen
1st and 3rd Thursday

Recyclables – Cans

Steel

Aluminum

Recyclables –Glass Bottles

But!

Sake Bottles = 10 Yen Deposit!

1 Bag = Small 50 yen / Large = 100 Yen
2nd and 4th Thursday

Burnable Garbage

**Each Bag Weighs Less Than 22lbs
**Each Item Less Than 20 inches Long

1 Bag = Small 40 yen / Large = 65 Yen
Tuesday and Friday

Appendix 18 Road Geek Presentation

Non-Combustibles

1 Bag = Small 50 yen / Large = 100 Yen
**Each Bag Weighs Less Than 22lbs
2nd and 4th Thursday

Hazardous Waste

*Most can be brought back to your local electronics store.

1 Bag = 100 yen
1st and 3rd Monday

Oversized Garbage

- Items over 20 inches long

1 Sticker = 400 Yen
January 15 and June 15

All Other Garbage

Return to the store where you bought them.

Welcome to Akitakata

AKITAKATA
安芸高田市

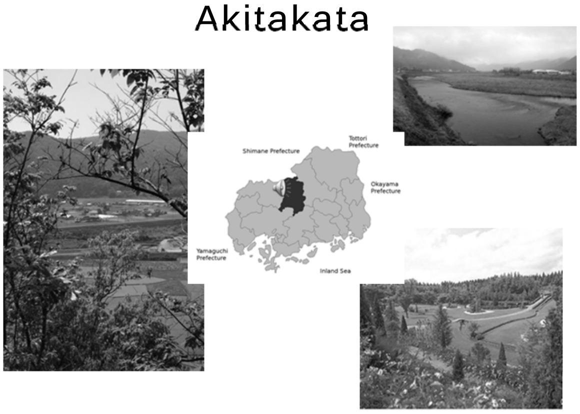
Any Questions?
Call the local Sanitation Department
645-3011

Appendix 18 Verdana Presentation

AKITAKATA
安芸高田市

Foreigners Guide
Household Waste Disposal

Akitakata



---

5 Categories of Collected Garbage

- Recyclables
- Combustibles (burnable)
- Non-Combustibles
- Hazardous
- Oversized

Recyclables

Four Categories

Waste Paper
Containers/ Packages
Cans
Bottles

Recyclables – Waste Paper

- Newspapers
- Magazines
- Boxes
- Cardboard
- Paper Bags
- Envelopes
- Advertisements

Less than 22 inches
Long Less than 20lbs

1 sticker = 65 Yen
2nd and 4th Wednesday

Recyclables–Containers/Packaging

Cartons

Plastic Containers/ Packages

PET Bottles

Appendix 18 Verdana Presentation

Recyclables–Containers/Packaging

Cartons

1 bag = 30 yen

1st and 3rd Thursday

Recyclables–Containers/Packaging

Plastic Containers / Packaging

1 bag = 30 Yen
1st and 3rd Thursday

Recyclables–Containers/Packaging

PET Bottles

1 bag = 30 Yen
1st and 3rd Thursday

Recyclables – Cans

Steel

Aluminum

Recyclables –Glass Bottles

But!

Sake Bottles = 10 Yen Deposit!

1 Bag = Small 50 yen / Large = 100 Yen
2nd and 4th Thursday

Burnable Garbage

**Each Bag Weighs Less Than 22lbs
**Each Item Less Than 20 inches Long

1 Bag = Small 40 yen / Large = 65 Yen
Tuesday and Friday

Appendix 18 Verdana Presentation

Non-Combustibles

1 Bag = Small 50 yen / Large = 100 Yen
**Each Bag Weighs Less Than 22lbs
2nd and 4th Thursday

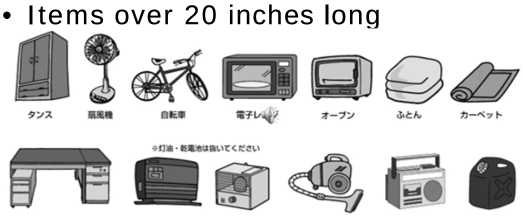
Hazardous Waste

*Most can be brought back to your local electronics store.

1 Bag = 100 yen
1st and 3rd Monday

Oversized Garbage

- Items over 20 inches long



1 Sticker = 400 Yen
January 15 and June 15

All Other Garbage

Return to the store where you bought them.

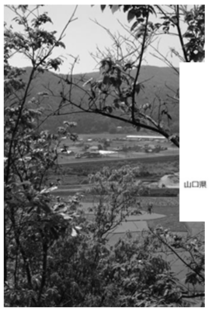
Welcome to Akitakata

AKITAKATA
安芸高田市

Any Questions?
Call the local Sanitation Department
645-3011

AKITAKATA
安芸高田市
外国人向けガイド
家庭ごみ

安芸高田



収集されたごみの5つのカテゴリー

- 資源ごみ
- 燃えるごみ（可燃）
- 燃えないごみ（不燃）
- 有害ごみ
- 粗大ごみ

資源　ごみ分別

四つのカテゴリ

古紙類
容器包装類
かん類
びん類

資源　ごみ– 古紙類

- 新聞 紙
- 雑誌
- 箱
- ダンボール
- 紙袋
- 封筒
- 広告

長さ５０ｃｍ以下
重さ１０kg以下

１ごみ処理券=６５円
第２と第４水曜日

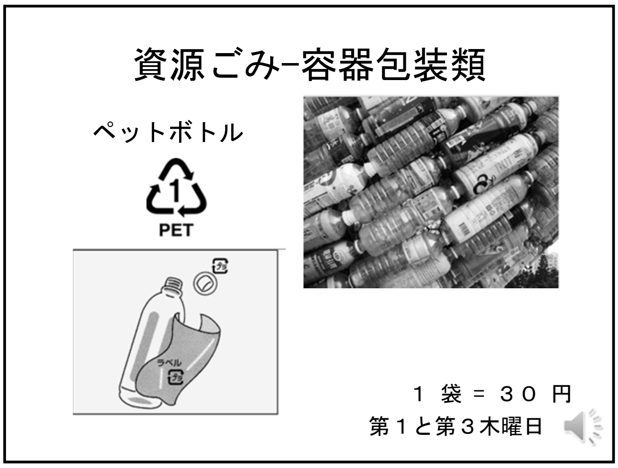
資源ごみ –容器包装類

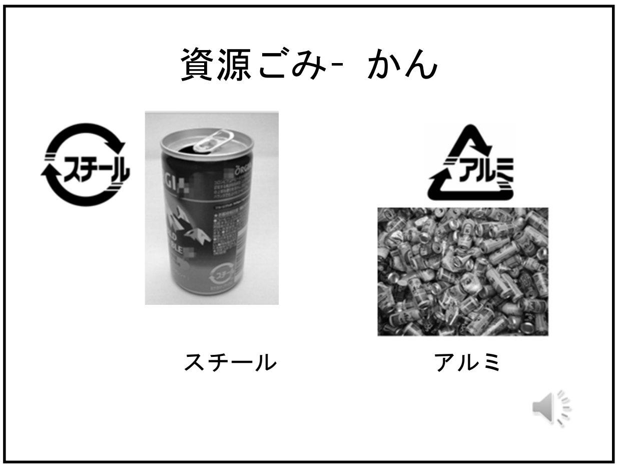
紙パック 紙パック

プラスチック類/容器包装類 プラ

ペットボトル 1 PET

Appendix 19 MS-Gothic Presentation





Appendix 19 MS-Gothic Presentation

燃えないごみ

１ 袋 = 小 ５０ 円 / 大 ＝１００ 円
**１袋重さ１０k下
第２と 第４木曜日

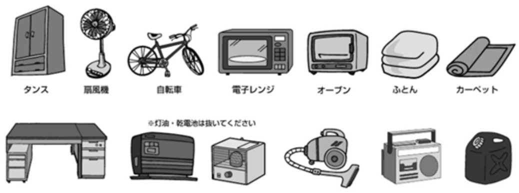
有害ごみ

**ほとんどのものは近くの電気屋へ持っていける

1袋 = １００ 円
第１と第３月曜日

粗大ごみ

- ５０ｃｍ以上のもの



１ 処理券 = ４００円
1月 １5日と6月 １5日

その他のごみ

その商品を買った店へ持って行ってください.

ようこそ安芸高田

AKITAKATA
安芸高田市

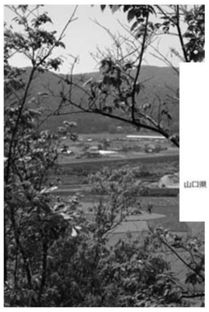
お問い合わせは、
市民生活課までお電話をください。
電話６４５-３０１１

Appendix 19 Aqua Presentation

AKITAKATA
安芸高田市

外国人向けガイド
家庭ごみ

安芸高田



収集されたごみの5つのカテゴリー

- 資源ごみ
- 燃えるごみ（可燃）
- 燃えないごみ（不燃）
- 有害ごみ
- 粗大ごみ

資源 ごみ分別

四つのカテゴリ

古紙類
容器包装類
かん類
びん類

資源 ごみ- 古紙類

- 新聞 紙
- 雑誌
- 箱
- ダンボール
- 紙袋
- 封筒
- 広告

長さ５０ｃｍ以下
重さ１０kg以下

１ごみ処理券=６５円
第２と第４水曜日

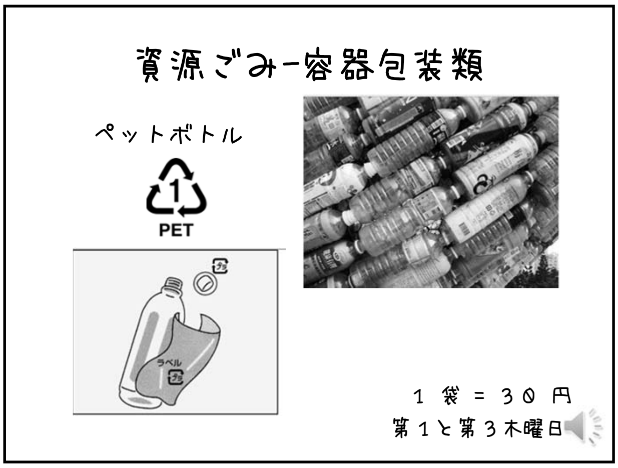
資源ごみ -容器包装類

紙パック 紙パック

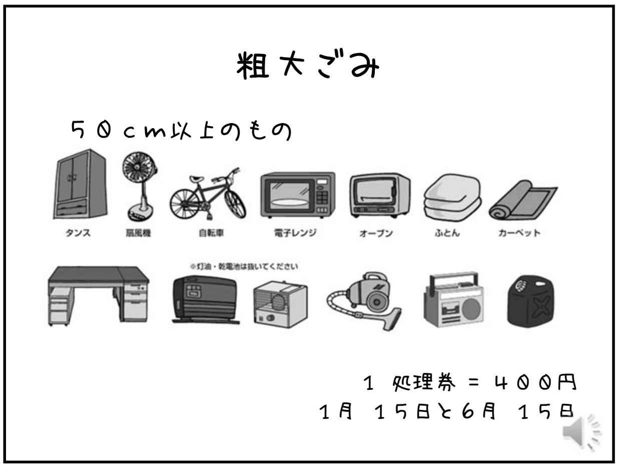
プラスチック類/容器包装類 プラ

ペットボトル 1 PET

Appendix 19 Aqua Presentation



Appendix 19 Aqua Presentation

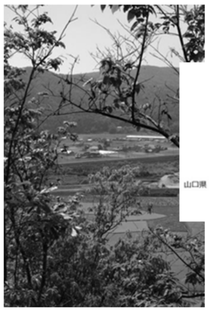


Appendix 19 HG-Gyo sha hon Presentation

AKITAKATA
安芸高田市

外国人向けガイド
家庭ごみ

安芸高田



収集されたごみの5つのカテゴリー

- 資源ごみ
- 燃えるごみ（可燃）
- 燃えないごみ（不燃）
- 有害ごみ
- 粗大ごみ

資源　ごみ分別

四つのカテゴリ

古紙類
容器包装類
かん類
びん類

資源　ごみ－ 古紙類

- 新聞 紙
- 雑誌
- 箱
- ダンボール
- 紙袋
- 封筒
- 広告

長さ５０ｃｍ以下
重さ１０kg以下

１ごみ処理券=６ ５円
第２と第４水曜日

資源ごみ －容器包装類

紙パック

紙パック

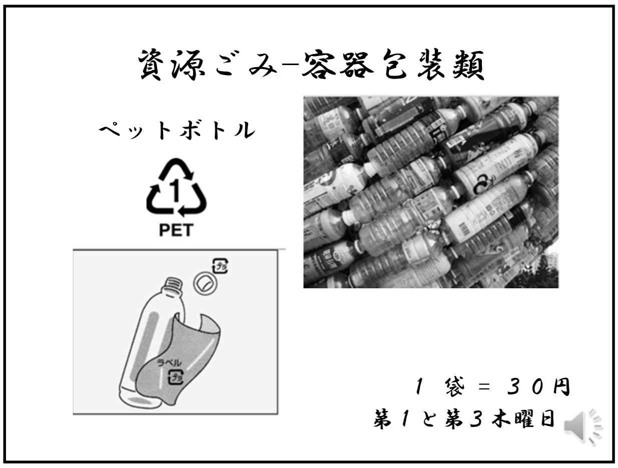
プラスチック類/容器包装類

プラ

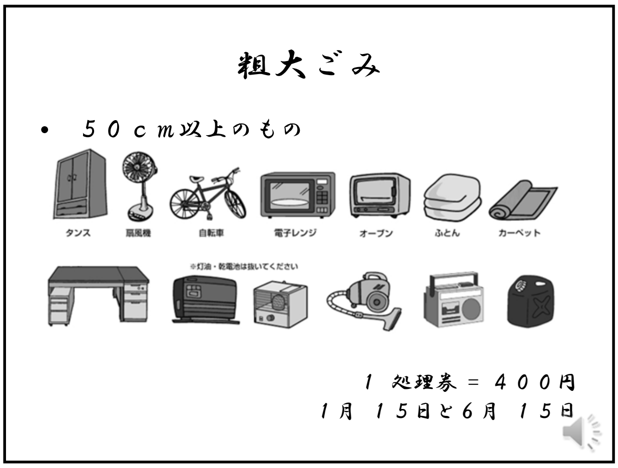
ペットボトル

1
PET

Appendix 19 HG-Gyo sha hon Presentation



Appendix 19 HG-Gyo sha hon Presentation

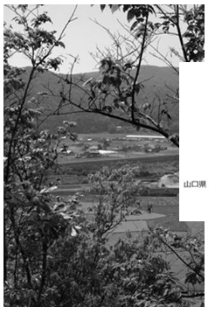


Appendix 19 Meiryo Presentation

AKITAKATA
安芸高田市

外国人向けガイド
家庭ごみ

安芸高田



収集されたごみの5つのカテゴリー

- 資源ごみ
- 燃えるごみ（可燃）
- 燃えないごみ（不燃）
- 有害ごみ
- 粗大ごみ

資源 ごみ分別

四つのカテゴリ

古紙類
容器包装類
かん類
びん類

資源 ごみ- 古紙類

- 新聞 紙
- 雑誌
- 箱
- ダンボール
- 紙袋
- 封筒
- 広告

長さ50ｃm以下
重さ10kg以下

1ごみ処理券=65円
第2と第4水曜日

資源ごみ -容器包装類

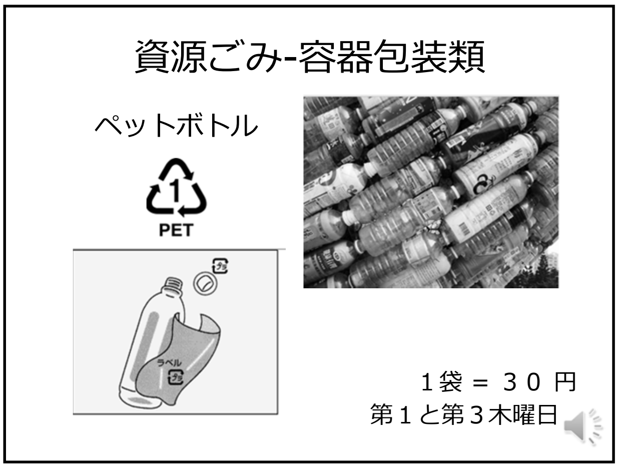
紙パック 紙パック

プラスチック類/容器包装類 プラ

ペットボトル 1 PET


資源ごみ-容器包装類
紙パック
紙パック
１ 袋 = ３０ 円
第１と第３木曜日


資源ごみ-容器包装類
プラスチック類/容器包装類
プラ
１袋 = ３０ 円
第１と第３木曜日


資源ごみ-容器包装類
ペットボトル
PET
ラベル
１袋 = ３０ 円
第１と第３木曜日


資源ごみ– かん
スチール
アルミ
スチール
アルミ


資源ごみーびん
しかし!
八重垣
酒びん = １０円補償金!
１袋 = 小５０ 円 / 大 = 100 円
びんとかん 第１と第３木曜日


燃えるごみ
**１袋 重さ１０ｋｇ以下
**１つのものの長さ５０ｃm以下
１袋 = 小 ４０ 円 / 大 = ６５ 円
火曜日と金曜日

Appendix 14 Meiryo Presentation

燃えないごみ

1袋 = 小 ５０ 円 / 大 = １００ 円
**１つ袋重さ１０kg以下
第２と 第４木曜日

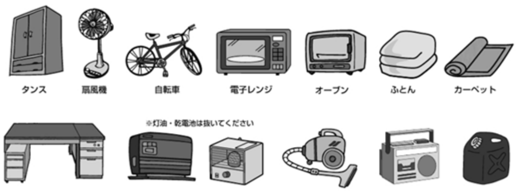
有害ごみ

**ほとんどのものは近くの電気屋へ持っていける

1袋 = １００ 円
第１と第３月曜日

粗大ごみ

- ５０ｃｍ以上のもの



１ 処理券 = ４００円
1月 １５日と6月 １５日

その他のごみ

その商品を買った店へ持って行ってください.

ようこそ安芸高田

AKITAKATA
安芸高田市

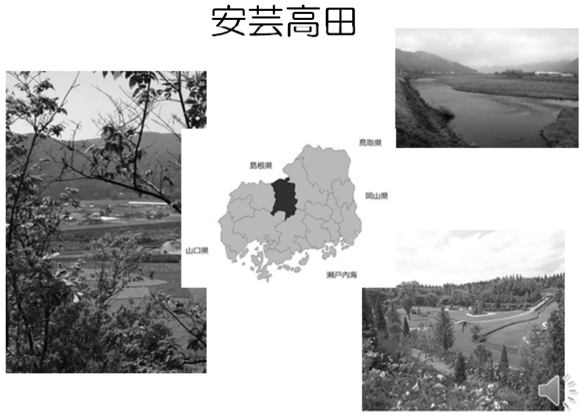
お問い合わせは、
市民生活課までお電話をください。
電話６４５-３０１１

Appendix 19 Maru Go Presentation

AKITAKATA
安芸高田市

外国人向けガイド
家庭ごみ

安芸高田



収集されたごみの5つのカテゴリー

- 資源ごみ
- 燃えるごみ（可燃）
- 燃えないごみ（不燃）
- 有害ごみ
- 粗大ごみ

資源 ごみ分別

四つのカテゴリ

古紙類
容器包装類
かん類
びん類

資源 ごみ- 古紙類

- 新聞 紙
- 雑誌
- 箱
- ダンボール
- 紙袋
- 封筒
- 広告

長さ50ｃm以下
重さ10kg以下

1ごみ処理券=65円
第2と第4水曜日

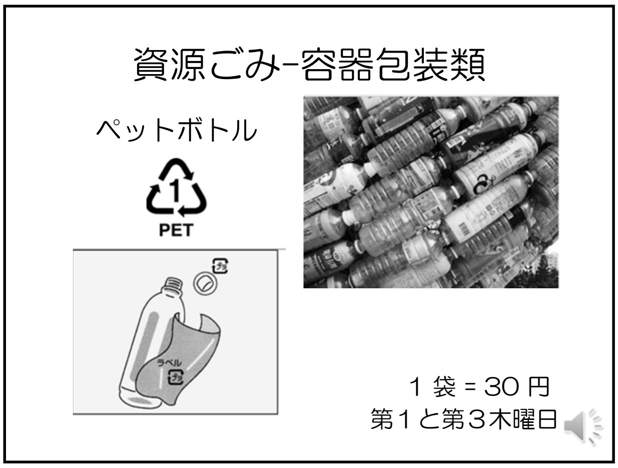
資源ごみ –容器包装類

紙パック 紙パック

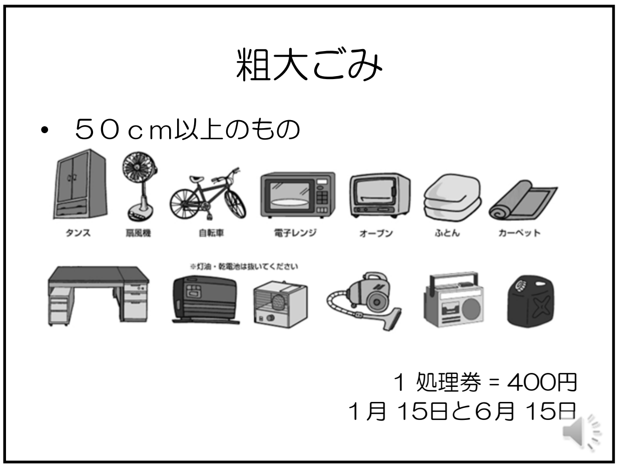
プラスチック類/容器包装類 プラ

ペットボトル 1 PET

Appendix 19 Maru Go Presentation



Appendix 19 Maru Go Presentation

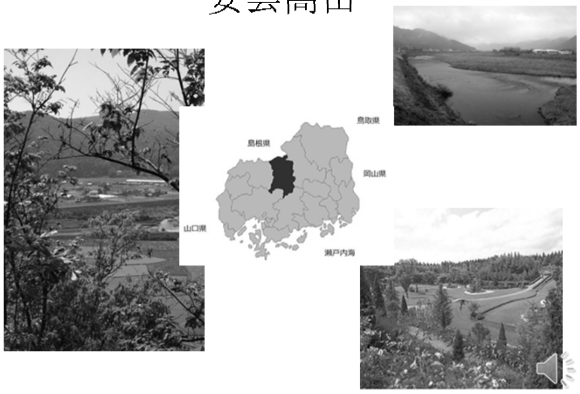


Appendix 19 Min-Cho Presentation

AKITAKATA
安芸高田市

外国人向けガイド
家庭ごみ

安芸高田



収集されたごみの5つのカテゴリー

- 資源ごみ
- 燃えるごみ（可燃）
- 燃えないごみ（不燃）
- 有害ごみ
- 粗大ごみ

資源　ごみ分別

四つのカテゴリ

古紙類
容器包装類
かん類
びん類

資源　ごみ– 古紙類

- 新聞 紙
- 雑誌
- 箱
- ダンボール
- 紙袋
- 封筒
- 広告

長さ50ｃｍ以下
重さ10kg以下

1ごみ処理券=65円
第2と第4水曜日

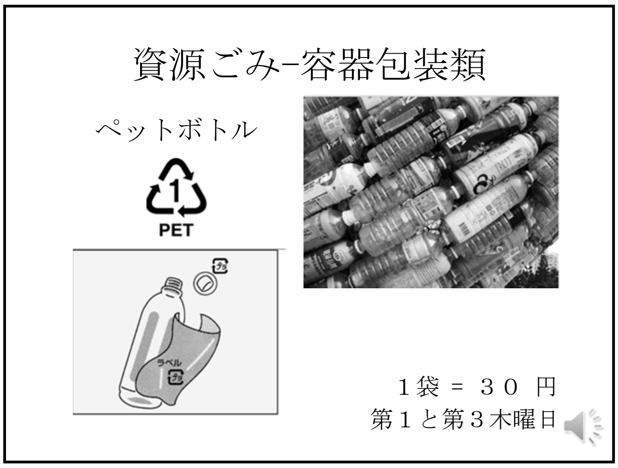
資源ごみ –容器包装類

紙パック 紙パック

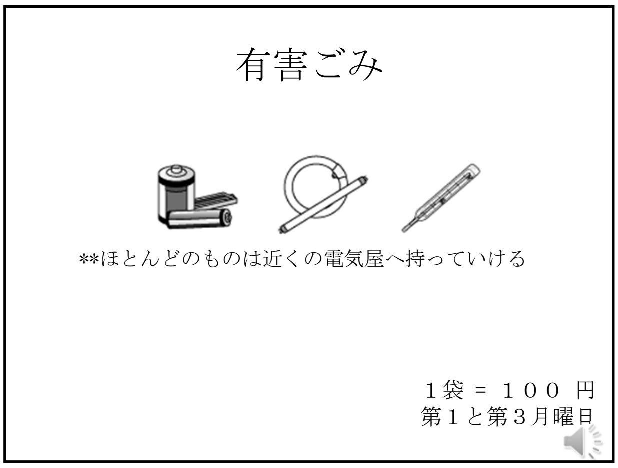
プラスチック類/容器包装類 プラ

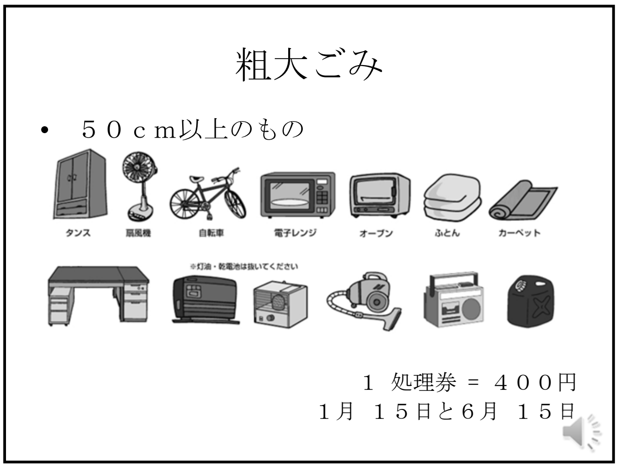
ペットボトル 1 PET

Appendix 19 Min-Cho Presentation



Appendix 19 Min-Cho Presentation

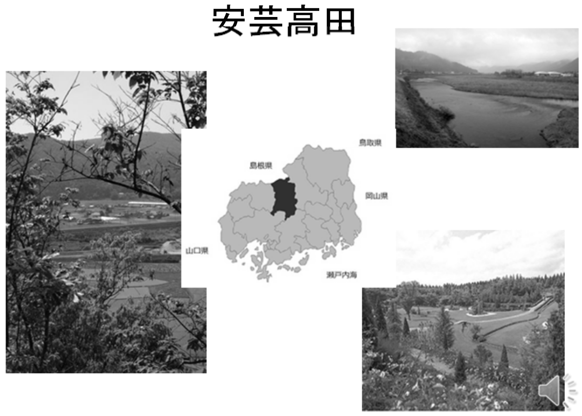




AKITAKATA
安芸高田市

外国人向けガイド
家庭ごみ

安芸高田



収集されたごみの5つのカテゴリー

- 資源ごみ
- 燃えるごみ（可燃）
- 燃えないごみ（不燃）
- 有害ごみ
- 粗大ごみ

資源 ごみ分別

四つのカテゴリ

古紙類
容器包装類
かん類
びん類

資源 ごみ– 古紙類

- 新聞 紙
- 雑誌
- 箱
- ダンボール
- 紙袋
- 封筒
- 広告

長さ50cm以下
重さ10kg以下

1ごみ処理券=65円
第2と第4水曜日

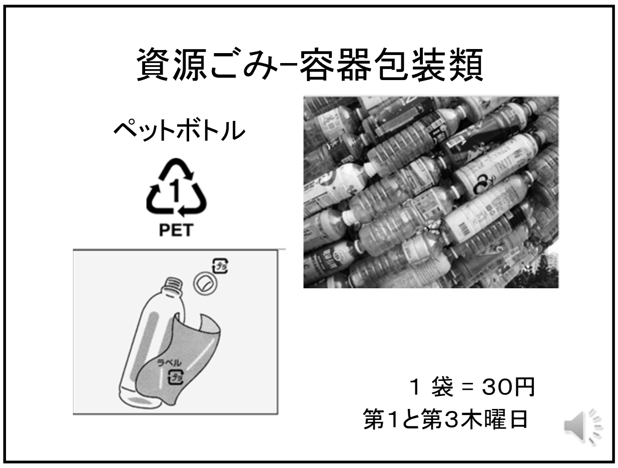
資源ごみ –容器包装類

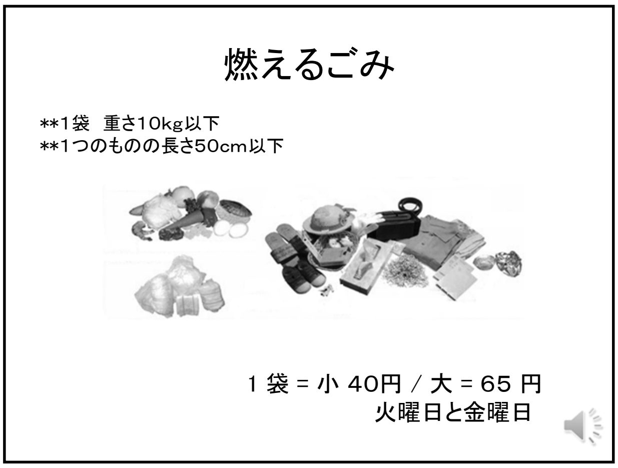
紙パック

プラスチック類/容器包装類

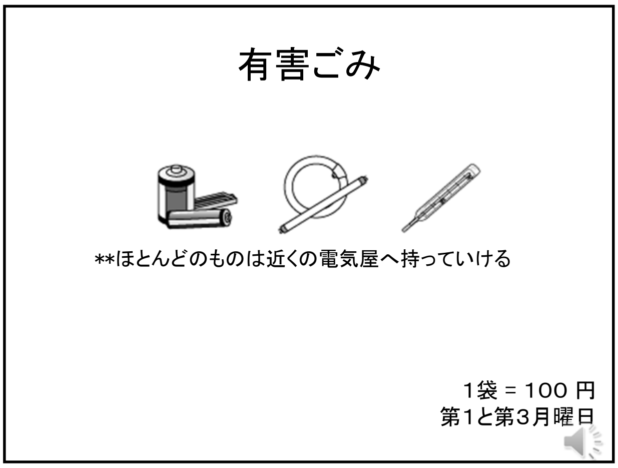
ペットボトル

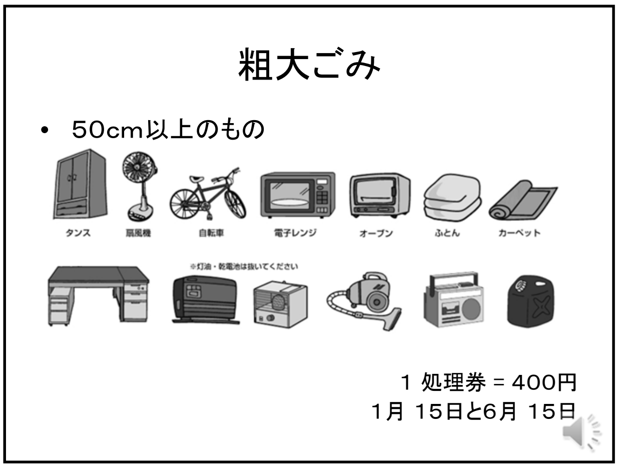
Appendix 19 MSP-Gothic Presentation





Appendix 19 MSP-Gothic Presentation





Appendix 19 Types of Fonts Utilized and Means

1. 元気　Aqua	68.634
2. 元気　MSP Gothic	65.082
3. 元気 HG gyoushohon（行書本）	64.674
4.元気 meiryo (メリオ)	64.412
5. 元気　MS-Gothic	63.262
6. 元気　MS-Mincho（明朝）	62.228
7.元気 hg-maru go gothic M	62.164

Appendix 20 English Data Arial Font

Arial				Q1		Q2		Q3		Q4		Q5		Q6		Q7		Q8		Q9		Q10		Q11		
**DR= Don't Remember	Gender	Age	Lived in Japan?	Name of City?		Categories of garbage		Hair dryer recyclable category?		Max Length of garbage (inches)		How dispose of Milk carton?		When waste paper collected?		What kind of bottle has a deposit		How much large burnable garbage bag in yen?		Non-combustible garbage, max weight?		Car batteries, hazardous? Bring back to store?		Do you recycle like this town ? Do you like it?	Totals	
Correct answer				Akitakata	a=1, ki=1, ta=1, ka=1 all correct=6	5	5=1	FALSE	False =1	20	2=1, ˜0=2, 20 = 3	Rinse/Flaten/ Put in special carton bag	Each instruction = 1 , correct answer = 4	2nd / 4th Wednesday	2=1, 4=1, Wednesday =2, 2 times =1, day=1, All correct 5	Sake	Sake(saki) =2	65	6=1, 5=1, 60=2, 65=3	22 lbs	2=1, ˜0=1, 20=2, lbs(pounds) = 1, 22lbs = 4	TRUE	True=1		Max =30	
a1	Female	20	No	Akitakata	6	5	1	FALSE	1	20 inches	3	It should be cleaned and flattened	2	every Tuesday and Friday	2	glass bottles	0	100 yen	0	22 lbs	4	DR	0	I do not recycle like this town. I like this recycling system	19	
a2	Female	20	Yes (4 years)	Akitakata	6	5	1	FALSE	1	20 inches	3	rinse, flatten and recycle in bag bought at supermarket	4	1st and 3rd Thursday	2	Sake glass bottles	2	65 yen	3	22 pounds	4	TRUE	1	No, I did when I lived in Tokyo though. It's not as tedious as it sounds and is routine after a while.	27	
a3	Female	21	No	Akitakata	6	DR	0	Dr	0	20	3	rinse, flatten , buy recycling bag at local grocery store and drop it off twice a month	4	DR	0	Sake	2	30	0	22lbs	4	TRUE	1	I do not, I think it's a better way of recycling but a bit time consuming, have to sort and clean and buy stickers and the appropriate bags.	20	
a4	Female	19	No	Akitakata	6	6	0	FALSE	1	20 inches	3	wash, unfold, and lay flat. Place in a special bag	4	2x a month, 1st and 3rd Tuesday	2	Sake bottles	2	65	3	22 lbs	4	TRUE	1	No, but their way seems more conscientious.	26	
a5	Female	20	No	Akitakata	6	5	1	FALSE	1	22 inches	2	in a recycle bag	1	2nd and 4th Wednesday	5	glass bottles	0	65 yen	3	22 lbs	4	TRUE	1	Yes, Yes	24	
a6	Female	18	No	Akitakata	6	4	0	FALSE	1	22 inches	2	rinse, flatten and recycle	3	Every Wednesday and Friday	2	Sake bottles	2	65 yen	3	22lbs	4	TRUE	1	I don't recycle like this town, but I think it is a very efficient and eco-friendly way to recycle.	24	
a7																									23.33	AVG
																									3.20	St
Average					6.000		0.500		0.833		2.667		3.000		2.167		1.333		2.000		4.000		0.833			
Std Dev					0.000		0.500		0.373		0.471		1.155		1.462		0.943		1.414		0.000		0.373			
Total					36.000		3.000		5.000		16.000		18.000		13.000		8.000		12.000		24.000		5.000	140.000		
Max total					36.000		6.000		6.000		18.000		24.000		30.000		12.000		18.000		24.000		6.000	180.000		
% Correct					100.000		50.000		83.333		88.889		75.000		43.333		66.667		66.667		100.000		83.333	77.778		

Appendix 20 English Data Comic Sans Font

Comic Sans				Q1		Q2		Q3		Q4		Q5		Q6		Q7		Q8		Q9		Q10		Q11	
**DR= Don't Remember	Gender	Age	Lived in Japan?	Name of City?		Categories of garbage		Hair dryer recyclable category?		Max Length of garbage (inches)		How dispose of Milk carton?		When waste paper collected?		What kind of bottle has a deposit		How much large burnable garbage bag in yen?		Non-combustible garbage, max weight?		Car batteries, hazardous? Bring back to store?		Do you recycle like this town ? Do you like it?	
Correct answer				Akitakata	a=1, ki=1, ta=1, ka=1 all correct=6	5	5=1	FALSE	False =1	20	2=1, ~0=1, 20 = 3	Rinse/Flaten/ Put in special carton bag	Each instruction = 1 , correct answer = 4	2nd / 4th Wednesday	2=1, 4=1, Wednesday =2, 2 times =1, day=1, All correct 5	Sake	Sake(saki) =2	65	6=1, 5=1, 60=2, 65=3	22 lbs	2=1, ~0=1, 20=2, lbs(pounds) = 1, 22lbs = 4	TRUE	True=1		Max =30
cm1	Female	36	No	Aikiata	3	5	1	FALSE	1	20	3	recyclables	1	2nd, 4th Thursday	4	glass bottles	0	DR	0	22lbs	4	TRUE	1	Not exactly, but it seems optimal. I don't think people would take the time in	18
cm2	Male	21	No	安芸高田市	6	6	0	FALSE	1	22	2	flatten and put in bags designated for papers	3	2nd and 4th Wednesday	5	Sake	2	100	0	22lbs	4	TRUE	1	Not as thorough as it is but we do recycle. Yes.	24
cm3		19	No	Akitakata	6	5	1	FALSE	1	22	2	in the paper recycle bag wash and flatten them first	3	1st and 3rd Mon/Wed	3	Sake	2	100 yen	0	20lbs	3	TRUE	1	No, too much of a hassle.	22
cm4	Male	22	No	Akitanata	4	5	1	FALSE	1	22	2	wash and flatten	2	2nd and 4th	4	Sake	2	100 yen	0	20lbs	3	TRUE	1	not quite like this	20
cm5	Male	20	No* Lived in China for a year	Akitakata	6	5	1	FALSE	1	20	3	buy a bag, tie it after you collapse it, take it to collection place	3	2nd and 4th Wednesday	5	Sake	2	65 yen	3	22lbs	4	TRUE	1	No, and No (expensive)	29
cm6	Male	19	No	Akitakata	6	5	1	FALSE	1	20	3	unfold it, make it flat, and place it in the carton bag	3	2nd and 4th Wednesday	5	Sake	2	100 yen	0	22lbs	4	TRUE	1	No.	26
cm7	First Language Korean	24	No	Akitakata	6	5	1	FALSE	1	20	3	flatten out and put them in a bag with stickers	2	2nd and 4th Wednesday	5	Sake	2	100 yen	0	22lbs	4	FALSE	0	No and no.	24
cm8	Male	21	No	Akitakata	6	4	0	FALSE	1	22	2	flatten the milk carton and pu it in a bag	2	2nd and 4th Tuesday	4	Sake	2	100 yen	0	DR	0	TRUE	1	No, this system seems great, but also a lot of work	18
cm9	Male	21	No	Akitakata	6	4	0	FALSE	1	20	3	Flatten it and put it in a bag	2	Twice a month	1	Sake	2	DR	0	DR	0	TRUE	1	No,yes seems progressive	16
cm10	Male	22	No	Aki	2	4	0	FALSE	1	22	2	fold it down and put in bag	2	Twice a month	1	Sake	2	100	0	20lbs	3	TRUE	1	No..recycling is a pain!	14
cm11	Female	22	No	Akitakata	6	5	1	FALSE	1	22	2	rinse, folded and bagged	3	2nd and 4th Wednesday	5	saka	1	100	0	22	3	FALSE	0	No, No	22
cm12	Male	20	No	Akitakata	6	4	0	FALSE	1	20	3	recyclables	1	2nd and 4th Thursday	4	saki	2	65 yen	3	22lbs	4	TRUE	1	Yes, and Yex	25

Appendix 20 English Data Comic Sans Font

cm13	Female	21	No	Akitakata	6	4	0	FALSE	1	22	2	rinse, flatten, place in bag, you need to purchase at convenience store	4	2nd and 4th Thursday	4	Sake (glass bottles)	1	100 yen	0	20lbs	3	TRUE	1	No. It's troublesome, but for a good cause	22	
cm14	Male	22	No	Akitakata	6	5	1	FALSE	1	20	3	folded and stack on top of each other	2	DR	0	Sake	2	60 yen	2	22lbs	4	TRUE	1	* lived in 1-3 countries over 2 weeks	22	
cm15	Female	20	No	Akitakata	6	5	1	FALSE	1	20	3	wash it and dispose it as of recyclable	2	1st and 3rd Wed	3	DR	0	100 yen	0	22lbs	4	TRUE	1		21	
cm16	Male	21	No	Akitakata	6	5	1	FALSE	1	22	2	combustable	0	Twice a month, 2nd and 4th	3	Glass	0	30 yen	1	22lbs	4	FALSE	0		18	
	avg	21.9																							21.31	AVG
																									3.89	St Dev
Average					5.438		0.625		1.000		2.500		2.188		3.500		1.500		0.563		3.188		0.813			
Std Dev					1.223		0.484		0.000		0.500		0.950		1.541		0.791		1.059		1.285		0.390			
Total					87.000		#####		16.000		40.000		35.000		56.000		24.000		9.000		51.000		13.000	341.000		
Max total					96.000		#####		16.000		48.000		64.000		80.000		32.000		48.000		64.000		16.000	480.000		
% Correct					90.625		#####		100.000		83.333		54.688		70.000		75.000		18.750		79.688		81.250	71.042		

Appendix 20 English Data Road Geek Font

Road Geek 5B Style				Q1		Q2		Q3		Q4		Q5		Q6		Q7		Q8		Q9		Q10		Q11		
**DR= Don't Remember	Gender	Age	Lived in Japan?	Name of City?		Categories of garbage		Hair dryer recyclable category?		Max Length of garbage (inches)		How dispose of Milk carton?		When waste paper collected?		What kind of bottle has a deposit		How much large burnable garbage bag in yen?		Non-combustible garbage, max weight?		Car batteries, hazardous? Bring back to store?		Do you recycle like this town ? Do you like it?		
Correct answer				Akitakata	a=1, ki=1, ta=1, ka=1 all correct=6	5	5=1	FALSE	False =1	20	2=1, ˜0=1, 20 = 3	Rinse/Flaten/ Put in special carton bag	Each instruction = 1 , correct	2nd / 4th Wednesday	2=1, 4=1, Wednesday =2, 2 times =1, day=1, All correct 5	Sake	Sake(saki) =2	65	6=1, 5=1, 60=2, 65=3	22 lbs	2=1, ˜0=1, 20=2, lbs(pounds) = 1, 22lbs = 4	TRUE	True=1		Max =30	
rd1	Female	20	No*	Akitakata	6	4	0	FALSE	1	DR	0	Squish and put in bag	2	Every Tues and Thurs	1	PET	0	30	0	DR	0	TRUE	1	Not exactly, but it seems optimal. I don't think people would	11	
rd2	Female	22	No	Hakitakata	5	5	1	FALSE	1	25	2	Clean, press it and make it flat buy separate bag for cartons to be thrown	4	1st and 3rd Thursday	2	DR	0	100	0	DR	0	TRUE	1	Not as thorough as it is but we do recycle. Yes.	16	
rd3	Male	19	No	Akitakata	6	4	0	TRUE	0	22 inches	2	Flatten and put in bag	2	2nd and 4th Wed	5	Sake Bottle	2	30 yen	0	22lb	4	TRUE	1	No, too much of a hassle.	22	
rd4	Female	18	No	Akitakata	6	5	1	FALSE	1	20 inches	3	Flatten it and bundle iit in a carton bag	2	2nd and 4th Wednesday	5	Pet	0	65	3	22lbs	4	TRUE	1	not quite like this	26	
rd5	Female	19	No*	DR	0	5	1	FALSE	1	20 inches	3	rinse and recycle	1	2x a week	1	sake	2	100Yen	0	20lbs	3	TRUE	1	No, and No (expensive)	13	
rd6	Male	21	No	Ankitakata	5	5	1	FALSE	1	20 inches	3	w/ the other cartons bundled together as	1	DR	0	glass bottles	0	40 yen	0	22lbs	4	TRUE	1	No.	16	
rd7	Female	20	No	Akitakata	6	5	1	FALSE	1	22 inches	2	Flattenbed and bounded	2	every 2nd and 4th Wednesday of a month	5	Sake	2	100 yen	0	20 pounds	3	TRUE	1	No and no.	23	
rd8	Male	20	No*	Akitakata	6	5	1	FALSE	1	20	3	Collapse and put designated bag	2	DR	0	Sake/glass	1	400	0	22lbs	4	TRUE	1	No, this system seems great, but also a lot of work	19	
rd9	Female	19	No*	Akitakata	6	5	1	FALSE	1	20 inches	3	empty, wash, fold,place in bag	4	DR	0	Pet	0	DR	0	22lbs	4	FALSE	0	No,yes seems progressive	19	
rd10	Female	19	No*	Akitakata	6	5	1	FALSE	1	20 inches	3	wash it out	1	Tuesday and Thursday every week	0	Sake Bottle	2	30 yen	0	20 inches	2	TRUE	1	No..recycling is a pain!	17	
rd11	Male	21	No*	Akitakata	6	4	0	FALSE	1	22 inches	2	Flatten and in a bag	2	1/3rd Wed	3	2	0	40	0	22lbs	4	TRUE	1	No, No	19	
rd12	Male	20	No	Akitakata	6	5	1	FALSE	1	20 inches	3	Make flat and put in pl?? Bag	2	2 x's a month (1st and 3rd wed)	3	Sake bottle	2	30 yen	0	22 lbs	4	TRUE	1	Yes, and Yes	23	
rd13	Male	22	Yes	Akitakata	6	5	1	FALSE	1	20 inches	3	rinse, rip it up so its not flat and bundle it up with other cartons	4	1st and 3rd Wed	3	Sake bottles	2	300 yen	0	22 pounds	4	TRUE	1	No. It's troublesome, but for a good cause	25	
																								* lived in 1-3 countries over 2	19.15	AVG
																									4.54	St
Average					5.385		0.769		0.923		2.462		2.231		2.154		1.000		0.231		3.077		0.923			
Std Dev					1.595		0.421		0.266		0.843		1.049		1.915		0.961		0.799		1.439		0.266			
Total					70.000		10.000		12.000		32.000		#####		28.000		13.000		3.000		40.000		12.000	249.000		
Max total					78.000		13.000		13.000		39.000		#####		65.000		26.000		#####		52.000		13.000	390.000		
% Correct					89.744		76.923		92.308		82.051		#####		43.077		50.000		7.692		76.923		92.308	63.846		

Appendix 20 English Data Verdana Font

Verdana				Q1		Q2		Q3		Q4		Q5		Q6		Q7		Q8		Q9		Q10		Q11	
**DR= Don't Remember	Gender	Age	Lived in Japan?	Name of City?		Categories of garbage		Hair dryer recyclable category?		Max Length of garbage (inches)		How dispose of Milk carton?		When waste paper collected?		What kind of bottle has a deposit		How much large burnable garbage bag in yen?		Non-combustible garbage, max weight?		Car batteries, hazardous? Bring back		Do you recycle like this town ? Do you like it?	
Correct answer				Akitakata	a=1, ki=1, ta=1, ka=1 all correct= 6	5	5=1	FALSE	False =1	20	2=1, ~0=2, 20 = 3	Rinse/Flaten/ Put in special carton bag	Each instruction = 1 , correct answer	2nd / 4th Wednesday	2=1, 4=1, Wednesday =2, 2 times =1, day=1, All correct 5	Sake	Sake (saki) =2	65	6=1, 5=1, 60=2, 65=3	22 lbs	2=1, ~0=1, 20=2, lbs(pounds) = 1, 22lbs = 4	TRUE	True=1		
v1	Female	22	No	Akitakaka	6	5	1	FALSE	1	22	2	Flaten it out and put it in a separate milk carton bag	2		0	Plastic Pet Bottles	0	75 Yen	1	20 lbs	3	TRUE	1	Some of the recycling procedures seen in Akitakataare similar to ones practiced in the States.I do	17
v2	Female	50	No	Akitakata	6	4	0	FALSE	1	20	3	open it up/ flaten it out (combustible)	1	Tues/Thurs	1	PET	0	30	0	22lbs	4	TRUE	1	No. Yes!It would take getting used to but seems efficient!	17
v3	Female		No	Akitakata	6	8?	0	TRUE	0	8-12 inches	1	recycle	1	1 time a month	0	sake	2	10 yen	0	5 lbs	1	TRUE	1	I recycle based on plastic, aluminum, etc. and I am reponsible for bringing it to the dumps. I like the idea, but should maybe have more	12
v4	Female	23	No	Akitakata	6	6/ DR	0	DR	0	30? DR	0	wash it and put it in ? Bag	2	1st /3rd Thursday every month	2	DR	0	100	0	DR	0	FALSE	0	No, Yes!	10
v5	Female	23	No	Akitakata	6	7	0	TRUE	0	22 inches	2	put with other cartons	1	twice a month	1	sake	2	30 yen	0	?	0	TRUE	1	Not exactly, yes.	13
v6	Female	23	No	Akitakata	6	4	0	FALSE	1	22	2	in a paper waste bag	1	2nd and 4th Tuesday of each month	3	sake bottles	2	65 yen	3	10 lbs	2	TRUE	1	Yes. Yes, I like it.	21
v7	Female	26	No	Atikata	3	4	0	FALSE	1	22	2	in a paper waste bag	1	2 times a month	1	saki	2	65 yen	3	50 pounds	2	TRUE	1	No we do not	16
v8	Female	22	No	Akitakata	6	5	1	FALSE	1	22	2	Fold it	1	2nd and 4th	3	glass/ sake	2	50	1	20	2	TRUE	1	No, I would not remember it all.	20
v9	Female	22	No	Okinawa	1	5	1	FALSE	1	22	2	Fold containers and put in bag	2	Tues and Thurs	2	saki	2	400 yen	0	22lbs	4	TRUE	1	No, I feelthat if my town tried to enforce this way if recycling it would never work. They shouldn't charge $ for the containers.	16
v10	Female	22	No	Akitakata	6	6	0	FALSE	1	21 in	2	fit about 25 unfolded in a box	1	Tues and Thurs	2	recyclable	1	100	0	30	1	TRUE	1	Yes	15
v11	Female	23	No	Akitakata	6	6	0	FALSE	1	DR	0	recycle	1	2 times a week	1	DR	0	DR	0	22 pounds	4	True	1	No,I don't, but it is a very good system.	14
v12	Female	25	No	Akitakata	6	12	0	FALSE	1	20 inches	3	Flatten, put in bag	2	Tues 1 time a week	1	Saki bottles	2	10 yen	0	20 lbs	3	True	1	I recycle but not in all of these different ways. I like to recycle!	19
v13	Male	55	No	Akitakata	6	6	0	FALSE	1	20 inches	3	open and rinse, stack with others	2	2nd and 4th wed of the month	5	sake	2	100	0	22lbs	4	True	1	No, we recycle with fewer rules. I do like it because its probably more effective and better for the environment.	24
v14			No	Akitakata	6	5	1	TRUE	0	22cm	2	rinse and flatten, put it in box	2	1 a week	0	plastic	0	65 yen	3	10 kg	1	FALSE	0	No, No	15
v15	Female	22	No	Akitakata	6	6	0	FALSE	1	20	3	collapse and fold cartons	1	DR	0	DR	0	30	0	DR	0	True	1	N/A	12
v16	Female	22	No	Anikaraka	2	5	1	FALSE	1	20 inches	3	Flatten and fold it up	1	2 times	1	glass saka bottle	2	100 yen	0	22 lbs	4	FALSE	0	Not exactly and not really	15

Appendix 20 English Data Verdana Font

v17	Female	23	No	Akitaka	4	5	1	FALSE	1	22″	2	You should clean them, flatten them and put them in Their designated bag	4	Thursdays, 2 times a month	2	Glass bottles, saki	2	100 yen	0	20 lbs	3	True	1	I do recycle but weekly	20	
v18	Female	22	No	Akitakata	6	4	0	FALSE	1	20 inches	3	empty it completely, noncombust	1	Tues and Thurs	2	sake	2	100 yen	0		0	True	1	No	16	
v19	Female	41	No	Akitakata	6	5	1	FALSE	1	20 inches	3	rinse and flatten	2	1 x a week Thursdays	2	Sake	2	100 yen	0	100 lbs	2	True	1	I recycle but don't have to deliver to waste center. I like it.	20	
v20	Female	22	No	Akitakata	6	10	0	FALSE	1	22 inches	2	rinse it and flatten it before putting it in the trash	2	3 times a week	0	pet bottles	0	100 yen	0	25lb	3	True	1	yes and yes	15	
v21	Female	23	No	Aokinokos	2	4	0	TRUE	0	DR	0	empty it and flatten it before you bag it.	2	2nd and 4th Wednesday	5	saki	2	$10.00	0	22 pounds	4	True	1	No	16	
v22	Female	22	No	Akataki	4	5	1	FALSE	1	20 inches	3	in a combustible group	0	2 times a month	1	sake bottle	2	400 yen	0	22 pounds	4	True	1	No, No	17	
Average		26.65			5.091		0.364		0.7727		2.045		1.5		1.5909091		1.318		0.5		2.31818		0.863636		16.36	Mean
Std Dev					1.593		0.481		0.4191		0.976		0.7833		1.4032135		0.924		1.0335		1.48894		0.343174		3.32	StDe
Total					112		8		17		45		33		35		29		11		51		19	360		
Max total					150		25		25		75		100		125		50		75		100		25	750		
% Correct					#####		#####		68.000		#####		33.000		28.000		#####		14.667		51.000		76.000	48.000		

Appendix 21 Japanese Data Aqua Font

Aqua				Q1		Q2		Q3		Q4		Q5		Q6		Q7		Q8		Q9		Q10		Q11
**DR= Don't Remember	Gender	Age	Lived in Japan over 2 years?	Name of City?	Q1	Categories of garbage	Q2	Hair dryer recyclable category?	Q3	Max Length of garbage (cm)	Q4	How dispose of Milk carton?	Q5	When waste paper collected?	Q6	What kind of bottle has a deposit	Q7	How much large burnable garbage bag in yen?	Q8	Non-combustible garbage, max weight?	Q9	Car batteries, hazardous? Bring back to store?	Q10	Total
Correct answer			yes	安芸高田市	1 point for each yomi, all correct=7	5	5=1	FALSE	False =1	50	5=1, ~0=1, 50 = 3	1. よく洗って/すすぎ 2．開いて 3. 乾かし 4. 紙パック専用収集袋に入れてください。	Each instruction = 1 , correct answer = 5	第2 / 4 水曜日	2=1, 4=1, Wednesday =2, 2 times =1, day=1, All correct 5	酒(さけ)	Sake(saki) =2	65	6=1, 5=1, 60=2, 65=4 2 digits=1	10キロ (kg)	1=1, ~0=1, kilo = 1, 10 kilo = 4	TRUE	True=1	
41	M	20	yes	安芸高田市	7	5つ	1	F	1	50cm	3	中?を洗って、開いてから専用の袋に入れる	3	第2 / 4 水曜日	5	大？のビン	0	60円	2	10キロ (kg)	4	T	1	27
42	M	18	yes	安芸高田市	7	6	0	F	1	50cm	3	洗って牛乳パックを開く	2	DR	0	酒(さけ)	2	65円	4	DR	0	T	1	20
43	M	19	yes	安芸高田市	7	5つ	1	T	0	50cm	3	DR	0	第2 / 4 水曜日	5	酒のビン	2	100円	0	10キロ (kg)	4	F	0	22
44	M	18	yes	安芸高田市	7	5	1	F	1	50cm	3	開いて	1	第2 / 4 水曜日	5	酒	2	100円	0	10キロ (kg)	4	T	1	25
45	M	18	yes	安芸高田市	7	5つ	1	F	1	50cm	3	開く	1	DR	0	DR	0	30円	1	10キロ (kg)	4	F	0	18
46	M	18	yes	安芸高田市	7	5	1	T	0	50cm	3	開いて袋に入れる	2	第2 / 4 水曜日	5	DR	0	65円	4	10キロ (kg)	4	T	1	27
47	M	18	yes	安芸高田市	7	5つ	1	F	1	50cm	3	中を洗って袋に入れて捨てる	1	第2 / 4 水曜日	5	酒のビン	2	100円	0	10キロ (kg)	4	T	1	25
48	M	19	yes	安芸高田市	7	5つ	1	F	1	50cm	3	中を洗って切って、広げて、乾かす	3	DR	0	酒類	2	10円	1	10キロ (kg)	4	F	0	22
49	M	18	yes	安芸高田市	7	5つ	1	F	1	50cm	3	紙パックの中を?洗し折り畳んで	1	月2週間に1度	1	酒類	2	10円	1	10キロ (kg)	4	F	0	21
50	M	18	yes	安芸高田市	7	4	0	F	1	50cm	3	中を洗ってリサイクルする	1	第2 / 4 水曜日	5	酒	2	100円	0	10キロ (kg)	4	T	1	24
51	M		yes	安芸高田市	7	5つ	1	F	1	50cm	3	資源ゴミの袋に入れて出す	1	第1, 3水曜日	3	酒ビン	2	65円	4	10キロ (kg)	4	T	1	27
52	M	19	yes	安芸高田市	7	6つ	0	F	1	50cm	3	洗ってかわかして袋に入れる	2	木曜日月2回	2	酒	2	60円	3	10キロ (kg)	4	T	1	25
53	M	19	yes	高田市	4	5つ	1	T	0	10cm	2	DR	0	DR	0	小さい方のビン	0	DR	0	DR	0	T	1	8
54	M	19	yes	安芸高田市	7	10	0	T	0	50cm	3	きいてひらく	1	月と木	1	酒	2	30円	1	50l	1	F	0	16
55	M	18	yes	安芸高田市	7	4	0	F	1	50cm	3	洗ってパックを？いて束ねてくくる	1	第1, 3水曜日	3	酒	2	100円	0	10キロ (kg)	4	T	1	22
56	M	18	yes	安芸高田市	7	4つ	0	F	1	DR	0	立体を崩して平面でまとめて	0	第1, 3木曜日	2	不可燃	0	60円	3	DR	0	F	0	13
57	M	19	yes	安芸高田市	7	10	0	T	0	50cm	3	よく洗って、開いてすすぎ 専用の収集袋(1枚30円)に入れて。第1, 3木曜日に専用の回収場所に持っていく	3	第2, 4火曜日	3	酒ビンを酒やへ	2	100円	0	10キロ (kg)	4	T	1	23
58	F	18	yes	安芸高田	7	5つ	1	F	1	50cm	3	開いて、専用の回収袋に入れる	2	第1, 3木曜日	2	酒ビン	2	100円	0	DR	0	T	1	19

Appendix 21 Japanese Data Aqua Font

59	M	18	yes	安芸高田市	7	5つ	1	T	0	DR	0	洗って広げてひきで結ぶ	2	第1, 3火, 木曜日	2	DR	0	450円	1	10キロ(kg)	4	T	1	18	
60	M	19	yes	安芸高田市	7	4つ	0	F	1	50cm	3	広げて専用のぶくろにいれる	2	第2 / 4水曜日	5	酒ビン	2	100円	0	10キロ(kg)	4	T	1	25	
61	M	19	yes	安芸高田市	7	5つ	1	F	1	50cm	3	リサイクルする	0	第2 / 4水曜日	5	酒ビン	2	100円	0	10キロ(kg)	4	T	1	24	
62	M	18	yes	安芸高田市	7	4つ	0	F	1	50cm	3	洗って乾かし開いて資源ゴミに出す	4	DR	0	酒ビン	2	65円	4	DR	0	T	1	22	
63	F	18	yes	安芸高田市	7	5つ	1	F	1	50cm	3	洗って開いて紙パック専用の袋入れる	3	第2, 4木曜日	3	お酒	2	65円	4	DR	0	T	1	25	
64	F	18	yes	安芸高田市	7	5種類	1	F	1	50cm	3	中を洗って平らに開いて、専用の袋に入れる	3	月に4回	0	酒	2	100円	0	10キロ(kg)	4	T	1	22	
65	M	18	yes	DR	0	5	1	T	0	50cm	3	DR	0	DR	0	DR	0	DR	0	DR	0	T	1	5	
66	M	19	yes	安芸高田市	7	5つ	1	DR	0	50cm	3	DR	0	DR	0	酒	2	100円	0	10キロ(kg)	4	DR	0	17	
67	M	19	yes	安芸高田市	7	5つ	1	F	1	50cm	3	高さ50cm長さ10cmに束ねて、第2第4水曜日	0	毎月第2、第4水曜日	5	酒の空ビン	2	65円	4	10キロ(kg)	4	T	1	28	
68	M	19	yes	安芸高田市	7	5つ	1	F	1	50cm	3	洗って、開いて、ふくろにつめる	3	第1, 3木曜日	2	お酒	2	DR	0	10キロ(kg)	4	T	1	24	
28 surveys		18.5																						594	21.21
average					6.643		0.679		0.714		2.750		1.500		2.464		1.500		1.321		2.893		0.750		5.53
st Dev					1.394		0.467		0.452		0.785		1.180		2.009		0.866		1.627		1.759		0.433		
total					186.000		19.000		20.000		77.000		42.000		69.000		42.000		37.000		81.000		21.000	594.000	
max total					196.000		28.000		28.000		84.000		140.000		140.000		56.000		112.000		112.000		28.000	924.000	
%correct					94.898		67.857		71.429		91.667		30.000		49.286		75.000		33.036		72.321		75.000	64.286	
Aqua				Q1		Q2		Q3		Q4		Q5		Q6		Q7		Q8		Q9		Q10		Q11	

Appendix 21 Japanese Data HG Gyuo Sha Hon Font

HG行書本				Q1		Q2		Q3		Q4		Q5		Q6		Q7		Q8		Q9		Q10		Q11
**DR= Don't Remember	Gender	Age	Lived in Japan over 2 years?	Name of City?		Categories of garbage		Hair dryer recyclable category?		Max Length of garbage (cm)		How dispose of Milk carton?		When waste paper collected?		What kind of bottle has a deposit		How much large burnable garbage bag in yen?		Non-combustible garbage, max weight?		Car batteries, hazardous? Bring back to store?		Total
Correct answer			yes	安芸高田市	1 point for each yomi, all correct=7	5	5=1	FALSE	False =1	50	5=1, ~0=1, 50 = 3	1. よく洗って/すすぎ 2．開いて 3. 乾かし 4. 紙パック専用収集袋に入れてください。	Each instruction = 1 , correct answer = 4	第2 / 4 水曜日	2=1, 4=1, Wednesday =2, 2 times =1, day=1, All correct 5	酒(さけ)	Sake(saki) =2	65	6=1, 5=1, 60=2, 65=4 2 digits=1	10キロ (kg)	1=1, ~0=1, kilo = 1, 10 kilo = 4	TRUE	True=1	
1	M	19	yes	広島県安芸高田市	7	5種類	1	F	1	50cm	3	中を洗って?理畳んで袋の中に入れる	1	第2第4	2	酒ビン	2	100円	0	10kg	4	F	0	21
2	M	19	yes	安芸高田市	7	5つ	1	T	0	DR	0	DR	0	水曜日(第1，3)	4	酒	2	DR	0	DR	0	T	1	15
3	M	21	yes	安芸高田市	7	5	1	F	1	50cm	3	まとめひもでしばる	0	DR	0	一升びん	0	40円	1	10kg	4	T	1	18
4	F	19	yes	安芸高田市	7	5つ	1	F	1	50センチ	3	洗って開いて、専用の袋に入れる	3	DR	0	お酒のビン	2	DR	0	10kg	4	T	1	22
5	F	19	yes	安芸高田市	7	5つ	1	F	1	50cm	3	牛乳パックを開いて、ぶくろにまとめて入れる	1	第1と第4水曜日	3	DR	0	60円	2	10kg	4	T	1	23
6	F	19	yes	安芸高田市	7	5つ	1	T	0	50cm	3	中を洗い、切り開いて、専用のぶくろにいれて処分売り	2	DR	0	いっしょうにびん	0	100円	0	10kg	4	T	1	18
7	M	20	yes	安芸高田市	7	5つ	1	F	1	50cm	3	よく洗い、切り開いて、資源ゴミとして処分	2	DR	0	酒ビン	2	DR	0	10kg	4	T	1	21
8	F	19	yes	安芸高田市	7	7つ	0	F	1	50cm	3	DR	0	週2回	1	DR	0	DR	0	10kg	4	T	1	17
9	F	19	yes	安芸高田市	7	8つ	0	F	1	55センチ	2	2洗って切る	1	月2回	2	酒ビン	2	100円	0	10kg	4	T	1	20
10	F	20	yes	安芸高田市	7	DR	0	F	1	50cm	3	水洗いして折りたたんで処分する	1	DR	0	DR	0	DR	0	10kg	4	F	0	16
11	F	19	yes	安芸高田市	7	4つ	0	F	1	50cm	3	洗ってひらいてレサイクル	2	第1だい3水曜日	3	酒	2	65円	4	10kg	4	T	1	27
12	M	20	yes	安芸高田市	7	5種類	1	F	1	50cm	3	なかを洗ってパックを開いてから専用袋にいれてゴミ収取所へ	3	火曜日と木曜日	1	大きいビン	1	100円	0	10kg	4	T	1	22
13	M	19	yes	安芸高田市	7	7	0	F	1	50x10cm	3	開いてまとめて	1	2週間に1かい	1	酒ビン	2	100	0	10kg	4	T	1	20
14	F	21	yes	安芸高田市	7	5	1	F	1	DR	0	洗い開いて乾かして専用の袋にいれて処分	5	DR	0	酒	2	DR	0	10kg	4	T	1	21
15	M	19	yes	安芸高田市	7	5種類	1	F	1	50センチ	3	切り開いて洗い資源ゴミてでいてだす	2	毎月第2第4水曜日	5	酒	2	100円	0	10kg	4	T	1	26

Appendix 21 Japanese Data HG Gyuo Sha Hon Font

16	M	20	yes	安芸高田市	7	6種類	0	F	1	DR	0	洗って乾かして広げて1枚30円の袋に入れる	3	DR	0	酒	2	64円	3	10kg	4	T	1	21
17	M	19	yes	安芸高田市	7	5つ	1	F	1	50cm	3	洗って切って平らな状態で	2	DR	0	?	0	DR	0	DR	0	T	1	15
18	M	21	yes	安芸高田市	7	11	0	?	0	50cm	3	牛乳パックを開いて、専用のごみぶくろを購入し、第1第3木曜日に指定の場所に。。てる	2	第1月曜日、第3木曜日	3	大きビン	1	50円と100円	2	10kg	4	T	1	23
19	M	21	yes	安芸高田市	7	5種	1	F	1	高さ50cm	3	切って平ら	1	第1，3月曜日	2	酒	2	40円	1	DR	0	F	0	18
20	M	19	yes	安芸高田市	7	6つ	0	F	1	高さ50cm	3	解休してひもで結ぶ	0	DR	0	お酒	2	100円	0	10kg	4	T	1	18
21	M	19	yes	安芸高田市	7	4種類	0	F	1	50cm	3	切り開いて牛乳パック用の袋に入れる	2	毎月第1第3木曜日	2	酒ビン	2	65円	4	10kg	4	T	1	26
22	M	19	yes	安芸高田市	7	5種	1	F	1	DR	0	切ってひらいて洗って	2	DR	0	DR	0	30円	1	10kg	4	T	1	17
23	M	19	yes	安芸高田市	7	4	0	F	1	50cm	3	開いて処分する	1	第2第4水曜日	5	酒のビン	2	60円	3	DR	0	T	1	23
																								468
average					7.000		0.565		0.870		2.435		1.609		1.478		1.304		0.913		3.304		0.870	
st Dev					0.000		0.496		0.337		1.135		1.170		1.638		0.906		1.349		1.516		0.337	
total					161.000		13.000		20.000		56.000		37.000		34.000		30.000		21.000		76.000		20.0	468.000
max total					161.000		23.000		23.000		69.000		115.000		115.000		46.000		92.000		92.000		23.00	759.000
%correct					100.000		56.522		86.957		81.159		32.174		29.565		65.217		22.826		82.609		86.957	61.660
HG行書本				Q1		Q2		Q3		Q4		Q5		Q6		Q7		Q8		Q9		Q10		Q11

Appendix 21 Japanese Data Maru Go Font

Maru go				Q1		Q2		Q3		Q4		Q5		Q6		Q7		Q8		Q9		Q10		Q11		
**DR= Don't Remember	Gender	Age	Lived in Japan over 2 years?	Name of City?		Categories of garbage		Hair dryer recyclable category?		Max Length of garbage (cm)		How dispose of Milk carton?		When waste paper collected?		What kind of bottle has a deposit		How much large burnable garbage bag in yen?		Non-combustible garbage, max weight?		Car batteries, hazardous? Bring back to store?		Do you+Y2:Z49 recycle like this town? Do you like it?	Positive, Negative, Neutral	Total
Correct answer			yes	安芸高田市	1 point for each yomi, all correct=7	5	5=1	FALSE	False =1	50	5=1, ˜0=1, 50 = 3	1. よく洗って/すすぎ 2．開いて 3. 乾かし 4. 紙パック専用収集袋に入れてください。	Each instruction = 1, correct answer = 5	第2 / 4 水曜日	2=1, 4=1, Wednesday =2, 2 times =1, day=1, All correct 5	酒(さけ)	Sake(saki) =2	65	6=1, 5=1, 60=2, 65=4 2 digits=1	10キロ(kg)	1=1, ˜0=1, kilo = 1, 10 kilo = 4	TRUE	True=1		P=1 N=-1, N=0	
1	Male	19	yes	安芸高田市	7	DR	0	F	1	DR	0	DR	0	DR	0	DR	0	DR	0	DR	0	T	1	–		9
2	Male	19	yes	安芸高田市	7	5	1	F	1	50	3	資源ごみとして回収する	0	第1,3月曜日	2	酒	2	DR	0	10kg	4	T	1	リサイクルは		21
3	Male	19	yes	安芸高田市	7	4つ	0	F	1	50cm	3	紙パック用のごみぶくろ	1	DR	0	びん	0	64円	2	10kg	4	T	1			19
4	Male	18	yes	安芸高田市	7	7つ	0	T	0	DR	0	DR	0	DR	0	DR	0	30円	1	DR	0	T	1			9
5	Female	18	yes	安芸高田市	7	5つ	1	F	1	50cm	3	コンビニやスーパーで処分用の袋を購入に25個ぐらいをま	1	週2	0	お酒のビン	2	60円	2	10kg	4	T	1			22
6	Male	18	yes	あきたかた	7	3	0	T	0	DR	0	たばねる (bundling)	0	月曜日2週間1かい	4	乳しビン	0	100円	0	10kg	4	T	1			16
7	Female	19	yes	安芸高田市	7	7つほど	0	F	1	50cm	3	開いてあらって袋に入れて収分する	3	DR	0	DR	0	DR	0	DR	0	T	1			15
8	Male	19	yes	安芸高田市	7	5	1	F	1	50cm	3	古紙	0	2、4水	5	大ビン	0	100円	0	10kg	4	T	1			22
9	Male	18	yes	DR	0	5	1	F	1	DR	0	DR	0	第3金曜日	1	DR	0	DR	0	DR	0	T	1			4
10	Male	24	yes	安芸高田市	7	5種類	1	F	1	50cm	3	開いてよく洗ってから資源ごみとして出す	2	DR	0	酒ビン	2	DR	0	10kg	4	T	1			21
11	Male	18	yes	広島県安芸高田市	7	5つ	1	F	1	50cm	3	洗って、開いた状態	2	第2第4	2	酒ビン	2	65円	4	10kg	4	F	0			26
12	Male	18	yes	安芸高田市	7	5つ	1	F	1	50cm	3	あらって、切ってひらいっておく	2	第2水曜日、第4水曜日	5	DR	0	DR	0	DR	0	F	0			19
13	Female	19	yes	安芸高田市	7	4つ	0	F	1	50センチ	3	DR	0	毎週水曜	2	DR	0	1枚10円	0	DR	0	T	1			14
14	Male	18	yes	安芸高田市	7	4つ	0	T	0	DR	0	分解してはねて	0	第1だい3木曜日	2	DR	0	300円	0	DR	0	T	1			10
15	Female	18	yes	安芸高田市	7	5つ	1	F	1	50cm	3	よく洗って, 切りひらいて、専用の袋に入れて収分をする	3	第2だい4水曜日	5	酒	2	100円	0	10kg	4	T	1			27
16	Male	19	yes	安芸高田市	7	4	0	–	0	50cm	3	DR	0	DR	0	DR	0	DR	0	DR	0	DR	0			10
17	Male	19	yes	安芸高田市	7	DR	0	F	1	50cm	3	DR	0	DR	0	DR	0	30円	1	DR	0	T	1			13
18	Female	18	yes	安芸高田市	7	5つ	1	F	1	50センチ	3	リサイクル	0	DR		ビールビン (yes, but not said in the presentati	0	50円	1	DR	0	T	1			14
19	Male	18	yes	安芸高田市	7	5種類	1	F	1	50cm	3	内を洗ってかわかして、ひらいて、まとめる	3	DR	0	酒ビン	2	65円	4	10kg	4	T	1			26
20	Male	18	yes	安芸高田市	7	5	1	F	1	50cm	3	切り開いて	1	第2だい4水曜日	5	ビール	0	100円	0	10kg	4	F	0			22
21	Female	18	yes	安芸高田市	7	4	0	T	0	DR	0	切ってひらく	1	DR	0	お酒のビン	2	DR	0	DR	0	T	1			11

Appendix 21 Japanese Data Maru Go Font

22	Female	18	yes	安芸高田市	7	10こぐらい	0	DR	0	50cm	3	DR	0	DR	0	お酒	2	DR	0	10kg	4	DR	0			16
23	Female	18	yes	安芸高田市	7	8つ	0	F	1	50cm	3	DR	0	DR	0	茶色	0	65円	4	DR	0	T	1			16
24	Female	18	yes	安芸高田市	7	5つ	1	F	1	50センチ	3	中を水洗いし切て開いて、まとめる	2	DR	0	酒ビン	2	100円	0	10kg	4	T	1			21
25	Male	19	yes	安芸高田市	7	6	0	DR	0	50cm	3	洗って開いて処分をする	2	DR	0	DR	0	100円	0	10kg	4	T	1			17
26	Male	20	yes	安芸高田市	7	5つ	1	F	1	10cm	1	紙パック用の袋に25個ずつ	1	第2第4金曜日	4	酒ビン	2	DR	0	DR	0	T	1			18
27	Male	19	yes	安芸高田市	7	DR	0	F	1	50cm	3	約30枚入る指定の袋に入れ	1	DR	0	DR	0	DR	0	DR	0	T	1			13
28	Female	19	yes	安芸高田市	7	5	1	F	1	50cm	3	よく洗ってひもでまとめて資源でゴミの日	1	毎月第2第4水曜日	5	酒店	1	60円	3	10kg	4	T	1			27
29	Female	19	yes	安芸高田市	7	5	1	F	1	50cm	3	資源ゴミ	0	毎週木曜	1	酒ビン	2	40円	1	10kg	4	T	1			21
30	Female	20	yes	安芸高田市	7	4つ	0	F	1	10cm	1	よく洗って千スー＞開くー＞専用の袋に入れて出す	3	水曜日、毎週	2	酒ビン	2	10円	1	DR	0	T	1			18
31	Male	19	yes	安芸高田市	7	5つ	1	F	1	50cm	3	ハサミで切り開いて平面状にする	1	第1第3木曜日	2	DR	0	35円	2	DR	0	T	1			18
32	Male	19	yes	安芸高田市	7	5つの分	1	F	1	DR	0	洗って乾かしてから市？の専用の袋にいれれて出す	3	第1第3水曜日	3	DR	0	50円	2	DR	0	T	1			18
33	Male	19	yes	安芸高田市	7	4	0	F	1	50センチ	3	中を洗って解体してゴミ袋に入れる	2	火曜日木曜日	2	大きいビン	1	100円	0	DR	0	T	1			17
34	Male	19	yes	安芸高田市	7	5つ	1	F	1	10cm	1	洗って開いて乾かす	2	第1第3水曜日	3	酒のビン	2	100円	0	10kg	4	T	1			22
35	Male	19	yes	安芸高田市	7	5つ全手	1	F	1	50cm	3	紙パック専用袋に入れて出	1	第1，3木曜日	2	酒ビン	2	65円	4	10kg	4	T	1			26
36	Male	20	yes	安芸高田市	7	5	1	F	1	50cm	3	パックを平にして第2と第4木曜日	1	第1と第3水曜日	3	酒ビン	2	65円	4	10kg	4	T	1			27
37	Male	19	yes	安芸高田市	7	5	1	F	1	50	3	開いて束ねる（25枚まで）	1	第2，4木曜日	3	透明	0	65	4	10kg	4	T	1			25
38	Male	19	yes	安芸高田市	7	4つ	0	F	1	50cm	3	中を水で洗い折りたたむ	1	第1第3木曜日	2	酒	2	DR	0	DR	0	F	0			16
39	Male	20	yes	安芸高田市	7	5つ	1	T	0	50cm	3	ひらく	1	第1第3木曜日	2	酒ビン	2	100円	0	DR	0	T	1			17
40	Female	20	yes	安芸高田市	7	5	1	T	0	50cm	3	紙パックの袋に洗ってひらいて指定のごみ収集所へ	3	第1第3木曜日	2	酒ビン	2	100円	0	10kg	4	T	1			23
41	Female	20	yes	安芸高田市	7	5つの分	1	F	1	50cm	3	切ってひらいて資源ゴミ	1	第2，4木曜日	3	1升ビン	0	65円	4	5kg	1	T	1			22
42	Female	20	yes	安芸高田市	7	4	0	F	1	50cm	3	洗ってひらいて専用の袋にいれる	3	第1第3水曜日	3	お酒のビン 1升ビン	2	50えん	2	10kg	4	T	1			26
43	Female	20	yes	安芸高田市	7	DR	0	F	1	DR	0	DR	0	DR	0	DR	0	DR	0	DR	0	T	1			9
44	Male	20	yes	安芸高田市	7	5つ	1	F	1	50センチ	3	束にしてまとめる	0	第1，3月曜日	2	お酒	2	65円	4	10kg	4	F	0			24
45	Female	19	yes	安芸高田市	7	5つ	1	F	1	50cm	3	洗ってきてひらく	2	月、水曜日	2	お酒	2	40円	1	10kg	4	F	0			23
46	Female	19	yes	安芸高田市	7	5つ	1	F	1	50センチ	3	よく洗ってから開いて乾燥させ、指定の袋に入れて出す	5	第2第4水曜日	5	お酒	2	50円	2	10kg	4	T	1			31
47	Female	19	yes	安芸高田市	7	5つ	1	T	0	50cm	3	切って平らにしてリサイクルする	1	第2水曜日と金曜日	2	お酒	2	30円	1	DR	0	T	1			18
48	Female	19	yes	安芸高田市	7	6つ	0	F	1	50cm	3	再生ゴミ	0	毎週水曜日と金	2	酒ビン	2	65えん	4	10kg	4	T	1			24
		19																								903
average					6.854		0.583		0.792		2.375		1.188		1.872		1.042		1.208		2.104		0.800			
st Dev					1.000		0.493		0.406		1.166		1.184		1.684		0.978		1.541		1.982		0.400			
total					329.000		28.000		38.000		114.000		57.000		88.000		50.000		58.000		101.000		40.000			903.000
max total					336.000		48.000		48.000		144.000		240.000		240.000		96.000		192.000		192.000		48.000			1584.000
%correct					97.917		58.333		79.167		79.167		23.750		36.667		52.083		30.208		52.604		83.333			57.008
Maru go				Q1		Q2		Q3		Q4		Q5		Q6		Q7		Q8		Q9		Q10				Q11

Appendix 21 Japanese Data Meiryo Font

Merio	merio			Q1		Q2		Q3		Q4		Q5		Q6		Q7		Q8		Q9		Q10		Q11
**DR= Don't Remember	Gender	Age	Lived in Japan over 2 years?	Name of City?		Categories of garbage		Hair dryer recyclable category?		Max Length of garbage (cm)		How dispose of Milk carton?		When waste paper collected?		What kind of bottle has a deposit		How much large burnable garbage bag in yen?		Non-combustible garbage, max weight?		Car batteries, hazardous? Bring back to store?		Total
Correct answer			yes	安芸高田市	1 point for each yomi, all correct=7	5	5=1	FALSE	False =1	50	5=1, ~0=1, 50 = 3	1. よく洗って/すすぎ 2．開いて 3. 乾かし 4. 紙パック専用収集袋に入れてください。	Each instruction = 1 , correct answer = 5	第2 / 4 水曜日	2=1, 4=1, Wednesday =2, 2 times =1, day=1, All correct 5	酒(さけ)	Sake(saki) =2	65	6=1, 5=1, 60=2, 65=4 2 digits=1	10キロ (kg)	1=1, ~0=1, kilo = 1, 10 kilo = 4	TRUE	True=1	
1	Male	18	yes	安芸高田市	7	5つ	1	T	0	50cm	3	折れってたたむ	0	第2水曜日と第4水曜日	5	お酒	2	100円	0	3.0kg	1	T	1	20
2	Male	19	yes	安芸高田市	7	DR	0	F	1	50cm	3	切り、開いて、しっかり洗い重ねて？用の袋に入れて処分する	3	DR	0	DR	0	DR	0	5kg	0	T	1	15
3	Male	18	yes	安芸高田市	7	5つ	1	F	1	50cm	3	DR	0	DR	0	お酒	2	65円	4	10キロ (kg)	4	F	0	22
4	Male	18	yes	安芸高田市	7	5つ	1	F	1	50cm	3	よく洗って、かわかし、ひらうてから指定されてゴミ袋に入れて專てる	5	第2水曜日と第4水曜日	5	酒(さけ)	2	65円	4	10キロ (kg)	4	T	0	32
5	Male	19	yes	アキタカシ	7	5つ	1	T	0	30cm	1	切り畳む	0	水曜日土曜日	2	色つきの空ビン	0	100円	0	5kg	0	F	0	11
6	Male	18	yes	高田市	4	4	0	F	1	50cm	3	30円で売りっているふくろに洗ったパックを入れて、ごみ処集所にだす	1	DR	0	DR	0	DR	0	DR	0	T	1	10
7	Male	19	yes	安芸高田市	7	5種類	1	F	1	50センチ	3	DR	0	水曜日と第2と第4	5	酒のビン	2	1枚65円	4	10キロ (kg)	4	T	1	28
8	Male	19	yes	安芸高田市	7	5	1	F	1	50cm	3	洗って開く	2	第2第4木曜日	3	酒ビン	2	40円	1	DR	0	T	1	21
9	Male	21	yes	安芸高田市	7	DR	0	F	1	DR	0	あらて、ひらいて、かわかして、まとめて袋に入れる—＞出す	4	第1，3木曜日	2	酒ビン	2	1枚30円	1	10キロ (kg)	4	T	1	22
10	Male	19	yes	安芸高田市	7	5	1	F	1	50cm	3	開いて乾かす	2	DR	0	酒	2	DR	0	10キロ (kg)	4	T	1	21
11	Male	18	yes	安芸高田市	7	5種類	1	F	1	50cm	3	中を洗って開って、燃えるごみとして処分する	2	第2と第4木曜日	2	酒ビン	2	100円	0	10キロ (kg)	4	X	0	22
12	Male	18	yes	安芸高田市	7	4種類	0	F	1	50cm	3	中をすすぎ開いて専用の袋に入れる	3	第1，3木曜日	2	酒	2	DR	0	DR	0	T	1	19
13	Male	18	yes	安芸高田市	7	5	1	F	1	50cm	3	開いて紙ごみ	1	DR	0	お酒	2	100	0	10L	2	T	1	18
14	Male	18	yes	安芸高田市	7	5種類	1	F	1	50cm	3	つぶした後乾かして専用の袋に入れる	2	第1木曜日第3木曜日	2	酒ビン	2	65円	4	10kg	4	T	1	27
15	Male	19	yes	安芸高田市	7	4	0	F	1	50cmx1m古紙	2	広げて資源でみにだす	1	第1,3木曜日	2	酒	2	65円	4	10kg	4	T	1	24
16	Male	18	yes	安芸高田市	7	4つ	0	F	1	50cm	3	開いて洗う	2	DR	0	酒ビン	2	DR	0	10kg	4	T	1	20

Appendix 21 Japanese Data Meiryo Font

17	Male	18	yes	安芸高田市	7	5種	1	F	1	50cm	3	よく洗い切り開いて、よく乾かしてから専用の袋に入れて出す	5	DR	0	酒ビン	2	100円	0	10kg	4	T	1	24
18	Male	19		秋高田市	6	5つ	1	F	1	50cm	3	中を　よく洗い、乾かした、後にきり開く	3	第1第3木曜日	2	酒ビン	2	65円	4	10kg	4	T	1	27
19	Male	19		安き高田市	6	5つ	1	DR	0	50cm	3	DR	0	第2，4の水曜日	5	DR	0	DR	0	DR	0	DR	0	15
20	Male	18	yes	安芸高田市	7	5つ	1	F	1	50	3	たたむ	0	DR	0	DR	0	100円	0	DR	0	T	1	13
21	Male	19	yes	安芸高田市	7	DR	0	F	1	50センチ	3	DR	0	第2木曜日 第4木曜日	4	酒ビン	2	100円	0	10kg	4	T	1	22
22	Male	18	yes	安芸高田市	7	5	1	F	1	50	3	洗って、開いて、?用の袋にいれる	3	DR	0	酒	2	100円	0	10kg	4	T	1	22
23	Female	18	yes	安芸高田市	7	5つ	1	F	1	50センチ	3	DR	0	月曜日と木曜日	2	DR	0	DR	0	DR	0	T	1	15
24	Male	18	yes	安芸高田市	7	4つ	0	F	1	50cm	3	洗って，切って開いて、ぶくろ入れる	2	DR	0	酒	2	100	0	DR	0	F	0	15
25	Male	18	yes	安芸高田市	7	5つ	1	F	1	50cm	3	DR	0	DR	0	酒ビン	2	DR	0	DR	0	F	0	14
26	Male	18	yes	安芸高田市	7	6種類	1	F	1	50cm	3	切り、開いて、重ねて袋に入れる	1	DR	0	酒	2	DR	0	10kg	4	T	1	20
27	Male	18	yes	安芸高田市	7	5種すべて	1	F	1	50cm	3	牛乳しパックをまとめてヒモて縛り。ごみ処理巻を1枚つけて集積所	0	第1第3木曜日	2	酒ビン	2	100円	0	10kg	4	T	1	21
28	Male	18	yes	安芸高田市	7	5つ	1	F	1	50cm	3	DR	0	第1，3木曜日	2	酒ビン	2	65円	4	10kg	4	T	1	25
29	Male	18	yes	安芸高田市	7	6	0	DR	0	50cm	3	しばる	0	第1、第3木曜日	2	酒ビン	2	65円	4	10kg	4	DR	0	22
30	Male	18	yes	安芸高田市	7	5つ	1	F	1	DR	0	それようの袋をスーパなどで買ってその袋に」入れだす	1	第2，4水曜日	3	酒ビン	2	DR	0	100kg	3	T	1	19
31	Male	18	yes	安芸高田市	7	4つ	0	F	1	DR	0	DR	0	DR	0	DR	0	DR	0	DR	0	F	0	8
																								614
average					6.839		0.677		0.871		2.613		1.387		1.677		1.548		1.097		2.387		0.710	
st Dev					0.573		0.467		0.335		0.939		1.517		1.711		0.836		1.729		1.878		0.454	
total					212.000		21.000		27.000		81.000		43.000		52.000		48.000		34.000		74.000		22.000	614.000
max total					217.000		31.000		31.000		93.000		155.000		124.000		62.000		124.000		124.000		31.000	992.000
%correct					97.696		67.742		87.097		87.097		27.742		41.935		77.419		27.419		59.677		70.968	61.895
Merio	merio			Q1		Q2		Q3		Q4		Q5		Q6		Q7		Q8		Q9		Q10		Q11

Appendix 21 Japanese Data Min Cho Font

Mincho				Q1		Q2		Q3		Q4		Q5		Q6		Q7		Q8		Q9		Q10		Q11
**DR= Don't Remember	Gender	Age	Lived in Japan over 2 years?	Name of City?		Categories of garbage		Hair dryer recyclable category?		Max Length of garbage (cm)		How dispose of Milk carton?		When waste paper collected?		What kind of bottle has a deposit		How much large burnable garbage bag in yen?		Non-combustible garbage, max weight?		Car batteries, hazardous? Bring back to store?		Total
Correct answer			yes	安芸高田市	1 point for each yomi, all correct=7	5	5=1	FALSE	False =1	50	5=1, ~0=1, 50 = 3	1. よく洗って/すすぎ 2．開いて 3. 乾かし 4. 紙パック専用収集袋に入れてください。	Each instruction = 1 , correct answer = 5	第2 / 4 水曜日	2=1, 4=1, Wednesday =2, 2 times =1, day=1, All correct 5	酒(さけ)	Sake(saki) =2	65	6=1, 5=1, 60=2, 65=4 2 digits=1	10キロ (kg)	1=1, ~0=1, kilo = 1, 10 kilo = 4	TRUE	True=1	
1	F	19	yes	安芸高田市	7	5つ	1	F	1	50cm	3	中をきれいに洗って開いて乾かす	3	DR	0	お酒のビン	2	100円	0	10キロ (kg)	4	T	1	22
2	F	18	yes	安芸高田市	7	5種類	1	T	0	DR	0	たばねう	0	月金	1	DR	0	100	0	100kg	3	F	0	12
3	F	19	yes	安芸高田市	7	5つ	1	F	1	50センチ	3	牛乳パック用の袋を購入し、その中に入れる	1	DR	0	DR	0	30円	1	DR	0	F	0	14
4	M	18	yes	安芸高田市	7	5つ	1	F	1	50cm	3	洗って広げてひもで結ぶ	2	第2，4水曜日	5	1升ビン	0	50円	2	10kg	4	T	1	26
5	F	19	yes	安芸高田市	7	4つ	0	F	1	50cm	3	ひらいて専用のぶくろに入れて資源ゴミに出す	2	DR	0	一升ビン	0	65えん	4	10kg	4	T	1	22
6	M	18	yes	安芸高田市	7	5つ	1	F	1	15cm	2	洗って乾かして長方形に切る	2	DR	0	酒(さけ)	2	DR	0	10kg	4	T	1	20
7	F	18	yes	安芸高田市	7	5つ	1	F	1	50cm	3	広げてひもでとめる	1	DR	0	酒ビン	2	DR	0	DR	0	T	1	16
8	F	18	yes	安芸高田市	7	5つ	1	F	1	50センチ	3	開いて洗って袋に入れる	2	第1，3木曜日	2	酒ビン	2	65円	4	10kg	4	T	1	27
9	F	18	yes	安芸高田市	7	4つ	0	T	0	DR	0	切って広げる	1	第2，4水曜日	5	DR	0	DR	0	10kg	4	T	1	18
10	F	18	yes	安芸高田市	7	5つ	1	F	1	50センチ	3	洗って乾かし紙を切って広げて、指示のゴミ袋へ入れる	5	火と木	1	お酒のビン	2	DR	0	10kg	4	T	1	25
11	F	20	yes	安芸高田市	7	5つ	1	F	1	50cm	3	中を洗って開いて専用の袋に入れる	3	DR	0	酒	2	100円	0	10kg	4	F	0	21
12	F	18	yes	安芸高田市	7	6	0	F	1	50cm	3	切って開く	1	第1，3木曜日	2	DR	0	30円	1	10kg	4	T	1	20
13	F	18	yes	安芸高田市	7	4つ	0	F	1	50cm	3	ひらく	1	木曜日第1と第3	2	DR	0	35円	2	10kg	4	T	1	21
14	M	19	No	安芸高田市	7	5つ	1	F	1	50cm	3	紙パックかたコノを？糸しばって指定日に出す	0	水曜日	2	酒ビン	2	50円	2	50kg	3	DR	0	21
15	M	19	yes	安芸高田市	7	4つ	0	F	1	DR	0	DR	0	DR	0	大きいビン	1	90L	0	DR	0	T	1	10
16	M	18	yes	安芸高田市	7	6種	0	F	1	50cm	3	開いて、洗って、乾かして	3	水曜日	2	酒	2	DR	0	DR	0	T	1	19

Appendix 21 Japanese Data Min Cho Font

17	F	18	yes	安芸高田市	7	8つ	0	F	1	50cm	3	ビニール袋い15枚くらいかさねて入れる	0	木曜日第2	2	お酒	2	100円	0	10kg	4	T	1	20
18	M	19	yes	安芸高田市	7	6	0	F	1	50cm	3	開いて捨てる	1	第1、第3水曜日	3	酒	2	10円	1	10kg	4	T	1	23
19	M	18	yes	広島県安芸高田市	7	5つ	1	F	1	50cm	3	開いて洗って専用の袋に入れてすてる	3	第2第4水曜日	5	お酒のビン	2	100円	0	1０kg	4	T	1	27
20	M	18	yes	安芸高田市	7	6つ	0	F	1	DR	0	洗って専用の袋に	2	第2第4水曜日	5	酒	2	小50円大100円	0	DR	0	T	1	18
21	F	19	yes	安芸高田市	7	DR	0	F	1	50cm	3	資源ゴミ	0	第1第3木曜日	2	DR	0	40円	1	DR	0	T	1	15
22	F	18	yes	安芸高田市	7	5つ	1	F	1	10cm	2	DR	0	DR	0	酒場で売っているもの	2	100円	0	10kg	4	T	1	18
23	F	19	yes	安芸高田市	7	DR	0	T	0	50cm	3	洗って開いて乾燥させて専用の袋にいれてかい回収する	5	DR	0	お酒のビン	2	100円	0	10kg	4	T	1	22
																								457
average					7.000		0.522		0.870		2.391		1.652		1.696		1.261		0.783		2.870		0.826	
st Dev					0.000		0.500		0.337		1.132		1.463		1.780		0.943		1.214		1.727		0.379	
total					161.000		12.000		20.000		55.000		38.000		39.000		29.000		18.000		66.000		19.000	457.000
max total					161.000		23.000		23.000		69.000		115.000		115.000		46.000		92.000		92.000		23.000	759.000
%correct					100.000		52.174		86.957		79.710		33.043		33.913		63.043		19.565		71.739		82.609	60.211
Mincho				Q1		Q2		Q3		Q4		Q5		Q6		Q7		Q8		Q9		Q10		Q11

Appendix 21 Japanese Data MS- Gothic Font

MSGothic				Q1		Q2		Q3		Q4		Q5		Q6		Q7		Q8		Q9		Q10		Q11
**DR= Don't Remember	Gender	Age	Lived in Japan over 2 years?	Name of City?		Categories of garbage		Hair dryer recyclable category?		Max Length of garbage (cm)		How dispose of Milk carton?		When waste paper collected?		What kind of bottle has a deposit		How much large burnable garbage bag in yen?		Non-combustible garbage, max weight?		Car batteries, hazardous? Bring back to store?		Total
Correct answer			yes	安芸高田市	1 point for each yomi, all correct=7	5	5=1	FALSE	False =1	50	5=1, ~0=1, 50 = 3	1. よく洗って/すすぎ 2．開いて 3. 乾かし 4. 紙パック専用収集袋に入れてください。	Each instruction = 1 , correct answer = 5	第2 / 4 水曜日	2=1, 4=1, Wednesday =2, 2 times =1, day=1, All correct 5	酒(さけ)	Sake(saki) =2	65	6=1, 5=1, 60=2, 65=4 2 digits=1	10キロ (kg)	1=1, ~0=1, kilo = 1, 10 kilo = 4	TRUE	True=1	
1	M	19	yes	安芸高田市	7	5	1	F	1	50	3	洗って、1枚30円の袋で第2,4木曜日に収傷所へ	2	第1、3水曜日	3	酒のビン	2	100円	0	10キロ (kg)	4	T	1	24
2	M	21	yes	安芸高田市	7	5	1	F	1	50cm	3	中を水洗いしてその後広げて、スーパーなど購入りして袋の入れ、ゴミの日出す	3	第1、第3水曜日	3	酒	2	65円	4	10キロ (kg)	4	T	1	29
3	M	20	yes	高田市	4	8	0	T	0	10cm	1	たたむ	0	第2　水曜日	3	酒ビン	2	65円	4	10キロ (kg)	4	F	0	18
4	M	20	yes	安芸高田市	7	5	1	F	1	DR	0	DR	0	DR	0	酒	2	Dr	0	DR	0	T	1	12
5	M	20	yes	安芸高田	7	5つ	1	F	1	50cm	3	資源ゴミ	0	DR	0	酒	2	100円	0	10キロ (kg)	4	F	0	18
6	M	19	yes	安芸高田市	7	4	0	F	1	50cm	3	洗う広く	2	DR	0	酒	2	Dr	0	10キロ (kg)	4	T	1	20
7	F	20	yes	安芸高田市	7	5種類	1	F	1	50cm	3	中を　洗って、切り、開いて、処分する	2	第1第3木曜日	2	DR	0	65円	4	10キロ (kg)	4	T	1	25
8	M	19	yes	安芸高田市	7	5種類	1	F	1	50cm	3	中をよくそそき、切り、開いて、干し、袋につめて出す	2	第2第4水曜日	5	びんビール	0	100	0	10キロ (kg)	4	T	1	24
9	M	19	yes	安芸高田市	7	6	0	F	1	50cm	3	切ってたねねる	1	DR	0	酒	2	100円	0	10キロ (kg)	4	T	1	19
10	F	19	yes	安芸高田市	7	5つ	1	F	1	10cm	2	十分に洗って水気を切り、紙パックを切ってもえるゴミ	1	DR	0	酒	2	Dr	0	DR	0	T	1	15
11	M	20	yes	安芸高田市	7	4つ	0	F	1	50cm	3	資ごみ	0	DR	0	酒	2	130円	0	DR	0	T	1	14
12	M	19	yes	安芸高田市	7	4つ	0	F	1	50cm	3	水で洗ってひらいて、袋の入れて出す	2	木曜日2週間	2	酒	2	Dr	0	10キロ (kg)	4	T	1	22
13	F	21	yes	安芸高田市	7	8	0	T	0	50センチ	3	DR	0	DR	0	ビール	0	100	0	60kg	2	T	1	13
14	M	19	yes	安芸高田市	7	6つ	0	F	1	18cm	1	きれいに洗って、ハサミで切って専用のふくろに入れる	2	火曜日と木曜日	1	酒	2	60えん	3	1kg	3	T	1	21
15	F	20	yes	安芸市	3	4種類	0	F	1	10cm	2	DR	0	DR	0	DR	0	Dr	0	DR	0	DR	0	6
16	M	19	yes	安芸高田し	7	DR	0	DR	0	DR	0	DR	0	第2第4水曜	5	酒ビン	2	Dr	0	10キロ (kg)	4	T	1	19
17	F	19	yes	あきたかた市	7	5つ	1	F	1	DR	0	DR	0	第2第4水曜日	5	DR	0	Dr	0	DR	0	T	1	15

Appendix 21 Japanese Data MS- Gothic Font

18	M	20	yes	安芸高田市	7	5つ	1	F	1	DR	0	はさみ切ってふくろに入れる	0	DR	0	DR	0	Dr	0	DR	0	T	1	10
19	F	20	yes	安芸高田市	7	5つ	1	F	1	50cm	3	開いて、まとめて袋に入れて出す	1	第1，3木曜日	2	お酒ビン	2	100円	0	10キロ (kg)	4	T	1	22
20	F	19	yes	安芸高田市	7	5つ	1	F	1	50cm	3	袋を購入して洗って、てかわかしたのを入れる	2	第1，3木曜日	2	飲み物が入れっていたビン	0	100円	0	10キロ (kg)	4	F	0	20
21	F	19	yes	安芸高田	7	5つ	1	T	0	30cm	2	牛乳パックを開き、袋のて資源ゴミとして提出	1	第3第4火曜日	2	DR	0	20L	1	30L	1	T	1	16
22	M	19	yes	安芸高田市	7	8	0	F	1	50センチ	3	ひらいして、かわかす、専用の袋に入れて出す。役25枚入る	3	火曜日の金曜日	1	酒	2	65円	4	10キロ (kg)	4	F	0	25
23	F	19	yes	安芸高田市	7	8	0	F	1	DR	0	十字にしばってとめる	0	DR	0	一升ビン	0	Dr	0	DR	0	T	1	9
24	F	20	yes	安芸高田市	7	DR	0	F	1	50cm	3	パックを入れる用の袋を買ってソンに入れる	1	第2第4木曜日	3	酒	2	30円	1	10キロ (kg)	4	T	1	23
25	F	19	yes	安芸高田市	7	5	1	F	1	50cm	3	洗って、開いてかわかしてか	3	DR	0	酒ビン	2	50円	2	10キロ (kg)	4	F	0	23
26	M	20	yes	安芸高田市	7	4	0	F	1	50cm以	3	DR	0	DR	0	酒ビン	2	Dr	0	DR	0	T	1	14
27	M	20	yes	安芸高田市	7	4	0	F	1	50センチ	3	牛乳パックだけをまとめる	0	第1第3木曜日	2	酒ビン	2	100円	0	10キロ (kg)	4	T	1	20
28	M	20	yes	安芸高田市	7	5種類	1	F	1	DR	0	中身をよく洗って，専用の袋に入れ、処理所	2	毎週木曜日と月曜日	2	酒のビン	2	Dr	0	10kg	4	DR	0	19
29	M	19	yes	安芸高田市	7	5	1	F	1	60cm	1	よく洗って、.1枚30円の？用のふくろ（？25枚ははいる）に入れてごみ？袋場にもてく	2	twice a month	2	酒ビン	2	65円	4	10kg	4	T	1	25
30	M	20	yes	アキタカだ	5	5	1	F	1	50cm	3	中を洗って切って専用のふくろに	2	DR	0	おさけのびん	2	100円	0	10kg	4	T	1	19
31	M	19	yes	安芸高田市	7	5	1	F	1	50cm	3	資源ゴミ	0	DR	0	お酒	2	65円	4	10kg	4	T	1	23
32	M	20	yes	安芸高田市	7	5種類	1	F	1	50cm	3	DR	0	DR	0	酒ビン	2	100円	0	100kg	3	T	1	18
33	M	20	yes	安芸高田市	7	6	0	F	1	50cm	3	開いて中を洗って、1つ30円の袋に入れて第1，３木曜日に処分	2	第1，3木曜日	2	酒の入れっていたビン	2	65円	4	10kg	4	F	0	25
34	M	20	yes	広島県安芸高田市	7	5つ	1	F	1	50cm	3	中を洗って、乾かし、平たく切って、まとめ回集巻をつける	3	第1，3木	2	酒ビン	2	100円	0	10kg	4	T	1	24
35	F	20	yes	安芸高田市	7	5種類	1	F	1	50cm	3	牛乳パックを開いて平らに	1	第2第4木曜日	3	酒ビン	2	65円	4	10kg	4	T	1	27
36	F	20	yes	安芸高田	7	4種類	0	F	1	100cm	1	展開して指定の袋にいれる	1	DR	0	酒ビン	2	40円	1	10kg	4	T	1	18
																								694
average					6.750		0.556		0.889		2.194		1.139		1.444		1.500		1.111		2.917		0.778	
st Dev					0.862		0.497		0.314		1.174		1.058		1.554		0.866		1.663		1.673		0.416	
total					243.000		20.000		32.000		79.000		41.000		52.000		54.000		40.000		105.000		28.000	694.000
max total					252.000		36.000		36.000		108.000		180.000		180.000		72.000		144.000		144.000		36.000	1188.000
%correct					96.429		55.556		88.889		73.148		22.778		28.889		75.000		27.778		72.917		77.778	58.418
MSGothic				Q1		Q2		Q3		Q4		Q5		Q6		Q7		Q8		Q9		Q10		Q11

Appendix 21 Japanese Data MSP- Gothic Font

MSP-Gothic				Q1		Q2		Q3		Q4		Q5		Q6		Q7		Q8		Q9		Q10		Q11
**DR= Don't Remember	Gender	Age	Lived in Japan over 2 years?	Name of City?		Categories of garbage		Hair dryer recyclable category?		Max Length of garbage (cm)		How dispose of Milk carton?		When waste paper collected?		What kind of bottle has a deposit		How much large burnable garbage bag in yen?		Non-combustible garbage, max weight?		Car batteries, hazardous? Bring back to store?		Individual Totals
Correct answer			yes	安芸高田市	1 point for each yomi, all correct=7	5	5=1	FALSE	False =1	50	5=1, ~0=1, 50 = 3	1. よく洗って/すすぎ 2．開いて 3. 乾かし 4. 紙パック専用収集袋に入れてください。	Each instruction = 1 , correct answer = 5	第2 / 4 水曜日	2=1, 4=1, Wednesday =2, 2 times =1, day=1, All correct 5	酒(さけ)	Sake(saki) =2	65	6=1, 5=1, 60=2, 65=4 2 digits=1	10キロ (kg)	1=1, ~0=1, kilo = 1, 10 kilo = 4	TRUE	True=1	
Max Score					7		1		1		3		5		5		2		4		4		4	36
1	F	18	yes	広島県安芸高田市	7	5つ	1	F	1	50センチ	3	パックを開いてひもでたばねる	1	毎月第2, 4水曜日	5	酒ビン	2	60円	3	10kg	4	T	1	28
2	F	19	yes	安芸高田市	7	6つ	1	F	1	50cm以下	3	開いてまとめてしばる	1	第1と第3木曜日	2	酒ビン	2	60円	3	10kg	4	T	1	25
3	F	18	yes	安芸高田市	7	DR	0	F	1	50cm	3	中をゆすぐ、開く、専用のごみ袋に入れて出す	3	DR	0	酒ビン	2	100円	0	10kg	4	T	1	21
4	F	18	yes	安芸高田市	7	5つ	1	F	1	50cm	3	DR	0	DR	0	DR	0	100円	0	DR	0	T	1	13
5	M	18	yes	安芸高田市	7	5つ	1	F	1	50センチ	3	中を洗って開いた状態で専用の袋に入れて処分する	3	第2第4水曜日	5	酒ビン	2	65円	4	10kg	4	T	1	31
6	F	18	yes	安芸高田市	7	5種類	1	F	1	50センチ	3	洗って開き乾かしから専用の袋に入れる	5	第1, 3、水曜日	4	酒ビン	2	60円	3	10kg	4	F	0	30
7	M	19	yes	安芸高田市	7	4つ	0	F	1	DR	0	中を洗って開いてかわかす	3	DR	0	DR	0	65円	4	DR	0	DR	0	15
8	F	18	yes	安芸高田市	7	8	0	F	1	DR	0	切って広げる	1	DR	0	DR	0	DR	0	DR	0	T	1	10
9	M	18	yes	安芸高田市	7	5	1	F	1	50cm	3	洗って開いて乾かして袋に入れて出す	3	第1、第3木曜日	2	酒	2	65円	4	10kg	4	F	0	27
10	M	18	yes	安芸高田市	7	4	0	T	0	50センチ	3	水で洗って広げる	2	DR	0	酒	2	100円	0	10kg	4	T	1	19
11	M	18	yes	安芸高田市	7	5つ	1	T	0	DR	0	中を水洗い分解する	1	DR	0	DR	0	DR	0	DR	0	F	0	9
12	F	18	yes	安芸高田市	7	DR	0	T	0	50cm	3	洗って暈ねて束ねる	1	DR	0	お酒のビン	2	DR	0	10kg	4	F	0	17
13	M	21	yes	安芸高田市	7	8つ	0	F	1	50cm	3	水で洗って、展開して、乾かしてから紙パックゴミとして処分わする	3	第2第4木曜日	3	酒ビン	2	100円	0	10kg	4	T	1	24
14	M	18	yes	安芸高田市	7	4つ	0	T	0	50cm	3	洗ってから開いて?用の袋に入れて出す	3	第1第3水曜日	3	酒ビン	2	65円	4	10kg	4	T	1	27
15	F	18	yes	安芸高田市	7	5つ	1	F	1	50cm	3	全部開いて洗って乾かして牛乳パック専用の袋に入れる	5	第1第3木曜日	2	DR	0	1枚30円	1	10kg	4	T	1	25

Appendix 21 Japanese Data MS- Gothic Font

16	M	18	yes	安芸高田市	7	5種類	1	F	1	50センチ	3	DR	0	DR	0	酒	2	65円	4	10kg	4	T	1	23
17	F	18	yes	安芸高田市	7	DR	0	F	1	DR	0	DR	0	DR	0	DR	0	DR	0	DR	0	DR	0	8
18	F	18	yes	安芸高田市	7	5	1	F	1	50cm	3	かして開いて専用の袋に入	5	DR	0	DR	0	100円	0	10kg	4	F	0	21
19	M	19	yes	安芸高田市	7	5つ	1	F	1	50センチ	3	洗って乾かしてパックを開いた状態	3	第1，3水曜日	3	酒ビン	2	100円	0	10kg	4	T	1	25
20	F	18	yes	安芸高田市	7	4つ	0	T	0	DR	0	洗って、開いて、リサイクルする	2	DR	0	ガラス	0	DR	0	DR	0	F	0	9
21	F	18	yes	安芸高田市	7	5つ	1	F	1	50cm	3	かして、ハサミで切って専用の容器に入れ	3	DR	0	DR	0	100円	0	10kg	4	T	1	20
22	F	18	yes	安芸高田市	7	8つ	0	F	1	50cm	3	切り開いて専用の袋に入れ	5	DR	0	酒ビン	2	DR	0	10kg	4	T	1	23
23	F	18	yes	安芸高田市	7	5つ	1	F	1	50cm	3	小さくつぶして、水洗って燃えるゴミに捨てる	1	第2第4水曜日	5	酒ビン	2	65円	4	10kg	4	T	1	29
																								479
average					7.000		0.565		0.783		2.348		2.348		1.478		1.217		1.478		2.957		0.652	
st Dev					0.000		0.496		0.412		1.237		1.605		1.862		0.976		1.791		1.756		0.476	
total					161.000		13.000		18.000		54.000		54.000		34.000		28.000		34.000		68.000		15.000	479.000
max total					161.000		23.000		23.000		69.000		115.000		115.000		46.000		92.000		92.000		23.000	759.000
%correct					**100.000**		**56.522**		**78.261**		**78.261**		**46.957**		**29.565**		**60.870**		**36.957**		**73.913**		**65.217**	**63.109**
MSP-Gothic				Q1		Q2		Q3		Q4		Q5		Q6		Q7		Q8		Q9		Q10		Q11

Appendix 22 All Font Data English and Japanese Analysis

Summary statistics:

Variable	Observations	Obs. with missing data	Minimum	Maximum	Mean	Std. deviation
% Correct Japanese	204	0	22.222	86.111	57.081	13.623
% Correct English	57	0	33.333	96.667	62.573	14.406

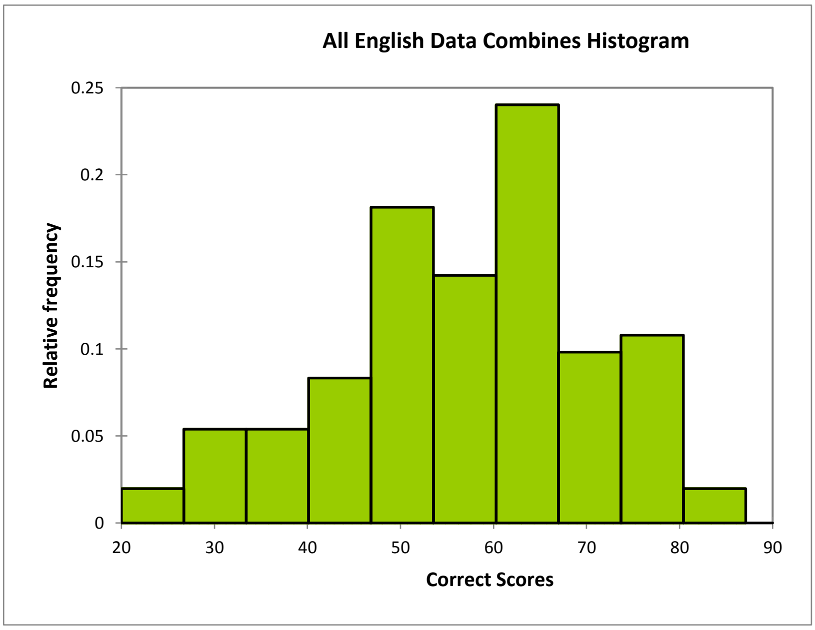
Difference	-5.492
z (Observed value)	-2.575
|z| (Critical value)	1.960
p-value (Two-tailed)	0.010
alpha	0.05

Difference	-5.492
t (Observed value)	-2.657
|t| (Critical value)	1.969
DF	259
p-value (Two-tailed)	0.008
alpha	0.05

Appendix 22 All English Data Histogram

All English Data represented in Percent
Font Presentations Combined

Variable	Obs.	Obs. with missing data	Obs. without missing data	Minimum	Maximum	Mean	Std. deviation
Var1	204	0	204	22.222	86.111	57.081	13.623



Descriptive statistics for the intervals :

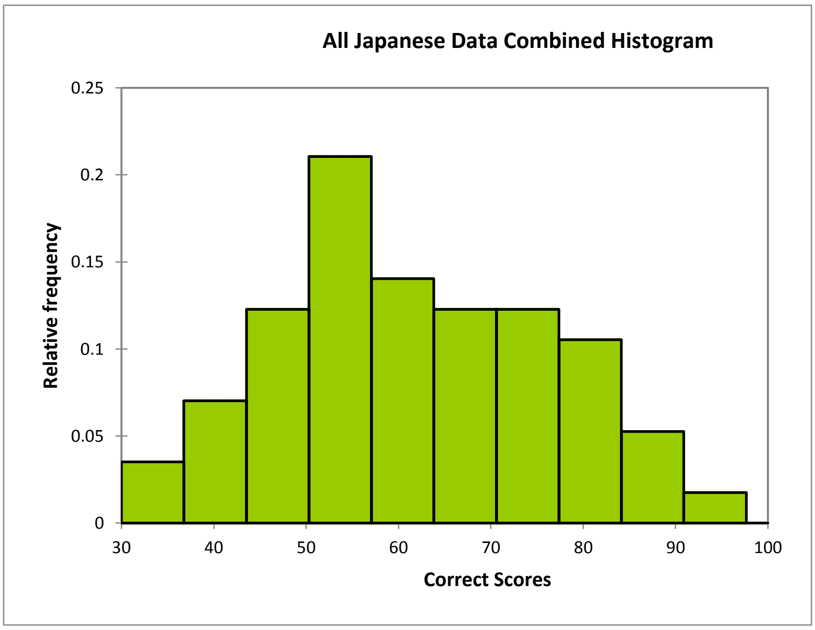
Lower bound	Upper bound	Frequency	Relative Frequency	Density
20	26.71111	4	0.020	0.003
26.71111	33.42222	11	0.054	0.008
33.42222	40.13333	11	0.054	0.008
40.13333	46.84444	17	0.083	0.012
46.84444	53.55556	37	0.181	0.027
53.55556	60.26667	29	0.142	0.021
60.26667	66.97778	49	0.240	0.036
66.97778	73.68889	20	0.098	0.015
73.68889	80.4	22	0.108	0.016
80.4	87.11111	4	0.020	0.003

Appendix 22 All Japanese Data Histogram

All Japanese Data Represented in Percent
Font Presentation All Data Combined

Summary statistics:

Variable	Obs.	Obs. with missing data	Obs. without missing data	Minimum	Maximum	Mean	Std. deviation
Var1	57	0	57	33.333	96.667	62.573	14.406



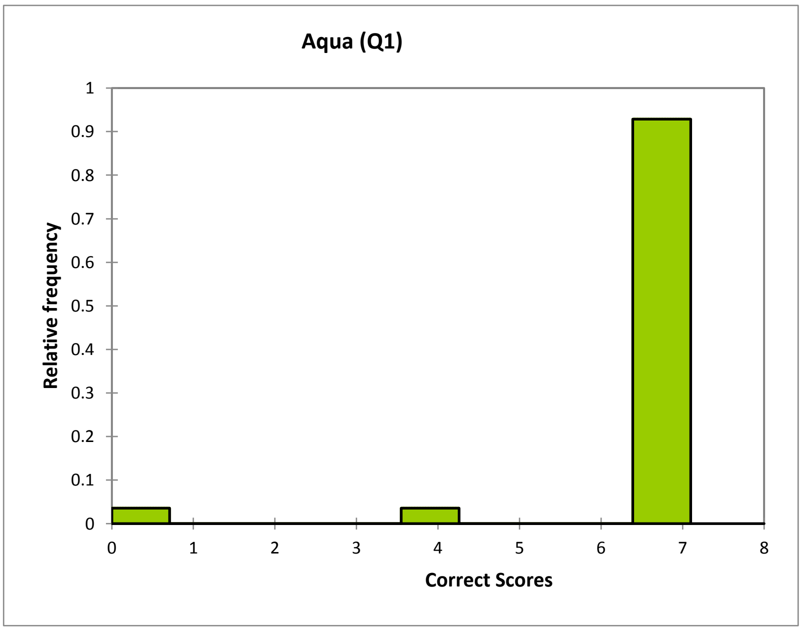
Descriptive statistics for the intervals :

Lower bound	Upper bound	Frequency	Relative Frequency	Density
30	36.76667	2	0.035	0.005
36.76667	43.53333	4	0.070	0.010
43.53333	50.3	7	0.123	0.018
50.3	57.06667	12	0.211	0.031
57.06667	63.83333	8	0.140	0.021
63.83333	70.6	7	0.123	0.018
70.6	77.36667	7	0.123	0.018
77.36667	84.13333	6	0.105	0.016
84.13333	90.9	3	0.053	0.008
90.9	97.66667	1	0.018	0.003

Appendix 23 Per Question Japanese Histogram Q1 Aqua

Summary statistics:

Variable	Obs.	Obs. with missing data	Obs. without missing data	Minimum	Maximum	Mean	Std. deviation
Q1	28	0	28	0.000	7.000	6.643	1.420



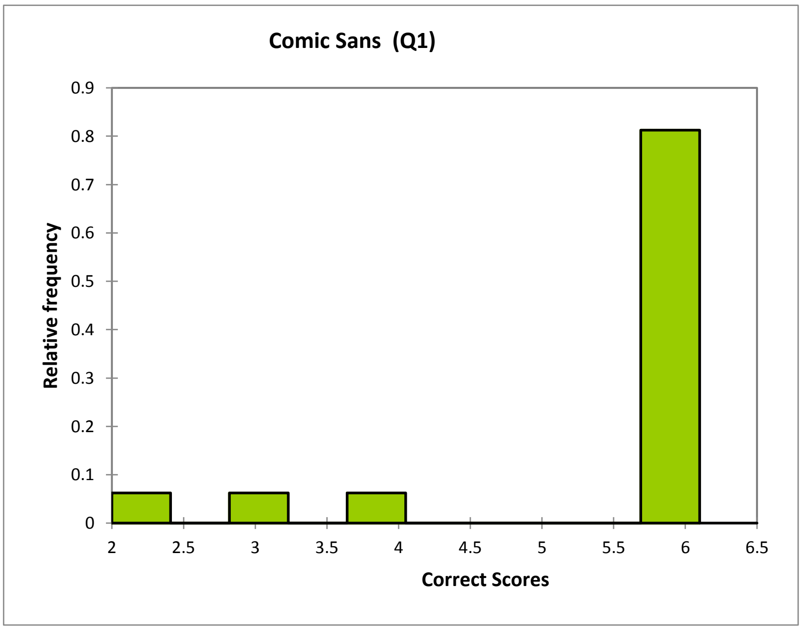
Descriptive statistics for the intervals :

Lower bound	Upper bound	Frequency	Relative Frequency	Density
0	0.71	1	0.036	0.050
0.71	1.42	0	0.000	0.000
1.42	2.13	0	0.000	0.000
2.13	2.84	0	0.000	0.000
2.84	3.55	0	0.000	0.000
3.55	4.26	1	0.036	0.050
4.26	4.97	0	0.000	0.000
4.97	5.68	0	0.000	0.000
5.68	6.39	0	0.000	0.000
6.39	7.1	26	0.929	1.308

Appendix 23 Per Question Japanese Histogram Q1 Comic Sans

Summary statistics:

Variable	Obs.	Obs. with missing data	Obs. without missing data	Minimum	Maximum	Mean	Std. deviation
Q1	16	0	16	2.000	6.000	5.438	1.263



Descriptive statistics for the intervals :

Lower bound	Upper bound	Frequency	Relative Frequency	Density
2	2.41	1	0.063	0.152
2.41	2.82	0	0.000	0.000
2.82	3.23	1	0.063	0.152
3.23	3.64	0	0.000	0.000
3.64	4.05	1	0.063	0.152
4.05	4.46	0	0.000	0.000
4.46	4.87	0	0.000	0.000
4.87	5.28	0	0.000	0.000
5.28	5.69	0	0.000	0.000
5.69	6.1	13	0.813	1.982

Appendix 23 Per Question Japanese Analysis Q1 Aqua Maru Go

Question 1 Aqua MaruGo

Comparison of two samples (Wilcoxon, Mann-Whitney, ...) - on 2015/04/27 at 3:33:51

Summary statistics:

Variable	Observations	Obs. with missing data	Obs. without missing data	Minimum	Maximum	Mean	Std. deviation
Aqua	28	0	28	0.000	7.000	6.643	1.420
MaruGo	48	0	48	0.000	7.000	6.854	1.010

Mann-Whitney test / Two-tailed test:	
U	638.500
Expected value	672.000
Variance (U)	981.474
p-value (Two-tailed)	0.292
alpha	0.05
An approximation has been used to compute the p-value.	
Test interpretation:	
H0: The difference of location between the samples is equal to 0.	
Ha: The difference of location between the samples is different from 0.	

Appendix 23 Per Question Japanese Analysis Q1 Comic Sans Verdana

Summary statistics:

Variable	Observations	Obs. with missing data	Obs. without missing data	Minimum	Maximum	Mean	Std. deviation
Q1	16	0	16	2.000	6.000	5.438	1.263
Q1(2)	22	0	22	1.000	6.000	5.091	1.630

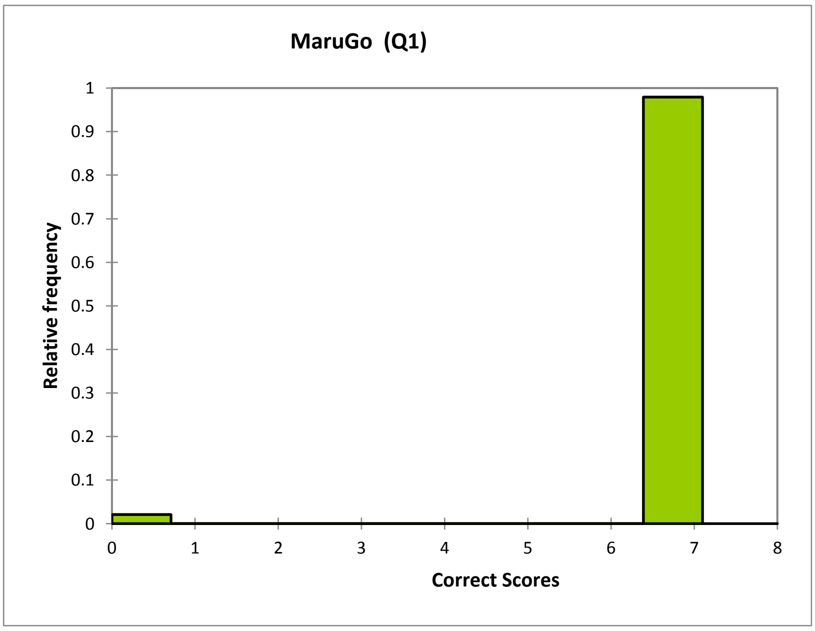
Mann–Whitney test / Two–tailed test:

U	192.500
Expected value	176.000
Variance (U)	634.651
p–value (Two–tailed)	0.525
alpha	0.05

Appendix 23 Per Question Japanese Histogram Q1 Maru GO

Summary statistics:

Variable	Obs.	Obs. with missing data	Obs. without missing data	Minimum	Maximum	Mean	Std. deviation
Q1	48	0	48	0.000	7.000	6.854	1.010



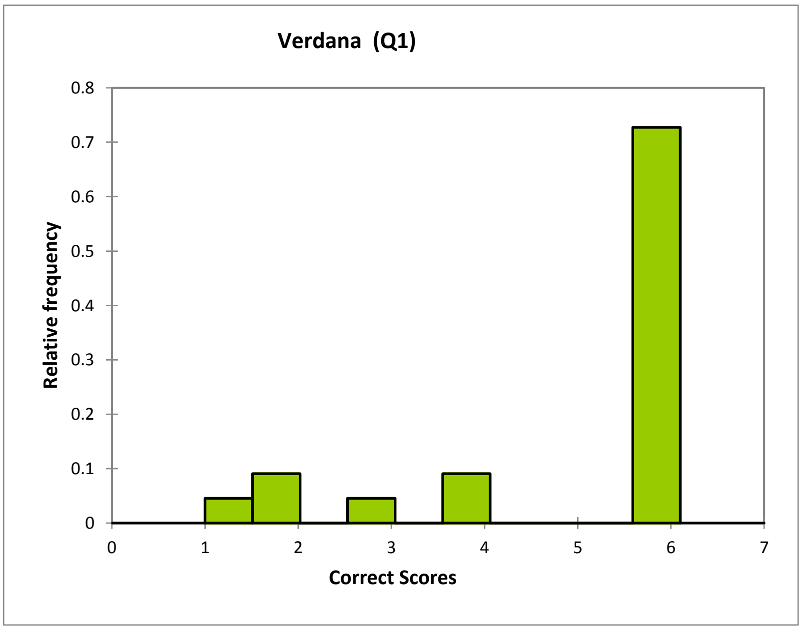
Descriptive statistics for the intervals :

Lower bound	Upper bound	Frequency	Relative Frequency	Density
0	0.71	1	0.021	0.029
0.71	1.42	0	0.000	0.000
1.42	2.13	0	0.000	0.000
2.13	2.84	0	0.000	0.000
2.84	3.55	0	0.000	0.000
3.55	4.26	0	0.000	0.000
4.26	4.97	0	0.000	0.000
4.97	5.68	0	0.000	0.000
5.68	6.39	0	0.000	0.000
6.39	7.1	47	0.979	1.379

Appendix 23 Per Question Japanese Histogram Q1 Verdana

Summary statistics:

Variable	Obs.	Obs. with missing data	Obs. without missing data	Minimum	Maximum	Mean	Std. deviation
Q1	22	0	22	1.000	6.000	5.091	1.630



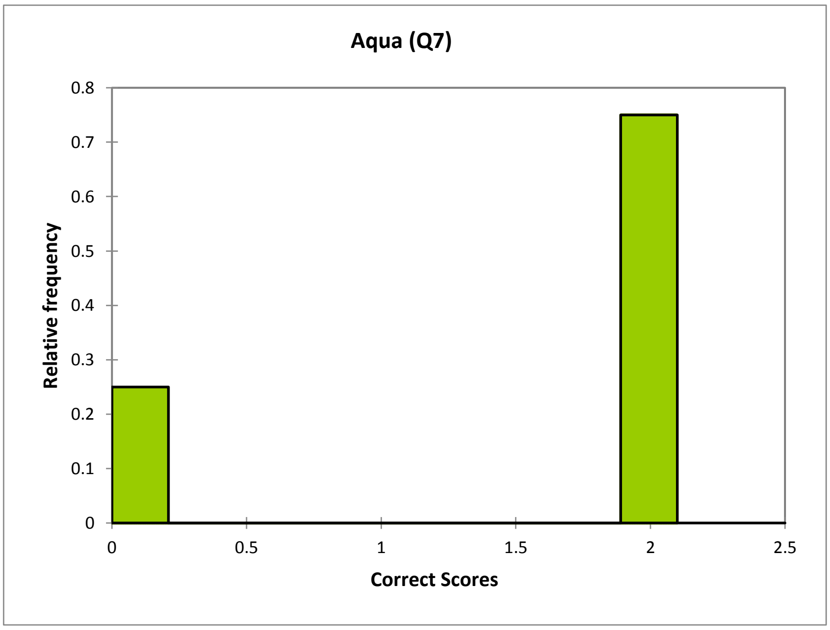
Descriptive statistics for the intervals :

	Upper bound	Frequency	Relative Frequency	Density
1	1.51	1	0.045	0.089
1.51	2.02	2	0.091	0.178
2.02	2.53	0	0.000	0.000
2.53	3.04	1	0.045	0.089
3.04	3.55	0	0.000	0.000
3.55	4.06	2	0.091	0.178
4.06	4.57	0	0.000	0.000
4.57	5.08	0	0.000	0.000
5.08	5.59	0	0.000	0.000
5.59	6.1	16	0.727	1.426

Appendix 23 Per Question Japanese Histogram Q7 Aqua

Summary statistics:

Variable	Obs.	Obs. with missing data	Obs. without missing data	Minimum	Maximum	Mean	Std. deviation
Q7	28	0	28	0.000	2.000	1.500	0.882



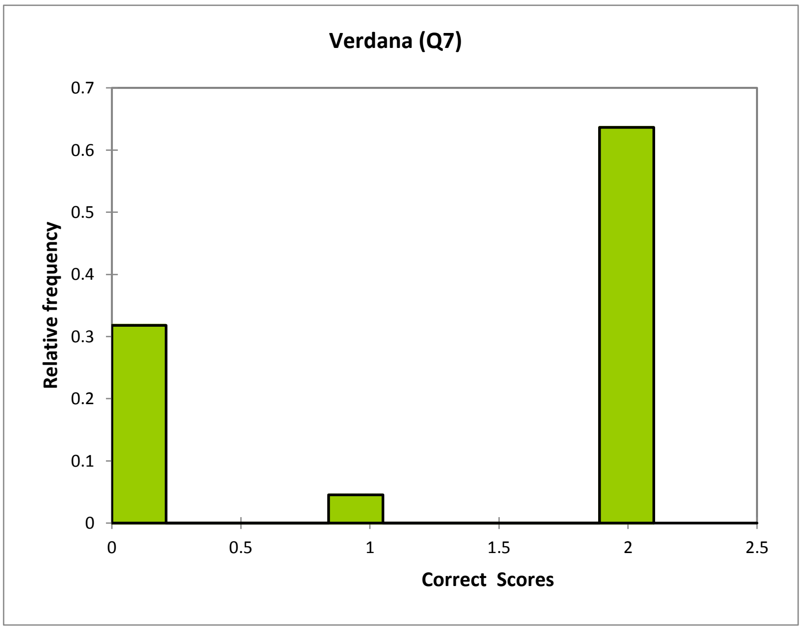
Descriptive statistics for the intervals :

Lower bound	Upper bound	Frequency	Relative Frequency	Density
0	0.21	7	0.250	1.190
0.21	0.42	0	0.000	0.000
0.42	0.63	0	0.000	0.000
0.63	0.84	0	0.000	0.000
0.84	1.05	0	0.000	0.000
1.05	1.26	0	0.000	0.000
1.26	1.47	0	0.000	0.000
1.47	1.68	0	0.000	0.000
1.68	1.89	0	0.000	0.000
1.89	2.1	21	0.750	3.571

Appendix 23 Per Question Japanese Histogram Q7 Verdana

Summary statistics:

Variable	Obs.	Obs. with missing data	Obs. without missing data	Minimum	Maximum	Mean	Std. deviation
Q7	22	0	22	0.000	2.000	1.318	0.945



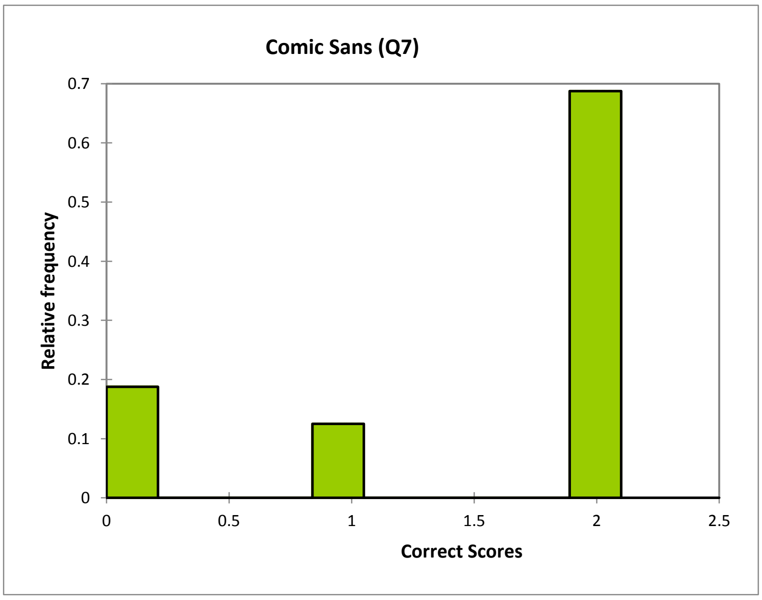
Descriptive statistics for the intervals :

Lower bound	Upper bound	Frequency	Relative Frequency	Density
0	0.21	7	0.318	1.515
0.21	0.42	0	0.000	0.000
0.42	0.63	0	0.000	0.000
0.63	0.84	0	0.000	0.000
0.84	1.05	1	0.045	0.216
1.05	1.26	0	0.000	0.000
1.26	1.47	0	0.000	0.000
1.47	1.68	0	0.000	0.000
1.68	1.89	0	0.000	0.000
1.89	2.1	14	0.636	3.030

Appendix 23 Per Question Japanese Histogram Q7 Comic Sans

Summary statistics:

Variable	Obs.	Obs. with missing data	Obs. without missing data	Minimum	Maximum	Mean	Std. deviation
Q7	16	0	16	0.000	2.000	1.500	0.816



Descriptive statistics for the intervals :

Lower bound	Upper bound	Frequency	Relative Frequency	Density
0	0.21	3	0.188	0.893
0.21	0.42	0	0.000	0.000
0.42	0.63	0	0.000	0.000
0.63	0.84	0	0.000	0.000
0.84	1.05	2	0.125	0.595
1.05	1.26	0	0.000	0.000
1.26	1.47	0	0.000	0.000
1.47	1.68	0	0.000	0.000
1.68	1.89	0	0.000	0.000
1.89	2.1	11	0.688	3.274

Appendix 23 Per Question Japanese Analysis Q7 Aqua and Maru Go

Summary statistics:

Variable		Observations	Minimum	Maximum	Mean	Std. Deviation
Aqua	28	28	0.000	2.000	1.500	0.882
MaruGo	48	48	0.000	2.000	1.042	0.988

Mann-Whitney test / Two-tailed test:	
U	833.000
Expected value	672.000
Variance (U)	6355.587
p-value (Two-tailed)	0.044
alpha	0.05
An approximation has been used to compute the p-value.	

Appendix 23 Per Question Japanese Analysis Q7 Comic Sans Verdana

Summary statistics:

Variable	Observations	Obs. with missing data	Obs. without missing data	Minimum	Maximum	Mean	Std. deviation
Comic Sans	16	0	16	0.000	2.000	1.500	0.816
Verdana	22	0	22	0.000	2.000	1.318	0.945

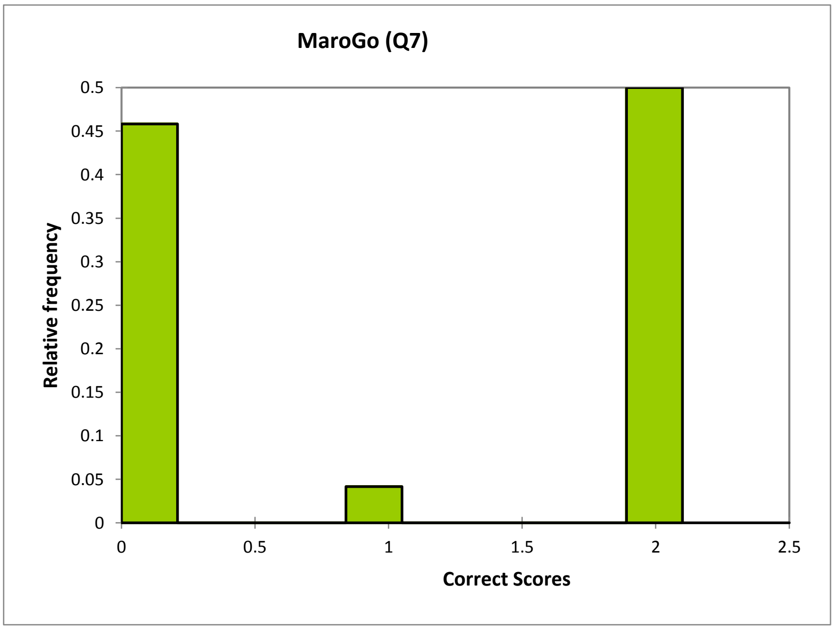
Mann-Whitney test / Two-tailed test:

U	190.500
Expected value	176.000
Variance (U)	797.383
p-value (Two-tailed)	0.620
alpha	0.05

Appendix 23 Per Question Japanese Histogram Q7 Maru Go

Summary statistics:

Variable	Obs.	Obs. with missing data	Obs. without missing data	Minimum	Maximum	Mean	Std. deviation
Q7	48	0	48	0.000	2.000	1.042	0.988



Descriptive statistics for the intervals :

Lower bound	Upper bound	Frequency	Relative Frequency	Density
0	0.21	22	0.458	2.183
0.21	0.42	0	0.000	0.000
0.42	0.63	0	0.000	0.000
0.63	0.84	0	0.000	0.000
0.84	1.05	2	0.042	0.198
1.05	1.26	0	0.000	0.000
1.26	1.47	0	0.000	0.000
1.47	1.68	0	0.000	0.000
1.68	1.89	0	0.000	0.000
1.89	2.1	24	0.500	2.381

Appendix 24 Per Question Japanese Analysis Q3 Comic Sans Verdana

Variable	Observations	Obs. with missing data	Obs. without missing data	Minimum	Maximum	Mean	Std. deviation
ComicSans 3	16	0	16	1.000	1.000	1.000	0.000
Verdana3	22	0	22	0.000	1.000	0.364	0.492

1	0
1	1
Mann-Whitney test / Two-tailed test:	1
	0
U	288.000
Expected value	176.000
Variance (U)	799.135
p-value (Two-tailed)	< 0.0001
alpha	0.05

Appendix 24 Per Question Japanese Analysis Q3 Aqua and Maru Go

Summary statistics:

Variable	Observations	Obs. with missing data	Obs. without missing data	Minimum	Maximum	Mean	Std. deviation
Q3Aqua	28	0	28	0.000	1.000	0.714	0.460
Q3MaruGo	48	0	48	0.000	1.000	0.792	0.410

Mann-Whitney test / Two-tailed test:	
U	620.000
Expected value	672.000
Variance (U)	4677.120
p-value (Two-tailed)	0.451
alpha	0.05

Appendix 24 Per Question Japanese Analysis Q10 Comic Sans Verdana

Summary statistics:

Variable	Observation	Obs. with missing data	Obs. without missing data	Minimum	Maximum	Mean	Std. deviation
Comic#10	16	0	16	0.000	1.000	0.813	0.403
Verdana #10	22	0	22	0.000	1.000	0.864	0.351

1	1
0	0
Mann-Whitney test / Two-tailed test:	1
	1
U	167.000
Expected value	176.000
Variance (U)	456.649
p-value (Two-tailed)	0.691
alpha	0.05

Appendix 24 Per Question Japanese Analysis Q10 Aqua and Maru Go

Summary statistics:

Variable	Observations	Obs. with missing data	Obs. without missing data	Minimum	Maximum	Mean	Std. deviation
Q10	28	0	28	0.000	1.000	0.750	0.441
Q10(2)	48	0	48	0.000	1.000	0.833	0.377

Mann-Whitney test / Two-tailed test:

U	616.000
Expected value	672.000
Variance (U)	4099.200
p-value (Two-tailed)	0.386
alpha	0.05

Appendix 25 Per Question Japanese Analysis Q4 Aqua and Maru Go

Summary statistics:
3

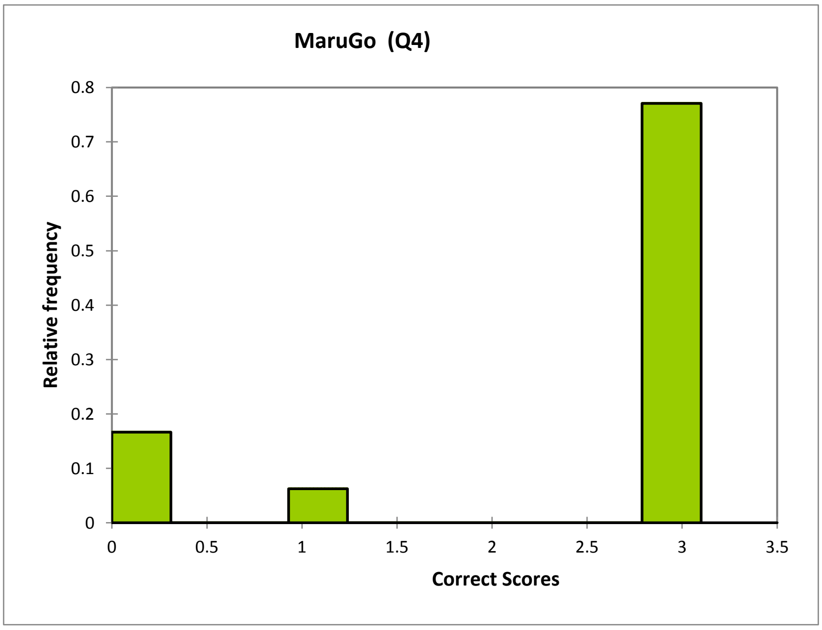
Variable	Observations	Obs. with missing data	Obs. without missing data	Minimum	Maximum	Mean	Std. deviation
Aqua	28	0	28	0.000	3.000	2.750	0.799
Marugo	48	0	48	0.000	3.000	2.375	1.178

Mann-Whitney test / Two-tailed test:	
3	
U	756.500
Expected value	672.000
Variance (U)	3922.358
p-value (Two-tailed)	0.180
alpha	0.05

Appendix 25 Per Question Japanese Histogram Q4 Maru Go

Summary statistics:

Variable	Obs.	Obs. with missing data	Obs. without missing data	Minimum	Maximum	Mean	Std. deviation
Q4	48	0	48	0.000	3.000	2.375	1.178



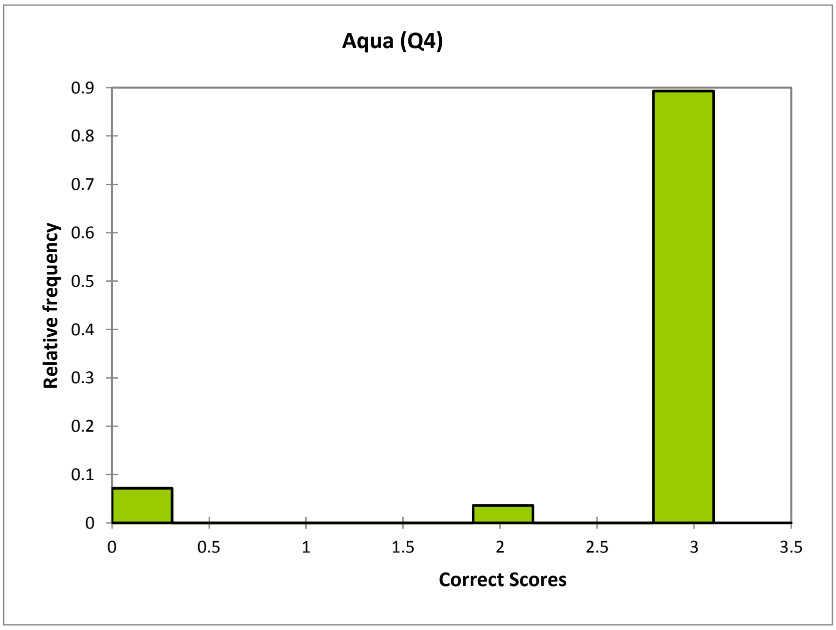
Descriptive statistics for the intervals :

Lower bound	Upper bound	Frequency	Relative frequency	Density
0	0.31	8	0.167	0.538
0.31	0.62	0	0.000	0.000
0.62	0.93	0	0.000	0.000
0.93	1.24	3	0.063	0.202
1.24	1.55	0	0.000	0.000
1.55	1.86	0	0.000	0.000
1.86	2.17	0	0.000	0.000
2.17	2.48	0	0.000	0.000
2.48	2.79	0	0.000	0.000
2.79	3.1	37	0.771	2.487

Appendix 25 Per Question Japanese Histogram Q4 Aqua

Summary statistics:

Variable	Obs.	Obs. with missing data	Obs. without missing data	Minimum	Maximum	Mean	Std. deviation
Q4	28	0	28	0.000	3.000	2.750	0.799



Descriptive statistics for the intervals :

Lower bound	Upper bound	Frequency	Relative Frequency	Density
0	0.31	2	0.071	0.230
0.31	0.62	0	0.000	0.000
0.62	0.93	0	0.000	0.000
0.93	1.24	0	0.000	0.000
1.24	1.55	0	0.000	0.000
1.55	1.86	0	0.000	0.000
1.86	2.17	1	0.036	0.115
2.17	2.48	0	0.000	0.000
2.48	2.79	0	0.000	0.000
2.79	3.1	25	0.893	2.880

Appendix 25 Per Question Japanese Analysis Q2 Aqua and Maru Go

Summary statistics:

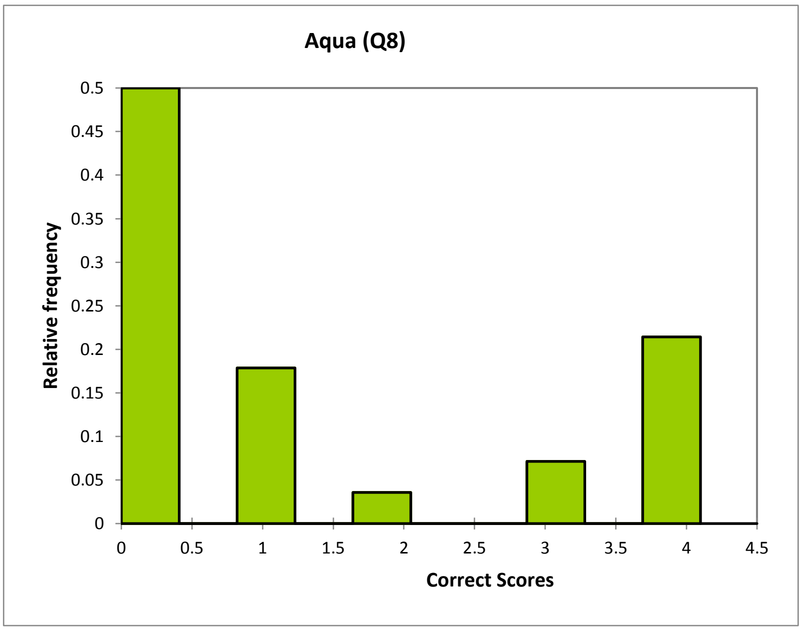
Variable	Observations	Obs. with missing data	Obs. without missing data	Minimum	Maximum	Mean	Std. deviation
Aqua	28	0	28	0.000	1.000	0.679	0.476
Marugo	48	0	48	0.000	1.000	0.583	0.498

Mann-Whitney test / Two-tailed test:	
U	736.000
Expected value	672.000
Variance (U)	6106.240
p-value (Two-tailed)	0.416
alpha	0.05

Appendix 25 Per Question Japanese Histogram Q8 Aqua

Summary statistics:

Variable	Obs.	Obs. with missing data	Obs. without missing data	Minimum	Maximum	Mean	Std. deviation
Q8	28	0	28	0.000	4.000	1.321	1.657



Descriptive statistics for the intervals :

Lower bound	Upper bound	Frequency	Relative Frequency	Density
0	0.41	14	0.500	1.220
0.41	0.82	0	0.000	0.000
0.82	1.23	5	0.179	0.436
1.23	1.64	0	0.000	0.000
1.64	2.05	1	0.036	0.087
2.05	2.46	0	0.000	0.000
2.46	2.87	0	0.000	0.000
2.87	3.28	2	0.071	0.174
3.28	3.69	0	0.000	0.000
3.69	4.1	6	0.214	0.523

Appendix 25 Per Question Japanese Analysis Q8 Aqua and Maru Go

Summary statistics:

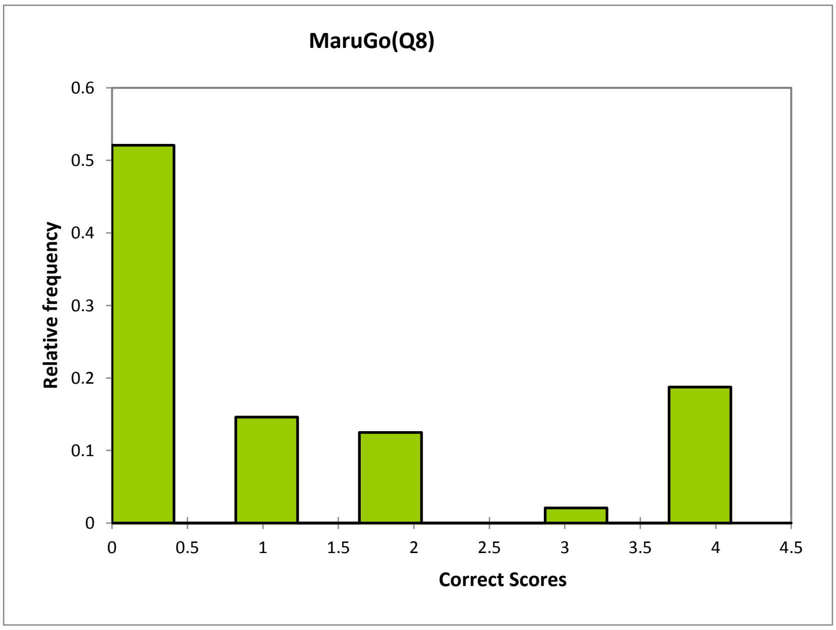
Variable	Observations	Obs. with missing data	Obs. without missing data	Minimum	Maximum	Mean	Std. deviation
Aqua	28	0	28	0.000	4.000	1.321	1.657
MaruGo	48	0	48	0.000	4.000	1.208	1.557

Mann-Whitney test / Two-tailed test:	
0	
U	690.500
Expected value	672.000
Variance (U)	7352.387
p-value (Two-tailed)	0.834
alpha	0.05

Appendix 25 Per Question Japanese Histogram Q8 Maru go

Summary statistics:

Variable	Obs.	Obs. with missing data	Obs. without missing data	Minimum	Maximum	Mean	Std. deviation
Q8	48	0	48	0.000	4.000	1.208	1.557



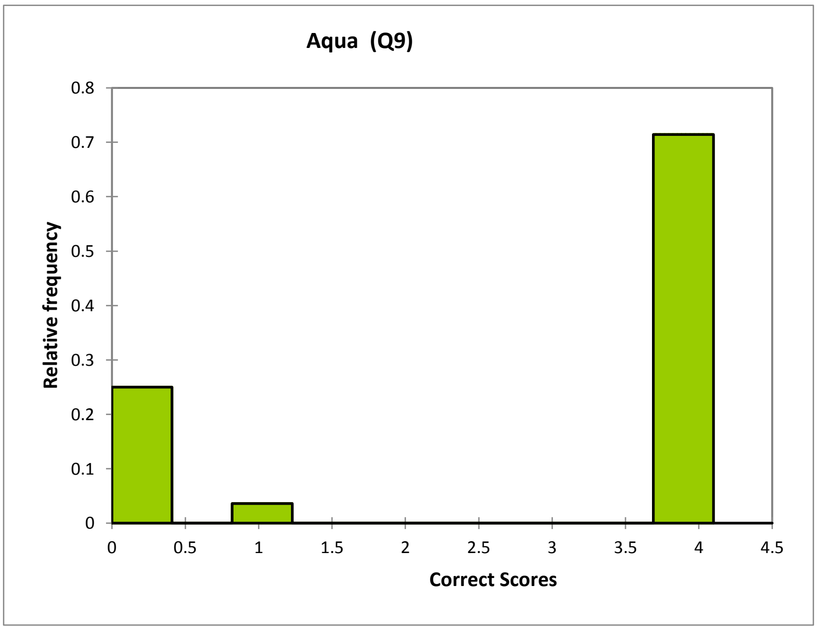
Descriptive statistics for the intervals :

Lower bound	Upper bound	Frequency	Relative Frequency	Density
0	0.41	25	0.521	1.270
0.41	0.82	0	0.000	0.000
0.82	1.23	7	0.146	0.356
1.23	1.64	0	0.000	0.000
1.64	2.05	6	0.125	0.305
2.05	2.46	0	0.000	0.000
2.46	2.87	0	0.000	0.000
2.87	3.28	1	0.021	0.051
3.28	3.69	0	0.000	0.000
3.69	4.1	9	0.188	0.457

Appendix 25 Per Question Japanese Histogram Q9 Aqua

Summary statistics:

Variable	Obs.	Obs. with missing data	Obs. without missing data	Minimum	Maximum	Mean	Std. deviation
Q9	28	0	28	0.000	4.000	2.893	1.792



Descriptive statistics for the intervals :

Lower bound	Upper bound	Frequency	Relative Frequency	Density
0	0.41	7	0.250	0.610
0.41	0.82	0	0.000	0.000
0.82	1.23	1	0.036	0.087
1.23	1.64	0	0.000	0.000
1.64	2.05	0	0.000	0.000
2.05	2.46	0	0.000	0.000
2.46	2.87	0	0.000	0.000
2.87	3.28	0	0.000	0.000
3.28	3.69	0	0.000	0.000
3.69	4.1	20	0.714	1.742

Appendix 25 Per Question Japanese Analysis Q9 Aqua and Maru Go

Summary statistics:

Variable	Observations	Obs. with missing data	Obs. without missing data	Minimum	Maximum	Mean	Std. deviation
Aqua	28	0	28	0.000	4.000	2.893	1.792
MaruGo	48	0	48	0.000	4.000	2.104	2.003

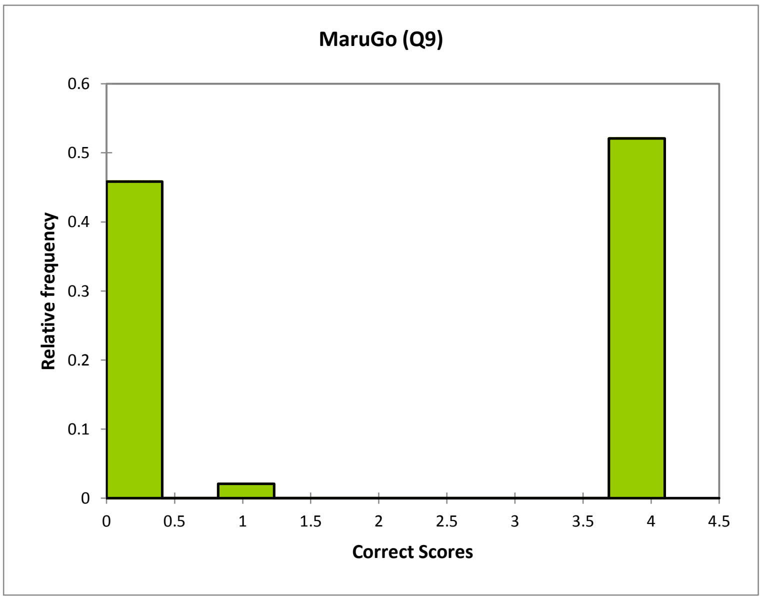
Mann-Whitney test / Two-tailed test:

U	809.500
Expected value	672.000
Variance (U)	6355.587
p-value (Two-tailed)	0.086
alpha	0.05

Appendix 25 Per Question Japanese Histogram Q9 Maru Go

Summary statistics:

Variable	Obs.	Obs. with missing data	Obs. without missing data	Minimum	Maximum	Mean	Std. deviation
Q9	48	0	48	0.000	4.000	2.104	2.003



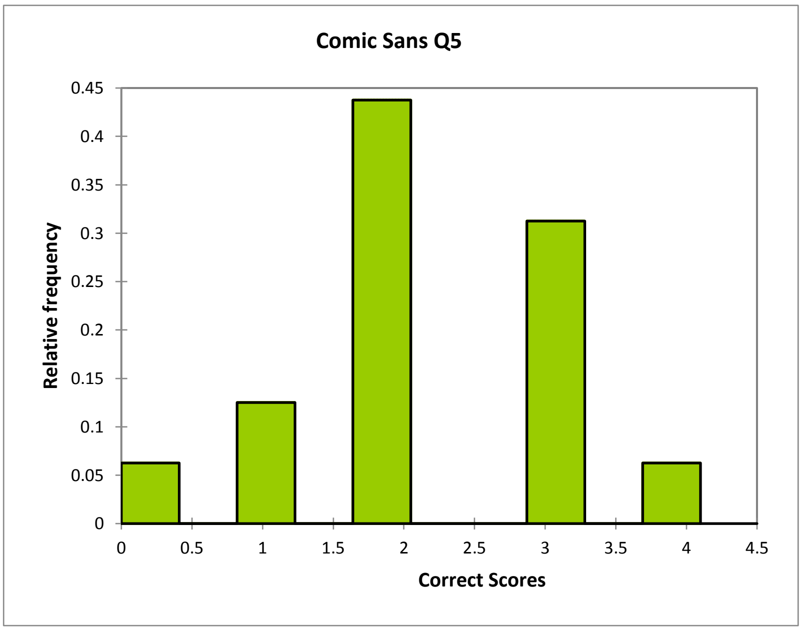
Descriptive statistics for the intervals :

Lower bound	Upper bound	Frequency	Relative Frequency	Density
0	0.41	22	0.458	1.118
0.41	0.82	0	0.000	0.000
0.82	1.23	1	0.021	0.051
1.23	1.64	0	0.000	0.000
1.64	2.05	0	0.000	0.000
2.05	2.46	0	0.000	0.000
2.46	2.87	0	0.000	0.000
2.87	3.28	0	0.000	0.000
3.28	3.69	0	0.000	0.000
3.69	4.1	25	0.521	1.270

Appendix 26 Comic Sans Q5 Histogram

Summary statistics:

Variable	Obs.	Obs. with missing data	Obs. without missing data	Minimum	Maximum	Mean	Std. deviation
Var1	16	0	16	0.000	4.000	2.188	0.981



Descriptive statistics for the intervals :

Lower bound	Upper bound	Frequency	Relative Frequency	Density
0	0.41	1	0.063	0.152
0.41	0.82	0	0.000	0.000
0.82	1.23	2	0.125	0.305
1.23	1.64	0	0.000	0.000
1.64	2.05	7	0.438	1.067
2.05	2.46	0	0.000	0.000
2.46	2.87	0	0.000	0.000
2.87	3.28	5	0.313	0.762
3.28	3.69	0	0.000	0.000
3.69	4.1	1	0.063	0.152

Appendix 26 Data Analysis Q5 Aqua Maru Go

Summary statistics:

Variable	Observations	Obs. with missing data	Obs. without missing data	Minimum	Maximum	Mean	Std. deviation
Q5Aqua	28	0	28	0.000	4.000	1.500	1.202
Q5zMaruGo	48	0	48	0.000	5.000	1.188	1.197

.	
U	779.500
Expected value	672.000
Variance (U)	8017.667
p-value (Two-tailed)	0.232
alpha	0.05

Appendix 26 Data Analysis Q5 Comic Sans Verdana

Summary statistics:

Variable	Observations	Obs. with missing data	Obs. without missing data	Minimum	Maximum	Mean	Std. deviation
Q5 Comic Sans	16	0	16	0.000	4.000	2.188	0.981
Q5 Verdana	22	0	22	0.000	4.000	1.500	0.802

z-test for two independent samples / Two-tailed test:

95% confidence interval on the difference between the means:] 0.102, 1.273 [

Difference	0.688
z (Observed value)	2.300
|z| (Critical value)	1.960
p-value (Two-tailed)	0.021
alpha	0.05

Appendix 26 Data Analysis Q5 Comic Sans Verdana

t-test for two independent samples / Two-tailed test:

95% confidence interval on the difference between the means:] 0.100, 1.275 [

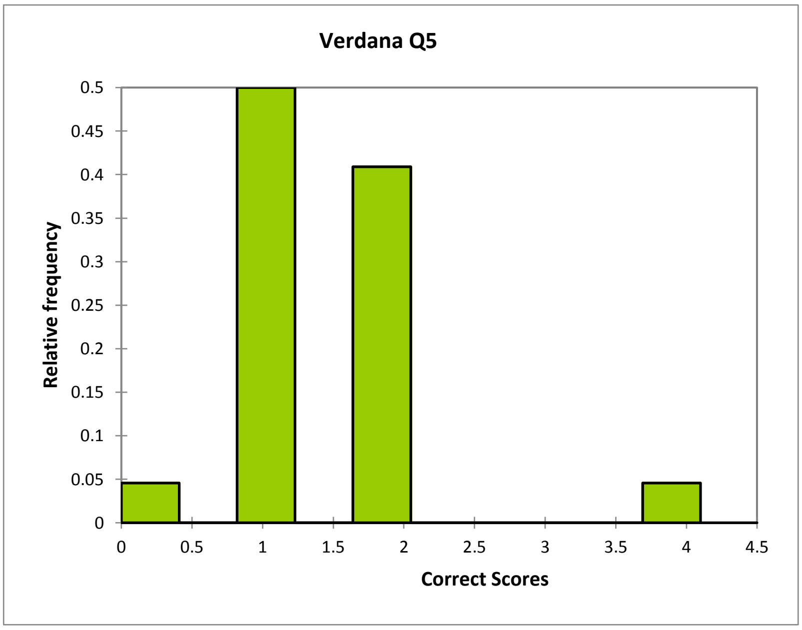
Difference	0.688
t (Observed value)	2.375
|t| (Critical value)	2.028
DF	36
p-value (Two-tailed)	0.023
alpha	0.05

Variable¥Test	z	Student
	0.021	**0.023**

Appendix 26 Verdana Histogram Q5

Summary statistics:

Variable	Obs.	Obs. with missing data	Obs. without missing data	Minimum	Maximum	Mean	Std. deviation
Q#5	22	0	22	0.000	4.000	1.500	0.802



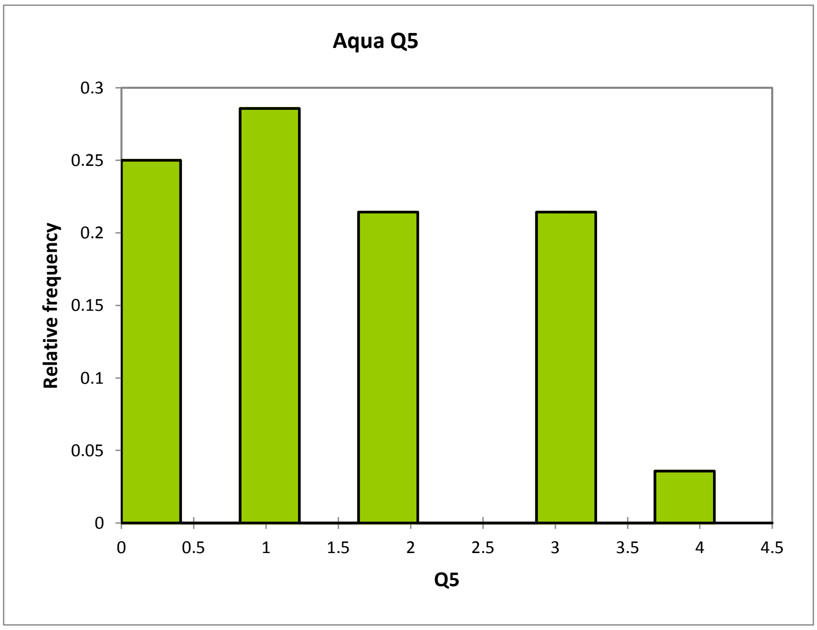
Descriptive statistics for the intervals :

Lower bound	Upper bound	Frequency	Relative Frequency	Density
0	0.41	1	0.045	0.111
0.41	0.82	0	0.000	0.000
0.82	1.23	11	0.500	1.220
1.23	1.64	0	0.000	0.000
1.64	2.05	9	0.409	0.998
2.05	2.46	0	0.000	0.000
2.46	2.87	0	0.000	0.000
2.87	3.28	0	0.000	0.000
3.28	3.69	0	0.000	0.000
3.69	4.1	1	0.045	0.111

Appendix 26 Q5 Aqua Histogram

Summary statistics:

Variable	Obs.	Obs. with missing data	Obs. without missing data	Minimum	Maximum	Mean	Std. deviation
Q5	28	0	28	0.000	4.000	1.500	1.202



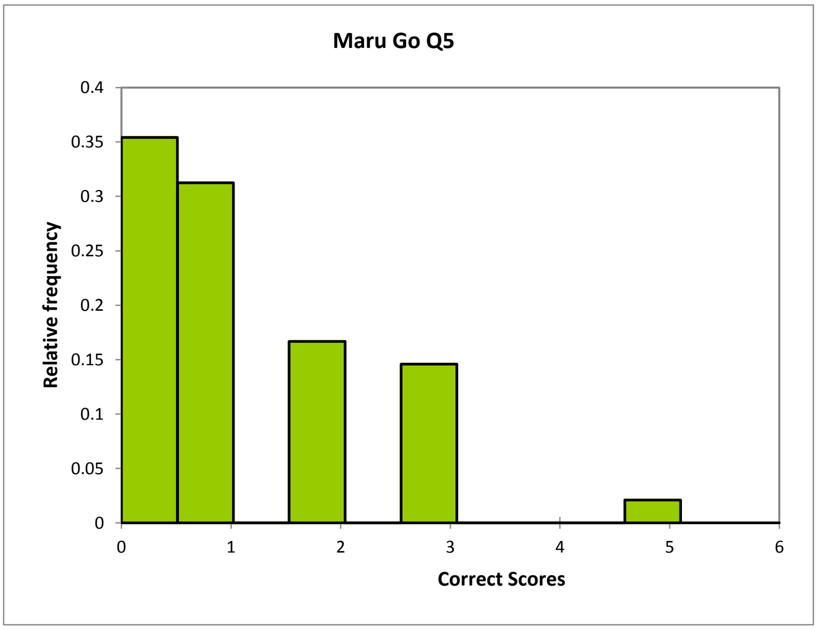
Descriptive statistics for the intervals :

	Upper bound	Frequency	Relative Frequency	Density
0	0.41	7	0.250	0.610
0.41	0.82	0	0.000	0.000
0.82	1.23	8	0.286	0.697
1.23	1.64	0	0.000	0.000
1.64	2.05	6	0.214	0.523
2.05	2.46	0	0.000	0.000
2.46	2.87	0	0.000	0.000
2.87	3.28	6	0.214	0.523
3.28	3.69	0	0.000	0.000
3.69	4.1	1	0.036	0.087

Appendix 26 Q5 Maru Go Histogram

Summary statistics:

Variable	Obs.	Obs. with missing data	Obs. without missing data	Minimum	Maximum	Mean	Std. deviation
Q5	48	0	48	0.000	5.000	1.188	1.197



Descriptive statistics for the intervals :

Lower bound	Upper bound	Frequency	Relative Frequency	Density
0	0.51	17	0.354	0.694
0.51	1.02	15	0.313	0.613
1.02	1.53	0	0.000	0.000
1.53	2.04	8	0.167	0.327
2.04	2.55	0	0.000	0.000
2.55	3.06	7	0.146	0.286
3.06	3.57	0	0.000	0.000
3.57	4.08	0	0.000	0.000
4.08	4.59	0	0.000	0.000
4.59	5.1	1	0.021	0.041

Appendix 26 Data Analysis Comic Sans Verdana Q6

Summary statistics:

Variable	Observations	Obs. with missing data	Obs. without missing data	Minimum	Maximum	Mean	Std. deviation
Q6 Comic Sans	16	0	16	0.000	5.000	3.500	1.592
Q6 Verdana	22	0	22	0.000	5.000	1.591	1.436
0							
3							
z-test for two independent samples / Two-tailed test:							

95% confidence interval on the difference between the means:

] 0.925,

Difference	1.909
z (Observed value)	3.802
|z| (Critical value)	1.960
p-value (Two-tailed)	0.000
alpha	0.05

Appendix 26 Data Analysis Comic Sans Verdana Q6

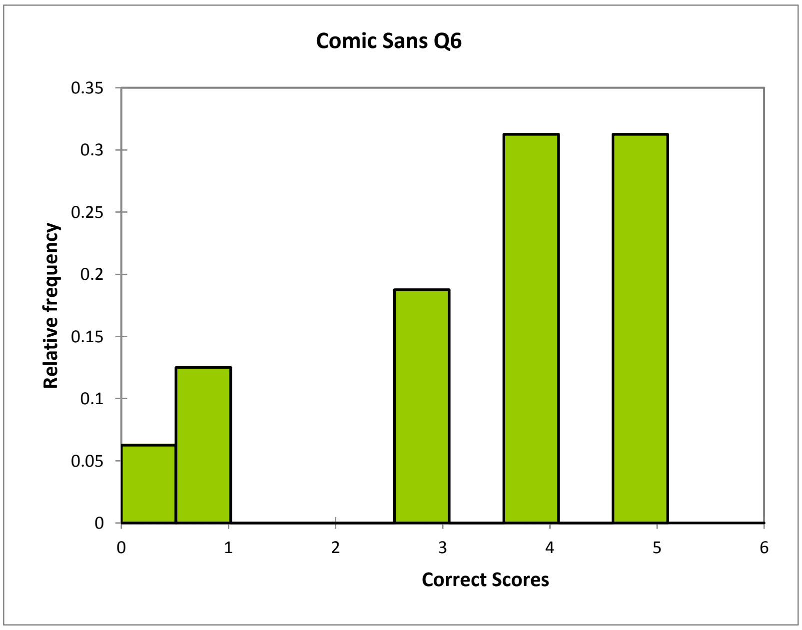
t-test for two independent samples / Two-tailed test:

Difference	1.909
t (Observed value)	3.866
|t| (Critical value)	2.028
DF	36
p-value (Two-tailed)	0.000
alpha	0.05

Appendix 26 Q6 Comic Sans Histogram

Summary statistics:

Variable	Obs.	Obs. with missing data	Obs. without missing data	Minimum	Maximum	Mean	Std. deviation
Var1	16	0	16	0.000	5.000	3.500	1.592



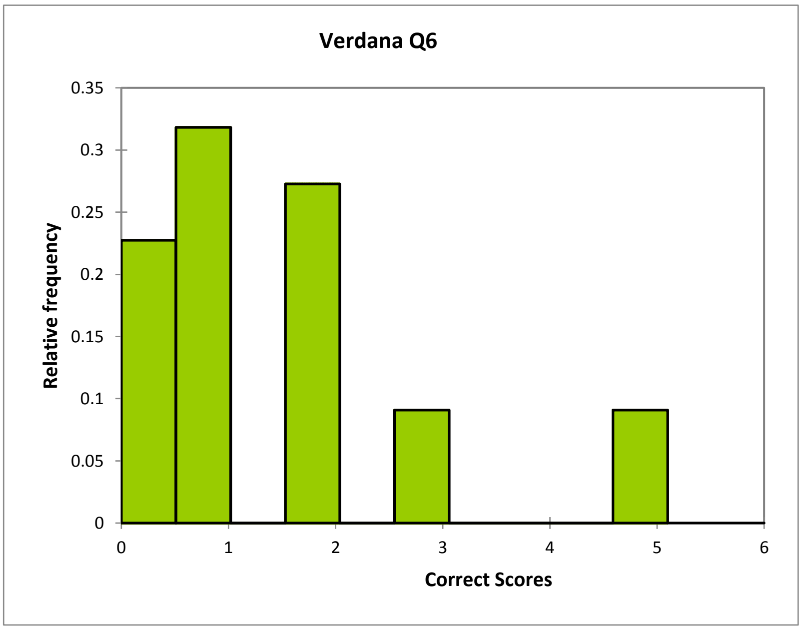
Descriptive statistics for the intervals :

Lower bound	Upper bound	Frequency	Relative Frequency	Density
0	0.51	1	0.063	0.123
0.51	1.02	2	0.125	0.245
1.02	1.53	0	0.000	0.000
1.53	2.04	0	0.000	0.000
2.04	2.55	0	0.000	0.000
2.55	3.06	3	0.188	0.368
3.06	3.57	0	0.000	0.000
3.57	4.08	5	0.313	0.613
4.08	4.59	0	0.000	0.000
4.59	5.1	5	0.313	0.613

Appendix 26 Q6 Verdana Histogram

Summary statistics:

Variable	Obs.	Obs. with missing data	Obs. without missing data	Minimum	Maximum	Mean	Std. deviation
Q#6	22	0	22	0.000	5.000	1.591	1.436



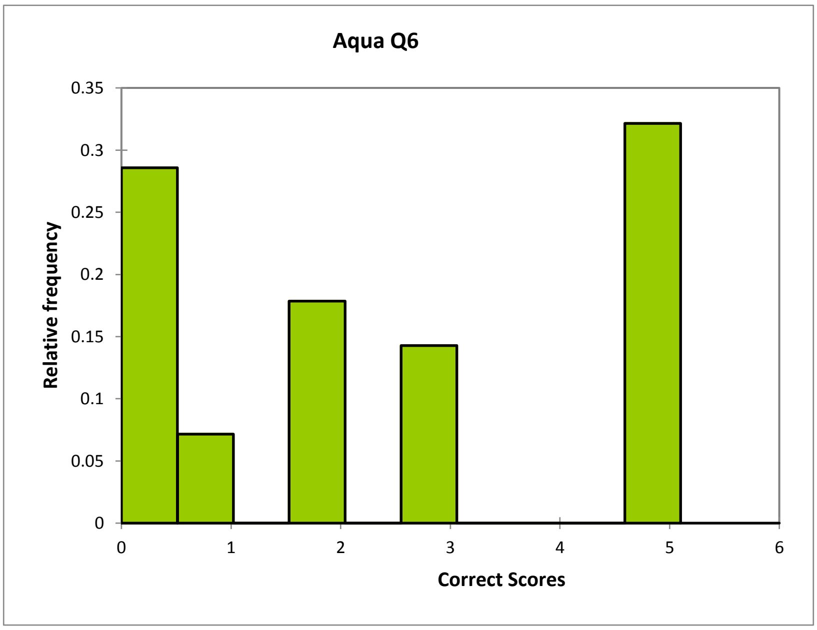
Descriptive statistics for the intervals :

Lower bound	Upper bound	Frequency	Relative Frequency	Density
0	0.51	5	0.227	0.446
0.51	1.02	7	0.318	0.624
1.02	1.53	0	0.000	0.000
1.53	2.04	6	0.273	0.535
2.04	2.55	0	0.000	0.000
2.55	3.06	2	0.091	0.178
3.06	3.57	0	0.000	0.000
3.57	4.08	0	0.000	0.000
4.08	4.59	0	0.000	0.000
4.59	5.1	2	0.091	0.178

Appendix 26 Q6 Aqua Histogram

Summary statistics:

Variable	Obs.	Obs. with missing data	Obs. without missing data	Minimum	Maximum	Mean	Std. deviation
Q6	28	0	28	0.000	5.000	2.464	2.045



Descriptive statistics for the intervals :

Lower bound	Upper bound	Frequency	Relative Frequency	Density
0	0.51	8	0.286	0.560
0.51	1.02	2	0.071	0.140
1.02	1.53	0	0.000	0.000
1.53	2.04	5	0.179	0.350
2.04	2.55	0	0.000	0.000
2.55	3.06	4	0.143	0.280
3.06	3.57	0	0.000	0.000
3.57	4.08	0	0.000	0.000
4.08	4.59	0	0.000	0.000
4.59	5.1	9	0.321	0.630

Appendix 26 Q6 Data Analysis Aqua Maru Go

Summary statistics:

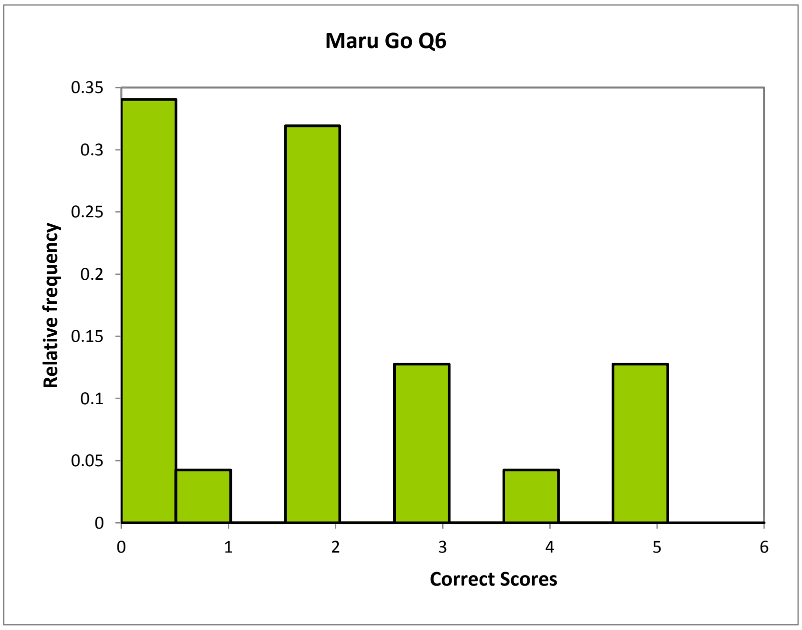
Variable	Observations	Obs. with missing data	Obs. without missing data	Minimum	Maximum	Mean	Std. deviation
Q6	28	0	28	0.000	5.000	2.464	2.045
Q6(2)	48	1	47	0.000	5.000	1.872	1.702

Mann-Whitney test / Two-tailed test:	
U	765.500
Expected value	658.000
Variance (U)	7817.040
p-value (Two-tailed)	0.226
alpha	0.05

Appendix 26 Q6 Maru Go Histogram

Summary statistics:

Variable	Obs.	Obs. with missing data	Obs. without missing data	Minimum	Maximum	Mean	Std. deviation
Q6	47	0	47	0.000	5.000	1.872	1.702



Descriptive statistics for the intervals :

Lower bound	Upper bound	Frequency	Relative Frequency	Density
0	0.51	16	0.340	0.668
0.51	1.02	2	0.043	0.083
1.02	1.53	0	0.000	0.000
1.53	2.04	15	0.319	0.626
2.04	2.55	0	0.000	0.000
2.55	3.06	6	0.128	0.250
3.06	3.57	0	0.000	0.000
3.57	4.08	2	0.043	0.083
4.08	4.59	0	0.000	0.000
4.59	5.1	6	0.128	0.250

Appendix 27 Q11 Subjects Comments English

Question 11 Positive Negative Neutral Opinion

Positive =1 Negative =-1

Comic Sans	Score	Verdana	
Not exactly, but it seems optimal. I don't think people would take the time in America to do this.	-1	Some of the recycling procedures seen in Akitakataare similar to ones practiced in the States.I do not agree with the oversized garbage policy.	0
Not as thorough as it is but we do recycle. Yes.	0	No. Yes!It would take getting used to but seems efficient!	0
No, too much of a hassle.	-1	I recycle based on plastic, aluminum, etc. and I am reponsible for bringing it to the dumps. I like the idea, but should maybe have more recycling days?	1
not quite like this	-1	No, Yes!	0
No, and No	-1	Not exactly, yes.	0
No.	-1	Yes. Yes, I like it.	1
No and no.	-1	No we do not	0
No, this system seems great, but also a lot of work	-1	No, I would not remember it all.	0
No,yes seems progressive	0	No, I feelthat if my town tried to enforce this way if recycling it would never work. They shouldn't charge $ for the	0
No..recycling is a pain!	-1	Yes	1

Appendix 27 Q11 Subjects Comments English

No, No	−1	No,I don't, but it is a very good system.	0
Yes, and Yex	1	I recycle but not in all of these different ways. I like to	1
No. It's troublesome, but for a good cause	−1	No, we recycle with fewer rules. I do like it because its probably more effective and better for the environment.	−1
		No, No	−1
		Not exactly and not really	−1
		I do recycle but weekly	0
		No	−1
		I recycle but don't have to deliver to waste center. I like it.	1
		yes and yes	1
		No	−1
		No, No	−1

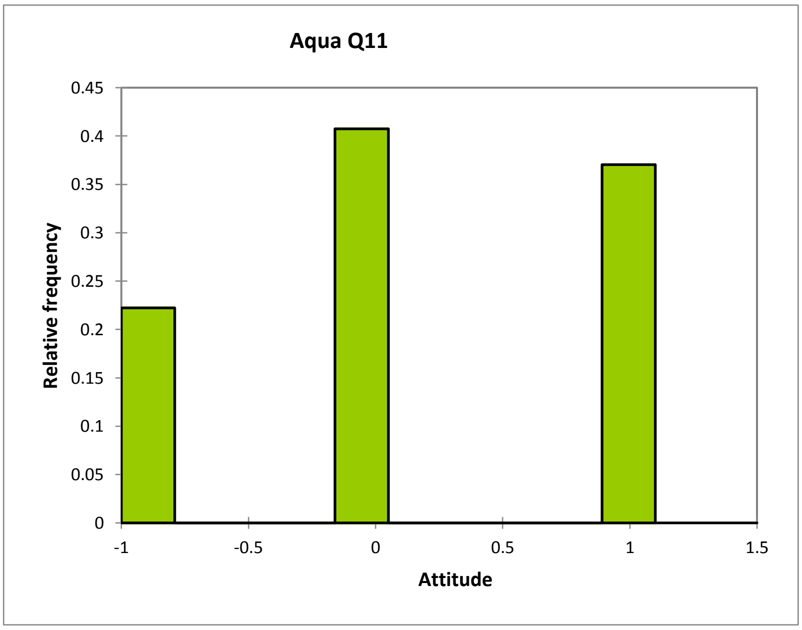
Appendix 27 Q11 Subjects Comments Aqua Font

Survey	Q11 Do you recycle like this town ? Do you like it?	English translation	Aqua Positive, Negative, Neutral P=1 N=−1, N=0
41	してません	I don't do it	−1
42	はい	Yes	1
43	はい	Yes	1
44	はい	Yes	1
45	リサイクルはしていない。すきだ	I don't recycle but I like it.	0
46	していない	I don' do it	−1
47	している	I do it	1
48	私はあまりリサイクルをしていません。しないければならないと思いますが好きになれないので。	I don't really recycle. I really think I don't have to do it. I don't like it.	−1
49	したません。好きでも嫌いでもないけどやるべきとは思います。	I don't do it. I like but don't like it I think we should do it.	0
50	しない。嫌い	I do't do it . I don't like it.	−1
51	−		
52	していない。すき	I don't do it but I like it.	0
53	Yes. めんどうです	Yes, it is troublesome	0
54	はい	Yes	1
55	ごみの分別は意識している	I'm aware of separating garbage。	0
56	カンやペットボトルは決められた所に捨てている。好きとは思はない。	I throw away cans and bottles in the determined place. I never thought about if I like it.	0
57	しているがすきとも嫌いとも感じていない	I like and don't like, I don't feel about it	0
58	リサイクルをしている。好きです	I recycle. I like it	1
59	している。あまりすきではない	I do it. I really do not like it.	0
60	重さ、長さにまで気を配って。リサイクルはできません。持に好きではありません。	Weight and length needs to be taken care of so I can't recycle. I do not like it.	−1
61	はい	yes	1
62	好きです	I like it.	1
63	いいえ	No	−1
64	いいえ。細かくリサイクルするのは良いことだと思う。	No Detailed recycling I think is good.	1
65	はい。いいことなので好きです	Yes.It is a good thing and I like it.	1
66	リサイクルはしている。好きという感情はないが環境に良い行動は進んでした。	I recycle. I have no feelings of love but it is good for the environment.	0
67	はい。好きかどうかはかかりませ	Yes. I like it, maybe	0
68	ビニールごみと普通ごみを分かけている	I separatevinyl and regular garbage.	0
			0.148148 Mean

Appendix 27 Q11 Subjects Comments Aqua Histogram

Summary statistics:

Variable	Obs.	Obs. with missing data	Obs. without missing data	Minimum	Maximum	Mean	Std. deviation
Var1	27	0	27	−1.000	1.000	0.148	0.770



Descriptive statistics for the intervals :

Lower bound	Upper bound	Frequency	Relative Frequency	Density
−1	−0.79	6	0.222	1.058
−0.79	−0.58	0	0.000	0.000
−0.58	−0.37	0	0.000	0.000
−0.37	−0.16	0	0.000	0.000
−0.16	0.05	11	0.407	1.940
0.05	0.26	0	0.000	0.000
0.26	0.47	0	0.000	0.000
0.47	0.68	0	0.000	0.000
0.68	0.89	0	0.000	0.000
0.89	1.1	10	0.370	1.764

Appendix 27 Q11 Subjects Comments Data Analysis Maru Go and Aqua

Summary statistics:

Variable	Observations	Obs. with missing data	Obs. without missing data	Minimum	Maximum	Mean	Std. deviation
Q11 Aqua	27	0	27	-1.000	1.000	0.148	0.770
Q11Marugo	40	0	40	-1.000	1.000	-0.150	0.949

z-test for two independent samples / Two-tailed test:	
0	
95% confidence interval on the difference between the means:	
] -0.115 ,	0.711 [
Difference	0.298
z (Observed value)	1.414
|z| (Critical value)	1.960
p-value (Two-tailed)	0.157
alpha	0.05

Appendix 27 Q11 Subjects Comments Data Analysis Maru Go and Aqua

	] -0.140 , 0.737 [
Difference	0.298
t (Observed value)	1.358
|t| (Critical value)	1.997
DF	65
p-value (Two-tailed)	0.179
alpha	0.05
	0

As the computed p-value is greater than the significance level alpha=0.05, one cannot reject the null hypothesis H0.

The risk to reject the null hypothesis H0 while it is true is 17.92%.

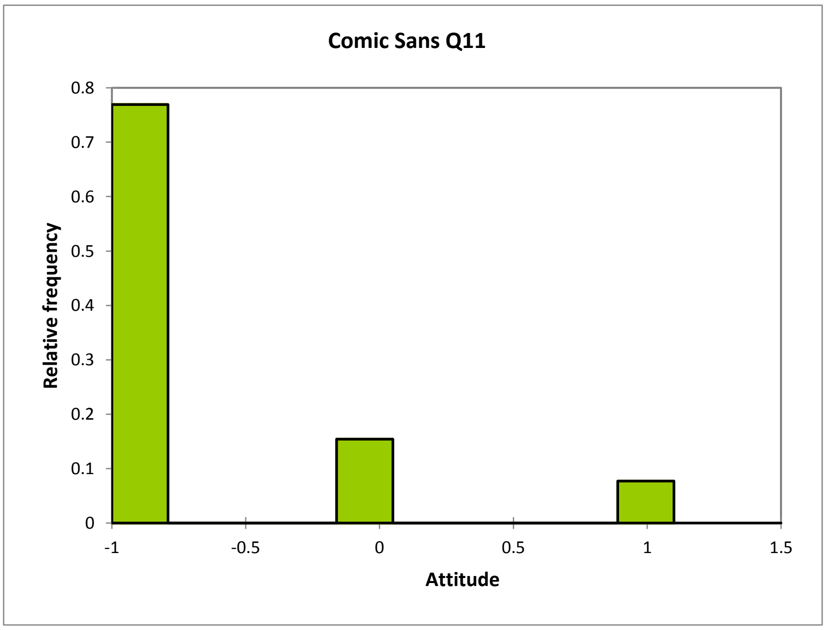
Summary:

Variable¥Test	z	Student
	0.157	0.179

Appendix 27 Q11 Subjects Comments Comic Sans Histogram

Summary statistics:

Variable	Obs.	Obs. with missing data	Obs. without missing data	Minimum	Maximum	Mean	Std. deviation
Var1	13	0	13	−1.000	1.000	−0.692	0.630



Descriptive statistics for the intervals :

Lower bound	Upper bound	Frequency	Relative Frequency	Density
−1	−0.79	10	0.769	3.663
−0.79	−0.58	0	0.000	0.000
−0.58	−0.37	0	0.000	0.000
−0.37	−0.16	0	0.000	0.000
−0.16	0.05	2	0.154	0.733
0.05	0.26	0	0.000	0.000
0.26	0.47	0	0.000	0.000
0.47	0.68	0	0.000	0.000
0.68	0.89	0	0.000	0.000
0.89	1.1	1	0.077	0.366

Appendix 27 Q11 Subjects Comments Data Analysis Comic Sans and Verdana

Variable	Observations	Obs. with missing data	Obs. without missing data	Minimum	Maximum	Mean	Std. deviation
Comic Sans	13	0	13	-1.000	1.000	-0.692	0.630
Verdana	21	0	21	-1.000	1.000	0.000	0.775

-1	-1
	-1
z-test for two independent samples / Two-tailed test:	-1
	0
95% confidence interval on the difference between the means:	-1
] -1.169 ,	-0.216 [
	1
Difference	-0.692
z (Observed value)	-2.847
|z| (Critical value)	1.960
p-value (Two-tailed)	0.004
alpha	0.05

reject the null hypothesis H0, and accept the alternative hypothesis Ha.
The risk to reject the null hypothesis H0 while it is true is lower than 0.44%.

t-test for two independent samples / Two-tailed test:

95% confidence interval on the difference between the means:
] -1.213 , -0.172 [

Difference	-0.692
t (Observed value)	-2.710
|t| (Critical value)	2.037
DF	32
p-value (Two-tailed)	0.011
alpha	0.05

Test interpretation:
H0: The difference between the means is equal to 0.
Ha: The difference between the means is different from 0.
As the computed p-value is lower than the significance level alpha=0.05, one should
reject the null hypothesis H0, and accept the alternative hypothesis Ha.
The risk to reject the null hypothesis H0 while it is true is lower than 1.07%.

Summary:

Variable¥Test	z	Student
	0.004	**0.011**

Appendix 27 Q11 Subjects Comments Maru Go

Survey	Q11 Do you recycle like this town ? Do you like it?	Maru Go English translation	Positive, Negative, Neutral P=1 N=-1, N=0
1	−	−	
2	リサイクルは必要なことであるために。りさいくるしている	Recycling is necessary. I am recycling	1
3	いいえ	No	−1
4	できていない。リサイクルする習慣をつけたい	I don't do it. I want to make it a habit.	1
5	している。すくではない。	I do it. I don't like it	0
6	いいえ、ない	No, I don't	−1
7	している。手間はかかるが、そのまま燃やしてしまうより良いと思	Yes, it takes effort, but it is better than burning	1
8	好き	I like it	1
9	してます。好きです	I do it and I like it	1
10	してません	I don't do it	−1
11	してない。やることはいいことだと思う	No, I don't do it Wanting to do it is good.	0
12	している。好き	I do it and I like it.	1
13	している。良いと思う。	I do it. I think it is good.	1
14	いいえ	No	−1
15	している。好き	I do it and I like it.	1
16	−		
17	してない	I don't do it。	−1
18	ない	No	−1
19	いいえ	No	−1
20	してない	I don't do it。	−1
21	してません	I don't do it.	−1
22	ない	No	−1
23	−		
24	あまりしてない	I really don't do it	−1
25	−		
26	ある？？		
27	DR		
28	はい。すきです	Yes, I like it	1
29	ゴミ回？センターに持っていき。分別する。面？なのですきです。		1
30	いいえ。細かいとこるまでやる手間が好きでない。家電などはリサイクルショップで買いとってもらえるのに、お金を私って市のリサイクルにだす必要はない。	No. I don't like all of the small details. Though if I had consumer electronicsI would bring it to a recycle shop and sell it, there is no need to spend money to the city recycling center.	−1
31	行っている。好きである。	I am doing it and I like it	1
32	Yes	Yes	1
33	してない。やることはいいことだと思う好きでない	I don't do it and I don't like it.	−1
34	あまりしてない。なんごみでどうやって?理をするかを考えるとめんどうで好きでない。	I really don't do it. What garbage, how to do it takes thinking and it is troublesome. I don't like it.	−1
35	−		
36	無理	impossible	−1
37	ない	No	−1
38	あまりしてないです	I really don't do it	−1
39	してない。すきでもない。	I don't do it and I don't like it.	−1
40	ない	No	−1

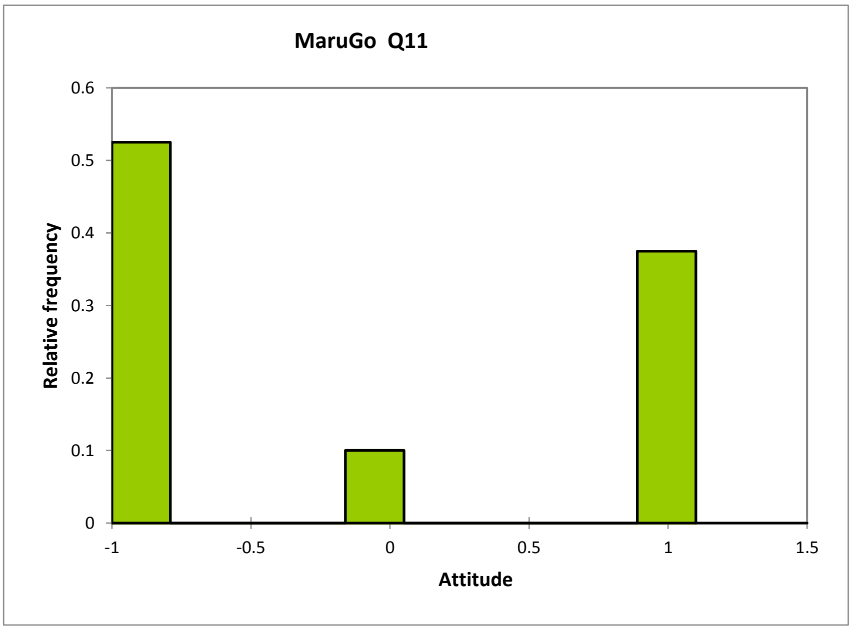
Appendix 27 Q11 Subjects Comments Maru Go

41	してます、すきです	I do it and I like it.	1
42	してない	I don't do it.	−1
43	ペットボトルぐらいならする。好き	I do it for pet bottles. I like it	1
44	あまりしてない。好きでない。	I really don't do it。I like it.	0
45	してない。面倒くさいので好きではない。	I don't do it. It is troublesome and I don't like it.	−1
46	リサイクルをしてあり。すきであ	I recycle. I like it.	1
47	してうる．？？		
48	ここまで細かくしていない。ふつう	I don't do it in detail, no felling, normal.	0

Appendix 27 Q11 Subjects Comments Maru Go Histogram

Summary statistics:

Variable	Observations	Obs. with missing data	Obs. without missing data	Minimum	Maximum	Mean	Std. deviation
Var1	40	0	40	−1.000	1.000	−0.150	0.949



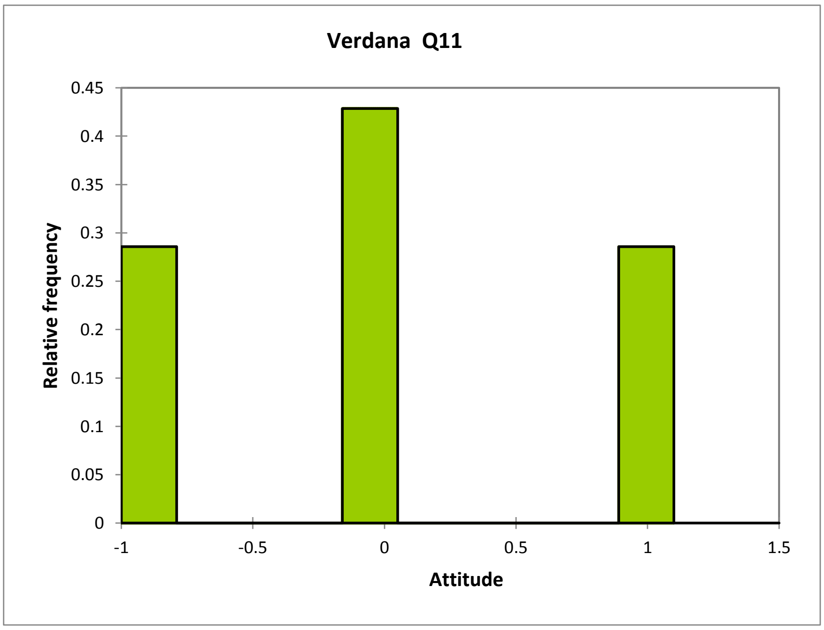
Descriptive statistics for the intervals :

Lower bound	Upper bound	Frequency	Relative Frequency	Density
−1	−0.79	21	0.525	2.500
−0.79	−0.58	0	0.000	0.000
−0.58	−0.37	0	0.000	0.000
−0.37	−0.16	0	0.000	0.000
−0.16	0.05	4	0.100	0.476
0.05	0.26	0	0.000	0.000
0.26	0.47	0	0.000	0.000
0.47	0.68	0	0.000	0.000
0.68	0.89	0	0.000	0.000
0.89	1.1	15	0.375	1.786

Appendix 27 Q11 Subjects Comments Verdana Histogram

Summary statistics:

Variable	Obs.	Obs. with missing data	Obs. without missing data	Minimum	Maximum	Mean	Std. deviation
Var1	21	0	21	−1.000	1.000	0.000	0.775



Descriptive statistics for the intervals :

Lower bound	Upper bound	Frequency	Relative Frequency	Density
−1	−0.79	6	0.286	1.361
−0.79	−0.58	0	0.000	0.000
−0.58	−0.37	0	0.000	0.000
−0.37	−0.16	0	0.000	0.000
−0.16	0.05	9	0.429	2.041
0.05	0.26	0	0.000	0.000
0.26	0.47	0	0.000	0.000
0.47	0.68	0	0.000	0.000
0.68	0.89	0	0.000	0.000
0.89	1.1	6	0.286	1.361

Appendix 28 All Japanese Data Analysis per Font Style

Summary statistics:

Variable	Observations	Obs. with missing data	Obs. without missing data	Minimum	Maximum	Mean	Std. deviation
Y1	204	0	204	8.000	31.000	20.549	4.904

Variable	Categories	Frequencies	%
Q1	MS-Gothic	35	17.157
	MSP-Gothic	22	10.784
	Maru go	45	22.059
	Merio	30	14.706
	Mincho	23	11.275
	aqua	26	12.745
	HG行書本	23	11.275

Correlation matrix:

Variables	Q1-MS-Gothic	Q1-MSP-Gothic	Q1-Maru go	Q1-Merio	Q1-Mincho	Q1-aqua	Q1-HG行書本	Y1
Q1-MS-Gothic	**1.000**	-0.158	-0.242	-0.189	-0.162	-0.174	-0.162	-0.051
Q1-MSP-Gothic	-0.158	**1.000**	-0.185	-0.144	-0.124	-0.133	-0.124	0.061
Q1-Maru go	-0.242	-0.185	**1.000**	-0.221	-0.190	-0.203	-0.190	-0.069
Q1-Merio	-0.189	-0.144	-0.221	**1.000**	-0.148	-0.159	-0.148	-0.015
Q1-Mincho	-0.162	-0.124	-0.190	-0.148	**1.000**	-0.136	-0.127	-0.046
Q1-aqua	-0.174	-0.133	-0.203	-0.159	-0.136	**1.000**	-0.136	0.137
Q1-HG行書本	-0.162	-0.124	-0.190	-0.148	-0.127	-0.136	**1.000**	0.011
Y1	-0.051	0.061	-0.069	-0.015	-0.046	0.137	0.011	**1.000**

Multicolinearity statistics:

Statistic	Q1-MS-Gothic	Q1-MSP-Gothic	Q1-Maru go	Q1-Merio	Q1-Mincho	Q1-aqua	Q1-HG行書本
Tolerance	0.000	0.000	0.000	0.000	0.000	0.000	0.000
VIF	0.000	0.000	0.000	0.000	0.000	0.000	0.000

Regression of variable Y1:

Goodness of fit statistics:

Observations	204.000
Sum of weights	204.000
DF	197.000
R2	0.028
Adjusted R2	-0.002
MSE	24.092
RMSE	4.908
MAPE	22.509
DW	2.023
Cp	7.000
AIC	655.982
SBC	679.209
PC	1.041

Analysis of variance:

Source	DF	Sum of squares	Mean squares	F	Pr > F
Model	6	136.346	22.724	0.943	0.465
Error	197	4746.163	24.092		
Corrected Total	203	4882.510			

Computed against model Y=Mean(Y)

Model parameters:

Source	Value	Standard error	t	Pr > |t|	Lower bound (95%)	Upper bound (95%)
Intercept	20.696	1.023	20.221	< 0.0001	18.677	22.714
Q1-MS-Gothic	-0.696	1.318	-0.528	0.598	-3.294	1.903
Q1-MSP-Gothic	0.713	1.464	0.487	0.627	-2.173	3.600
Q1-Maru go	-0.785	1.258	-0.624	0.534	-3.266	1.697
Q1-Merio	-0.329	1.360	-0.242	0.809	-3.012	2.354
Q1-Mincho	-0.783	1.447	-0.541	0.589	-3.637	2.072
Q1-aqua	1.612	1.405	1.147	0.253	-1.159	4.383
Q1-HG行書本	0.000	0.000				

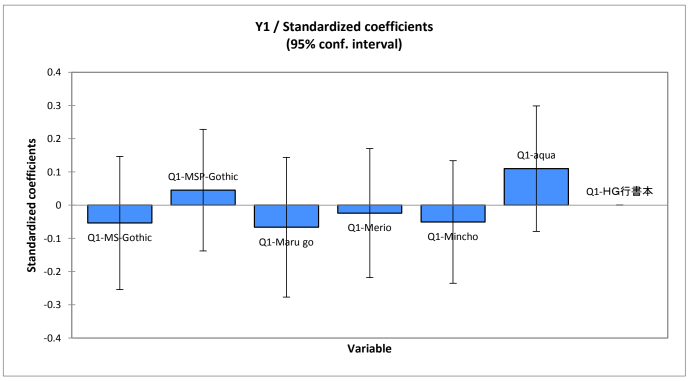
Equation of the model:

Y1 = 20.6956521739131-0.695652173913045*Q1-MS-Gothic+0.713438735177865*Q1-MSP-Gothic-0.784541062801933*Q1-Maru go-0.328985507246377*Q1-Merio-0.782608695652174*Q1-Mincho+1.61204013377926*Q1-aqua

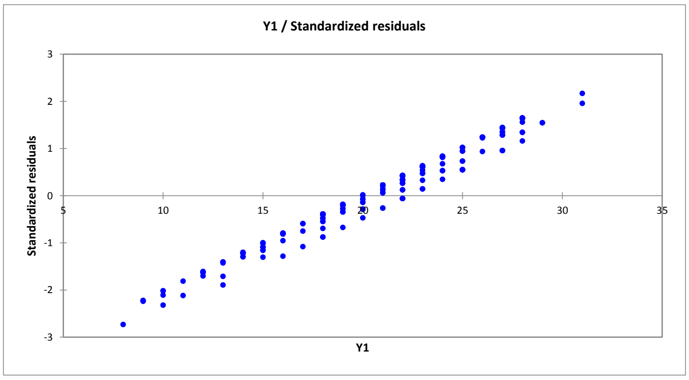
Appendix 28 All Japanese Data Analysis per Font Style

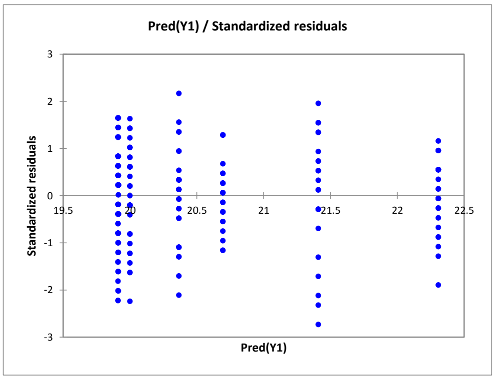
Standardized coefficients:

Source	Value	Standard error	t	Pr > |t|	Lower bound (95%)	Upper bound (95%)
Q1-MS-Gothic	-0.054	0.102	-0.528	0.598	-0.254	0.147
Q1-MSP-Gothic	0.045	0.093	0.487	0.627	-0.138	0.228
Q1-Maru go	-0.066	0.107	-0.624	0.534	-0.277	0.144
Q1-Merio	-0.024	0.098	-0.242	0.809	-0.218	0.170
Q1-Mincho	-0.051	0.094	-0.541	0.589	-0.235	0.134
Q1-aqua	0.110	0.096	1.147	0.253	-0.079	0.299
Q1-HG行書本	0.000	0.000				

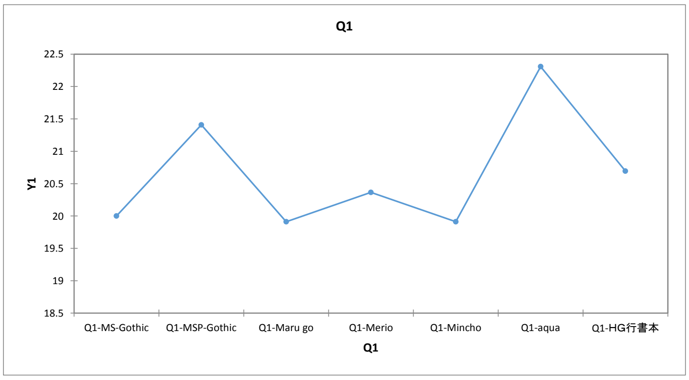


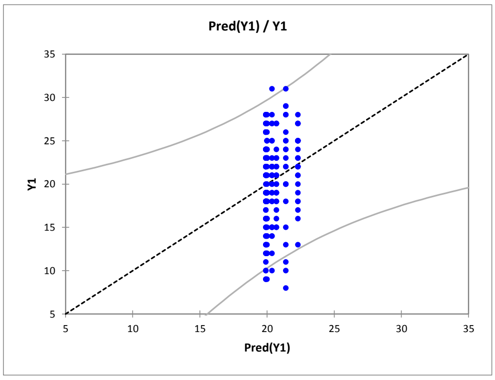
Appendix 28 All Japanese Data Analysis per Font Style





Means charts:





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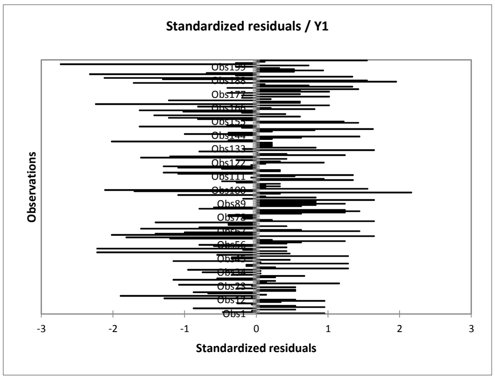
Q1 / Tukey (HSD) / Analysis of the differences between the categories with a confidence interval of 95%:

Contrast	Difference	ndardized diffe	Critical value	Pr > Diff	Significant
aqua vs Maru go	2.397	1.982	2.979	0.429	No
aqua vs Mincho	2.395	1.704	2.979	0.614	No
aqua vs MS-Gothic	2.308	1.816	2.979	0.539	No
aqua vs Merio	1.941	1.476	2.979	0.759	No
aqua vs HG行書本	1.612	1.147	2.979	0.912	No
aqua vs MSP-Gothic	0.899	0.632	2.979	0.996	No
MSP-Gothic vs Maru go	1.498	1.173	2.979	0.903	No
MSP-Gothic vs Mincho	1.496	1.022	2.979	0.948	No
MSP-Gothic vs MS-Goth	1.409	1.055	2.979	0.940	No
MSP-Gothic vs Merio	1.042	0.757	2.979	0.989	No
MSP-Gothic vs HG行書本	0.713	0.487	2.979	0.999	No
HG行書本 vs Maru go	0.785	0.624	2.979	0.996	No
HG行書本 vs Mincho	0.783	0.541	2.979	0.998	No
HG行書本 vs MS-Gothic	0.696	0.528	2.979	0.998	No
HG行書本 vs Merio	0.329	0.242	2.979	1.000	No
Merio vs Maru go	0.456	0.394	2.979	1.000	No
Merio vs Mincho	0.454	0.333	2.979	1.000	No
Merio vs MS-Gothic	0.367	0.300	2.979	1.000	No
MS-Gothic vs Maru go	0.089	0.080	2.979	1.000	No
MS-Gothic vs Mincho	0.087	0.066	2.979	1.000	No
Mincho vs Maru go	0.002	0.002	2.979	1.000	No
Tukey's d critical value:			4.213		



Category	Mean	Groups
aqua	22.308	A
MSP-Gothic	21.409	A
HG行書本	20.696	A
Merio	20.367	A
MS-Gothic	20.000	A
Mincho	19.913	A
Maru go	19.911	A

Appendix 28 All Japanese Data Analysis per Font Style

Q1 / Fisher (LSD) / Analysis of the differences between the categories with a confidence interval of 95%:

Contrast	Difference	Standardized difference	Critical value	Pr > Diff	Significant
aqua vs Maru go	2.397	1.982	1.972	0.049	Yes
aqua vs Mincho	2.395	1.704	1.972	0.090	No
aqua vs MS-Gothic	2.308	1.816	1.972	0.071	No
aqua vs Merio	1.941	1.476	1.972	0.142	No
aqua vs HG行書本	1.612	1.147	1.972	0.253	No
aqua vs MSP-Gothic	0.899	0.632	1.972	0.528	No
icMSP-Gothic vs Maru go	1.498	1.173	1.972	0.242	No
MSP-Gothic vs Mincho	1.496	1.022	1.972	0.308	No
MSP-Gothic vs MS-Goth	1.409	1.055	1.972	0.293	No
MSP-Gothic vs Merio	1.042	0.757	1.972	0.450	No
MSP-Gothic vs HG行書本	0.713	0.487	1.972	0.627	No
HG行書本 vs Maru go	0.785	0.624	1.972	0.534	No
HG行書本 vs Mincho	0.783	0.541	1.972	0.589	No
HG行書本 vs MS-Gothic	0.696	0.528	1.972	0.598	No
HG行書本 vs Merio	0.329	0.242	1.972	0.809	No
Merio vs Maru go	0.456	0.394	1.972	0.694	No
Merio vs Mincho	0.454	0.333	1.972	0.739	No
Merio vs MS-Gothic	0.367	0.300	1.972	0.764	No
MS-Gothic vs Maru go	0.089	0.080	1.972	0.936	No
MS-Gothic vs Mincho	0.087	0.066	1.972	0.947	No
Mincho vs Maru go	0.002	0.002	1.972	0.999	No
LSD-value:			2.536		

Category	Mean	Groups	
aqua	22.308	A	
MSP-Gothic	21.409	A	B
HG行書本	20.696	A	B
Merio	20.367	A	B
MS-Gothic	20.000	A	B
Mincho	19.913	A	B
Maru go	19.911		B

Q1 / Bonferroni / Analysis of the differences between the categories with a confidence interval of 95%:

Contrast	Difference	Standardized difference	Critical value	Pr > Diff	Significant
aqua vs Maru go	2.397	1.982	3.078	0.049	No
aqua vs Mincho	2.395	1.704	3.078	0.090	No
aqua vs MS-Gothic	2.308	1.816	3.078	0.071	No
aqua vs Merio	1.941	1.476	3.078	0.142	No
aqua vs HG行書本	1.612	1.147	3.078	0.253	No
aqua vs MSP-Gothic	0.899	0.632	3.078	0.528	No
icMSP-Gothic vs Maru go	1.498	1.173	3.078	0.242	No
MSP-Gothic vs Mincho	1.496	1.022	3.078	0.308	No
MSP-Gothic vs MS-Goth	1.409	1.055	3.078	0.293	No
MSP-Gothic vs Merio	1.042	0.757	3.078	0.450	No
MSP-Gothic vs HG行書本	0.713	0.487	3.078	0.627	No
HG行書本 vs Maru go	0.785	0.624	3.078	0.534	No
HG行書本 vs Mincho	0.783	0.541	3.078	0.589	No
HG行書本 vs MS-Gothic	0.696	0.528	3.078	0.598	No
HG行書本 vs Merio	0.329	0.242	3.078	0.809	No
Merio vs Maru go	0.456	0.394	3.078	0.694	No
Merio vs Mincho	0.454	0.333	3.078	0.739	No
Merio vs MS-Gothic	0.367	0.300	3.078	0.764	No
MS-Gothic vs Maru go	0.089	0.080	3.078	0.936	No
MS-Gothic vs Mincho	0.087	0.066	3.078	0.947	No
Mincho vs Maru go	0.002	0.002	3.078	0.999	No
Modified significance level:			0.002		

Category	Mean	Groups
aqua	22.308	A
MSP-Gothic	21.409	A
HG行書本	20.696	A
Merio	20.367	A
MS-Gothic	20.000	A
Mincho	19.913	A
Maru go	19.911	A

Q1 / Dunn-Sidak / Analysis of the differences between the categories with a confidence interval of 95%:

Contrast	Difference	Standardized difference	Critical value	Pr > Diff	Significant
aqua vs Maru go	2.397	1.982	3.070	0.049	No
aqua vs Mincho	2.395	1.704	3.070	0.090	No
aqua vs MS-Gothic	2.308	1.816	3.070	0.071	No
aqua vs Merio	1.941	1.476	3.070	0.142	No
aqua vs HG行書本	1.612	1.147	3.070	0.253	No
aqua vs MSP-Gothic	0.899	0.632	3.070	0.528	No
icMSP-Gothic vs Maru go	1.498	1.173	3.070	0.242	No
MSP-Gothic vs Mincho	1.496	1.022	3.070	0.308	No
MSP-Gothic vs MS-Goth	1.409	1.055	3.070	0.293	No
MSP-Gothic vs Merio	1.042	0.757	3.070	0.450	No
MSP-Gothic vs HG行書本	0.713	0.487	3.070	0.627	No
HG行書本 vs Maru go	0.785	0.624	3.070	0.534	No
HG行書本 vs Mincho	0.783	0.541	3.070	0.589	No
HG行書本 vs MS-Gothic	0.696	0.528	3.070	0.598	No
HG行書本 vs Merio	0.329	0.242	3.070	0.809	No
Merio vs Maru go	0.456	0.394	3.070	0.694	No
Merio vs Mincho	0.454	0.333	3.070	0.739	No
Merio vs MS-Gothic	0.367	0.300	3.070	0.764	No
MS-Gothic vs Maru go	0.089	0.080	3.070	0.936	No
MS-Gothic vs Mincho	0.087	0.066	3.070	0.947	No
Mincho vs Maru go	0.002	0.002	3.070	0.999	No
Modified significance level:			0.002		

Appendix 28 All Japanese Data Analysis per Font Style

Category	Mean	Groups
aqua	22.308	A
MSP-Gothic	21.409	A
HG行書本	20.696	A
Merio	20.367	A
MS-Gothic	20.000	A
Mincho	19.913	A
Maru go	19.911	A

Q1 / Newman-Keuls (SNK) / Analysis of the differences between the categories with a confidence interval of 95%:

Contrast	Difference	Standardized difference	Critical value	Pr > Diff	Significant
aqua vs Maru go	2.397	1.982	2.979	0.429	No
aqua vs Mincho	2.395	1.704	2.878	0.531	No
aqua vs MS-Gothic	2.308	1.816	2.753	0.367	No
aqua vs Merio	1.941	1.476	2.591	0.454	No
aqua vs HG行書本	1.612	1.147	2.362	0.486	No
aqua vs MSP-Gothic	0.899	0.632	1.972	0.528	No
MSP-Gothic vs Maru go	1.498	1.173	2.878	0.849	No
MSP-Gothic vs Mincho	1.496	1.022	2.753	0.845	No
MSP-Gothic vs MS-Goth	1.409	1.055	2.591	0.717	No
MSP-Gothic vs Merio	1.042	0.757	2.362	0.730	No
MSP-Gothic vs HG行書本	0.713	0.487	1.972	0.627	No
HG行書本 vs Maru go	0.785	0.624	2.753	0.971	No
HG行書本 vs Mincho	0.783	0.541	2.591	0.949	No
HG行書本 vs MS-Gothic	0.696	0.528	2.362	0.858	No
HG行書本 vs Merio	0.329	0.242	1.972	0.809	No
Merio vs Maru go	0.456	0.394	2.591	0.979	No
Merio vs Mincho	0.454	0.333	2.362	0.941	No
Merio vs MS-Gothic	0.367	0.300	1.972	0.764	No
MS-Gothic vs Maru go	0.089	0.080	2.362	0.996	No
MS-Gothic vs Mincho	0.087	0.066	1.972	0.947	No
Mincho vs Maru go	0.002	0.002	1.972	0.999	No

Category	Mean	Groups
aqua	22.308	A
MSP-Gothic	21.409	A
HG行書本	20.696	A
Merio	20.367	A
MS-Gothic	20.000	A
Mincho	19.913	A
Maru go	19.911	A

Q1 / Duncan / Analysis of the differences between the categories with a confidence interval of 95%:

Contrast	Difference	Standardized difference	Critical value	Pr > Diff	alpha (Modified)	Significant
aqua vs Maru go	2.397	1.982	2.268	0.429	0.265	No
aqua vs Mincho	2.395	1.704	2.236	0.531	0.226	No
aqua vs MS-Gothic	2.308	1.816	2.196	0.367	0.185	No
aqua vs Merio	1.941	1.476	2.145	0.454	0.143	No
aqua vs HG行書本	1.612	1.147	2.076	0.486	0.098	No
aqua vs MSP-Gothic	0.899	0.632	1.972	0.528	0.050	No
MSP-Gothic vs Maru go	1.498	1.173	2.236	0.849	0.226	No
MSP-Gothic vs Mincho	1.496	1.022	2.196	0.845	0.185	No
MSP-Gothic vs MS-Goth	1.409	1.055	2.145	0.717	0.143	No
MSP-Gothic vs Merio	1.042	0.757	2.076	0.730	0.098	No
MSP-Gothic vs HG行書本	0.713	0.487	1.972	0.627	0.050	No
HG行書本 vs Maru go	0.785	0.624	2.196	0.971	0.185	No
HG行書本 vs Mincho	0.783	0.541	2.145	0.949	0.143	No
HG行書本 vs MS-Gothic	0.696	0.528	2.076	0.858	0.098	No
HG行書本 vs Merio	0.329	0.242	1.972	0.809	0.050	No
Merio vs Maru go	0.456	0.394	2.145	0.979	0.143	No
Merio vs Mincho	0.454	0.333	2.076	0.941	0.098	No
Merio vs MS-Gothic	0.367	0.300	1.972	0.764	0.050	No
MS-Gothic vs Maru go	0.089	0.080	2.076	0.996	0.098	No
MS-Gothic vs Mincho	0.087	0.066	1.972	0.947	0.050	No
Mincho vs Maru go	0.002	0.002	1.972	0.999	0.050	No

Category	Mean	Groups
aqua	22.308	A
MSP-Gothic	21.409	A
HG行書本	20.696	A
Merio	20.367	A
MS-Gothic	20.000	A
Mincho	19.913	A
Maru go	19.911	A

Appendix 28 All Japanese Data Analysis per Font Style

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Q1 / REGWQ / Analysis of the differences between the categories with a confidence interval of 95%:

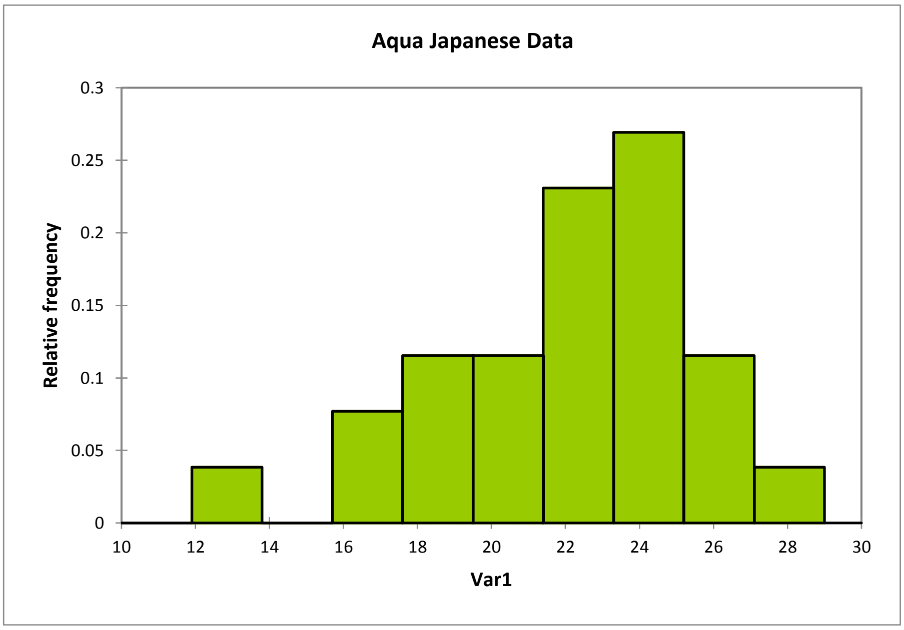
Contrast	Difference	Standardized difference	Critical value	Pr > Diff	alpha (Modified)	Significant
aqua vs Maru go	2.397	1.982	2.979	0.429	0.050	No
aqua vs Mincho	2.395	1.704	2.878	0.531	0.050	No
aqua vs MS-Gothic	2.308	1.816	2.878	0.367	0.050	No
aqua vs Merio	1.941	1.476	2.878	0.454	0.050	No
aqua vs HG行書本	1.612	1.147	2.878	0.486	0.050	No
aqua vs MSP-Gothic	0.899	0.632	2.878	0.528	0.050	No
MSP-Gothic vs Maru go	1.498	1.173	2.878	0.849	0.050	No
MSP-Gothic vs Mincho	1.496	1.022	2.874	0.845	0.036	No
MSP-Gothic vs MS-Goth	1.409	1.055	2.874	0.717	0.036	No
MSP-Gothic vs Merio	1.042	0.757	2.874	0.730	0.036	No
MSP-Gothic vs HG行書本	0.713	0.487	2.874	0.627	0.036	No
HG行書本 vs Maru go	0.785	0.624	2.874	0.971	0.036	No
HG行書本 vs Mincho	0.783	0.541	2.795	0.949	0.029	No
HG行書本 vs MS-Gothic	0.696	0.528	2.795	0.858	0.029	No
HG行書本 vs Merio	0.329	0.242	2.795	0.809	0.029	No
Merio vs Maru go	0.456	0.394	2.795	0.979	0.029	No
Merio vs Mincho	0.454	0.333	2.679	0.941	0.022	No
Merio vs MS-Gothic	0.367	0.300	2.679	0.764	0.022	No
MS-Gothic vs Maru go	0.089	0.080	2.679	0.996	0.022	No
MS-Gothic vs Mincho	0.087	0.066	2.465	0.947	0.015	No
Mincho vs Maru go	0.002	0.002	2.465	0.999	0.015	No

Category	Mean	Groups
aqua	22.308	A
MSP-Gothic	21.409	A
HG行書本	20.696	A
Merio	20.367	A
MS-Gothic	20.000	A
Mincho	19.913	A
Maru go	19.911	A

Appendix 28 Japanese Data Aqua Histogram

Summary statistics:

Variable	Observations	Obs. with missing data	Obs. without missing data	Minimum	Maximum	Mean	Std. deviation
Var1	26	0	26	13.000	28.000	22.308	3.782



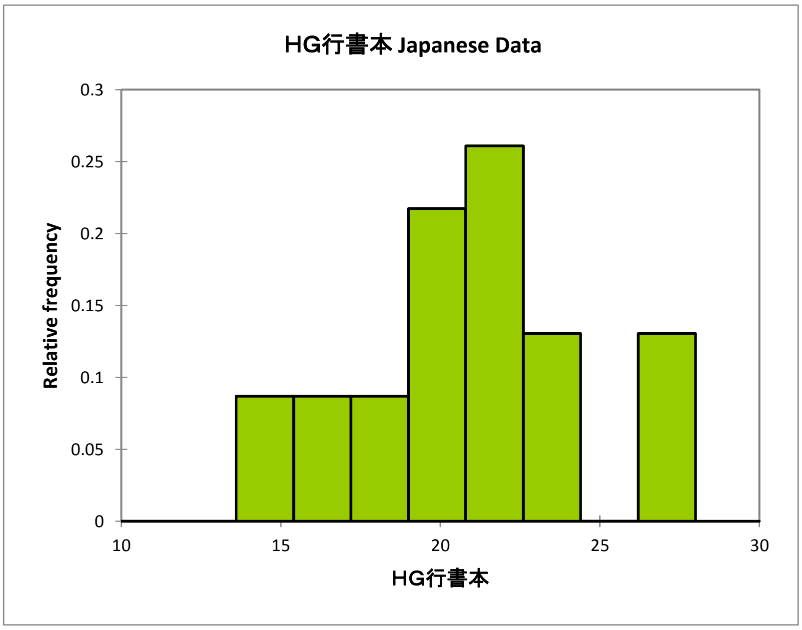
Descriptive statistics for the intervals :

Lower bound	Upper bound	Frequency	Relative Frequency	Density
10	11.9	0	0.000	0.000
11.9	13.8	1	0.038	0.020
13.8	15.7	0	0.000	0.000
15.7	17.6	2	0.077	0.040
17.6	19.5	3	0.115	0.061
19.5	21.4	3	0.115	0.061
21.4	23.3	6	0.231	0.121
23.3	25.2	7	0.269	0.142
25.2	27.1	3	0.115	0.061
27.1	29	1	0.038	0.020

Appendix 28 Japanese Data Gyo sha Hon Histogram

Summary statistics:

Variable	Obs.	Obs. with missing data	Obs. without missing data	Minimum	Maximum	Mean	Std. deviation
HG行書本	23	0	23	15.000	27.000	20.696	3.509



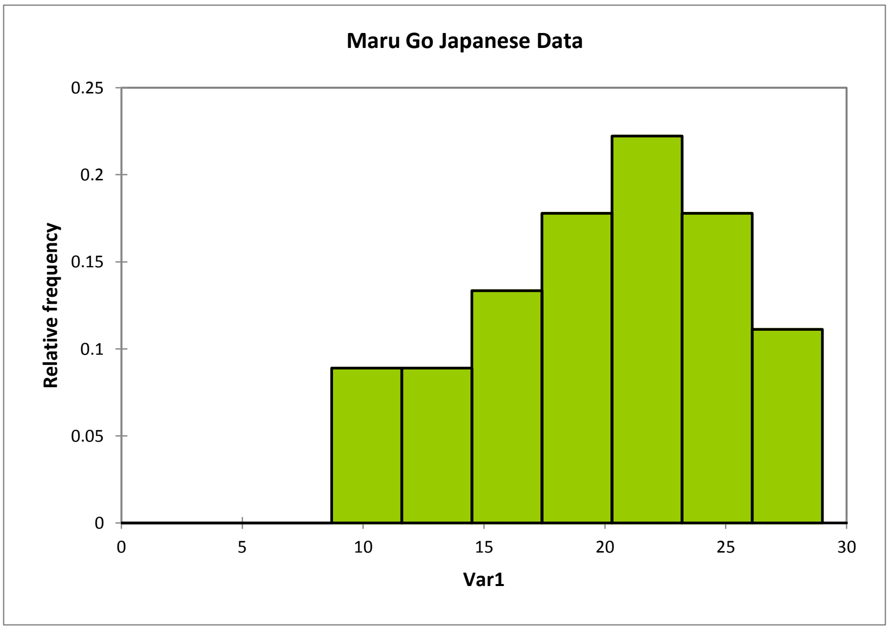
Descriptive statistics for the intervals :

Lower bound	Upper bound	Frequency	Relative Frequency	Density
10	11.8	0	0.000	0.000
11.8	13.6	0	0.000	0.000
13.6	15.4	2	0.087	0.048
15.4	17.2	2	0.087	0.048
17.2	19	2	0.087	0.048
19	20.8	5	0.217	0.121
20.8	22.6	6	0.261	0.145
22.6	24.4	3	0.130	0.072
24.4	26.2	0	0.000	0.000
26.2	28	3	0.130	0.072

Appendix 28 Japanese Data Maru Go Histogram

Summary statistics:

Variable	Observations	Obs. with missing data	Obs. without missing data	Minimum	Maximum	Mean	Std. deviation
Var1	45	0	45	9.000	28.000	19.911	5.401



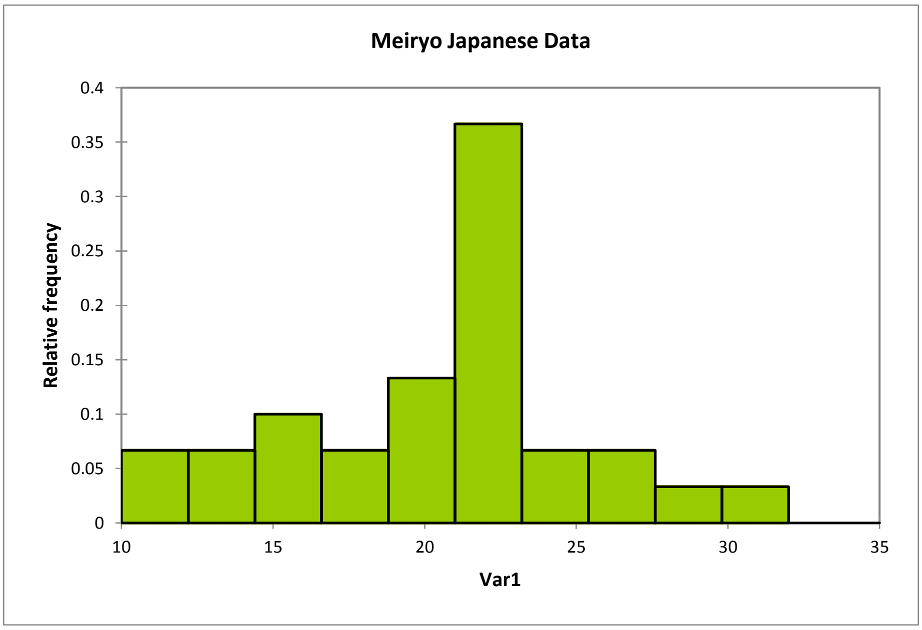
Descriptive statistics for the intervals :

Lower bound	Upper bound	Frequency	Relative frequency	Density
0	2.9	0	0.000	0.000
2.9	5.8	0	0.000	0.000
5.8	8.7	0	0.000	0.000
8.7	11.6	4	0.089	0.031
11.6	14.5	4	0.089	0.031
14.5	17.4	6	0.133	0.046
17.4	20.3	8	0.178	0.061
20.3	23.2	10	0.222	0.077
23.2	26.1	8	0.178	0.061
26.1	29	5	0.111	0.038

Appendix 28 Japanese Data Meiryo Histogram

Summary statistics:

Variable	Observations	Obs. with missing data	Obs. without missing data	Minimum	Maximum	Mean	Std. deviation
Var1	30	0	30	10.000	31.000	20.367	4.867



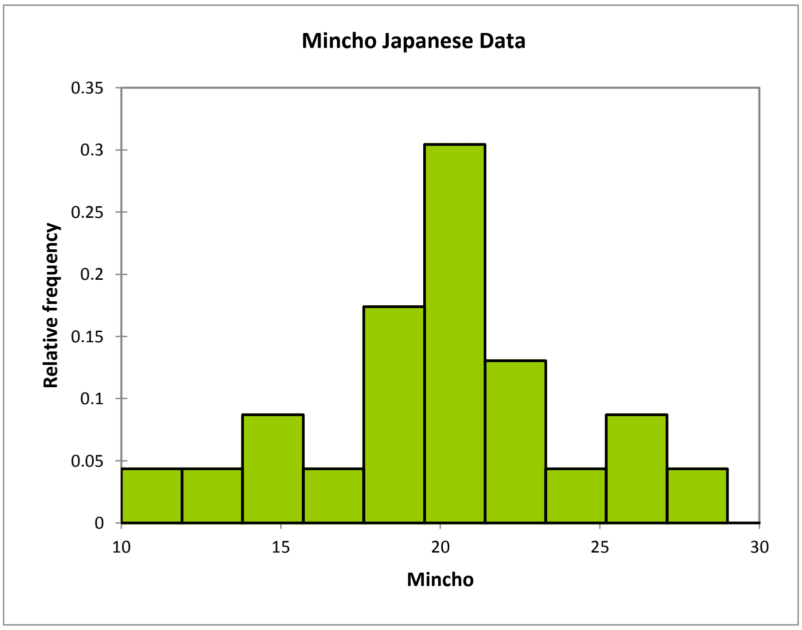
Descriptive statistics for the intervals :

Lower bound	Upper bound	Frequency	Relative Frequency	Density
10	12.2	2	0.067	0.030
12.2	14.4	2	0.067	0.030
14.4	16.6	3	0.100	0.045
16.6	18.8	2	0.067	0.030
18.8	21	4	0.133	0.061
21	23.2	11	0.367	0.167
23.2	25.4	2	0.067	0.030
25.4	27.6	2	0.067	0.030
27.6	29.8	1	0.033	0.015
29.8	32	1	0.033	0.015

Appendix 28 Japanese Data Min Cho Histogram

Summary statistics:

Variable	Obs.	Obs. with missing data	Obs. without missing data	Minimum	Maximum	Mean	Std. deviation
Mincho	23	0	23	10.000	28.000	19.913	4.481



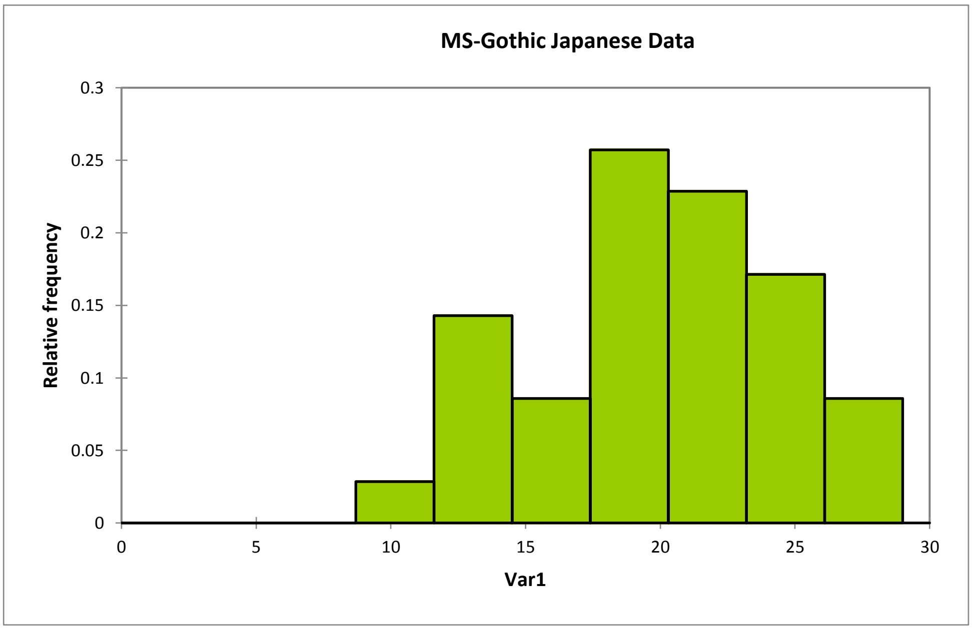
Descriptive statistics for the intervals :

Lower bound	Upper bound	Frequency	Relative Frequency	Density
10	11.9	1	0.043	0.023
11.9	13.8	1	0.043	0.023
13.8	15.7	2	0.087	0.046
15.7	17.6	1	0.043	0.023
17.6	19.5	4	0.174	0.092
19.5	21.4	7	0.304	0.160
21.4	23.3	3	0.130	0.069
23.3	25.2	1	0.043	0.023
25.2	27.1	2	0.087	0.046
27.1	29	1	0.043	0.023

Appendix 28 Japanese Data MS-Gothic Histogram

Summary statistics:

Variable	Observations	Obs. with missing data	Obs. without missing data	Minimum	Maximum	Mean	Std. deviation
Var1	35	0	35	9.000	28.000	20.000	4.851



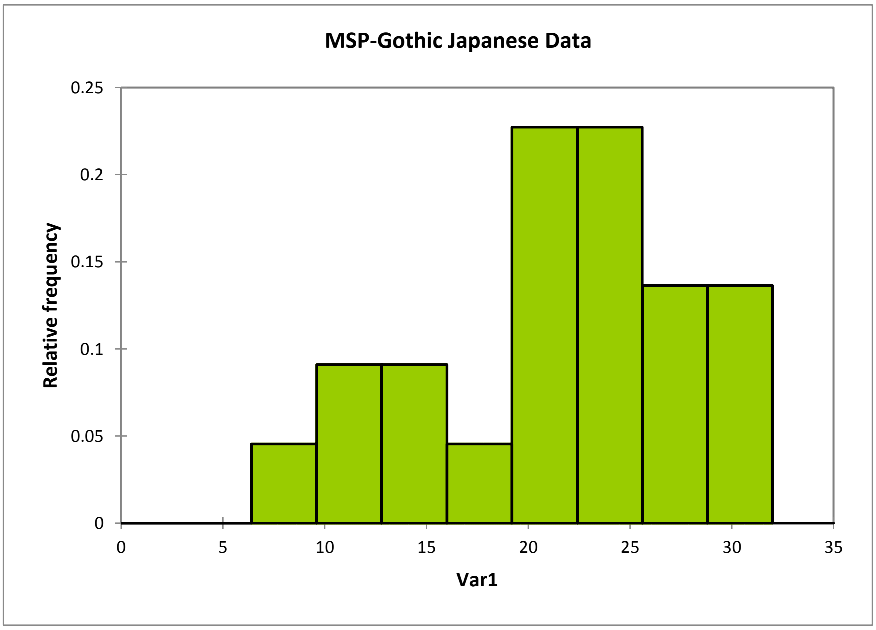
Descriptive statistics for the intervals :

Lower bound	Upper bound	Frequency	Relative Frequency	Density
0	2.9	0	0.000	0.000
2.9	5.8	0	0.000	0.000
5.8	8.7	0	0.000	0.000
8.7	11.6	1	0.029	0.010
11.6	14.5	5	0.143	0.049
14.5	17.4	3	0.086	0.030
17.4	20.3	9	0.257	0.089
20.3	23.2	8	0.229	0.079
23.2	26.1	6	0.171	0.059
26.1	29	3	0.086	0.030

Appendix 28 Japanese Data MSP-Gothic Histogram

Summary statistics:

Variable	Observations	Obs. with missing data	Obs. without missing data	Minimum	Maximum	Mean	Std. deviation
Var1	22	0	22	8.000	31.000	21.409	6.566



Descriptive statistics for the intervals :

Lower bound	Upper bound	Frequency	Relative Frequency	Density
0	3.2	0	0.000	0.000
3.2	6.4	0	0.000	0.000
6.4	9.6	1	0.045	0.014
9.6	12.8	2	0.091	0.028
12.8	16	2	0.091	0.028
16	19.2	1	0.045	0.014
19.2	22.4	5	0.227	0.071
22.4	25.6	5	0.227	0.071
25.6	28.8	3	0.136	0.043
28.8	32	3	0.136	0.043

Appendix 29 Text Density English / Japanese Presentation Comparison

Slide #		Basic Presentation			
		English		Japanese	
1	#Words (Characters) Per line	8-3	11	14-6	20
	#Lines per slide	2		2	
2	#Words (Characters) Per line	2-1-1-1	5	10-4-2-2	18
	#Lines per slide	4		4	
3	#Words (Characters) Per line	2-9-8-9-9	37	7-16-22-16-14	75
	#Lines per slide	5		5	
4	#Words (Characters) Per line	2-8-10-8-11-8	48	4-18-15-18-13-15	83
	#Lines per slide	6		6	
5	#Words (Characters) Per line	2-9-6-6-8-9	40	2-14-19-18-22-21-12	108
	#Lines per slide	6		7	
6	#Words (Characters) Per line	3-10-10-7-7-8	45	6-25-21-15-19-23	109
	#Lines per slide	6		6	
7	#Words (Characters) Per line	3-6-3-6-3-3-7-6	37	9-14-8-10-4-8-13-11	77
	#Lines per slide	8		8	
8	#Words (Characters) Per line	2-5-3-6-6	22	5-11-16-9-9	50
	#Lines per slide	5		5	
			33		67

1 #= 1 Character Characters =Kanji, Katakana, Hiragana
US=2, 20 , 1979, 2004, 2017..=1, ~-~ = 1

Appendix 29 Text Density English / Japanese Presentation Comparison

Slide #		Whole Script			
		English		Japanese	
1	#Words (Characters) Per line	8-3	11	14-6	20
	#Lines per slide	2		2	
2	#Words (Characters) Per line	2-14-13-14	43	10-26-26-25-22	109
	#Lines per slide	4		5	
3	#Words (Characters) Per line	2-15-13-12-12-12-13-15-18-13-16-12-11-15	179	7-28-28-27-26-29-29-28-27-29-29-27-26-	404
	#Lines per slide	14		16	
4	#Words (Characters) Per line	2-14-11-11-11-11-11-4	75	4-26-26-26-26-24-25-18	175
	#Lines per slide	7		8	
5	#Words (Characters) Per line	2-15-14-12-12-20-5	80	6-26-23-24-26-26-26-	194
	#Lines per slide	7		9	
6	#Words (Characters) Per line	3-13-12-10-13-10-10-10-10	91	6-27-26-25-25-26-26-26-24-7	218
	#Lines per slide	9		10	
7	#Words (Characters) Per line	3-15-12-12-18-13-15-7	95	9-26-26-26-25-26-26-	193
	#Lines per slide	8		9	
8	#Words (Characters) Per line	2-12-17-11-18-11-14-10	95	5-25-26-26-25-26-26-18	177
	#Lines per slide	8		8	
			94		186

1 #= 1 Character Characters =Kanji, Katakana, Hiragana
US=2, 20 , 1979, 2004, 2017..=1, ~-~ = 1

Appendix 29 Text Density English / Japanese Presentation Comparison

Slide #		Simple Presentation			
		English		Japanese	
1	#Words (Characters) Per line	8-3	11	14-6	20
	#Lines per slide	2		2	
2	#Words (Characters) Per line	2-5-3-3	13	10-11-5-6	32
	#Lines per slide	4		4	
3	#Words (Characters) Per line	2-4-1-1-1	7	7-5-3-6-2	23
	#Lines per slide	5		5	
4	#Words (Characters) Per line	2-2-2-2-7-3	18	4-10-10-5-11-9	49
	#Lines per slide	6		6	
5	#Words (Characters) Per line	2-5-1-2-1-1	12	6-5-1-5-6-3-2	28
	#Lines per slide	6		7	
6	#Words (Characters) Per line	3-1-1-1-1-1-2-1	11	5-2-3-2-2-2-6-3	25
	#Lines per slide	8		8	
7	#Words (Characters) Per line	3-2-1-2-1-2-5	16	9-4-5-5-2-6-2-8	41
	#Lines per slide	7		8	
8	#Words (Characters) Per line	2-3-1-4	10	5-7-10-9	31
	#Lines per slide	4		4	
		Average	12		20

1 #= 1 Character Characters =Kanji, Katakana, Hiragana
US=2, 20 , 1979, 2004, 2017..=1, ~-~ = 1

Appendix 30 English Presentation Script

1. Barack H. Obama is the 44th President of the United States.

2. Obama's story is the typical American story. Born in a middle-class family that believed in hard work and education as a way to move up in life. In addition, to believing that a happy life is a life helping others.

3. President Obama was born in Hawaii on August 4, 1961. He is the first US president born in Hawaii. His parents were Ann Durham, an American from Kansas and Barack Obama Sr. a Luo from Kenya. A Luo is a group of people from Western Kenya, eastern Uganda and Northern Tanzania. His parents met while going to the University of Hawaii. His parents were only together for a short time, 3 years. His father went on to Harvard University and moved back to Kenya in 1964. In 1965 his mother married again to a man from Indonesia and the family moved in 1967. Young Barrack went to school there until 1971. While in Indonesia, his sister was born. His nickname was "Barry" among his family and friends. In 1971 he moved back to Hawaii to be with his grandparents. He won an academic scholarship to attend school and stayed there until he graduated from high school, in 1979.

4. After high school, Obama moved to Los Angeles in 1979 to attend college for 2 years. After that he transferred to Columbia University in New York. He studied political science while working his way through college with the help of scholarships and student loans. Obama moved to Chicago after graduation where he worked with a group of churches to help rebuild communities and set up programs to help the poor.

5. In 1988, President Obama was accepted to enter Harvard Law School. While he was at Harvard, he was selected as the first African-American president of the Harvard Law Review Academic Journal. This made him famous in America. Because he was famous with this position at Harvard, a company asked him to write a book about his life and he published it in 1995 with the title "Dreams from My Father"

6. President Obama graduated in 1991 and returned to Chicago. Michelle and Barrack were married in October 1992. While in Chicago, he got a job teaching constitutional law at the University of Chicago until 2004. At the same time, he worked as a civil rights lawyer, and was active in his community. Because of his active service helping African Americans in Chicago, a famous magazine saw his talent and placed him on the powerful people in America under 40 list.

7. Obama was elected as a State Senator in 1997 and served in that position until 2004. He campaigned as a member of the democratic political party. He was re-elected 3 times. He tried to be elected as a congressman in 2000, but lost. In 2004, Obama tried and won the election as a US Senator representing Illinois. He was very active as a senator for 3 years and stepped down in 2008 to become President of the United States.

8. Barrack Obama was elected as the 44th President of the United States on November 4, 2008 with a 52.9% of the vote. He became the first African American to be elected president and sworn in on January 20, 2009. In April 2011 he announced his re-election campaign and was elected again as president

He will end his job as president in January 2017 .

Appendix 30　Japanese Presentation Script

１．バラク・オバマは、アメリカ合衆国の第４４代大統領です。

２．オバマのストーリーは典型的なアメリカンストーリーです。オバマ大統領は、勤勉さと教育が人生で成功する方法だと信じる中産階級の家庭に生まれました。さらに、幸せな人生とは人を助ける人生だということも信じていました。

３．オバマ大統領は、１９６１年８月４日にハワイで生まれました。彼は初めてのハワイ出身の大統領です。彼は、カンザス州出身のアメリカ人の母アン・ダナムとケニア出身のルオ族の父バラク・オバマ・シニアのもとに生まれました。ルオ族とは、ケニア西部、ウガンダ東部とタンザニア北部にかけて居住する一民族です。彼の両親は二人がハワイ大学に通っていた時に出会いました。彼らが一緒にいた期間は短く、たった３年間でした。彼の父はハーバード大学へ進み、１９６４年にケニアに戻りました。１９６５年に彼の母はインドネシア出身の男性と再婚し、家族は１９６７年にインドネシアに引っ越しました。幼いオバマはそこで１９７１年まで学校に通いました。インドネシアにいる間に、妹が誕生しました。彼は家族や友達から「バリー」と呼ばれていました。１９７１年にオバマはハワイへ戻り、彼の祖父母と暮らしました。そして、彼は高校へ通うための奨学金を得て、１９７９年にこの高校を卒業するまでハワイに住んでいました。

４．高校卒業後、オバマは１９７９年に大学へ二年間通うためロサンジェルスに引っ越しました。そしてその後ニューヨークのコロンビア大学に移りました。彼は奨学金と学資ローンの助けを借りながら苦学をして政治学を学びました。大学を卒業後は、オバマはシカゴへ越しました。シカゴでは、教会の人々と協力し、コミュニティーを立て直し、貧しい人々を助けるためのプログラムを立ち上げました。

５．１９８８年、オバマ大統領はハーバード大学法学大学院に合格しました。ハーバードに通っていた時、彼は「ハーバード・ロー・レビュー」のアフリカ系アメリカ人初の編集長に選ばれました。これをきっかけに彼はアメリカで有名になりました。彼はハーバードで編集長の立場であることで有名であったため、ある出版社が彼に自分の人生についての本の執筆を依頼し、１９９５年にオバマ大統領は『Dreams from My Father』（邦題『マイ・ドリーム』）を出版しました。

６．オバマ大統領は１９９１年にハーバードを卒業しシカゴに戻りました。そしてミシェルとは１９９２年１０月に結婚しました。シカゴにいる間、彼はシカゴ大学で憲法学の教職の仕事を得て２００４年まで教鞭をとりました。それと同時に、彼は公民権専門の弁護士として働き、彼のコミュニティで積極的に活動しました。シカゴでアフリカ系アメリカ人を助けるために積極的に貢献していたため、有名な雑誌が彼の才能に目をつけ、「４０歳未満の影響力のある人々」のリストに彼を載せました。

７．オバマは１９９７年に州の上院議員に選ばれ、２００４年までその地位で職務を行いました。彼は民主党のメンバーとして選挙運動を行い３度再選されました。２０００年には連邦議会議員に立候補しますが、落選してしまいました。そして、２００４年に、オバマはイリノイ州選出の上院議員に立候補し当選しました。彼は３年間とても精力的に上院議員を務め、２００８年にアメリカの大統領になるためその職を辞任しました。

８．バラク・オバマは２００８年１１月４日に、５２．９％の得票率でアメリカ合衆国の第４４代大統領に選ばれました。彼はアフリカ系アメリカ人初の大統領になり、２００９年１月２０日に就任しました。２０１１年４月に、再選を目指した選挙運動を行うことを発表し、５１．１％の得票率で再びアメリカ合衆国の大統領に選ばれました。そして彼は２０１７年１月に大統領としての職務を終えます。

Appendix 31 Japanese Basic Presentation

アメリカ合衆国第４４代大統領

バラク・オバマ

アメリカン　ストーリー

- 中級階級
- 教育
- 援助

人生のはじまり

- １９６１年８月４日ハワイで生まれ
- アン・ダナム(アメリカ出身),バラク・オバマ (ケニア出身)
- １９６７年母再婚インドネシア移住
- １９７１年ハワイ帰郷 高校卒業

学生生活

- ロサンジェルス　オキシデンタル大学入学
- ２年後コロンビア大学（ＮＹＣ）転入
- 学生生活を奨学金とアルバイトで支えた
- 1983年政治学学位を修得
- シカゴで地域づくりの仕事に就く

大学院法学部

- 1988ハーバード大学に合格
- 1989年夏ミシェル·ロビンソンと出会い
- ハーバード·ロー·レビュー誌編長を務める
- アフリカ系アメリカ人初のロー·レビュー会長就任
- ハーバード大学が彼を全米で有名な存在とする
- １９９５年 "Dreams of My Father" を出版

シカゴの勤務

- １９９１年にハーバード大学大学院にて法律学修士修得
- シカゴの法律事務所所属中の1992年に結婚
- シカゴ大学の教壇で憲法を教える
- コミュニティ組織で積極的に公民権を支援
- 雑誌が "４０歳未満の影響力のある人々" に彼を選んだ

Appendix 31 Japanese Basic Presentation

政治家人生の始まり

- 1997年州上院議員に初当選
- 民主党候補に選出
- 2004年まで働いた
- 再選3回
- 下院議員選挙落選
- 2004年米国上院議員当選
- 2008年大統領選勝利

大統領人生

- 第44代アメリカ大統領
- 最初のアフリカ系アメリカ人大統領
- 2012年11月再選
- 2017年任期終了

Appendix 31　Japanese Simple Presentation

アメリカ合衆国第４４代大統領

バラク・オバマ

アメリカン　ストーリー

- アメリカ中級階級の物語
- 苦学生時代
- 人助けに喜び

人生のはじまり

- １９６１年
- ハワイ
- インドネシア
- 帰郷

学生生活

- ロサンジェルス２年間
- コロンビア大学２年間
- 苦学生時代
- 1983年政治学部卒業
- シカゴで地域づくり

Appendix 31 Japanese Simple Presentation

大学院法学部

- 1988年
- 夏
- 編集委員長
- ローレビュー
- 有名人
- 出版

シカゴ勤務

- 卒業
- シカゴ
- 結婚
- 教壇
- 憲法
- コミュニティ
- 影響力

政治家人生の初まり

- 上院議員
- 民主党候補
- 2004年
- 3回
- 下院議員落選
- ３年
- 2008年大統領

大統領人生

- 第44代大統領
- アフリカ系アメリカ人
- 2017年任期満了

Appendix 31　Japanese Script Presentation

アメリカ合衆国第４４代大統領

バラク・オバマ

アメリカン　ストーリー

- オバマのストーリーは典型的なアメリカンストーリーです。オバマ大統領は、勤勉さと教育が人生で成功する方法だと信じる中産階級の家庭に生まれました。さらに、幸せな人生とは人を助ける人生だということも信じていました。

人生のはじまり

- オバマ大統領は、１９６１年8月４日にハワイで生まれました。彼は初めてのハワイ出身の大統領です。彼は、カンザス州出身のアメリカ人の母アン・ダナムとケニア出身のルオ族の父バラク・オバマ・シニアのもとに生まれました。ルオ族とは、ケニア西部、ウガンダ東部とタンザニア北部にかけて居住する一民族です。彼の両親は二人がハワイ大学に通っていた時に出会いました。彼らが一緒にいた期間は短く、たった３年間でした。彼の父はハーバード大学へ進み、１９６４年にケニアに戻りました。１９６５年に彼の母はインドネシア出身の男性と再婚し、家族は１９６７年にインドネシアに引っ越しました。幼いオバマはそこで１９７１年まで学校に通いました。インドネシアにいる間に、妹が誕生しました。彼は家族や友達から「バリー」と呼ばれていました。１９７１年にオバマはハワイへ戻り、彼の祖父母と暮らしました。そして、彼は高校へ通うための奨学金を得て、１９７９年にこの高校を卒業するまでハワイに住んでいました。

学生生活

- 高校卒業後、オバマは１９７９年に大学へ二年間通うためロサンジェルスに引っ越しました。そしてその後ニューヨークのコロンビア大学に移りました。彼は奨学金と学資ローンの助けを借りながら苦学をして政治学を学びました。大学を卒業後は、オバマはシカゴへ越しました。シカゴでは、教会の人々と協力し、コミュニティーを立て直し、貧しい人々を助けるためのプログラムを立ち上げました。

Appendix 31 Japanese Script Presentation

大学院法学部

- １９８８年、オバマ大統領はハーバード大学法学大学院に合格しました。ハーバードに通っていた時、彼は「ハーバード・ロー・レビュー」のアフリカ系アメリカ人初の編集長に選ばれました。これをきっかけに彼はアメリカで有名になりました。彼はハーバードで編集長の立場であることで有名であったため、ある出版社が彼に自分の人生についての本の執筆を依頼し、１９９５年にオバマ大統領は『Dreams from My Father』（邦題『マイ・ドリーム』）を出版しました。

シカゴの勤務

- オバマ大統領は１９９１年にハーバードを卒業しシカゴに戻りました。そしてミシェルとは１９９２年１０月に結婚しました。シカゴにいる間、彼はシカゴ大学で憲法学の教職の仕事を得て２００４年まで教鞭をとりました。それと同時に、彼は公民権専門の弁護士として働き、彼のコミュニティで積極的に活動しました。シカゴでアフリカ系アメリカ人を助けるために積極的に貢献していたため、有名な雑誌が彼の才能に目をつけ、「４０歳未満の影響力のある人々」のリストに彼を載せました。

政治家人生の始まり

- オバマは１９９７年に州の上院議員に選ばれ、２００４年までその地位で職務を行いました。彼は民主党のメンバーとして選挙運動を行い３度再選されました。２０００年には連邦議会議員に立候補しますが、落選してしまいました。そして、２００４年に、オバマはイリノイ州選出の上院議員に立候補し当選しました。彼は３年間とても精力的に上院議員を務め、２００８年にアメリカの大統領になるためその職を辞任しました。

大統領人生

- バラク・オバマは２００８年１１月４日に、５２．９%の得票率でアメリカ合衆国の第４４代大統領に選ばれました。彼はアフリカ系アメリカ人初の大統領になり、２００９年１月２０日に就任しました。２０１１年４月に、再選を目指した選挙運動を行うことを発表し、５１．１%の得票率で再びアメリカ合衆国の大統領に選ばれました。そして彼は２０１７年１月に大統領としての職務を終えます。

Appendix 31 English Basic Presentation

44^{th} President of the United States

Barack H. Obama

American Story

- Middle- Class
- Education
- Helping

Early Life

- Born on August 4, 1961 Hawaii
- Ann Durham (USA), Barack Obama (Kenya)
- Mother Re-married, Moved to Indonesia 1967
- 1971 Returned Hawaii, Graduated High School

Undergraduate Life

- Went to Occidental College in Los Angeles California
- Transferred to Columbia University (NYC) After 2 Years
- Supported himself with Scholarships and Part Time Jobs
- Graduated in 1983 with a Political Science Degree
- Moved to Chicago to Work at Community Building

Law School

- 1988 was Accepted to Harvard University
- Editor of Harvard Law Review Journal
- First African-American President of Law Review
- Famous in USA because of Harvard
- Wrote 1995 "Dreams from My Father"

Working in Chicago

- Graduated Law Degree From Harvard in 1991
- Worked Chicago Law Firm, Married in 1992
- Lecturer University of Chicago Taught Constitutional Law
- Active in Community Organizations Helping Civil Rights
- Magazine Saw Talent: "Powerful People Under 40"

Appendix 31 English Basic Presentation

Early Political Life

- State Senator 1997
- Democratic Party Candidate
- Worked Until 2004
- Re-elected 3 Times
- Lost Congressman Election
- 2004 US Senator
- Elected President 2008

Presidential Life

- 44^{th} American President
- First African-American President
- Re-Elected November 2012
- Term Ends 2017

Thank You For Listening

Appendix 31 English Simple Presentation

44th President of the United States

Barack H. Obama

American Story

- American Story of Middle- Class Life
- Hard Work Education
- Happy Helping Others

Early Life

- 1961
- Hawaii
- Indonesia
- Returned

Undergraduate Life

- Occidental College
- Columbia University
- Supported Himself
- 1983 Graduated Political Science
- Moved to Chicago

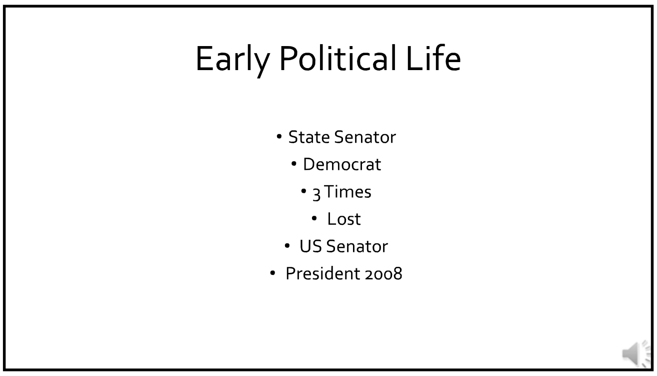
Law School

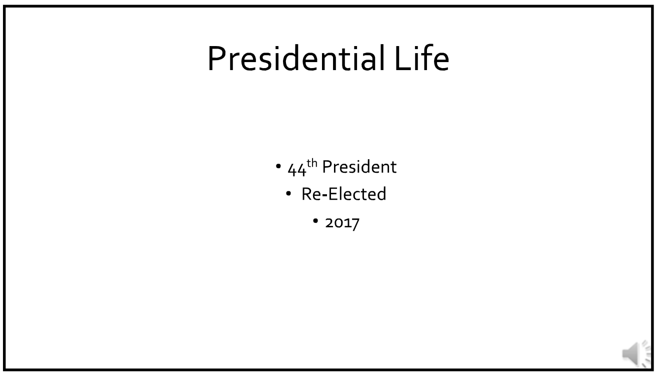
- 1988 Harvard
- Editor
- First African-American
- Famous
- Wrote

Working in Chicago

- Graduated
- Chicago
- Married
- Lecturer
- Community
- Civil Rights
- Powerful

Appendix 31 English Simple Presentation





Appendix 31 English Script Presentation

44th President of the United States

Barack H. Obama

American Story

Obama's story is the typical American story. Born in a middle-class family that believed in hard work and education as a way to move up in life. In addition, to believing that a happy life is a life helping others.

Early Life

President Obama was born in Hawaii on August 4, 1961. He is the first US president born in Hawaii. His parents were Ann Durham, an American from Kansas and Barack Obama Sr. a Luo from Kenya. A Luo is a group of people from Western Kenya, eastern Uganda and Northern Tanzania. His parents met while going to the University of Hi. His parents were only together for a short time, 3 years. His father went on to Harvard University and moved back to Kenya in 1964. In 1965 his mother married again to a man from Indonesia and the family moved in 1967. Young Barrack went to school there until 1971. While in Indonesia, his sister was born. His nickname was "Barry" among his family and friends. In 1971 he moved back to Hawaii to be with his grandparents. He won an academic scholarship to attend school and stayed there until he graduated from high school in 1979.

Undergraduate Life

After high school, Obama moved to Los Angeles in 1979 to attend college for 2 years. After that he transferred to Columbia University in New York. He studied political science while working his way through college with the help of scholarships and student loans. Obama moved to Chicago after graduation where he worked with a group of churches to help rebuild communities and set up programs to help the poor.

Law School

In 1988, President Obama was accepted to enter Harvard Law School. While he was at Harvard, he was selected as the first African-American president of the Harvard Law Review Academic Journal. This made him very famous in America. Because he was famous with this position at Harvard, a company asked him to write a book about his life and he published it in 1995 with the title "Dreams From My Father"

Working in Chicago

President Obama graduated in 1991 and returned to Chicago. Michelle and Barrack were married in October 1992. While in Chicago, he got a job teaching constitutional law at the University of Chicago until 2004. At the same time, he worked as a civil rights lawyer, and was active in his community. Because of his active service helping African Americans in Chicago, a famous magazine saw his talent and placed him on the powerful people in America under 40 list.

Appendix 31 English Script Presentation

Early Political Life

Obama was elected as a State Senator in 1997 and served in that position until 2004. He campaigned as a member of the democratic political party. He was re-elected 3 times. He tried to be elected as a congressman in 2000, but lost. In 2004, Obama tried and won the election as a US Senator representing Illinois. He was very active as a senator for 3 years and stepped down in 2008 to become President of the United States.

Presidential Life

Barrack Obama was elected as the 44th President of the United States on November 4, 2008 with a 52.9% of the vote. He became the first African American to be elected president and sworn in on January 20, 2009. In April 2011 he announced his re-election campaign and was elected again as president of the United States with a 51.1% of the vote. He will end his job as president in January 2017.

Thank You for Listening

Appendix 32 English Survey

Script/Simple/Basic

Barack H. Obama Presentation

lease help us determine how much you remember and answer the questions below.
If you do not remember anything, please write DA for "Don't Remember". Please be honest. This is for scientific research and your answers are very important. Thank you. S. Meiki

Gender Male / Female
Age ______________

Have you ever lived in another country for over 4 weeks consecutively? Yes / No
If you answered yes, where? ____

1. Barack Obama's came from a very rich family. True (O) False(X) DR
2. Barack Obama parents met in Hawaii True (O) False(X) DR
3. Barack Obama moved to Indonesia when he was in High School. True (O) False(X) DR
4. Barack Obama graduated High School in 1979. True (O) False(X) DR
5. Barack Obama graduated from the University of Chicago. True (O) False(X) DR
6. Barack Obama was the first African-American at Harvard University. True (O) False(X) DR
7. Barack Obama became famous in the USA because he was president of the Harvard Law Review. True (O) False(X) DR
8. Barack Obama was a civil rights lawyer in Chicago 1991. True (O) False(X) DR
9. Barack become a State senator in 1997. True (O) False(X) DR
10. Barack Obama won the election to be a congressman. True (O) False(X) DR
11. Barack Obama became president of the United States in November 2009. True (O) False(X) DR
12. As president, Barack Obama will end his term in 2018. True (O) False(X) DR
13. Barack Obama is the 44th president of the United States. True(O) False(X) DR

Appendix 32 Japanese Survey

Script/Basic/Simple

Barack H. Obama Presentation

あなたがどれくらい覚えているか、以下の質問にお答えください。
もしあなたが答えの一部を覚えていれば、それを書いてください。また、もしあなたが何も覚えていない場合は、DR と選んでください。ありがとうございます。

性別　　男性　/　女性
年齢____________
あなたは今までに 2 週間以上日本に住んでいたことがありますか？　　はい / いいえ
あなたは、このプレゼンテーションを以前見たことがありますか。　　はい / いいえ

1. バラク・オバマはとても裕福な家庭に生まれた。　True (O) False(X)　DR

2. バラク・オバマの両親はハワイで出会った。　True (O) False(X)　DR

3. バラク・オバマは高校生のときにインドネシアに引っ越した。　True (O) False(X)　DR

4. バラク・オバマは１９７９年に高校を卒業した。　True (O) False(X)　DR

5. バラク・オバマはシカゴ大学を卒業した。　True (O) False(X)　DR

6. バラク・オバマはハーバード大学の初のアフリカ系アメリカ人の学生だった。　True (O) False(X)　DR

7. バラク・オバマは『ハーバード・ロー・レビュー』の編集長であったため、アメリカで有名になった。　True (O) False(X)　DR

8. バラク・オバマは１９９１年にシカゴで公民権専門の弁護士を務めていた。　True (O) False(X)　DR

9. バラク・オバマは１９９７年に州の上院議員になった。　True (O) False(X)　DR

10 バラク・オバマは連邦議会議員選挙に当選した。　True (O) False(X)　DR

10.バラク・オバマは２００９年１１月にアメリカの大統領になった。　True (O) False(X)　DR

11.バラク・オバマは、２０１８年に大統領としての任期を終える。　True(O) False(X)　DR

12.バラク・オバマはアメリカ合衆国の第４４代大統領である。　True (O) False(X)　DR

Appendix 33 English Data Collected Basic Text Density

Script Presentation N=78 False = 0 True = 1

Correct Answer				FALSE	TRUE	FALSE	TRUE	FALSE	FALSE	TRUE	TRUE	TRUE	FALSE	FALSE	FALSE	TRUE			
Number of Survey	Sex	Age	Lived in foreign country over 4 yrs	Question #1	Question #2	Question #3	Question #4	Question #5	Question #6	Question #7	Question #8	Question #9	Question #10	Question #11	Question #12	Question #13	# Answered	# Correct	Score %
1	F	25	London	0	1	0	0	0	0	1	0	1	0	0	0	1	13	12	92.31
2	F	23	N	0	0	0	1	0	0	1	X	X	X	0	1	0	10	7	70.00
3	F	23	Israel, Galapagos Islands	0	1	0	X	0	0	0	0	1	0	0	0	1	12	10	83.33
4	F	23	N	0	1	0	X	X	0	1	1	1	0	0	0	1	11	11	100.00
5	F	24	N	0	1	1	1	0	0	1	1	1	0	1	0	1	13	10	76.92
6	F	22	N	0	1	1	1	0	0	1	X	X	1	0	0	1	11	8	72.73
7	F	22	N	0	1	0	0	0	0	1	1	0	0	0	0	1	13	12	92.31
8	F	23	N	0	1	0	X	0	0	1	X	X	0	0	0	1	10	10	100.00
9	F	23	N	0	1	1	1	0	0	1	0	1	1	0	0	1	13	9	69.23
10	F	23	N	0	1	X	X	0	0	0	X	0	0	X	0	1	9	7	77.78
11	M	54	N	0	X	0	1	0	0	1	0	X	0	0	0	1	11	9	81.82
12	F	22	N	0	1	1	1	X	0	0	1	1	1	0	0	1	12	8	66.67
13	F	24	N	0	1	0	X	0	X	X	X	X	X	0	0	1	7	7	100.00
14	F	22	N	0	1	1	1	1	1	0	0	1	0	0	0	1	13	7	53.85
15	F	23	N	0	1	0	1	0	0	1	0	1	0	1	0	1	13	10	76.92
16	F	23	N	0	1	0	X	0	X	1	1	1	X	0	0	1	10	10	100.00
17	F	23	N	0	1	0	1	1	0	1	0	1	0	1	0	1	13	9	69.23
18	F	23	Denmark	0	1	1	1	0	0	1	1	1	0	1	0	1	13	10	76.92
19	F	22	N	0	1	0	1	0	0	0	0	X	0	0	0	1	12	9	75.00
20	F	23	N	0	1	0	X	0	0	1	0	1	0	1	0	1	12	10	83.33
21	F	23	N	0	1	0	X	0	0	1	1	X	0	0	0	1	11	11	100.00
																	11.52381		
																	1.631534		
																	242		
				% Correct	% Correct	% Correct	% Correct	% Correct	% Correct	% Correct	% Correct	% Correct	% Correct	% Correct	% Correct	% Correct	Overall average		
				100%	95%	70%	23%	89%	95%	75%	44%	86%	83%	75%	95%	95%	79%		81.83
20 Surveys	20 Female	24.42857143		% Not Answered	% Not Answered	% Not Answered	% Not Answered	% Not Answered	% Not Answered	% Not Answered	% Not Answered	% Not Answered	% Not Answered	% Not Answered	% Not Answered	% Not Answered			
				0.00	4.76	4.76	38.10	9.52	9.52	4.76	23.81	33.33	14.29	4.76	0.00	0.00			
# NA				0	1	1	8	2	2	1	5	7	3	1	0	0			
# Answered				21	20	20	13	19	19	20	16	14	18	20	21	21			
# Wrong				0	1	6	10	2	1	5	9	2	3	5	1	1			

Appendix 33 English Data Collected Script Text Density

Script Presentation
N=78

False = 0 True = 1

Correct Answer				FALSE	TRUE	FALSE	TRUE	FALSE	FALSE	TRUE	TRUE	TRUE	FALSE	FALSE	FALSE	TRUE			
Number of Survey	Sex	Age	Lived in foreign country over 4 weeks?	Question #1	Question #2	Question #3	Question #4	Question #5	Question #6	Question #7	Question #8	Question #9	Question #10	Question #11	Question #12	Question #13	# Answered	# Correct	Score %
1	F	44	Japan 10	0	0	1	1	0	0	1	1	1	0	1	1	1	13	10	76.92
2	F	23	N	0	1	1	1	0	0	0	1	1	1	0	0	1	13	11	84.62
3	F	23	N	0	1	1	X	1	0	X	1	1	X	1	1	1	10	7	70.00
4	F	22	Italy	0	X	X	X	0	0	0	1	1	1	1	0	1	10	7	70.00
5	F	22	Italy	0	1	0	1	0	0	1	X	1	0	0	0	1	12	11	91.67
6	F	23	India	0	1	0	1	0	0	0	0	X	X	1	1	1	11	6	54.55
7	F	22	N	0	1	0	1	0	0	0	0	X	0	0	0	1	12	9	75.00
8	F	23	N	0	1	1	1	1	0	1	0	1	0	1	0	1	13	10	76.92
9	F	24	N	X	1	0	0	1	0	X	1	1	X	1	0	1	11	7	63.64
10	F	22	N	1	1	0	0	0	0	1	1	0	0	1	0	1	13	8	61.54
11	F	22	N	1	1	X	X	0	0	1	1	1	1	0	0	1	11	9	81.82
12	F	22	N	0	1	0	X	0	0	1	X	X	X	0	0	1	9	8	88.89
13	F	22	N	0	1	0	X	0	0	1	X	1	0	1	0	1	11	9	81.82
14	F	22	Israel	0	1	0	1	0	0	1	X	0	0	0	0	1	12	10	83.33
15	F	23	Greece	0	1	1	X	0	0	1	1	1	0	0	0	1	12	12	100.00
16	F	23	N	0	1	1	1	0	0	1	1	1	0	1	0	1	13	12	92.31
17	F	23	Italy	0	1	0	1	0	0	1	1	1	1	0	0	1	13	11	84.62
18	F	23	Cyprus	0	1	1	0	1	0	1	1	1	1	0	0	1	13	10	76.92
19	F	23	N	0	1	1	1	X	0	1	X	X	0	X	0	1	9	9	100.00
20	F	22	Italy	0	1	1	1	0	0	1	1	1	0	1	0	1	13	12	92.31
																	11.7		
																	234		
																	1.380313		
				% Correct	% Correct	% Correct	% Correct	% Correct	% Correct	% Correct	% Correct	% Correct	% Correct	% Correct	% Correct	% Correct	Overall average		
				89%	95%	50%	79%	79%	100%	78%	80%	88%	69%	47%	85%	100%	80%		80.34
20 Surveys	20 Female	23.65		% Not Answered	% Not Answered	% Not Answered	% Not Answered	% Not Answered	% Not Answered	% Not Answered	% Not Answered	% Not Answered	% Not Answered	% Not Answered	% Not Answered	% Not Answered			
				5.00	5.00	10.00	30.00	5.00	0.00	10.00	25.00	20.00	20.00	5.00	0.00	0.00			
# NA				1	1	2	6	1	0	2	5	4	4	1	0	0			
# Answered				19	19	18	14	19	20	18	15	16	16	19	20	20			
# Wrong				2	1	9	3	4	0	4	3	2	5	10	3	0			

Appendix 33 English Data Collected Simple Text Density

Simple Presentation N=78 False = 0 True = 1

Correct Answer				FALSE	TRUE	FALSE	TRUE	FALSE	FALSE	TRUE	TRUE	TRUE	FALSE	FALSE	FALSE	TRUE			
Number of Survey	Sex	Age	Lived in foreign country over 4 weeks?	Question #1	Question #2	Question #3	Question #4	Question #5	Question #6	Question #7	Question #8	Question #9	Question #10	Question #11	Question #12	Question #13	# Answered	# Correct	Score %
1	M	19	Spain	0	1	0	1	1	0	1	1	1	0	0	0	1	13	10	76.92
2	F	18	N	0	1	0	0	0	0	1	0	0	1	0	0	1	13	11	84.62
3	F	22	Korea	0	1	1	X	0	1	1	1	1	0	1	0	1	12	7	58.33
4	M	20	Belarus	0	X	0	1	0	0	X	1	X	X	1	0	1	9	7	77.78
5	M	19	N	0	X	0	0	1	0	0	1	0	0	0	1	1	12	11	91.67
6	M	20	Shanghai	0	0	0	0	0	0	1	0	1	0	1	0	1	13	6	46.15
7	M	21	N	0	1	0	1	0	0	1	1	0	1	0	0	1	13	9	69.23
8	F	18	N	0	1	0	1	0	0	1	1	X	0	0	0	1	12	10	83.33
9	M	18	N	0	1	0	1	0	0	0	1	X	0	0	0	1	12	7	58.33
10	F	19	China	0	1	0	X	0	0	1	1	0	0	0	0	0	12	8	66.67
11	F	18	N	0	1	X	1	0	0	1	1	1	0	0	0	1	12	9	75.00
12	M	21	UK,China	0	1	0	X	0	0	0	X	X	0	0	0	1	10	8	80.00
13	M	54	N	0	1	0	1	0	0	1	1	1	0	0	1	1	13	9	69.23
																Avg	12		
																Total	156		
																	1.176697		
				% Correct	% Correct	% Correct	% Correct	% Correct	% Correct	% Correct	% Correct	% Correct	% Correct	% Correct	% Correct	% Correct	Overall average		
				100%	91%	92%	70%	85%	92%	75%	83%	56%	83%	77%	85%	92%	83%		72.10
20 Surveys	20 Female	22.07692308		% Not Answered	% Not Answered	% Not Answered	% Not Answered	% Not Answered	% Not Answered	% Not Answered	% Not Answered	% Not Answered	% Not Answered	% Not Answered	% Not Answered	% Not Answered			
				0.00	10.00	5.00	15.00	0.00	0.00	5.00	5.00	20.00	5.00	0.00	0.00	0.00			
# NA				0	2	1	3	0	0	1	1	4	1	0	0	0			
# Answered				13	11	12	10	13	13	12	12	9	12	13	13	13			
# Wrong				0	1	1	3	2	1	3	2	4	2	3	2	1			

Appendix 34 Japanese Data Collected Basic Test Density

				Part 2 Number of words on a slide				Basic Presentation			False = 0	True = 1								
								N=101												
Correct Answer					FALSE	TRUE	FALSE	TRUE	FALSE	FALSE	TRUE	TRUE	TRUE	FALSE	FALSE	FALSE	TRUE			
Number of Survey	Sex	Age	Lived in Japan over 2 weeks?	Have you seen this presentation before?	Question #1	Question #2	Question #3	Question #4	Question #5	Question #6	Question #7	Question #8	Question #9	Question #10	Question #11	Question #12	Question #13	# Answered	# Correct	Score %
1-11	BLANK																			
12	Male	19	Y	N	0	1	0	1	0	0	1	1	1	0	1	0	1	13	12	92.31
13	Male	19	Y	N	0	1	0	1	0	0	1	1	1	0	0	0	1	13	13	100.00
14	Male	19	Y	N	0	1	0	1	0	0	1	0	1	0	0	0	1	13	12	92.31
15	Male	20	Y	N	0	1	0	1	0	0	1	1	1	1	0	0	1	13	12	92.31
16	Male	19	Y	N	0	1	0	1	0	0	1	1	1	0	0	0	1	13	13	100.00
17	Female	19	Y	N	0	1	0	X	0	0	1	X	X	X	1	0	1	9	8	88.89
18	Female	19	Y	N	0	1	0	1	0	0	1	0	1	X	0	0	1	12	11	91.67
19	Female	19	Y	N	0	1	1	X	1	0	1	X	X	1	0	0	1	9	6	66.67
20	Female	20	Y	N	0	1	0	1	1	0	1	X	X	1	1	0	1	10	7	70.00
21	Male	20	Y	N	0	1	0	1	0	0	1	1	1	X	0	0	1	12	12	100.00
22	Male	20	Y	N	0	1	0	0	0	0	1	1	1	0	0	0	1	13	12	100.00
23	Female	20	Y	N	0	1	0	0	0	0	1	0	1	X	0	0	1	12	11	92.31
24	Female	19	Y	N	0	1	0	1	0	0	1	1	1	0	0	0	1	13	13	100.00
25	Female	19	Y	N	0	1	0	1	0	0	1	1	1	0	0	0	1	13	13	100.00
26	Female	19	Y	x	0	1	0	0	0	0	1	0	X	0	1	0	1	12	9	75.00
27	Male	19	Y	N	0	1	0	1	0	0	1	0	1	0	0	0	1	13	12	92.31
28	Male	20	Y	N	0	1	0	1	0	1	1	0	0	1	0	0	1	13	9	69.23
29	Female	20	Y	N	0	1	0	0	0	1	0	1	1	X	0	0	1	12	9	75.00
30	Female	19	Y	N	0	1	0	1	0	0	1	1	1	0	0	0	1	13	13	100.00
31	Female	19	Y	N	0	1	0	1	0	0	1	1	1	0	0	0	1	13	13	100.00
32	Male	19	Y	N	0	1	0	1	1	0	1	1	1	1	1	0	1	13	9	69.23
33	Male	19	Y	N	0	1	1	1	0	0	1	1	1	0	0	0	1	13	12	92.31
34	Female	20	Y	N	0	1	0	1	0	0	1	1	X	1	1	0	1	12	10	83.33
35	Female	19	Y	N	0	1	0	1	0	0	1	1	1	0	0	0	1	13	13	100.00
36	Female	19	Y	N	0	1	0	1	0	0	1	1	1	0	0	0	1	13	13	100.00
37	Male	20	Y	N	0	1	0	0	0	0	1	1	1	0	1	0	1	13	11	84.62
38	Male	19	Y	N	0	1	0	1	0	0	1	1	1	0	1	0	1	13	12	92.31
39	Male	19	Y	N	0	1	0	1	0	0	1	1	1	0	1	1	1	13	11	84.62
40	Male	19	Y	N	0	1	0	1	0	0	1	1	1	0	0	0	1	13	13	100.00
41	Male	20	Y	N	0	1	0	1	0	0	1	1	1	0	0	0	1	13	13	100.00
42	Female	19	x	x	0	1	0	1	0	0	1	0	1	0	0	0	1	13	12	92.31
43	Female	19	Y	N	0	1	1	X	1	0	1	1	1	0	0	0	1	12	10	83.33
44	Female	20	Y	N	0	1	0	1	0	0	1	1	1	0	0	0	1	13	13	100.00
45	Female	20	Y	N	0	1	0	0	0	0	1	1	1	0	0	0	1	13	12	92.31
46	Female	20	Y	N	0	1	0	1	0	0	1	1	1	0	0	0	1	13	13	100.00
47	Female	19	Y	N	0	1	0	1	0	0	1	1	1	0	0	0	1	13	13	100.00
48	Male	20	Y	N	0	1	1	1	0	0	1	0	1	0	0	0	1	13	11	84.62
49	Male	19	Y	N	0	1	0	1	0	0	1	0	0	1	1	0	1	13	9	69.23
50	Male	19	Y	N	0	1	0	1	0	0	1	1	0	0	0	0	1	13	12	92.31
51	Male	18	Y	N	0	1	0	1	0	0	0	1	1	0	0	1	1	13	11	84.62
52	Male	19	Y	N	0	1	X	X	0	0	1	0	1	0	1	0	1	11	9	81.82
53	Male	19	Y	N	0	X	X	X	0	1	1	1	X	0	1	0	1	9	8	88.89
54	Male	18	Y	N	0	1	X	1	0	0	0	0	1	0	0	0	1	12	10	83.33
55	Male	18	Y	N	0	1	0	X	X	0	1	0	1	0	1	0	1	12	10	83.33
56	Male	20	Y	N	0	1	0	1	0	0	1	1	1	0	X	0	1	12	12	100.00
57	Male	18	Y	N	0	1	1	X	0	0	1	0	1	1	0	0	1	12	9	75.00
58	Male	19	Y	N	0	1	X	0	1	0	1	1	1	0	1	0	1	12	9	75.00
59	Male	19	Y	N	0	1	0	1	0	0	0	0	1	0	1	0	1	13	10	76.92

Appendix 34 Japanese Data Collected Basic Test Density

60	Male	19	Y	N	0	0	0	1	0	0	1	X	1	1	1	0	1	12	9	75.00
61	Male	18	Y	N	0	1	0	X	X	0	1	X	1	X	0	0	1	9	9	100.00
62	Male	19	Y	N	0	1	0	1	0	0	1	1	1	0	1	0	1	13	12	92.31
63	Male	19	Y	N	0	1	0	1	1	0	1	1	1	0	1	0	1	13	11	84.62
64	Male	18	Y	N	0	1	1	0	0	0	1	0	1	0	0	0	1	13	10	76.92
65	Male	18	Y	N	0	1	1	1	1	0	1	0	1	0	1	1	1	13	9	69.23
66	Male	19	Y	N	0	1	1	0	0	0	1	0	0	0	0	0	1	13	9	69.23
67	Female	18	Y	N	0	1	0	X	1	0	1	1	X	X	X	0	1	9	8	88.89
68	Male	21	Y	N	0	X	0	X	0	0	1	1	1	0	1	0	1	11	10	90.91
69	Male	18	Y	N	0	1	0	X	0	0	1	0	X	0	1	0	1	11	9	81.82
70	Male	18	Y	N	0	0	1	1	0	0	1	1	0	0	1	0	1	13	9	69.23
71	Male	18	Y	N	0	1	0	1	0	1	1	1	0	X	1	0	1	12	9	75.00
72	Male	19	Y	N	0	1	0	1	0	0	1	X	1	0	1	0	1	12	11	91.67
73	Male	19	Y	N	0	0	0	1	0	0	1	0	0	0	1	0	1	13	9	69.23
74	Male	18	Y	N	0	1	0	X	0	0	0	1	X	X	0	0	1	10	9	90.00
75	Male	18	Y	N	0	0	0	1	0	0	1	0	1	0	1	0	1	13	10	76.92
76	Male	20	Y	N	0	0	1	1	0	1	0	1	1	1	1	1	1	13	10	76.92
77	Male	18	Y	N	0	1	0	1	0	0	1	1	0	1	1	0	1	13	10	76.92
78	Male	19	Y	N	0	1	1	X	0	0	X	1	X	X	0	0	1	9	8	88.89
79	Male	19	Y	N	0	1	1	0	1	0	1	1	0	0	0	0	1	13	10	76.92
80	Female	20	Y	N	0	1	0	0	1	0	1	0	X	0	1	0	1	12	8	66.67
81	Male	19	Y	N	0	1	0	1	1	0	0	1	1	0	1	0	1	13	10	76.92
82	Male	21	Y	N	0	X	0	1	0	X	0	1	X	1	0	0	1	10	8	80.00
83	Female	20	Y	N	0	1	0	X	1	0	1	1	X	1	1	0	X	10	7	70.00
84	Female	19	Y	N	0	1	0	X	1	0	1	1	1	0	0	0	1	12	11	91.67
85	Female	19	Y	N	0	1	0	X	0	0	1	1	1	0	1	0	1	12	11	91.67
86	Female	19	Y	N	0	X	0	1	1	0	1	1	0	1	1	0	1	12	8	66.67
87	Female	21	Y	N	0	1	0	1	0	0	1	X	1	X	1	0	1	10	9	90.00
88	Female	19	Y	N	0	1	1	1	0	0	0	X	1	0	1	0	1	12	9	75.00
89	Male	19	Y	N	0	1	0	0	1	0	1	X	0	0	0	0	1	12	9	75.00
90	Male	21	Y	N	0	1	X	X	0	0	1	0	X	X	0	0	1	8	7	87.50
91	Male	21	Y	N	0	1	1	1	0	0	1	1	1	0	0	0	1	13	13	100.00
92	Male	21	Y	N	0	0	X	X	X	0	1	1	X	X	0	0	1	8	7	87.50
93	Female	19	Y	N	0	1	1	0	X	1	0	X	1	0	1	0	X	10	6	60.00
94	Male	19	Y	N	0	1	0	1	0	0	1	1	1	0	1	0	1	13	12	92.31
95	Male	19	Y	N	0	1	0	X	0	0	1	1	0	0	1	0	1	12	11	91.67
96	Male	20	Y	N	0	1	0	X	0	X	X	0	0	0	0	0	1	10	8	80.00
97	Female	19	Y	N	0	1	0	X	1	0	1	X	0	0	X	0	1	10	8	80.00
98	Male	20	Y	N	0	0	0	1	1	0	1	1	0	1	0	0	1	13	9	69.23
99	Male	19	Y	N	0	1	0	X	0	0	1	1	1	0	0	0	1	12	12	100.00
100	Male	19	Y	N	0	1	X	1	0	0	0	1	0	1	0	0	1	12	9	75.00
101	Male	20	Y	N	0	1	0	1	0	0	1	1	0	0	1	0	1	13	11	84.62
102	Male	19	Y	N	0	1	1	X	0	0	1	0	1	0	0	0	1	12	10	83.33
																		12.02198		85.31
					% Correct	% Correct	% Correct	% Correct	% Correct	% Correct	% Correct	% Correct	% Correct	% Correct	% Correct	% Correct	% Correct	1094	Total	
					100%	92%	82.60%	84.50%	81.60%	93.30%	87.60%	71.30%	78.90%	79.50%	56.80%	95.60%	100	1.366081	Stdev	85.31%
91 Surveys	30 F/ 61 M	19.20879			% Not Answered	% Not Answered	% Not Answered	% Not Answered	% Not Answered	% Not Answered	% Not Answered	% Not Answered	% Not Answered	% Not Answered	% Not Answered	% Not Answered	% Not Answered			
					0	4.30%	5.40%	24.20%	4.40%	2.20%	2.20%	12.10%	16.50%	14.30%	3.30%	0.00%	2.20%	7.50%		
# NA					0	4	8	22	4	2	2	11	15	13	3	0	2			
# Answered					91	87	83	69	87	89	89	80	76	78	88	91	89			
# Wrong					0	7	15	11	16	6	11	23	16	16	38	4	0			

Appendix 34 Japanese Data Collected Script Presentation

Part 2 Number of words on a slide   Script Presentation N=78   False = 0 True = 1

Number of Survey	Sex	Age	Lived in Japan over 2 weeks?	Have you seen this presentation before?	Question #1	Question #2	Question #3	Question #4	Question #5	Question #6	Question #7	Question #8	Question #9	Question #10	Question #11	Question #12	Question #13	# Answered	# Correct	Score %
Correct Answer					FALSE	TRUE	FALSE	TRUE	FALSE	FALSE	TRUE	TRUE	TRUE	FALSE	FALSE	FALSE	TRUE			
1	m	20	Y	N	0	1	0	0	0	0	1	0	1	1	1	0	0	13	5	38.46
2	M	19	Y	N	0	1	0	X	0	0	1	1	1	0	1	0	1	12	8	66.67
3	F	20	Y	N	0	1	0	0	0	0	1	0	1	0	0	0	1	13	11	84.62
4	M	23	Y	N	0	1	0	1	1	0	1	1	1	0	0	0	1	13	12	92.31
5	F	20	Y	N	0	1	0	1	1	0	1	1	1	0	1	0	1	13	11	84.62
6	F	19	Y	N	0	1	0	1	0	0	1	1	1	0	1	0	1	13	12	92.31
7	F	20	Y	N	0	X	X	1	1	0	1	0	X	1	1	X	1	9	5	55.56
8	M	19	Y	N	0	1	0	1	0	0	1	0	1	0	0	0	1	13	12	92.31
9	M	20	Y	N	0	0	X	X	1	0	1	1	1	X	0	0	1	10	8	80.00
10	M	19	Y	N	0	1	0	X	1	0	1	X	X	1	1	X	1	9	6	66.67
11	M	21	Y	N	0	X	X	X	0	X	X	X	1	X	0	0	1	6	6	100.00
12	M	19	Y	N	0	1	0	1	1	0	0	1	1	0	1	0	1	12	9	75.00
13	F	19	Y	N	1	1	0	X	0	0	1	0	1	1	0	0	X	11	9	81.82
14	F	20	Y	N	0	0	0	1	1	0	1	X	1	0	0	0	1	12	10	83.33
15	M	21	Y	N	0	1	1	0	0	1	1	1	1	0	0	0	0	13	9	69.23
16	F	20	Y	N	0	1	1	1	1	0	1	1	1	0	1	X	1	12	9	75.00
17	M	20	Y	N	0	0	1	1	1	0	1	0	1	1	1	0	1	13	7	53.85
18	M	21	Y	N	0	X	X	X	0	0	1	1	X	0	1	0	1	9	8	88.89
19	M	19	Y	N	0	1	1	X	X	0	1	1	1	0	1	1	X	10	8	80.00
20	M	21	Y	N	0	1	0	1	1	0	1	1	1	1	0	0	1	13	11	84.62
21	F	20	Y	N	0	1	0	X	1	0	1	1	X	0	X	0	1	10	9	90.00
22	F	19	Y	N	0	0	0	X	0	1	1	1	1	0	1	0	1	12	9	90.00
23	F	19	Y	N	0	0	0	1	0	0	1	0	1	1	0	0	1	13	10	75.00
24	F	19	Y	N	0	1	1	X	1	0	1	X	X	0	1	0	X	9	6	66.67
25	M	20	Y	N	0	1	0	1	X	0	1	1	1	0	0	0	1	12	12	100.00
26	F	19	Y	N	0	1	0	X	0	0	1	1	1	0	0	0	1	12	12	100.00
27	M	20	Y	N	0	1	0	1	0	0	1	1	1	0	0	0	1	13	13	100.00
28	M	20	Y	N	0	1	1	X	1	0	1	0	1	0	0	0	1	12	10	83.33
29	F	21	Y	N	0	1	X	X	1	0	1	X	X	X	1	0	1	8	6	75.00
30	F	20	Y	N	1	1	1	0	0	0	1	1	1	1	1	0	1	13	8	61.54
31	M	19	Y	N	0	0	1	X	1	X	1	1	1	0	1	X	1	10	9	90.00
32	M	19	Y	N	0	1	0	0	0	0	1	1	1	1	0	0	1	13	11	84.62
33	M	20	Y	N	0	1	0	X	1	0	X	1	1	1	1	1	1	11	7	63.64
34	M	20	Y	N	0	1	0	1	1	0	1	1	1	1	1	1	1	13	9	69.23
35	M	20	Y	N	0	1	0	X	0	0	1	0	X	0	0	0	X	10	9	90.00
36	M	19	Y	N	0	1	0	X	0	0	1	1	1	1	1	X	1	11	9	81.82
37	M	20	Y	N	0	1	X	1	0	0	1	X	1	0	1	0	1	11	10	90.91
38	M	19	Y	N	0	X	0	X	1	0	0	1	0	1	0	0	1	11	7	63.64
39	F	18	Y	N	0	1	0	X	0	0	0	0	1	1	1	0	1	12	8	66.67
40	M	19	Y	N	0	1	0	1	0	0	1	1	1	0	1	0	1	13	12	92.31
41	F	19	Y	N	0	1	1	0	1	0	0	1	1	0	0	0	1	13	9	69.23
42	F	18	Y	N	X	1	X	X	0	0	1	1	X	X	0	0	1	8	8	100.00
43	F	19	Y	N	1	1	1	X	1	0	0	1	1	0	0	0	1	12	10	83.33
44	F	18	Y	N	0	1	X	X	0	X	1	X	1	0	1	0	1	9	8	88.89
45	F	18	Y	N	0	0	1	1	1	0	1	1	0	X	0	X	1	11	7	63.64
46	F	19	Y	N	0	1	0	X	0	0	1	1	1	1	1	0	1	12	10	83.33
47	F	18	Y	N	0	0	0	X	1	0	1	1	X	0	0	0	X	10	8	80.00
49	M	19	Y	N	0	1	0	0	0	0	1	0	0	0	0	0	1	13	10	76.92
50	M	18	Y	N	0	1	0	1	0	1	1	0	1	0	1	0	1	13	11	84.62
51	F	19	Y	N	0	1	0	1	1	0	1	1	1	0	1	0	1	13	11	84.62
52	F	18	Y	N	0	1	1	1	0	0	1	1	1	0	0	0	1	13	12	92.31
53	M	18	Y	N	0	1	X	1	1	0	0	1	X	0	0	0	1	11	9	81.82
54	F	19	Y	N	0	1	0	X	X	0	1	X	1	1	1	0	1	10	8	80.00
55	M	18	Y	N	0	1	0	0	0	X	1	0	0	0	0	0	1	12	9	75.00

Appendix 34 Japanese Data Collected Script Presentation

56	F	20	Y	N	0	1	0	1	0	0	1	1	1	0	0	0	1	13	13	100.00
57	M	18	Y	N	0	1	0	1	1	0	1	1	1	0	0	0	1	13	12	92.31
58	F	20	Y	N	0	0	0	X	1	X	0	X	1	0	1	1	X	9	4	44.44
59	F	19	Y	N	0	1	1	1	1	0	1	0	1	0	1	X	1	12	8	66.67
60	F	19	Y	N	0	0	1	1	1	0	0	0	1	1	1	0	1	13	6	46.15
61	F	21	N	N	0	0	1	1	0	0	1	0	1	1	1	0	1	13	8	61.54
62	F	19	Y	N	0	1	1	X	1	0	1	1	1	1	0	0	1	12	9	75.00
63	M	20	Y	N	0	1	X	X	0	0	1	X	X	0	0	0	1	9	9	100.00
64	M	19	Y	N	0	1	1	X	0	0	1	1	X	0	0	0	1	11	10	90.91
65	F	20	Y	N	0	1	X	X	X	0	X	1	X	1	1	0	X	7	5	71.43
66	M	19	Y	N	0	1	0	0	1	0	1	1	1	0	1	0	1	13	10	76.92
67	M	19	Y	N	0	1	X	X	1	0	0	X	0	X	0	0	0	9	5	55.56
68	M	19	Y	N	0	1	0	1	0	0	1	1	1	0	0	0	1	13	13	100.00
69	M	19	Y	N	0	1	1	1	0	1	0	0	1	1	1	1	1	13	6	46.15
70	F	20	Y	N	0	1	1	1	0	0	0	1	1	0	0	0	1	13	11	84.62
71	F	20			0	1	1	1	0	0	1	1	1	0	0	0	1	13	12	92.31
72	F	20	Y	N	0	1	1	X	0	1	0	X	X	0	1	0	X	9	6	66.67
73	F	20	Y	N	0	1	0	1	0	0	1	1	0	0	1	0	1	13	11	84.62
74	F	20	Y	N	0	1	0	1	X	0	1	0	X	X	X	0	1	9	8	88.89
75	M	22	Y	N	0	X	1	X	1	0	1	1	1	0	0	0	1	11	9	81.82
76	M	20	Y	N	0	1	1	1	X	0	1	0	0	0	1	0	1	23	9	39.13
77	M	20	Y	N	0	1	0	1	1	0	1	0	1	1	0	0	1	13	10	76.92
78	F	21	Y	N	X	1	0	X	1	0	1	X	1	X	1	X	1	8	6	75.00
																		11.55844		
																		890		
																		2.22		
					% Correct	% Correct	% Correct	% Correct	% Correct	% Correct	% Correct	% Correct	% Correct	% Correct	% Correct	% Correct	% Correct	Overall average		
					98.68%	84.93%	71.21%	79.55%	52.78%	95.89%	84.00%	69.23%	88.89%	68.12%	50.00%	92.86%	95.71%	79%		78.45
91 Surveys	37 F/ 41 M	19.50649351			% Not Answered	% Not Answered	% Not Answered	% Not Answered	% Not Answered	% Not Answered	% Not Answered	% Not Answered	% Not Answered	% Not Answered	% Not Answered	% Not Answered	% Not Answered			
					2.56	6.41	15.38	43.59	7.69	6.41	3.85	16.67	19.23	11.54	2.56	10.26	10.26			
# NA					2	5	12	34	6	5	3	13	15	9	2	8	8			
# Answered					76	73	66	44	72	73	75	65	63	69	76	70	70			
# Wrong					1	11	19	9	34	3	12	20	7	22	38	5	3			

48	M	18	Y	N	0	1	0	1	0	X	0	1	1		Delete Not answered majjority opf questions					#DIV/0!
Number of Survey	Sex	Age	Lived in Japan over 2 weeks?	Have you seen this presentation before?	Question #1	Question #2	Question #3	Question #4	Question #5	Question #6	Question #7	Question #8	Question #9	Question #10	Question #11	Question #12	Question #13	# Answered	# Correct	Score %

Appendix 34 Japanese Data Collected Simple Text Density

N=78

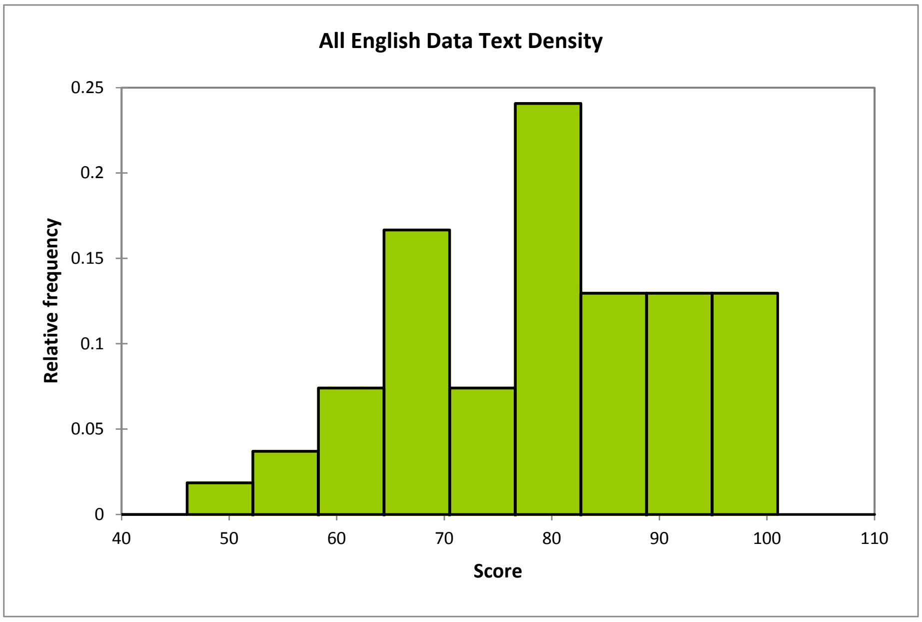
Number of Survey	Sex	Age	Lived in Japan over 2 weeks?	Have you seen this presentation before?	Question #1	Question #2	Question #3	Question #4	Question #5	Question #6	Question #7	Question #8	Question #9	Question #10	Question #11	Question #12	Question #13	# Answered	# Correct	Score %
Correct Answer					FALSE	TRUE	FALSE	TRUE	FALSE	FALSE	TRUE	TRUE	TRUE	FALSE	FALSE	FALSE	TRUE			
1	Female	18	Y	N	0	X	X	1	1	0	1	1	0	X	0	0	1	9	7	77.78
2	Female	18	Y	N	0	0	0	X	1	0	1	0	1	X	X	0	1	9	6	66.67
3	Male	18	Y	N	0	1	0	0	1	0	1	1	1	0	0	0	1	13	11	84.62
4	Male	18	Y	N	0	1	X	X	0	0	1	1	1	0	1	0	1	11	10	90.91
5	Female	18	Y	N	0	1	0	1	1	0	1	0	X	X	0	0	1	11	9	81.82
6	Female	18	Y	N	0	1	0	0	0	0	1	X	0	X	0	0	1	11	9	81.82
7	Female	19	Y	N	0	1	1	X	1	0	1	1	1	X	1	0	1	11	8	72.73
8	Female	19	Y	N	0	1	0	X	1	1	1	1	1	1	1	0	1	12	8	66.67
9	Male	18	Y	N	0	1	0	1	0	0	1	0	1	1	0	0	1	13	11	84.62
10	Female	18	Y	N	0	1	0	1	1	0	1	0	1	X	0	0	1	12	10	83.33
11	Male	18	Y	N	0	1	0	1	0	0	1	1	1	0	0	0	1	13	13	100.00
12	Female	18	Y	N	0	1	0	X	0	0	1	0	1	0	1	0	1	12	10	83.33
13	Female	18	Y	N	0	1	0	X	0	0	1	1	1	1	0	0	1	12	11	91.67
14	Female	18	Y	N	0	1	0	X	0	0	1	0	1	0	0	0	1	12	11	91.67
15	Male	19	Y	N	0	X	X	1	X	X	1	0	X	X	X	0	1	6	5	83.33
16	Female	18	Y	N	0	1	0	X	0	X	0	0	1	X	0	0	1	10	8	80.00
17	Female	18	Y	N	0	1	0	1	1	0	1	0	1	0	0	0	1	13	11	84.62
18	Female	19	Y	N	0	1	0	X	0	0	1	1	X	0	0	0	1	11	11	100.00
19	Male	21	Y	N	0	1	0	1	1	0	1	1	1	0	1	0	1	13	11	84.62
20	Female	18	Y	N	0	1	0	1	0	0	1	X	X	0	1	0	1	11	10	90.91
21	Female	18	Y	N	0	1	0	1	X	X	1	1	X	0	0	0	1	10	10	100.00
22	Female	18	Y	N	0	1	0	0	0	0	1	1	1	0	1	0	1	13	11	100.00
23	Male	18	Y	N	0	X	X	X	X	0	0	0	1	0	0	0	1	9	7	84.62
24	Male	18	Y	N	0	1	0	X	0	0	1	1	1	0	1	0	1	12	11	91.67
25	Male	20	Y	N	0	0	1	1	1	X	1	1	1	1	1	0	1	12	7	58.33
26	Female	20	Y	N	0	1	X	1	1	0	1	X	0	0	X	0	1	10	8	80.00
27	Female	19	Y	N	0	1	X	X	1	X	1	0	1	0	1	0	1	10	7	70.00
28	Male	19	Y	N	0	1	0	1	1	0	0	0	1	1	1	0	1	13	8	61.54
29	Female	20	Y	N	0	1	0	1	1	0	1	1	0	1	0	0	1	13	10	76.92
30	Female	20	Y	N	0	1	1	X	1	0	0	X	1	1	0	0	1	11	7	63.64
31	Female	19	Y	N	0	1	1	0	1	1	X	X	X	0	0	0	1	10	6	60.00
32	Female	20	Y	N	0	1	0	0	1	0	1	0	1	1	1	0	1	13	8	61.54
33	Male	20	Y	N	0	1	0	1	1	X	X	X	1	0	0	0	1	10	9	90.00
34	Male	19	Y	N	0	1	0	1	1	0	0	0	1	0	0	0	1	13	10	76.92
35	Male	20	Y	N	0	1	1	1	0	0	1	1	1	1	1	0	1	13	10	76.92
36	Female	19	Y	N	0	X	1	X	0	1	1	X	0	1	1	X	1	9	4	44.44
37	Female	19	Y	N	0	X	1	X	0	1	1	X	X	0	1	0	1	9	6	66.67
38	Female	19	Y	N	0	1	0	1	0	0	0	1	1	1	0	0	1	13	11	84.62
39	Female	19	Y	N	0	1	0	0	0	X	1	1	1	0	1	0	1	12	10	83.33
40	Male	19	Y	N	0	1	0	X	1	0	1	0	0	0	1	0	1	12	8	66.67
41	Male	19	Y	N	0	1	0	X	1	0	1	1	1	0	1	0	1	12	10	83.33
42	Male	19	Y	N	0	X	1	1	1	0	X	0	X	1	0	0	1	10	6	60.00
43	Male	19	Y	N	0	1	0	1	1	0	1	0	0	1	1	0	1	13	8	61.54
44	Female	19	Y	N	0	1	1	0	0	1	0	0	X	1	1	0	1	12	5	41.67
45	Male	19	Y	N	0	1	0	X	1	0	1	X	X	1	1	1	0	10	5	50.00
46	Male	19	x	x	1	1	1	1	0	0	1	0	1	1	0	0	1	13	9	69.23
47	Female	19	Y	N	0	0	1	1	0	0	1	0	1	1	1	0	1	13	8	61.54
48	Female	20	Y	N	0	0	0	1	0	0	0	1	1	0	0	0	1	13	11	84.62
49	Male	18	Y	N	0	X	0	1	0	0	1	1	1	0	0	0	1	12	12	100.00
50	Male	20	Y	N	0	0	1	0	1	0	0	0	0	1	1	0	1	13	4	30.77
51	Male	20	Y	N	0	1	0	0	1	X	X	X	0	1	0	0	1	10	6	60.00
52	Female	18	Y	N	0	X	1	1	0	0	X	1	X	X	X	0	1	9	8	88.89
53	Male	19	Y	N	0	0	0	1	0	0	0	0	0	0	0	0	1	13	9	69.23
54	Male	18	Y	N	0	1	X	1	0	0	1	X	1	0	1	1	1	11	9	81.82

Appendix 34 Japanese Data Collected Simple Text Density

55	Female	19	Y	N	X	1	1	X	1	0	1	1	0	1	0	0	1	11	7	63.64
56	Male	19	Y	N	0	1	0	1	0	0	1	1	0	1	1	0	1	13	10	76.92
57	Male	19	Y	N	0	X	1	X	0	0	1	X	X	0	X	X	1	7	6	85.71
58	Male	18	Y	N	0	0	1	0	1	0	0	0	0	1	1	0	1	13	4	30.77
59	Male	19	Y	N	0	1	0	1	1	0	1	1	1	X	1	0	1	12	10	83.33
60	Female	18	Y	N	0	1	0	1	0	0	1	0	1	0	0	0	1	13	12	92.31
61	Male	19	Y	N	0	1	0	1	0	X	1	0	1	1	1	X	1	11	8	72.73
62	Male	18	Y	N	0	0	1	X	0	0	1	0	0	1	X	X	1	10	5	50.00
63	Female	18	Y	N	0	1	1	X	1	X	1	X	1	X	1	0	1	9	6	66.67
64	Male	24	Y	N	0	1	0	1	1	0	1	1	0	1	1	0	1	13	9	69.23
65	Male	18	Y	N	0	1	0	1	0	0	1	0	1	0	1	0	1	13	11	84.62
66	Male	18	Y	N	0	X	0	1	1	0	0	1	1	0	1	1	1	13	9	69.23
67	Female	18	Y	N	X	1	1	X	0	0	0	X	1	X	1	0	X	8	5	62.50
68	Female	19	Y	N	X	1	0	1	1	0	1	0	1	X	1	0	1	11	9	81.82
69	Male	18	Y	N	0	0	0	0	0	1	0	1	1	0	0	0	1	13	9	69.23
70	Male	18	Y	N	0	1	0	X	0	0	1	1	X	X	1	0	1	10	9	90.00
71	Female	18	Y	N	0	1	0	X	0	0	1	0	1	0	1	0	1	12	10	83.33
72	Male	18	Y	N	0	1	1	0	1	0	X	0	X	X	1	0	1	10	5	50.00
73	Male	19	Y	N	0	1	0	X	0	0	1	X	X	0	0	0	1	10	10	100.00
74	Male	18	Y	N	0	1	0	X	1	0	1	1	X	0	0	0	1	11	10	90.91
75	Male	18	Y	N	0	0	1	1	0	0	1	1	0	1	1	0	1	13	8	61.54
76	Male	18	Y	N	1	0	0	1	0	1	0	0	1	1	1	1	1	13	6	46.15
77	Male	19	Y	N	0	x	0	x	x	0	0	0	x	x	0	0	1	8	7	87.50
78	Female	18	Y	N	0	0	1	0	1	0	0	0	1	0	1	0	1	13	7	53.85
																		11.35897		
																		886		
																		1.674673		
					% Correct	% Correct	% Correct	% Correct	% Correct	% Correct	% Correct	% Correct	% Correct	% Correct	% Correct	% Correct	% Correct	Answered		
					97.33%	82.09%	69.01%	74.00%	51.35%	89.71%	76.39%	47.62%	73.77%	56.45%	44.44%	94.59%	98.70%	22.49		74.92
91 Surveys	37 F/ 41 M	18.74358974			% Not Answered	% Not Answered	% Not Answered	% Not Answered	% Not Answered	% Not Answered	% Not Answered	% Not Answered	% Not Answered	% Not Answered	% Not Answered	% Not Answered	% Not Answered	87%		
					3.85	14.10	8.97	35.90	5.13	12.82	7.69	19.23	21.79	20.51	7.69	5.13	1.28			
# NA					3	11	7	28	4	10	6	15	17	16	6	4	1			
# Answered					75	67	71	50	74	68	72	63	61	62	72	74	77			
# Wrong					2	12	22	13	36	7	17	33	16	27	40	4	1			

Appendix 35 Text Density **All English Data Combined**

Variable	Observations	Obs. with missing data	Obs. without missing data	Minimum	Maximum	Mean	Std. deviation
Score	54	0	54	46.154	100.000	78.935	13.148



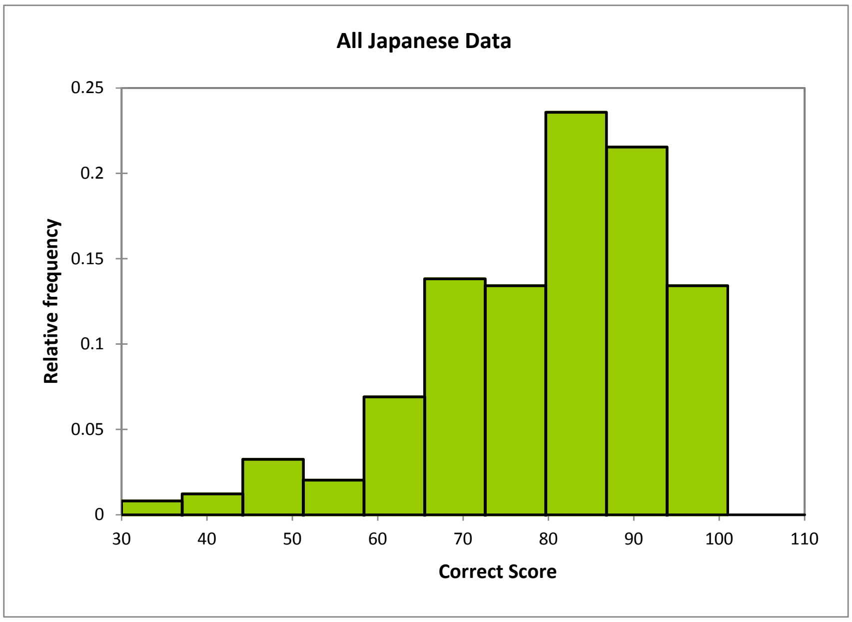
Descriptive statistics for the intervals :

Lower bound	Upper bound	Frequency	Relative Frequency	Density
40	46.1	0	0.000	0.000
46.1	52.2	1	0.019	0.003
52.2	58.3	2	0.037	0.006
58.3	64.4	4	0.074	0.012
64.4	70.5	9	0.167	0.027
70.5	76.6	4	0.074	0.012
76.6	82.7	13	0.241	0.039
82.7	88.8	7	0.130	0.021
88.8	94.9	7	0.130	0.021
94.9	101	7	0.130	0.021

All Japanese Data – 3 Presentation Types Combined

Summary statistics:

Variable	Obs.	Obs. with missing data	Obs. without missing data	Minimum	Maximum	Mean	Std. deviation
Score	246	0	246	30.769	100.000	79.864	14.672



Descriptive statistics for the intervals :

Lower bound	Upper bound	Frequency	Relative Frequency	Density
30	37.1	2	0.008	0.001
37.1	44.2	3	0.012	0.002
44.2	51.3	8	0.033	0.005
51.3	58.4	5	0.020	0.003
58.4	65.5	17	0.069	0.010
65.5	72.6	34	0.138	0.019
72.6	79.7	33	0.134	0.019
79.7	86.8	58	0.236	0.033
86.8	93.9	53	0.215	0.030
93.9	101	33	0.134	0.019

Appendix 37 Grubbs Test for Outliers Basic Japanese Data Set

Alternative hypothesis: Two-sided
Significance level (%): 5
Iterations: Maximum: 1
Summary statistics

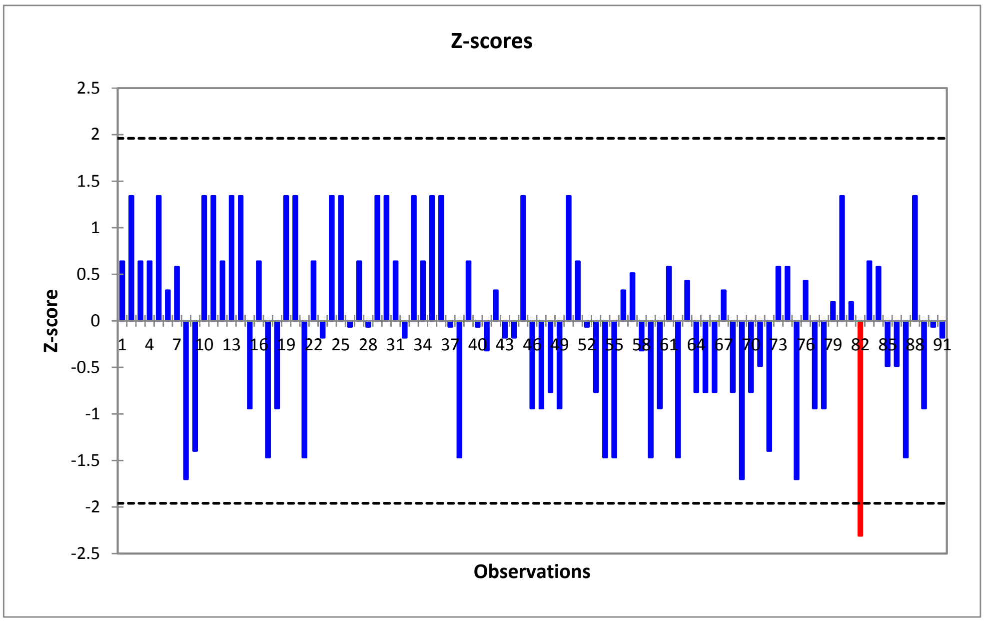
Summary statistics:

Variable	Observations	Obs. with missing data	Obs. without missing data	Minimum	Maximum	Mean	Std. deviation
Var1	91	0	91	60.000	100.000	85.305	10.968

Grubbs test for outliers / Two-tailed test:

G (Observed value)	2.307
G (Critical value)	3.352
p-value (Two-tailed)	0.227
alpha	0.05

99% confidence interval on the p-value:
] 0.226, 0.228 [



Appendix 37　Grubbs Test for Outliers Script Japanese Data Set

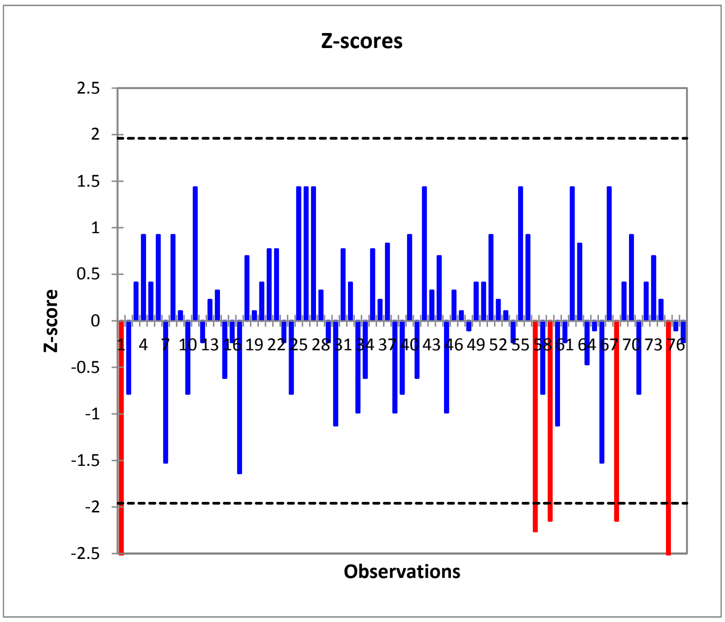
Summary statistics:

Variable	Obs.	Obs. with missing data	Obs. without missing data	Minimum	Maximum	Mean	Std. deviation
Var1	77	0	77	38.462	100.000	78.446	15.037

Grubbs test for outliers / Two-tailed test:

G (Observed value)	2.659
G (Critical value)	3.292
p-value (Two-tailed)	0.509
alpha	0.05

99% confidence interval on the p-value:
] 0.508, 0.510 [



Appendix 37 Grubbs Test for Outliers Simple Japanese Data Set

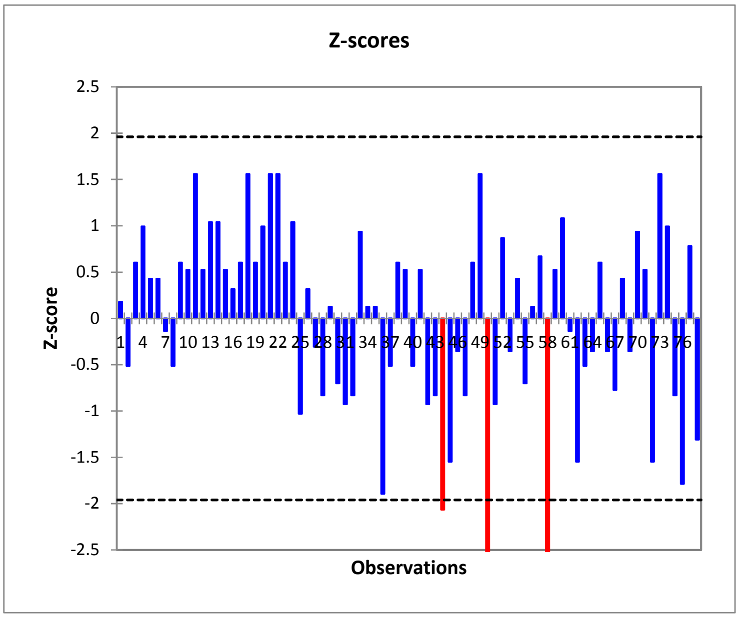
Summary statistics:

Variable	Observations	Obs. with missing data	Obs. without missing data	Minimum	Maximum	Mean	Std. deviation
Var1	78	0	78	30.769	100.000	74.917	16.106

Grubbs test for outliers / Two-tailed test:

G (Observed value)	2.741
G (Critical value)	3.297
p-value (Two-tailed	0.395
alpha	0.05

99% confidence interval on the p-value:
] 0.393, 0.396 [



Appendix 38 All English Data, All Three Presentation Types ANOVA

Summary statistics:

Variable	Observations	Obs. with missing data	Obs. without missing data	Minimum	Maximum	Mean	Std. deviation
Score	54	0	54	46.154	100.000	78.935	13.148

Variable	Categories	Frequencies	%
Presentation Type	Basic - English	21	38.889
	Script - English	20	37.037
	Simple - English	13	24.074

Correlation matrix:

Variables	Presentation Type-Basic - English	Presentation Type-Script - English	Presentation Type-Simple - English	Score
Presentation Type-Basic - English	1.000	-0.612	-0.449	0.177
Presentation Type-Script - English	-0.612	1.000	-0.432	0.083
Presentation Type-Simple - English	-0.449	-0.432	1.000	-0.296
Score	0.177	0.083	-0.296	1.000

Presentation Type / Dunnett (right sided) / Analysis of the differences between the control category Basic - English and the other categories with a confidence interval of 95%:

Category	Difference	Standardized difference	Critical value	Critical difference	Pr > Diff	Significant
Basic - English vs Simple - English	9.729	2.156	1.968	8.882	0.030	Yes
Basic - English vs Script - English	1.483	0.371	1.968	7.864	0.521	No

All English Data, All Three Presentation Types ANOVA

Multicolinearity statistics:

Statistic	Presentation Type-Basic - English	Presentation Type-Script - English	Presentation Type-Simple - English
Tolerance	0.000	0.000	0.000
VIF	0.000	0.000	0.000

Regression of variable Score:

Goodness of fit statistics:

Observations	54.000
Sum of weights	54.000
DF	51.000
R2	0.090
Adjusted R2	0.054
MSE	163.523
RMSE	12.788
MAPE	13.825
DW	2.243
Cp	3.000
AIC	278.149
SBC	284.116
PC	1.017

Analysis of variance:

Source	DF	Sum of squares	Mean squares	F	Pr > F
Model	2	822.987	411.494	2.516	0.091
Error	51	8339.659	163.523		
Corrected Total	53	9162.646			

Computed against model Y=Mean(Y)

Appendix 38 All English Data, All Three Presentation Types ANOVA

Model parameters:

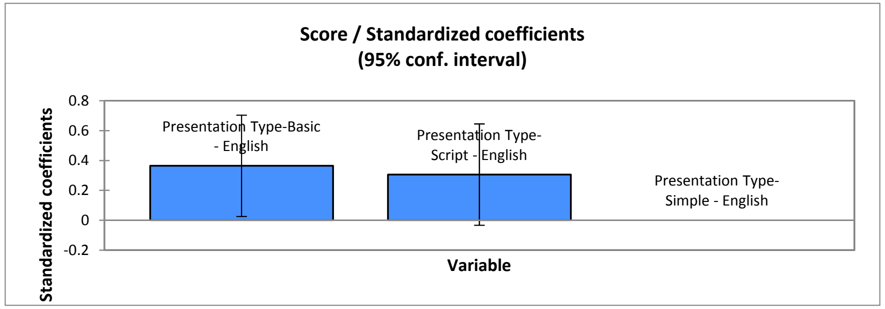
Source	Value	Standard error	t	Pr > |t|	Lower bound (95%)	Upper bound (95%)
Intercept	72.097	3.547	20.328	< 0.0001	64.977	79.217
Presentation Type-Basic - English	9.729	4.513	2.156	0.036	0.669	18.789
Presentation Type-Script - English	8.246	4.556	1.810	0.076	-0.900	17.392
Presentation Type-Simple - English	0.000	0.000				

Equation of the model:

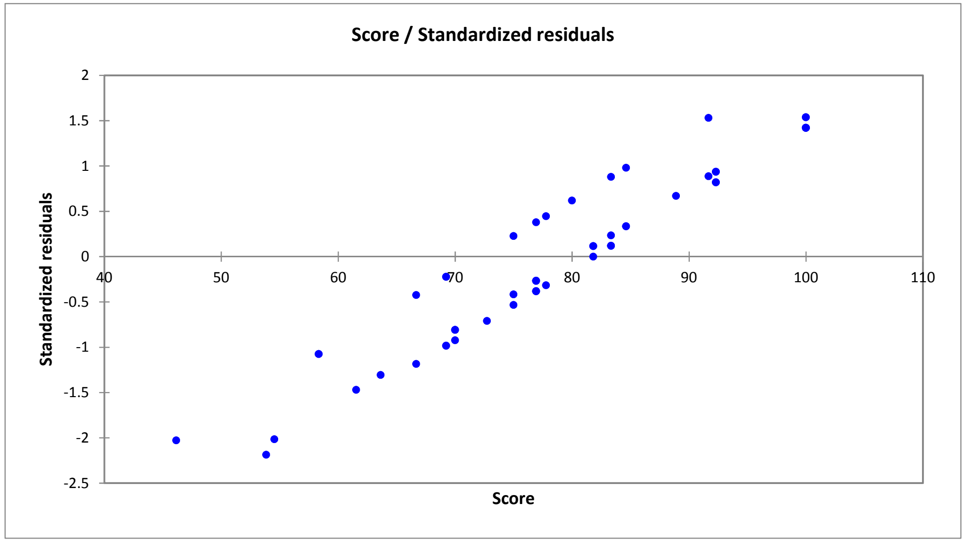
Score = 72.0973044049967+9.72883242114012*Presentation Type-Basic - English+8.24574143804913*Presentation Type-Script - English

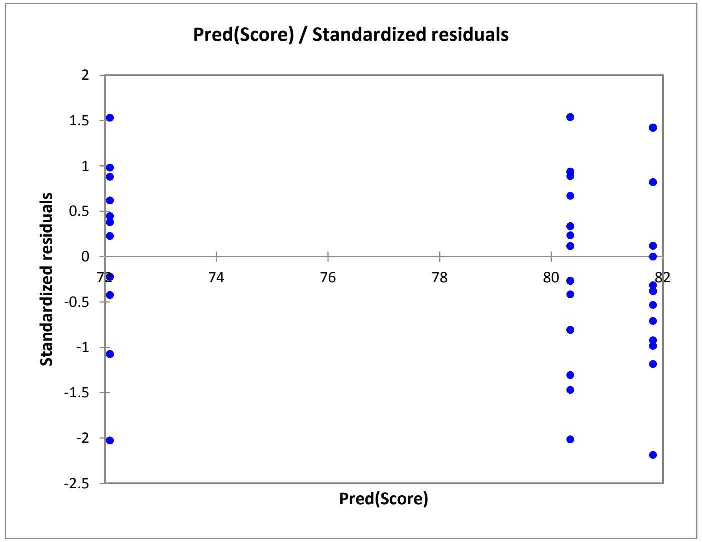
Standardized coefficients:

Source	Value	Standard error	t	Pr > |t|	Lower bound (95%)	Upper bound (95%)
Presentation Type-Basic - English	0.364	0.169	2.156	0.036	0.025	0.703
Presentation Type-Script - English	0.306	0.169	1.810	0.076	-0.033	0.645
Presentation Type-Simple - English	0.000	0.000				

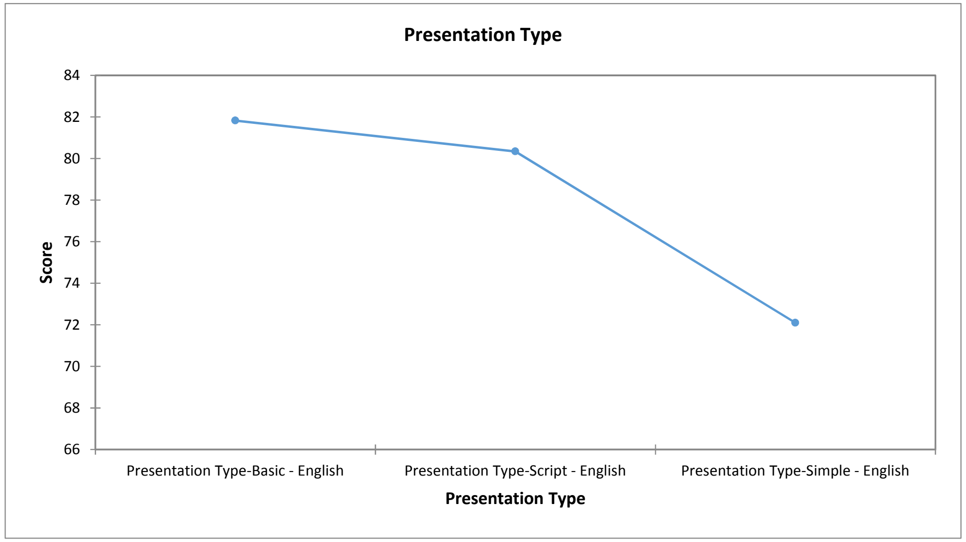


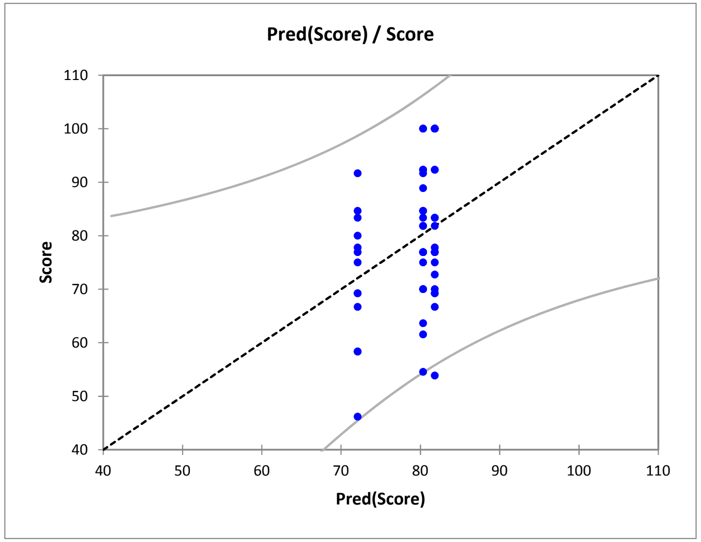
Appendix 38 All English Data, All Three Presentation Types ANOVA





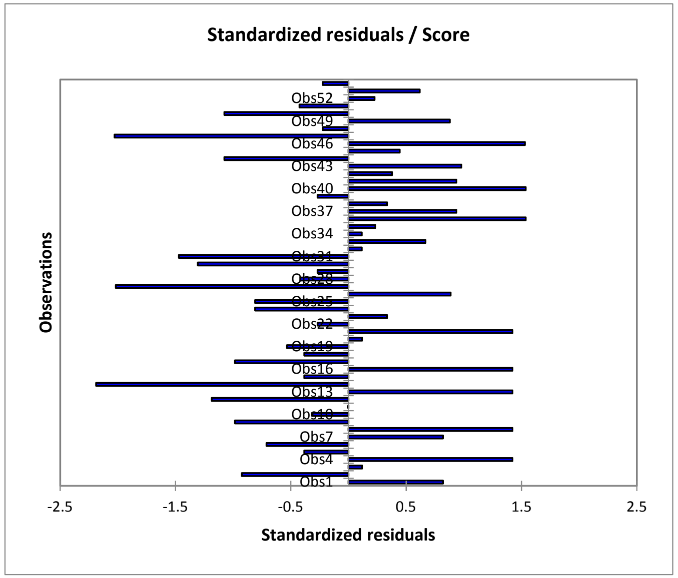
Means charts: Appendix 38 All English Data, All Three Presentation Types ANOVA





Presentation Type / Tukey (HSD) / Analysis of the differences between the categories with a confidence interval of 95%:

Contrast	Difference	Standardized difference	Critical value	Pr > Diff	Significant
Basic – English vs Simple – English	9.729	2.156	2.414	0.089	No
Basic – English vs Script – English	1.483	0.371	2.414	0.927	No
Script – English vs Simple – English	8.246	1.810	2.414	0.177	No
Tukey's d critical value:			3.414		



Category	LS means	Groups
Basic – English	81.826	A
Script – English	80.343	A
Simple – English	72.097	A

Appendix 38 All English Data, All Three Presentation Types ANOVA

Presentation Type / Fisher (LSD) / Analysis of the differences between the categories with a confidence interval of 95%:

Contrast	Difference	Standardized difference	Critical value	Pr > Diff	Significant
Basic - English vs Simple - English	9.729	2.156	2.008	0.036	Yes
Basic - English vs Script - English	1.483	0.371	2.008	0.712	No
Script - English vs Simple - English	8.246	1.810	2.008	0.076	No
LSD-value:			8.557		

Category	LS means	Groups	
Basic - English	81.826	A	
Script - English	80.343	A	B
Simple - English	72.097		B

Presentation Type / Bonferroni / Analysis of the differences between the categories with a confidence interval of 95%:

Contrast	Difference	Standardized difference	Critical value	Pr > Diff	Significant
Basic - English vs Simple - English	9.729	2.156	2.476	0.036	No
Basic - English vs Script - English	1.483	0.371	2.476	0.712	No
Script - English vs Simple - English	8.246	1.810	2.476	0.076	No
Modified significance			0.017		

Category	LS means	Groups
Basic - English	81.826	A
Script - English	80.343	A
Simple - English	72.097	A

Presentation Type / Dunn-Sidak / Analysis of the differences between the categories with a confidence interval of 95%:

Contrast	Difference	Standardized difference	Critical value	Pr > Diff	Significant

Basic - English vs Simple - English	9.729	2.156	2.469	0.036	No
Basic - English vs Script - English	1.483	0.371	2.469	0.712	No
Script - English vs Simple - English	8.246	1.810	2.469	0.076	No
Modified significance level:			0.017		

Category	LS means	Groups
Basic - English	81.826	A
Script - English	80.343	A
Simple - English	72.097	A

Presentation Type / Newman-Keuls (SNK) / Analysis of the differences between the categories with a confidence interval of 95%:

Contrast	Difference	Standardized difference	Critical value	Pr > Diff	Significant
Basic - English vs Simple - English	9.729	2.156	2.414	0.089	No
Basic - English vs Script - English	1.483	0.371			No
Script - English vs Simple - English	8.246	1.810	2.008	0.076	No

Category	LS means	Groups
Basic - English	81.826	A
Script - English	80.343	A
Simple - English	72.097	A

Appendix 38 All English Data, All Three Presentation Types ANOVA

Presentation Type / Duncan / Analysis of the differences between the categories with a confidence interval of 95%:

Contrast	Difference	Standardized difference	Critical value	Pr > Diff	alpha (Modified)	Significant
Basic - English vs Simple - English	9.729	2.156	2.112	0.089	0.098	Yes
Basic - English vs Script - English	1.483	0.371	2.008	0.712	0.050	No
Script - English vs Simple - English	8.246	1.810	2.008	0.076	0.050	No

Category	LS means	Groups	
Basic - English	81.826	A	
Script - English	80.343	A	B
Simple - English	72.097		B

Presentation Type / REGWQ / Analysis of the differences between the categories with a confidence interval of 95%:

Contrast	Difference	Standardized difference	Critical value	Pr > Diff	alpha (Modified)	Significant
Basic - English vs Simple - English	9.729	2.156	2.414	0.089	0.050	No
Basic - English vs Script - English	1.483	0.371				No
Script - English vs Simple - English	8.246	1.810	2.008	0.076	0.050	No

Category	LS means	Groups
Basic - English	81.826	A
Script - English	80.343	A
Simple - English	72.097	A

Presentation Type / Benjamini-Hochberg / Analysis of the differences between the categories with a confidence interval of 95%:

Contrast	Difference	Standardized difference	Critical value	Pr > Diff	Significant
Basic - English vs Simple - English	9.729	2.156	2.008	0.108	No
Basic - English vs Script - English	1.483	0.371	2.008	0.712	No
Script - English vs Simple - English	8.246	1.810	2.008	0.114	No

Category	LS means	Groups
Basic - English	81.826	A
Script - English	80.343	A
Simple - English	72.097	A

Presentation Type / Dunnett (two sided) / Analysis of the differences between the control category Basic - English and the other categories with a confidence interval of 95%:

Category	Difference	Standardized difference	Critical value	Critical difference	Pr > Diff	Significant
Basic - English vs Simple - English	9.729	2.156	2.283	10.301	0.059	No
Basic - English vs Script - English	1.483	0.371	2.283	9.120	0.904	No

Presentation Type / Dunnett (left sided) / Analysis of the differences between the control category Basic - English and the other categories with a confidence interval of 95%:

Category	Difference	Standardized difference	Critical value	Critical difference	Pr > Diff	Significant
Basic - English vs Simple - English	9.729	2.156	-1.968	-8.882	0.998	No
Basic - English vs Script - English	1.483	0.371	-1.968	-7.864	0.817	No

Appendix 39 Japanese Data ANOVA Analysis Text Density Presentations

Summary statistics:

Variable	Observations	Obs. with missing data	Obs. without missing data	Minimum	Maximum	Mean	Std. deviation
Score	246	0	246	30.769	100.000	79.864	14.672

Variable	Categories	Frequencies	%
Text Presentation	Basic − Japanese	91	36.992
	Script − Japanese	77	31.301
	Simple − Japanese	78	31.707

Correlation matrix:

Variables	Text Presentation−Basic − Japanese	Text Presentation−Script − Japanese	Text Presentation−Simple − Japanese	Score
Text Presentation−Basic − Japanese	**1.000**	−0.517	−0.522	0.285
Text Presentation−Script − Japanese	−0.517	**1.000**	−0.460	−0.065
Text Presentation−Simple − Japanese	−0.522	−0.460	**1.000**	−0.230
Score	0.285	−0.065	−0.230	**1.000**

Appendix 39 Japanese Data ANOVA Analysis Text Density Presentations

Multicolinearity statistics:

Statistic	Text Presentation-Basic - Japanese	Text Presentation-Script - Japanese	Text Presentation-Simple - Japanese
Tolerance	0.000	0.000	0.000
VIF	0.000	0.000	0.000

Regression of variable Score:

Goodness of fit statistics:

Observations	246.000
Sum of weights	246.000
DF	243.000
R2	0.090
Adjusted R2	0.083
MSE	197.470
RMSE	14.052
MAPE	16.479
DW	1.823
Cp	3.000
AIC	1303.236
SBC	1313.752
PC	0.932

Analysis of variance:

Source	DF	Sum of squares	Mean squares	F	Pr > F
Model	2	4758.110	2379.055	12.048	< 0.0001
Error	243	47985.195	197.470		
Corrected Tot:	245	52743.305			

Computed against model Y=Mean(Y)

Model parameters:

Source	Value	Standard error	t	Pr > |t|	Lower bound (95%)	Upper bound (95%)
Intercept	74.917	1.591	47.084	< 0.0001	71.783	78.051
Text Presenta	10.388	2.168	4.791	< 0.0001	6.117	14.660
Text Presenta	3.529	2.257	1.563	0.119	-0.918	7.976
Text Presenta	0.000	0.000				

Text Presentation / Dunnett (left sided) / Analysis of the differences between the control category Basic - Japanese and the other categories with a confidence interval of 95%:

Category	Difference	Standardized difference	Critical value	Critical difference	Pr > Diff	Significant
Basic - Japanese vs Simple - Japanese	10.388	4.791	-1.922	-4.167	1.000	No
Basic - Japanese vs Script - Japanese	6.859	3.152	-1.922	-4.182	1.000	No

Text Presentation / Dunnett (right sided) / Analysis of the differences between the control category Basic - Japanese and the other categories with a confidence interval of

Category	Difference	Standardized difference	Critical value	Critical difference	Pr > Diff	Significant
Basic - Japanese vs Simple - Japanese	10.388	4.791	1.922	4.167	0.000	Yes
Basic - Japanese vs Script - Japanese	6.859	3.152	1.922	4.182	0.002	Yes

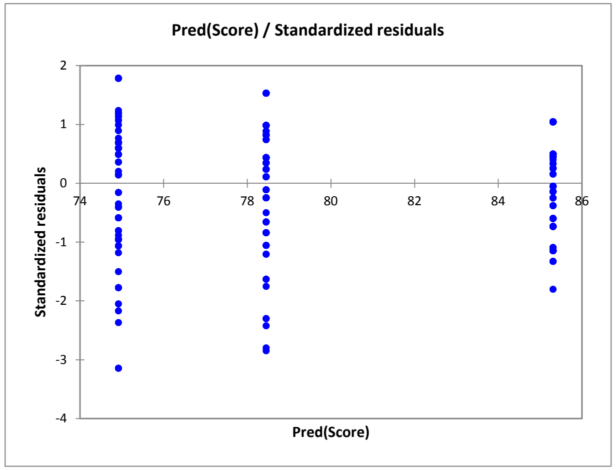
Appendix 39 Japanese Data ANOVA Analysis Text Density Presentations

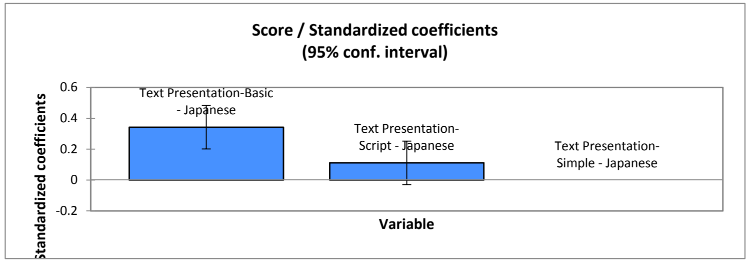
Equation of the model:

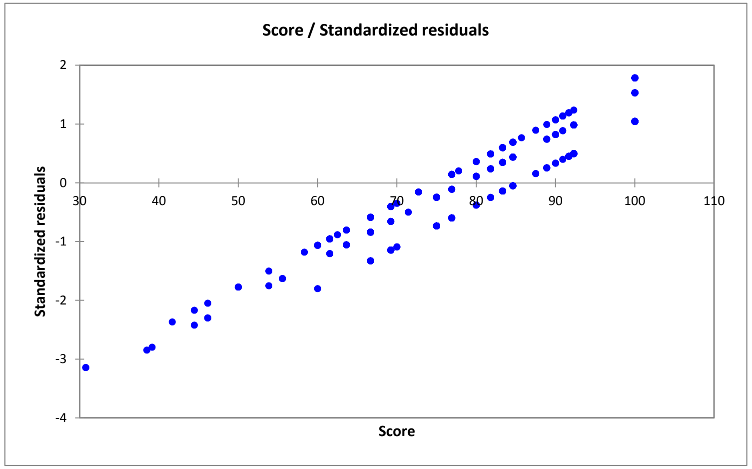
Score = 74.917013186244+10.3884078884079*Text Presentation-Basic - Japanese+3.52903007346391*Text Presentation-Script - Japanese

Standardized coefficients:

Source	Value	Standard error	t	Pr > |t|	Lower bound (95%)	Upper bound (95%)
Text Presentation-Basic - Japanese	0.343	0.071	4.791	< 0.0001	0.202	0.483
Text Presentation-Script - Japanese	0.112	0.071	1.563	0.119	-0.029	0.253
Text Presentation-Simple - Japanese	0.000	0.000				

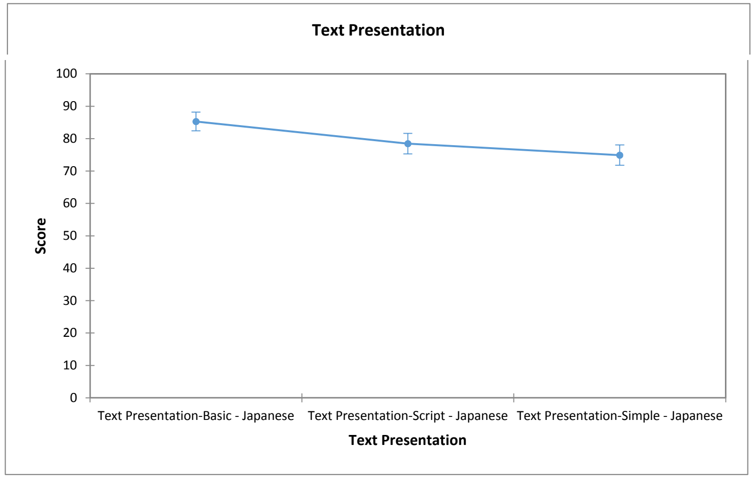


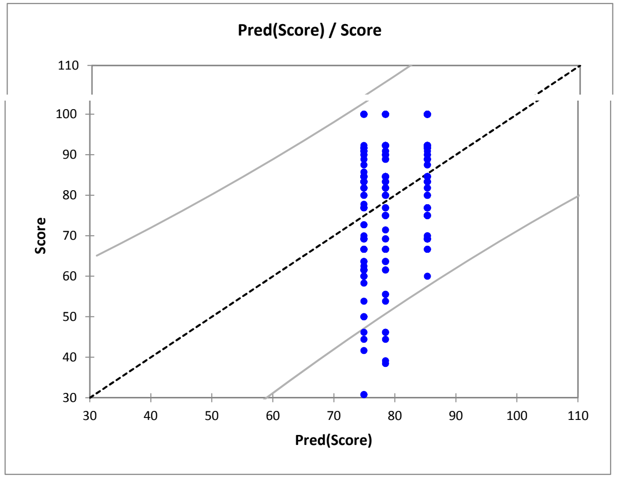




Appendix 39 Japanese Data ANOVA Analysis Text Density Presentations

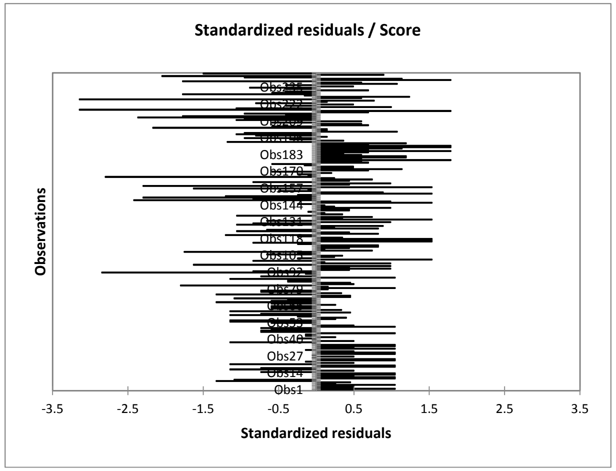
Means charts:





Text Presentation / Tukey (HSD) / Analysis of the differences between the categories with a confidence interval of 95%:

Contrast	Difference	Standardize difference	Critical value	Pr > Diff	Significant
Basic – Japanese vs Simple – Japanese	10.388	4.791	2.358	< 0.0001	Yes
Basic – Japanese vs Script – Japanese	6.859	3.152	2.358	0.005	Yes
Script – Japanese vs Simple – Japanese	3.529	1.563	2.358	0.264	No
Tukey's d critical value:			3.335		



Appendix 39 Japanese Data ANOVA Analysis Text Density Presentations

Category	LS means	Groups	
Basic - Japanese	85.305	A	
Script - Japanese	78.446		B
Simple - Japanese	74.917		B

Text Presentation / Fisher (LSD) / Analysis of the differences between the categories with a confidence interval of 95%:

Contrast	Difference	Standardized difference	Critical value	Pr > Diff	Significant
Basic - Japanese vs Simple - Japanese	10.388	4.791	1.970	< 0.0001	Yes
Basic - Japanese vs Script - Japanese	6.859	3.152	1.970	0.002	Yes
Script - Japanese vs Simple - Japanese	3.529	1.563	1.970	0.119	No
LSD-value:			4.323		

Category	LS means	Groups	
Basic - Japanese	85.305	A	
Script - Japanese	78.446		B
Simple - Japanese	74.917		B

Text Presentation / Bonferroni / Analysis of the differences between the categories with a confidence interval of 95%:

Contrast	Difference	Standardized difference	Critical value	Pr > Diff	Significant

Basic – Japanese vs Simple – Japanese	10.388	4.791	2.411	< 0.0001	Yes
Basic – Japanese vs Script – Japanese	6.859	3.152	2.411	0.002	Yes
Script – Japanese vs Simple – Japanese	3.529	1.563	2.411	0.119	No
Modified significance level:			0.017		

Category	LS means	Groups	
Basic – Japan	85.305	A	
Script – Japan	78.446		B
Simple – Japai	74.917		B

Text Presentation / Dunn-Sidak / Analysis of the differences between the categories with a confidence interval of 95%:

Contrast	Difference	ardized diffe	ritical valu	Pr > Diff	Significant
Basic – Japan	10.388	4.791	2.404	< 0.0001	Yes
Basic – Japan	6.859	3.152	2.404	0.002	Yes
Script – Japan	3.529	1.563	2.404	0.119	No
Modified significance level:			0.017		

Category	LS means	Groups	
Basic – Japan	85.305	A	
Script – Japan	78.446		B
Simple – Japai	74.917		B

Text Presentation / Newman-Keuls (SNK) / Analysis of the differences between the categories with a confidence interval of 95%:

Contrast	Difference	Standardized difference	Critical value	Pr > Diff	Significant
Basic – Japanese vs Simple – Japanese	10.388	4.791	2.344	< 0.0001	Yes
Basic – Japanese vs Script – Japanese	6.859	3.152	1.960	0.002	Yes
Script – Japanese vs Simple – Japanese	3.529	1.563	1.960	0.118	No

Appendix 39 Japanese Data ANOVA Analysis Text Density Presentations

Category	LS means	Groups	
Basic - Japan‹	85.305	A	
Script - Japan	78.446		B
Simple - Japar	74.917		B

Text Presentation / Duncan / Analysis of the differences between the categories with a confidence interval of 95%:

Contrast	Difference	Standardized difference	Critical value	Pr > Diff	alpha (Modified)	Significant
Basic - Japanese vs Simple - Japanese	10.388	4.791	2.064	< 0.0001	0.098	Yes
Basic - Japanese vs Script - Japanese	6.859	3.152	1.960	0.002	0.050	Yes
Script - Japanese vs Simple - Japanese	3.529	1.563	1.960	0.118	0.050	No

Category	LS means	Groups	
Basic - Japan‹	85.305	A	
Script - Japan	78.446		B
Simple - Japar	74.917		B

Text Presentation / REGWQ / Analysis of the differences between the categories with a confidence interval of 95%:

Contrast	Difference	Standardized difference	Critical value	Pr > Diff	alpha (Modified)	Significant
Basic - Japanese vs Simple - Japanese	10.388	4.791	2.344	< 0.0001	0.050	Yes
Basic - Japanese vs Script - Japanese	6.859	3.152	1.960	0.002	0.050	Yes
Script - Japanese vs Simple - Japanese	3.529	1.563	1.960	0.118	0.050	No

Appendix 39 Japanese Data ANOVA Analysis Text Density Presentations

Category	LS means	Groups	
Basic – Japanese	85.305	A	
Script – Japanese	78.446		B
Simple – Japanese	74.917		B

Text Presentation / Benjamini–Hochberg / Analysis of the differences between the categories with a confidence interval of 95%:

Contrast	Difference	Standardized difference	Critical value	Pr > Diff	Significant
Basic – Japanese vs Simple – Japanese	10.388	4.791	1.970	< 0.0001	Yes
Basic – Japanese vs Script – Japanese	6.859	3.152	1.970	0.003	Yes
Script – Japanese vs Simple – Japanese	3.529	1.563	1.970	0.119	No

Category	LS means	Groups	
Basic – Japan	85.305	A	
Script – Japan	78.446		B
Simple – Japar	74.917		B

Text Presentation / Dunnett (two sided) / Analysis of the differences between the control category Basic – Japanese and the other categories with a confidence interval of 95%:

Category	Difference	Standardized difference	Critical value	Critical difference	Pr > Diff	Significant
Basic – Japanese vs Simple – Japanese	10.388	4.791	2.216	4.806	0.000	Yes
Basic – Japanese vs Script – Japanese	6.859	3.152	2.216	4.823	0.003	Yes

Appendix 39 Basic Japanese Presentation Data Analysis

Summary statistics:

Variable	Observations	Obs. with missing data	Obs. without missing data	Minimum	Maximum	Mean	Std. deviation
Score	91	0	91	60.000	100.000	85.305	10.968

One-sample z-test / Two-tailed test:

95% confidence interval on the mean:
] 83.052, 87.559 [

Difference	85.305
z (Observed value)	74.194
|z| (Critical value)	1.960
p-value (Two-tailed)	< 0.0001
alpha	0.05

One-sample t-test / Two-tailed test:

95% confidence interval on the mean:
] 83.021, 87.590 [

Difference	85.305
t (Observed value)	74.194
|t| (Critical value)	1.987
DF	90
p-value (Two-tailed)	< 0.0001
alpha	0.05

Summary:

Variable¥Test	z	Student
	< 0.0001	**< 0.0001**

Appendix 39 Script Japanese Presentation Data Analysis

Summary statistics:

Variable	Observations	Obs. with missing data	Obs. without missing data	Minimum	Maximum	Mean	Std. deviation
Var1	77	0	77	38.462	100.000	78.446	15.037

One-sample z-test / Two-tailed test:

95% confidence interval on the mean:
] 75.087, 81.805 [

Difference	78.446
z (Observed value)	45.778
|z| (Critical value)	1.960
p-value (Two-tailed)	< 0.0001
alpha	0.05

One-sample t-test / Two-tailed test:

95% confidence interval on the mean:
] 75.033, 81.859 [

Difference	78.446
t (Observed value)	45.778
|t| (Critical value)	1.992
DF	76
p-value (Two-tailed)	< 0.0001
alpha	0.05

Summary:

Variable¥Test	z	Student
	< 0.0001	**< 0.0001**

Appendix 39 Simple Japanese Presentation Data Analysis

Summary statistics:

Variable	Observations	Obs. with missing data	Obs. without missing data	Minimum	Maximum	Mean	Std. deviation
Var1	78	0	78	30.769	100.000	74.917	16.106

One-sample z-test / Two-tailed test:

95% confidence interval on the mean:
] 71.343, 78.491 [

Difference	74.917
z (Observed value)	41.081
|z| (Critical value)	1.960
p-value (Two-tailed)	< 0.0001
alpha	0.05

One-sample t-test / Two-tailed test:

95% confidence interval on the mean:
] 71.286, 78.548 [

Difference	74.917
t (Observed value)	41.081
|t| (Critical value)	1.991
DF	77
p-value (Two-tailed)	< 0.0001
alpha	0.05

Summary:

Variable¥Test	z	Student
	< 0.0001	**< 0.0001**

Appendix 40 Japanese Analysis Question #1

Summary statistics:

Variable	Categories	Frequencies	%
Y1	0	208	94.118
	1	13	5.882

Variable	Categories	Frequencies	%
Q1	Basic	91	41.176
	Script	62	28.054
	Simple	68	30.769

Regression of variable Y1:

Correspondence between the categories of the response variable and the probabilities (Variable Y1):

Categories	Probabilities
0	0
1	1

Appendix 40

Japanese Analysis Question #1

Goodness of fit statistics (Variable Y1):

Statistic	Independent	Full
Observatic	221	221
Sum of we	221.000	221.000
DF	220	218
-2 Log(Lik	98.883	96.833
R2(McFad	0.000	0.021
R2(Cox an	0.000	0.009
R2(Nagelk	0.000	0.026
AIC	100.883	102.833
SBC	104.282	113.028
Iterations	0	6

Test of the null hypothesis H0: Y=0.059 (Variable Y1):

Statistic	DF	Chi-square	Pr > Chi2
-2 Log(Lik	2	2.050	0.359
Score	2	2.242	0.326
Wald	2	2.135	0.344

Type II analysis (Variable Y1):

Source	DF	Chi-square (Wald)	Pr > Wald	Chi-square (LR)	Pr > LR
Q1	2	2.135	0.344	2.050	0.359

Hosmer-Lemeshow test (Variable Y1):

Statistic	Chi-square	DF	Pr > Chi2
Hosmer-L	0.109	2	0.947

Model parameters (Variable Y1):

Appendix 40 Japanese Analysis Question #1

Source	Value	Standard error	Wald Chi-Square	Pr > Chi2	Wald Lower bound (95%)	Wald Upper bound (95%)	PL Lower bound (95%)	PL Upper bound (95%)	Odds ratio	Odds ratio Lower bound	Odds ratio Upper bound
Intercept	-3.080	0.511	36.269	< 0.0001	-4.082	-2.077	-4.265	-2.206			
Q1-Basic	0.000	0.000									
Q1-Script	0.846	0.668	1.605	0.205	-0.463	2.155			2.330	0.629	8.628
Q1-Simple	0.004	0.781	0.000	0.996	-1.527	1.535			1.004	0.217	4.641

Covariance matrix:

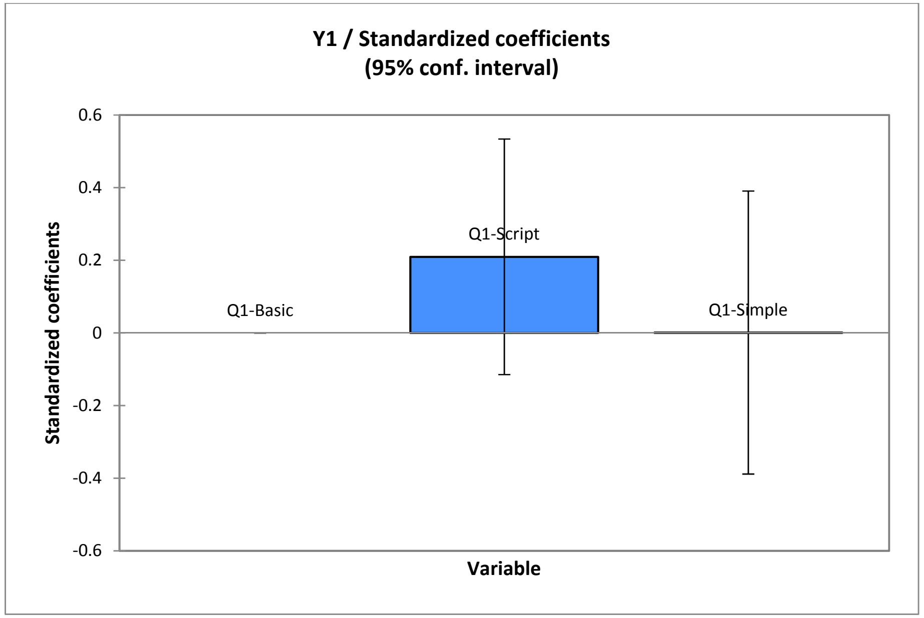
	Intercept	Q1-Basic	Q1-Script	Q1-Simple
Intercept	0.261	0.000	-0.261	-0.261
Q1-Basic	0.000	0.000	0.000	0.000
Q1-Script	-0.261	0.000	0.446	0.261
Q1-Simple	-0.261	0.000	0.261	0.610

Equation of the model (Variable Y1):

Pred(Y1) = 1 / (1 + exp(-(-3.07961375753468+0.846021536307318*Q1-Script+3.83877630716276E-03*Q1-Simple)))

Standardized coefficients (Variable Y1):

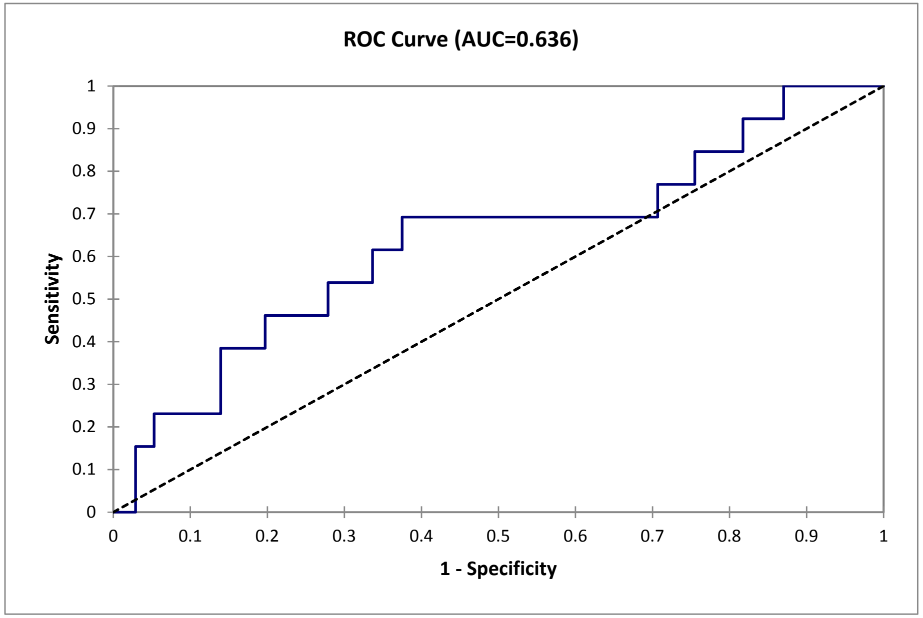
Source	Value	Standard error	Wald Chi-Square	Pr > Chi2	Wald Lower bound (95%)	Wald Upper bound (95%)	PL Lower bound (95%)	PL Upper bound (95%)
Q1-Basic	0.000	0.000						
Q1-Script	0.210	0.165	1.605	0.205	-0.115	0.534		
Q1-Simple	0.001	0.199	0.000	0.996	-0.389	0.391		



Classification table for the estimation sample (Variable Y1):

from ¥ to	0	1	Total	% correct
0	208	0	208	100.00%
1	13	0	13	0.00%
Total	221	0	221	94.12%

ROC Curve (Variable Y1):



Area under the curve: 0.636

Comparison of the categories of the qualitative variables (Variable Y1):

Contrast	DF	Chi-square	Pr > Chi2
Q1-Basic v	1	1.605	0.205
Q1-Basic v	1	0.000	0.996
Q1-Script	1	1.330	0.249

Appendix 40 Japanese Data Question #2 Analysis

Summary statistics:

Variable	Categories	Frequencies	%
Y1	0	29	13.679
	1	183	86.321

Variable	Categories	Frequencies	%
Q1	Basic	85	40.094
	Script	68	32.075
	Simple	59	27.830

Regression of variable Y1:

Correspondence between the categories of the response variable and the probabilities (Variable Y1):

Categories	Probabilities
0	0
1	1

Goodness of fit statistics (Variable Y1):

Statistic	Independent	Full
Observatic	212	212
Sum of we	212.000	212.000
DF	211	209
-2 Log(Lik	169.217	165.437
R2(McFad	0.000	0.022
R2(Cox an	0.000	0.018
R2(Nagelk	0.000	0.032
AIC	171.217	171.437
SBC	174.574	181.506
Iterations	0	6

Test of the null hypothesis H0: Y=0.863 (Variable Y1):

Statistic	DF	Chi-square	Pr > Chi2
-2 Log(Lik	2	3.781	0.151
Score	2	3.574	0.167
Wald	2	3.425	0.180

Type II analysis (Variable Y1):

Source	DF	Chi-square (Wald)	Pr > Wald	Chi-square (LR)	Pr > LR
Q1	2	3.425	0.180	3.781	0.151

Hosmer-Lemeshow test (Variable Y1):

Statistic	Chi-square	DF	Pr > Chi2
Hosmer-L	0.091	2	0.956

Model parameters (Variable Y1):

Source	Value	Standard error	Wald Chi-Square	Pr > Chi2	Wald Lower bound (95%)	Wald Upper bound (95%)	PL Lower bound (95%)	PL Upper bound (95%)	Odds ratio	Odds ratio Lower bound	Odds ratio Upper bound
Intercept	2.411	0.395	37.333	< 0.0001	1.637	3.184	1.710	3.280			
Q1-Basic	0.000	0.000									
Q1-Script	-0.870	0.507	2.949	0.086	-1.864	0.123	-1.913	0.103	0.419	0.155	1.131
Q1-Simple	-0.822	0.525	2.445	0.118	-1.851	0.208	-1.893	0.199	0.440	0.157	1.232

Covariance matrix:

	Intercept	Q1-Basic	Q1-Script	Q1-Simple
Intercept	0.156	0.000	-0.156	-0.156
Q1-Basic	0.000	0.000	0.000	0.000
Q1-Script	-0.156	0.000	0.257	0.156
Q1-Simple	-0.156	0.000	0.156	0.276

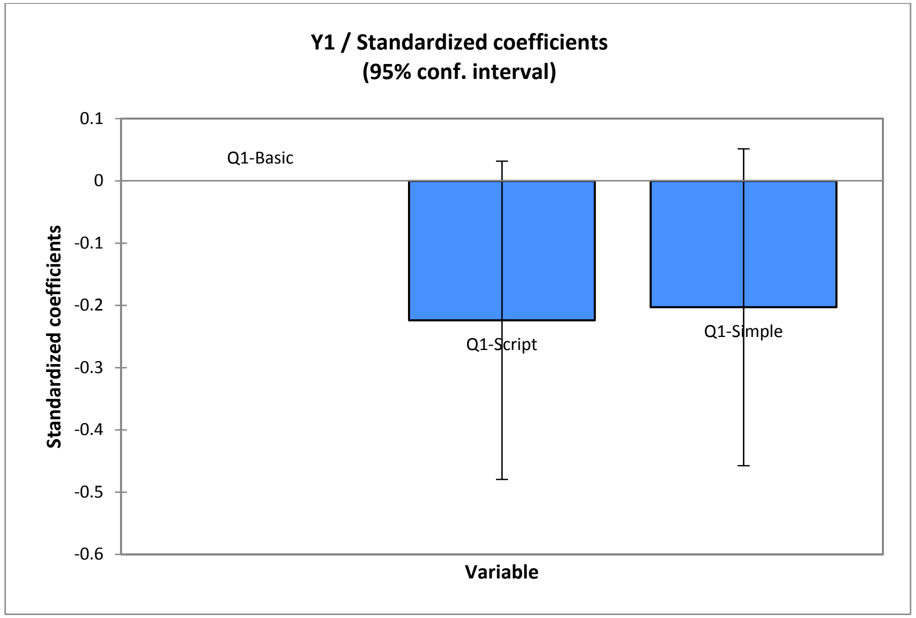
Equation of the model (Variable Y1):

Pred(Y1) = 1 / (1 + exp(-(2.41079867762594-0.870353636678793*Q1-Script-0.821563472509361*Q1-Simple)))

Standardized coefficients (Variable Y1):

Source	Value	Standard error	Wald Chi-Square	Pr > Chi2	Wald Lower bound (95%)	Wald Upper bound (95%)	PL Lower bound (95%)	PL Upper bound (95%)
Q1-Basic	0.000	0.000						
Q1-Script	-0.224	0.130	2.949	0.086	-0.480	0.032	-0.893	0.048
Q1-Simple	-0.203	0.130	2.445	0.118	-0.457	0.051	-0.848	0.089

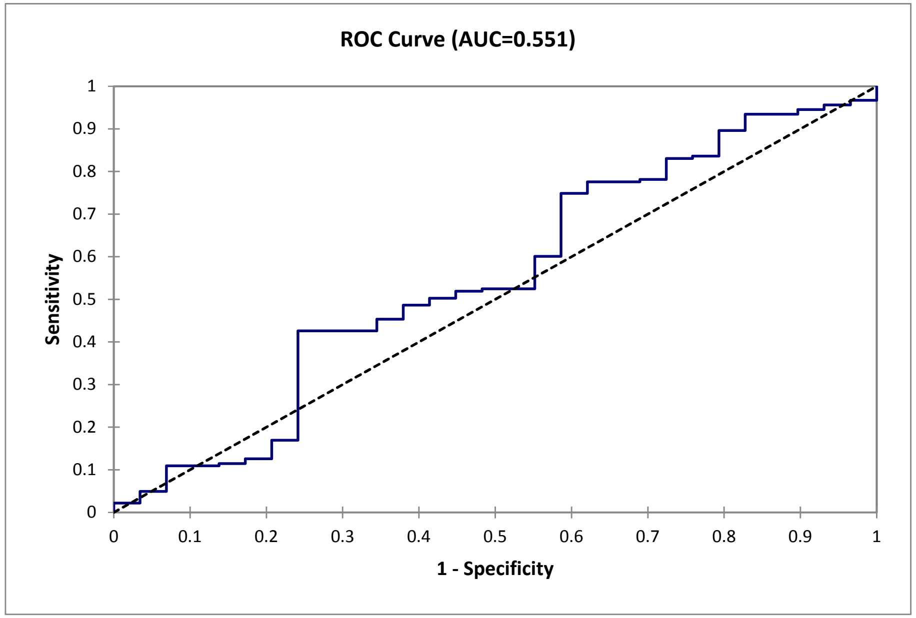
Appendix 40 Japanese Data Question #2 Analysis



Classification table for the estimation sample (Variable Y1):

from ¥ to	0	1	Total	% correct
0	0	29	29	0.00%
1	0	183	183	100.00%
Total	0	212	212	86.32%

ROC Curve (Variable Y1):



Area under the curve: 0.551

Comparison of the categories of the qualitative variables (Variable Y1):

Contrast	DF	Chi-square	Pr > Chi2
Q1-Basic v	1	2.949	0.086
Q1-Basic v	1	2.445	0.118
Q1-Script	1	0.011	0.917

Appendix 40 Japanese Question #4 Analysis

Summary statistics:

Variable	Categories	Frequencies	%
Y1	0	35	22.152
	1	123	77.848

Variable	Categories	Frequencies	%
Q1	Basic	65	41.139
	Script	44	27.848
	Simple	49	31.013

Regression of variable Y1:

Correspondence between the categories of the response variable and the probabilities (Variable Y1):

Categories	Probabilities
0	0
1	1

Goodness of fit statistics (Variable Y1):

Classification table for the estimation sample (Variable Y1):

from ¥ to	0	1	Total	% correct
0	0	35	35	0.00%
1	0	123	123	100.00%
Total	0	158	158	77.85%

Appendix 40 Japanese Question #4 Analysis

Statistic	Independent	Full
Observations	158	158
Sum of weights	158.000	158.000
DF	157	155
−2 Log(Likelihood)	167.108	166.769
R2(McFadden)	0.000	0.002
R2(Cox and Snell)	0.000	0.002
R2(Nagelkerke)	0.000	0.003
AIC	169.108	172.769
SBC	172.171	181.957
Iterations	0	6

Test of the null hypothesis H0: Y=0.778 (Variable Y1):

Statistic	DF	Chi−square	Pr > Chi2
−2 Log(Likelihood)	2	0.339	0.844
Score	2	0.338	0.844
Wald	2	0.337	0.845

Type II analysis (Variable Y1):

Source	DF	Chi−square (Wald)	Pr > Wald	Chi−square (LR)	Pr > LR
Q1	2	0.337	0.845	0.339	0.844

Hosmer−Lemeshow test (Variable Y1):

Statistic	Chi−square	DF	Pr > Chi2
Hosmer−Lemeshov	0.254	2	0.881

Model parameters (Variable Y1):

Source	Value	Standard error	Wald Chi-Square	Pr > Chi2	Wald Lower bound (95%)	Wald Upper bound (95%)	PL Lower bound (95%)	PL Upper bound (95%)	Odds ratio	Odds ratio Lower bound	Odds ratio Upper bound
Intercept	1.386	0.310	19.987	< 0.0001	0.779	1.994	0.811	2.037			
Q1-Basic	0.000	0.000									
Q1-Script	-0.163	0.475	0.117	0.732	-1.093	0.768	-1.091	0.787	0.850	0.335	2.156
Q1-Simple	-0.260	0.454	0.328	0.567	-1.151	0.630	-1.156	0.640	0.771	0.316	1.878

Covariance matrix:

	Intercept	Q1-Basic	Q1-Script	Q1-Simple
Intercept	0.096	0.000	-0.096	-0.096
Q1-Basic	0.000	0.000	0.000	0.000
Q1-Script	-0.096	0.000	0.226	0.096
Q1-Simple	-0.096	0.000	0.096	0.207

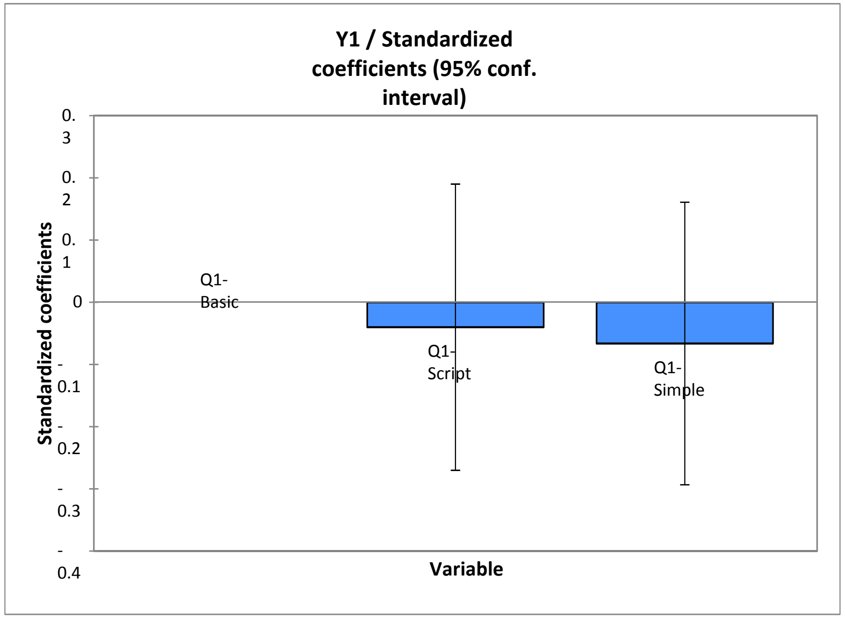
Equation of the model (Variable Y1):

Pred(Y1) = 1 / (1 + exp(-(1.38629436111989-0.162518929497775*Q1-Script-0.260283098263667*Q1-Simple)))

Standardized coefficients (Variable Y1):

Source	Value	Standard error	Wald Chi-Square	Pr > Chi2	Wald Lower bound (95%)	Wald Upper bound (95%)	PL Lower bound (95%)	PL Upper bound (95%)
Q1-Basic	0.000	0.000						
Q1-Script	-0.040	0.117	0.117	0.732	-0.270	0.190	-0.489	0.353
Q1-Simple	-0.066	0.116	0.328	0.567	-0.294	0.161	-0.535	0.296

Appendix 40 Japanese Question #4 Analysis



Summary statistics:

Variable	Categories	Frequencies	%
Y1	0	35	22.152
	1	123	77.848

Variable	Categories	Frequencies	%
Q1	Basic	65	41.139
	Script	44	27.848
	Simple	49	31.013

Regression of variable Y1:

Correspondence between the categories of the response variable and the probabilities (Variable Y1):

Categories	Probabilities
0	0
1	1

Classification table for the estimation sample (Variable Y1):

from ¥ to	0	1	Total	% correct
0	0	35	35	0.00%
1	0	123	123	100.00%
Total	0	158	158	77.85%

Goodness of fit statistics (Variable Y1):

Statistic	Independent	Full
Observations	158	158
Sum of weights	158.000	158.000
DF	157	155
-2 Log(Likelihood)	167.108	166.769
R2(McFadden)	0.000	0.002
R2(Cox and Snell)	0.000	0.002
R2(Nagelkerke)	0.000	0.003
AIC	169.108	172.769
SBC	172.171	181.957
Iterations	0	6

Test of the null hypothesis H0: Y=0.778 (Variable Y1):

Statistic	DF	Chi-square	Pr > Chi2
-2 Log(Likelihood)	2	0.339	0.844
Score	2	0.338	0.844
Wald	2	0.337	0.845

Type II analysis (Variable Y1):

Source	DF	Chi-square (Wald)	Pr > Wald	Chi-square (LR)	Pr > LR
Q1	2	0.337	0.845	0.339	0.844

Hosmer-Lemeshow test (Variable Y1):

Statistic	Chi-square	DF	Pr > Chi2
Hosmer-Lemeshow Statistic	0.254	2	0.881

Model parameters (Variable Y1):

Source	Value	Standard error	Wald Chi-Square	Pr > Chi2	Wald Lower bound (95%)	Wald Upper bound (95%)	PL Lower bound (95%)	PL Upper bound (95%)	Odds ratio	Odds ratio Lower bound	Odds ratio Upper bound
Intercept	1.386	0.310	19.987	< 0.0001	0.779	1.994	0.811	2.037			
Q1-Basic	0.000	0.000									
Q1-Script	-0.163	0.475	0.117	0.732	-1.093	0.768	-1.091	0.787	0.850	0.335	2.156
Q1-Simple	-0.260	0.454	0.328	0.567	-1.151	0.630	-1.156	0.640	0.771	0.316	1.878

Covariance matrix:

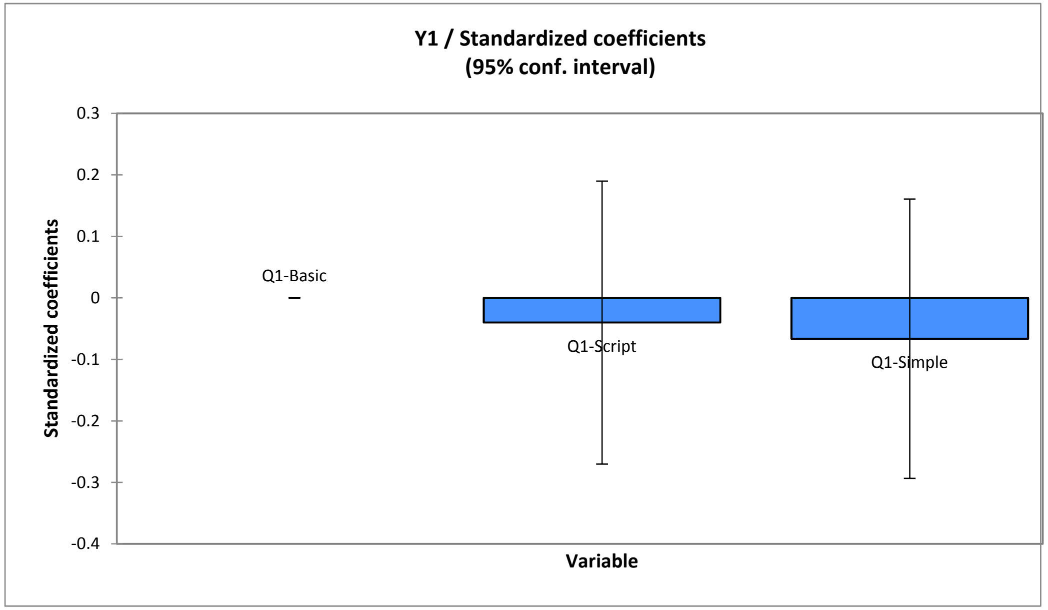
	Intercept	Q1-Basic	Q1-Script	Q1-Simple
Intercept	0.096	0.000	-0.096	-0.096
Q1-Basic	0.000	0.000	0.000	0.000
Q1-Script	-0.096	0.000	0.226	0.096
Q1-Simple	-0.096	0.000	0.096	0.207

Equation of the model (Variable Y1):

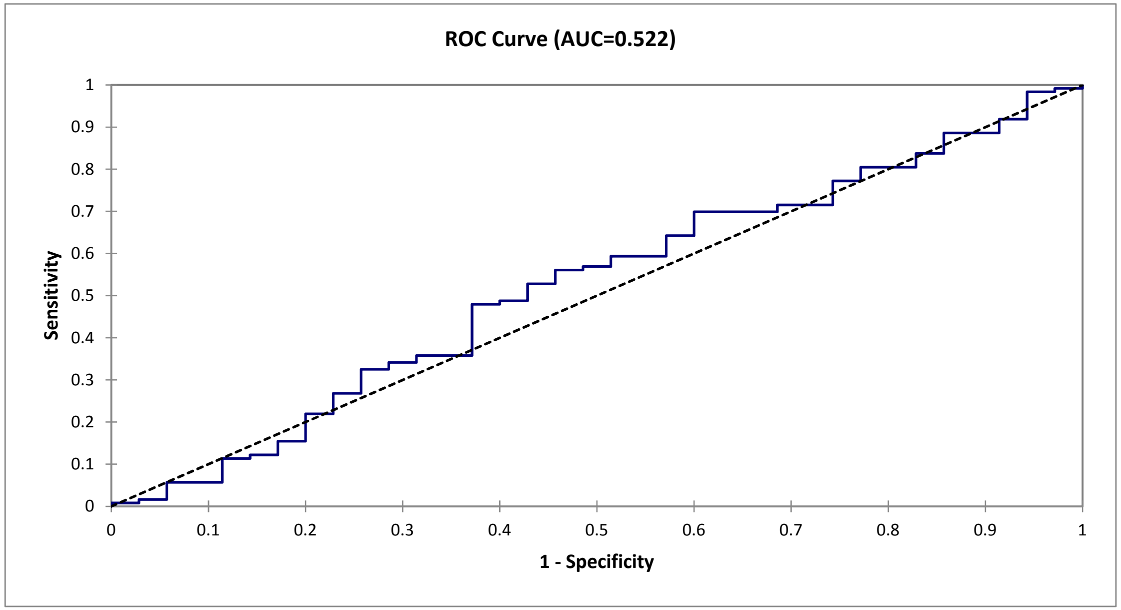
Pred(Y1) = 1 / (1 + exp(-(1.38629436111989-0.162518929497775*Q1-Script-0.260283098263667*Q1-Simple)))

Standardized coefficients (Variable Y1):

Source	Value	Standard error	Wald Chi-Square	Pr > Chi2	Wald Lower bound (95%)	Wald Upper bound (95%)	PL Lower bound (95%)	PL Upper bound (95%)
Q1-Basic	0.000	0.000						
Q1-Script	-0.040	0.117	0.117	0.732	-0.270	0.190	-0.489	0.353
Q1-Simple	-0.066	0.116	0.328	0.567	-0.294	0.161	-0.535	0.296



ROC Curve (Variable Y1):



Appendix 40 Japanese Data Question #6 Analysis

Area under the curve: 0.522

Comparison of the categories of the qualitative variables (Variable Y1):

Contrast	DF	Chi-square	Pr > Chi2
Q1-Basic vs Q1-Script	1	0.117	0.732
Q1-Basic vs Q1-Simple	1	0.328	0.567
Q1-Script vs Q1-Simple	1	0.040	0.842

570

Summary statistics:

Variable	Categories	Frequencies	%
Y1	0	209	92.070
	1	18	7.930

Variable	Categories	Frequencies	%
Q1	Basic	87	38.326
	Script	72	31.718
	Simple	68	29.956

Regression of variable Y1:

Correspondence between the categories of the response variable and the probabilities (Variable Y1):

Categories	Probabilities
0	0
1	1

Goodness of fit statistics (Variable Y1):

Statistic	Independent	Full
Observations	227	227
Sum of weights	227.000	227.000
DF	226	224
-2 Log(Likelihood)	125.778	125.067
R2(McFadden)	0.000	0.006
R2(Cox and Snell)	0.000	0.003
R2(Nagelkerke)	0.000	0.007
AIC	127.778	131.067
SBC	131.203	141.341
Iterations	0	6

Test of the null hypothesis H0: Y=0.079 (Variable Y1):

Statistic	DF	Chi-square	Pr > Chi2
-2 Log(Likelihood)	2	0.712	0.701
Score	2	0.744	0.689
Wald	2	0.734	0.693

Type II analysis (Variable Y1):

Source	DF	Chi-square (Wald)	Pr > Wald	Chi-square (LR)	Pr > LR
Q1	2	0.734	0.693	0.712	0.701

Hosmer-Lemeshow test (Variable Y1):

Statistic	Chi-square	DF	Pr > Chi2
Hosmer-Lemeshow Statistic	0.116	2	0.943

Model parameters (Variable Y1):

Source	Value	Standard error	Wald Chi-Square	Pr > Chi2	Wald Lower bound (95%)	Wald Upper bound (95%)	PL Lower bound (95%)	PL Upper bound (95%)	Odds ratio	Odds ratio Lower bound (95%)	Odds ratio Upper bound (95%)
Intercept	-2.603	0.423	37.841	< 0.0001	-3.432	-1.773	-3.547	-1.859			
Q1-Basic	0.000	0.000									
Q1-Script	0.007	0.628	0.000	0.991	-1.223	1.238			1.007	0.294	3.447
Q1-Simple	0.438	0.582	0.566	0.452	-0.702	1.578			1.549	0.495	4.844

Covariance matrix:

	Intercept	Q1-Basic	Q1-Script	Q1-Simple
Intercept	0.179	0.000	-0.179	-0.179
Q1-Basic	0.000	0.000	0.000	0.000
Q1-Script	-0.179	0.000	0.394	0.179
Q1-Simple	-0.179	0.000	0.179	0.338

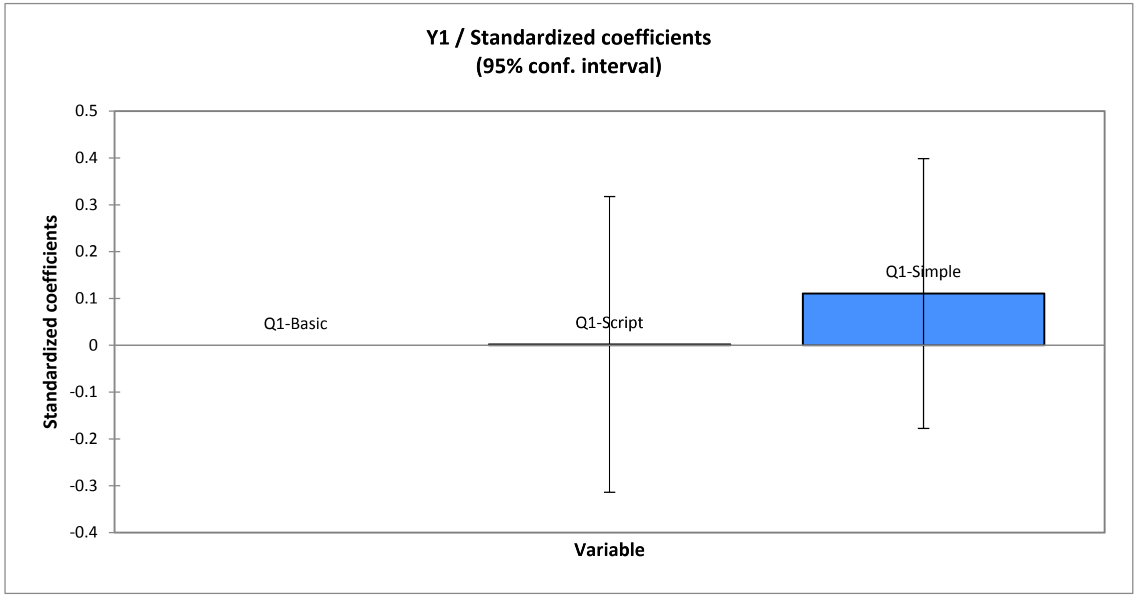
Equation of the model (Variable Y1):

Pred(Y1) = 1 / (1 + exp(-(-2.60268968544438+7.43497848751708E-03*Q1-Script+0.43772597032639*Q1-Simple)))

Standardized coefficients (Variable Y1):

Source	Value	Standard error	Wald Chi-Square	Pr > Chi2	Wald Lower bound (95%)	Wald Upper bound (95%)	PL Lower bound (95%)	PL Upper bound (95%)
Q1-Basic	0.000	0.000						
Q1-Script	0.002	0.161	0.000	0.991	-0.314	0.318		
Q1-Simple	0.111	0.147	0.566	0.452	-0.177	0.398		

Appendix 40 Japanese Data Question #6 Analysis



Area under the curve: 0.565

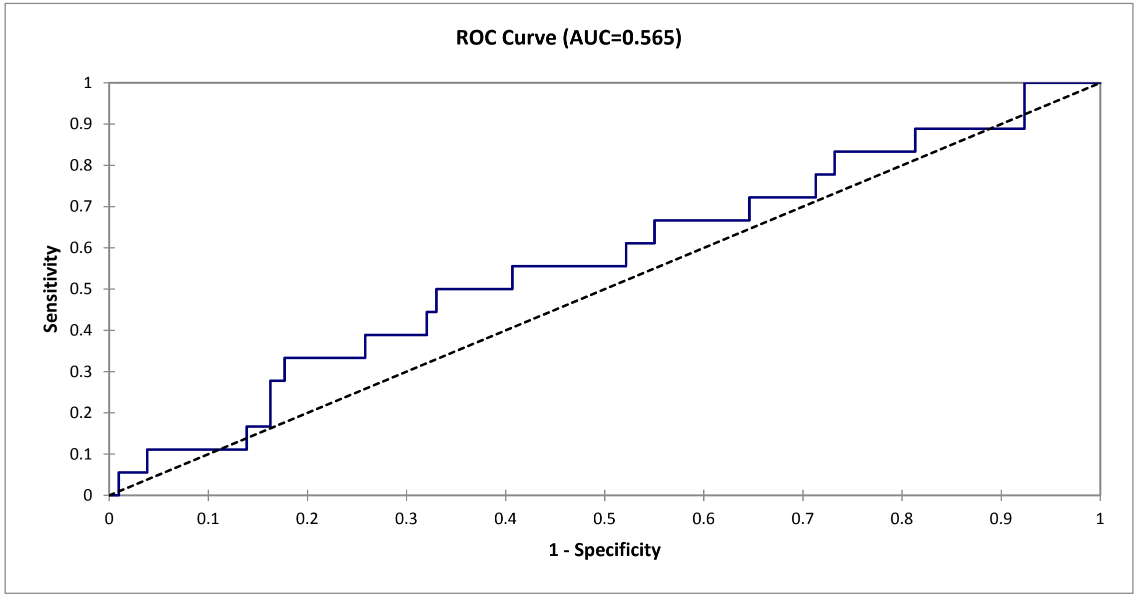
Comparison of the categories of the qualitative variables (Variable Y1):

Contrast	DF	Chi-square	Pr > Chi2
Q1-Basic vs Q1-Script	1	0.000	0.991
Q1-Basic vs Q1-Simple	1	0.566	0.452
Q1-Script vs Q1-Simple	1	0.495	0.482

Classification table for the estimation sample (Variable Y1):

from ¥ to	0	1	Total	% correct
0	209	0	209	100.00%
1	18	0	18	0.00%
Total	227	0	227	92.07%

ROC Curve (Variable Y1):



Summary statistics:

Variable	Categories	Frequencies	%
Y1	0	36	15.721
	1	193	84.279

Variable	Categories	Frequencies	%
Q1	Basic	89	38.865
	Script	69	30.131
	Simple	71	31.004

Regression of variable Y1:

Correspondence between the categories of the response variable and the probabilities (Variable Y1):

Categories	Probabilities
0	0
1	1

Classification table for the estimation sample (Variable Y1):

from ¥ to	0	1	Total	% correct
0	0	36	36	0.00%
1	0	193	193	100.00%
Total	0	229	229	84.28%

Goodness of fit statistics (Variable Y1):

Statistic	Independent	Full
Observatic	229	229
Sum of we	229.000	229.000
DF	228	226
-2 Log(Lik	199.233	197.048
R2(McFad	0.000	0.011
R2(Cox an	0.000	0.009
R2(Nagelk	0.000	0.016
AIC	201.233	203.048
SBC	204.667	213.350
Iterations	0	6

Test of the null hypothesis H0: Y=0.843 (Variable Y1):

Statistic	DF	Chi-square	Pr > Chi2
-2 Log(Lik	2	2.184	0.335
Score	2	2.276	0.321
Wald	2	2.240	0.326

Type II analysis (Variable Y1):

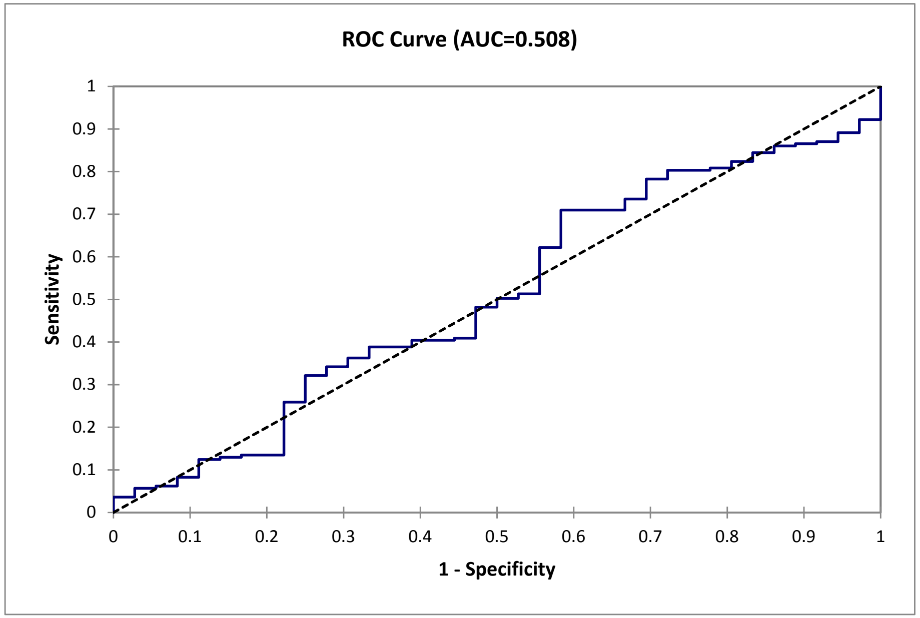
Source	DF	Chi-square (Wald)	Pr > Wald	Chi-square (LR)	Pr > LR
Q1	2	2.240	0.326	2.184	0.335

Hosmer-Lemeshow test (Variable Y1):

Statistic	Chi-square	DF	Pr > Chi2
Hosmer-L	0.152	2	0.927

Model parameters (Variable Y1):

ROC Curve (Variable Y1):



Area under the curve: 0.508

Comparison of the categories of the qualitative variables (Variable Y1):

Contrast	DF	Chi-square	Pr > Chi2
Q1-Basic v	1	0.007	0.936
Q1-Basic v	1	1.622	0.203
Q1-Script	1	1.584	0.208

Source	Value	Standard error	Wald Chi-Square	Pr > Chi2	Wald Lower bound (95%)	Wald Upper bound (95%)	PL Lower bound (95%)	PL Upper bound (95%)	Odds ratio	Odds ratio Lower bound	Odds ratio Upper bound
Intercept	1.859	0.310	35.875	< 0.0001	1.251	2.467	1.291	2.518			
Q1-Basic	0.000	0.000									
Q1-Script	0.038	0.473	0.007	0.936	-0.890	0.966	-0.885	0.993	1.039	0.411	2.628
Q1-Simple	-0.542	0.425	1.622	0.203	-1.375	0.292	-1.392	0.289	0.582	0.253	1.339

Covariance matrix:

	Intercept	Q1-Basic	Q1-Script	Q1-Simple
Intercept	0.096	0.000	-0.096	-0.096
Q1-Basic	0.000	0.000	0.000	0.000
Q1-Script	-0.096	0.000	0.224	0.096
Q1-Simple	-0.096	0.000	0.096	0.181

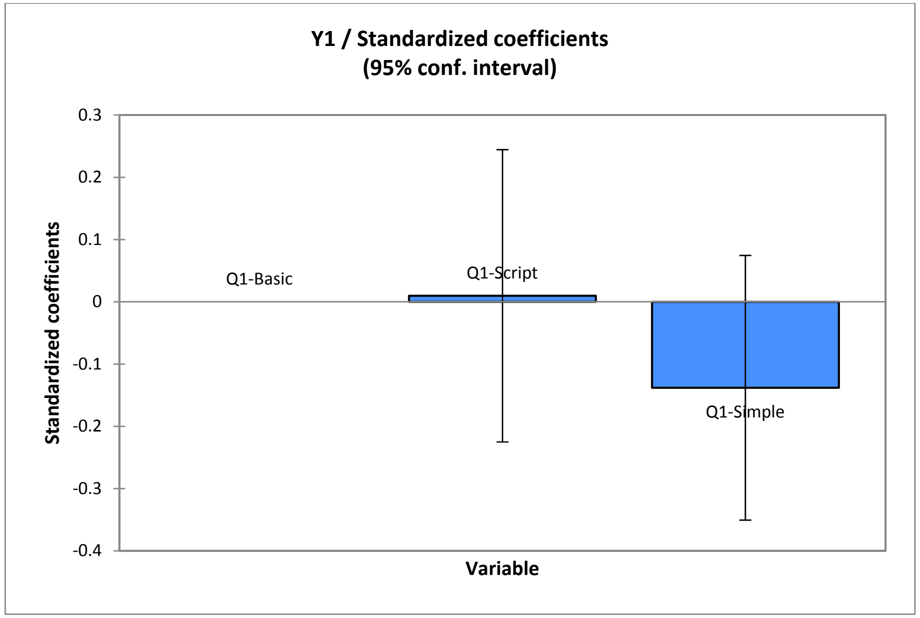
Equation of the model (Variable Y1):

Pred(Y1) = 1 / (1 + exp(-(1.85889877206568+0.038221212820198*Q1-Script-0.541597282432745*Q1-Simple)))

Standardized coefficients (Variable Y1):

Source	Value	Standard error	Wald Chi-Square	Pr > Chi2	Wald Lower bound (95%)	Wald Upper bound (95%)	PL Lower bound (95%)	PL Upper bound (95%)
Q1-Basic	0.000	0.000						
Q1-Script	0.010	0.120	0.007	0.936	-0.225	0.244	-0.406	0.456
Q1-Simple	-0.138	0.108	1.622	0.203	-0.351	0.074	-0.644	0.134

Appendix 40 Japanese Data Analysis Question #7



Appendix 40 Japanese Data Question # 8 Data Analysis

Summary statistics:

Variable	Categories	Frequencies	%
Y1	0	69	36.898
	1	118	63.102

Variable	Categories	Frequencies	%
Q1	Basic	70	37.433
	Script	58	31.016
	Simple	59	31.551

Regression of variable Y1:

Correspondence between the categories of the response variable and the probabilities (Variable Y1):

Categories	Probabilities
0	0
1	1

Classification table for the estimation sample (Variable Y1):

from ¥ to	0	1	Total	% correct
0	32	37	69	46.38%
1	27	91	118	77.12%
Total	59	128	187	65.78%

Goodness of fit statistics (Variable Y1):

Statistic	Independent	Full
Observatic	187	187
Sum of we	187.000	187.000
DF	186	184
-2 Log(Lik	246.246	235.212
R2(McFad	0.000	0.045
R2(Cox an	0.000	0.057
R2(Nagelk	0.000	0.078
AIC	248.246	241.212
SBC	251.477	250.906
Iterations	0	6

Test of the null hypothesis H0: Y=0.631 (Variable Y1):

Statistic	DF	Chi-square	Pr > Chi2
-2 Log(Lik	2	11.034	0.004
Score	2	11.209	0.004
Wald	2	10.839	0.004

Type II analysis (Variable Y1):

Source	DF	Chi-square (Wald)	Pr > Wald	Chi-square (LR)	Pr > LR
Q1	2	10.839	0.004	11.034	0.004

Hosmer-Lemeshow test (Variable Y1):

Statistic	Chi-square	DF	Pr > Chi2
Hosmer-L	2.671	2	0.263

Model parameters (Variable Y1):

Source	Value	Standard error	Wald Chi-Square	Pr > Chi2	Wald Lower bound (95%)	Wald Upper bound (95%)	PL Lower bound (95%)	PL Upper bound (95%)	Odds ratio	Odds ratio Lower bound	Odds ratio Upper bound
Intercept	0.847	0.261	10.553	0.001	0.336	1.358	0.351	1.379			
Q1-Basic	0.000	0.000									
Q1-Script	0.118	0.393	0.090	0.764	-0.652	0.888	-0.650	0.898	1.125	0.521	2.430
Q1-Simple	-1.017	0.369	7.590	0.006	-1.741	-0.294	-1.754	-0.302	0.362	0.175	0.746

Covariance matrix:

	Intercept	Q1-Basic	Q1-Script	Q1-Simple
Intercept	0.068	0.000	-0.068	-0.068
Q1-Basic	0.000	0.000	0.000	0.000
Q1-Script	-0.068	0.000	0.154	0.068
Q1-Simple	-0.068	0.000	0.068	0.136

Equation of the model (Variable Y1):

Pred(Y1) = 1 / (1 + exp(-(0.847297860074097+0.117783029357852*Q1-Script-1.01719689667169*Q1-Simple)))

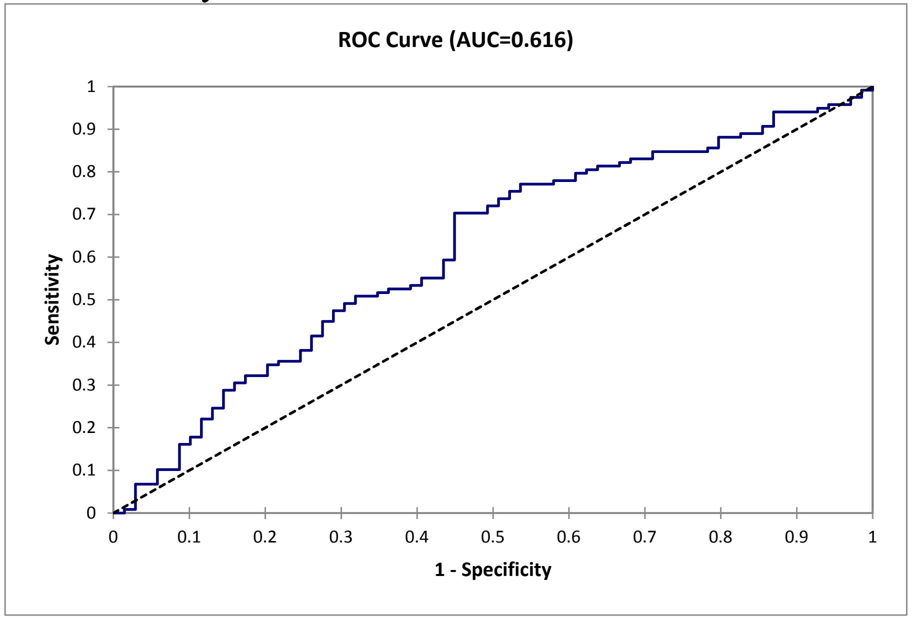
Standardized coefficients (Variable Y1):

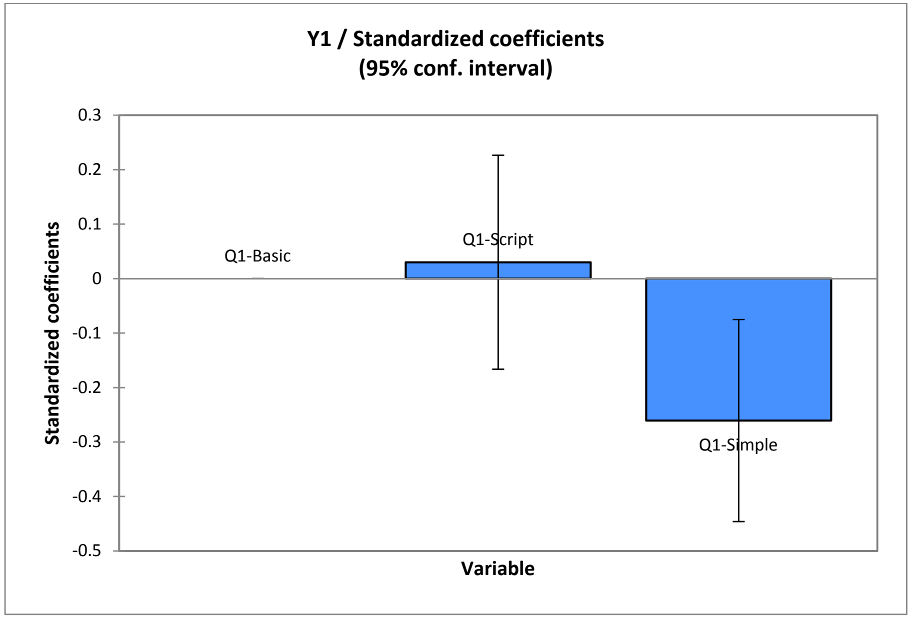
Source	Value	Standard error	Wald Chi-Square	Pr > Chi2	Wald Lower bound (95%)	Wald Upper bound (95%)	PL Lower bound (95%)	PL Upper bound (95%)
Q1-Basic	0.000	0.000						
Q1-Script	0.030	0.100	0.090	0.764	-0.166	0.226	-0.301	0.415
Q1-Simple	-0.261	0.095	7.590	0.006	-0.446	-0.075	-0.815	-0.140

Appendix 40

Japanese Data Question # 8 Data Analysis

ROC Curve (Variable Y1):





Area under the curve: 0.616

Comparison of the categories of the qualitative variables (Variable Y1):

Contrast	DF	Chi-square	Pr > Chi2
Q1-Basic v	1	0.090	0.764
Q1-Basic v	1	7.590	0.006
Q1-Script	1	8.333	0.004

Appendix 40 Japanese Data Analysis Question #9

Summary statistics:

Variable	Categories	Frequencies	%
Y1	0	29	17.059
	1	141	82.941

Variable	Categories	Frequencies	%
Q1	Basic	57	33.529
	Script	61	35.882
	Simple	52	30.588

Regression of variable Y1:

Correspondence between the categories of the response variable and the probabilities (Variable Y1):

Categories	Probabilities
0	0
1	1

Goodness of fit statistics (Variable Y1):

Statistic	Independent	Full
Observatic	170	170
Sum of we	170.000	170.000
DF	169	167
-2 Log(Lik	155.318	148.416
R2(McFad(	0.000	0.044
R2(Cox an	0.000	0.040
R2(Nagelk(	0.000	0.066
AIC	157.318	154.416
SBC	160.454	163.824
Iterations	0	6

Test of the null hypothesis H0: Y=0.829 (Variable Y1):

Statistic	DF	Chi-square	Pr > Chi2
-2 Log(Lik	2	6.902	0.032
Score	2	7.370	0.025
Wald	2	6.966	0.031

Type II analysis (Variable Y1):

Source	DF	Chi-square (Wald)	Pr > Wald	Chi-square (LR)	Pr > LR
Q1	2	6.966	0.031	6.902	0.032

Hosmer-Lemeshow test (Variable Y1):

Statistic	Chi-square	DF	Pr > Chi2
Hosmer-L(	0.132	2	0.936

Model parameters (Variable Y1):

Appendix 40 Japanese Data Analysis Question #9

Source	Value	Standard error	Wald Chi-Square	Pr > Chi2	Wald Lower bound (95%)	Wald Upper bound (95%)	PL Lower bound (95%)	PL Upper bound (95%)	Odds ratio	Odds ratio Lower bound	Odds ratio Upper bound
Intercept	1.966	0.404	23.736	< 0.0001	1.175	2.757	1.243	2.849			
Q1-Basic	0.000	0.000									
Q1-Script	0.077	0.569	0.018	0.892	-1.039	1.193	-1.059	1.213	1.080	0.354	3.297
Q1-Simple	-1.063	0.507	4.406	0.036	-2.056	-0.071	-2.110	-0.100	0.345	0.128	0.932

Covariance matrix:

	Intercept	Q1-Basic	Q1-Script	Q1-Simple
Intercept	0.163	0.000	-0.163	-0.163
Q1-Basic	0.000	0.000	0.000	0.000
Q1-Script	-0.163	0.000	0.324	0.163
Q1-Simple	-0.163	0.000	0.163	0.257

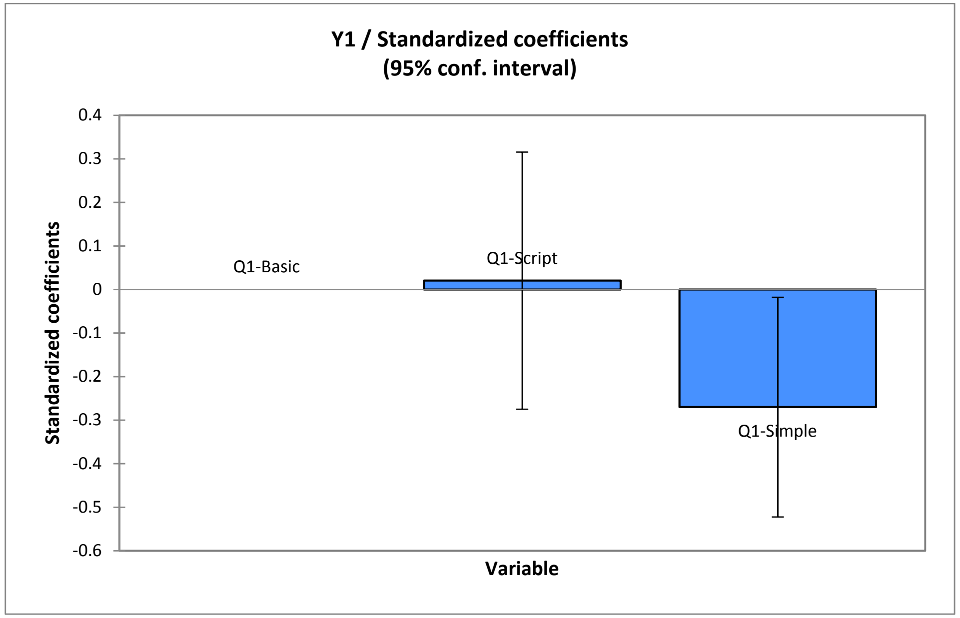
Equation of the model (Variable Y1):

Pred(Y1) = 1 / (1 + exp(-(1.96611285637283+7.69610411360215E-02*Q1-Script-1.06324514483173*Q1-Simple)))

Standardized coefficients (Variable Y1):

Source	Value	Standard error	Wald Chi-Square	Pr > Chi2	Wald Lower bound (95%)	Wald Upper bound (95%)	PL Lower bound (95%)	PL Upper bound (95%)
Q1-Basic	0.000	0.000						
Q1-Script	0.020	0.151	0.018	0.892	-0.275	0.315	-0.508	0.582
Q1-Simple	-0.270	0.129	4.406	0.036	-0.522	-0.018	-0.972	-0.046

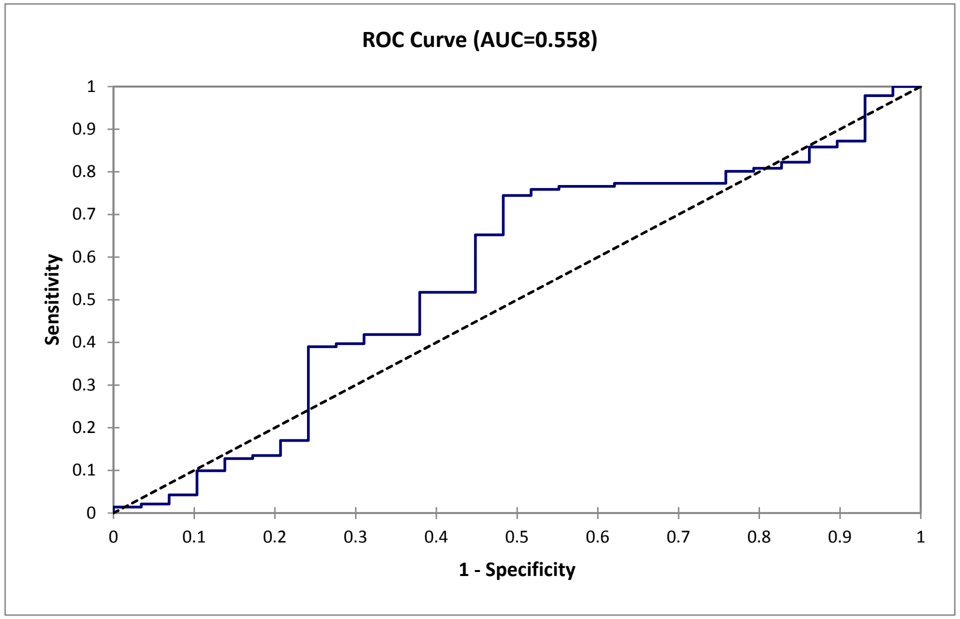
Appendix 40 Japanese Data Analysis Question #9



Classification table for the estimation sample (Variable Y1):

from ¥ to	0	1	Total	% correct
0	0	29	29	0.00%
1	0	141	141	100.00%
Total	0	170	170	82.94%

ROC Curve (Variable Y1):



Area under the curve: 0.558

Comparison of the categories of the qualitative variables (Variable Y1):

Contrast	DF	Chi-square	Pr > Chi2
Q1-Basic v	1	0.018	0.892
Q1-Basic v	1	4.406	0.036
Q1-Script	1	5.097	0.024

Appendix 40 Japanese Data Analysis Question #10

Summary statistics:

Variable	Categories	Frequencies	%
Y1	0	127	67.196
	1	62	32.804

Variable	Categories	Frequencies	%
Q1	Basic	66	34.921
	Script	67	35.450
	Simple	56	29.630

Regression of variable Y1:

Correspondence between the categories of the response variable and the probabilities (Variable Y1):

Categories	Probabilities
0	0
1	1

Classification table for the estimation sample (Variable Y1):

from ¥ to	0	1	Total	% correct
0	127	0	127	100.00%
1	62	0	62	0.00%
Total	189	0	189	67.20%

Goodness of fit statistics (Variable Y1):

Statistic	Independent	Full
Observatic	189	189
Sum of we	189.000	189.000
DF	188	186
-2 Log(Lik	239.192	231.387
R2(McFad	0.000	0.033
R2(Cox an	0.000	0.040
R2(Nagelk	0.000	0.056
AIC	241.192	237.387
SBC	244.434	247.112
Iterations	0	6

Test of the null hypothesis H0: Y=0.328 (Variable Y1):

Statistic	DF	Chi-square	Pr > Chi2
-2 Log(Lik	2	7.805	0.020
Score	2	7.655	0.022
Wald	2	7.414	0.025

Type II analysis (Variable Y1):

Source	DF	Chi-square (Wald)	Pr > Wald	Chi-square (LR)	Pr > LR
Q1	2	7.414	0.025	7.805	0.020

Hosmer-Lemeshow test (Variable Y1):

Statistic	Chi-square	DF	Pr > Chi2
Hosmer-L	1.263	2	0.532

Model parameters (Variable Y1):

Source	Value	Standard error	Wald Chi-Square	Pr > Chi2	Wald Lower bound (95%)	Wald Upper bound (95%)	PL Lower bound (95%)	PL Upper bound (95%)	Odds ratio	Odds ratio Lower bound	Odds ratio Upper bound
Intercept	−1.312	0.301	18.992	< 0.0001	−1.902	−0.722	−1.941	−0.751			
Q1-Basic	0.000	0.000									
Q1-Script	0.663	0.396	2.806	0.094	−0.113	1.440	−0.103	1.458	1.942	0.893	4.220
Q1-Simple	1.097	0.404	7.388	0.007	0.306	1.888	0.319	1.909	2.995	1.358	6.607

Covariance matrix:

	Intercept	Q1-Basic	Q1-Script	Q1-Simple
Intercept	0.091	0.000	−0.091	−0.091
Q1-Basic	0.000	0.000	0.000	0.000
Q1-Script	−0.091	0.000	0.157	0.091
Q1-Simple	−0.091	0.000	0.091	0.163

Equation of the model (Variable Y1):

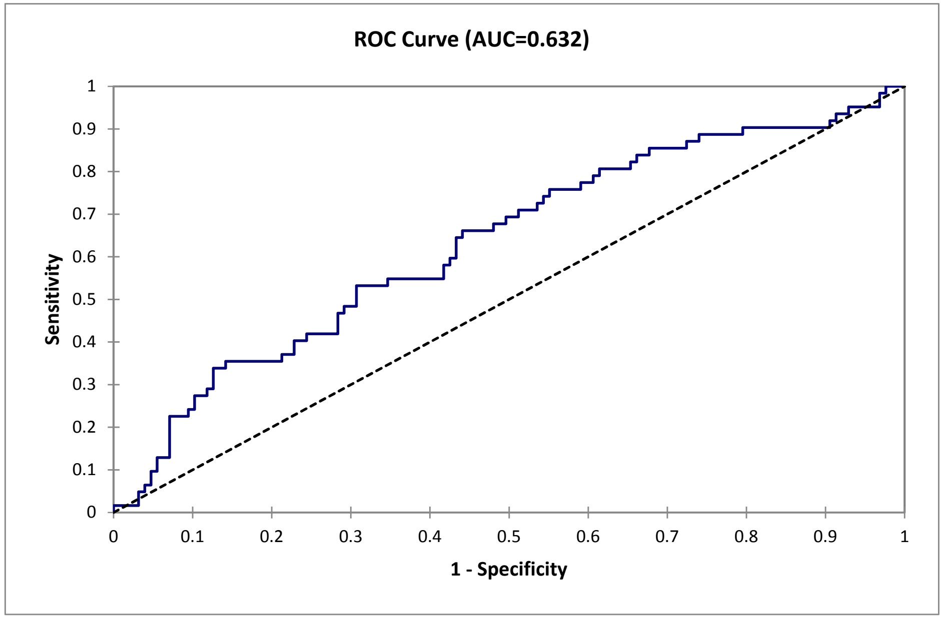
Pred(Y1) = 1 / (1 + exp(−(−1.3121863889661+0.663490970976984*Q1−Script+1.09707500934915*Q1−Simple)))

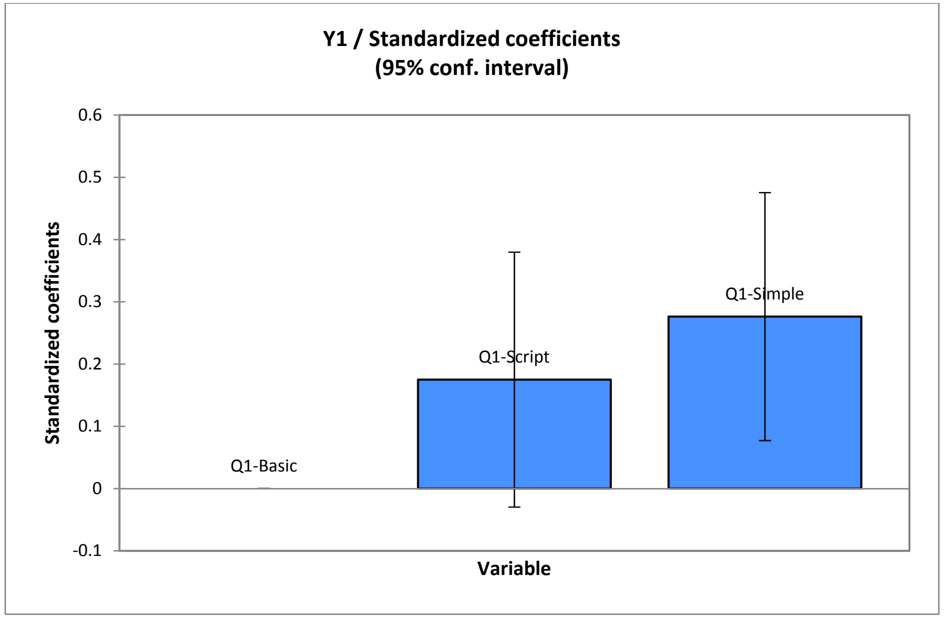
Standardized coefficients (Variable Y1):

Source	Value	Standard error	Wald Chi-Square	Pr > Chi2	Wald Lower bound (95%)	Wald Upper bound (95%)	PL Lower bound (95%)	PL Upper bound (95%)
Q1-Basic	0.000	0.000						
Q1-Script	0.175	0.104	2.806	0.094	−0.030	0.380	−0.049	0.697
Q1-Simple	0.276	0.102	7.388	0.007	0.077	0.475	0.146	0.872

Appendix 40 Japanese Data Analysis Question #10

ROC Curve (Variable Y1):





Area under the curve: 0.632

Comparison of the categories of the qualitative variables (Variable Y1):

Contrast	DF	Chi-square	Pr > Chi2
Q1-Basic v	1	2.806	0.094
Q1-Basic v	1	7.388	0.007
Q1-Script	1	1.358	0.244

Appendix 40 Japanese Data Question #11 Analysis

Summary statistics:

Variable	Categories	Frequencies	%
Y1	0	117	52.000
	1	108	48.000

Variable	Categories	Frequencies	%
Q1	Basic	84	37.333
	Script	75	33.333
	Simple	66	29.333

Regression of variable Y1:

Correspondence between the categories of the response variable and the probabilities (Variable Y1):

Categories	Probabilities
0	0
1	1

Goodness of fit statistics (Variable Y1):

Statistic	Independent	Full
Observatic	225	225
Sum of we	225.000	225.000
DF	224	222
-2 Log(Lik	311.556	309.391
R2(McFadı	0.000	0.007
R2(Cox an	0.000	0.010
R2(Nagelkı	0.000	0.013
AIC	313.556	315.391
SBC	316.972	325.640
Iterations	0	6

Test of the null hypothesis H0: Y=0.480 (Variable Y1):

Statistic	DF	Chi-square	Pr > Chi2
-2 Log(Lik	2	2.165	0.339
Score	2	2.157	0.340
Wald	2	2.148	0.342

Type II analysis (Variable Y1):

Source	DF	Chi-square (Wald)	Pr > Wald	Chi-square (LR)	Pr > LR
Q1	2	2.148	0.342	2.165	0.339

Hosmer-Lemeshow test (Variable Y1):

Statistic	Chi-square	DF	Pr > Chi2
Hosmer-L	0.936	2	0.626

Model parameters (Variable Y1):

Source	Value	Standard error	Wald Chi-Square	Pr > Chi2	Wald Lower bound (95%)	Wald Upper bound (95%)	PL Lower bound (95%)	PL Upper bound (95%)	Odds ratio	Odds ratio Lower bound	Odds ratio Upper bound
Intercept	-0.336	0.221	2.311	0.128	-0.770	0.097	-0.777	0.094			
Q1-Basic	0.000	0.000									
Q1-Script	0.417	0.320	1.694	0.193	-0.211	1.044	-0.209	1.048	1.517	0.810	2.840
Q1-Simple	0.397	0.331	1.438	0.230	-0.252	1.046	-0.250	1.051	1.487	0.777	2.846

Covariance matrix:

Appendix 40 Japanese Data Question #11 Analysis

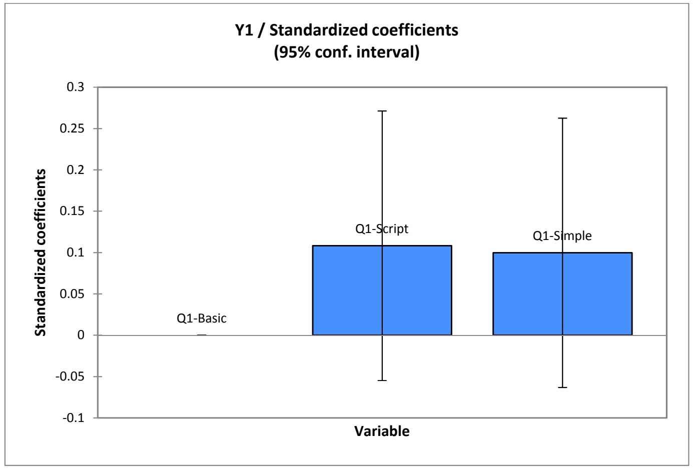
	Intercept	Q1-Basic	Q1-Script	Q1-Simple
Intercept	0.049	0.000	-0.049	-0.049
Q1-Basic	0.000	0.000	0.000	0.000
Q1-Script	-0.049	0.000	0.102	0.049
Q1-Simple	-0.049	0.000	0.049	0.110

Equation of the model (Variable Y1):

Pred(Y1) = 1 / (1 + exp(-(-0.336472236621183+0.416514944294719*Q1-Script+0.397096858437617*Q1-Simple)))

Standardized coefficients (Variable Y1):

Source	Value	Standard error	Wald Chi-Square	Pr > Chi2	Wald Lower bound (95%)	Wald Upper bound (95%)	PL Lower bound (95%)	PL Upper bound (95%)
Q1-Basic	0.000	0.000						
Q1-Script	0.108	0.083	1.694	0.193	-0.055	0.271	-0.098	0.494
Q1-Simple	0.100	0.083	1.438	0.230	-0.063	0.263	-0.114	0.478

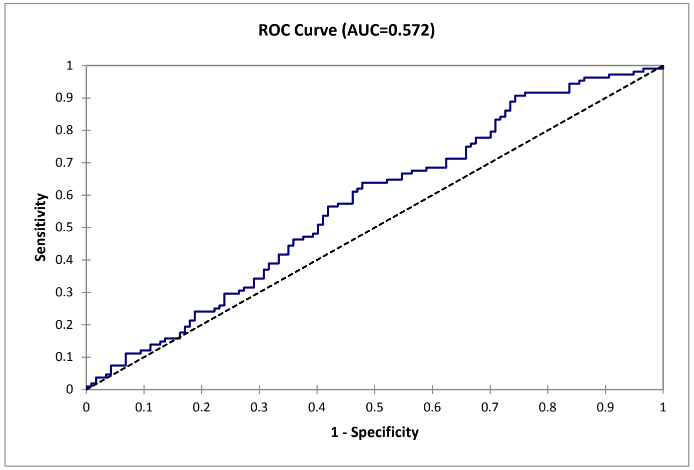


Appendix 40 Japanese Data Question #11 Analysis

Classification table for the estimation sample (Variable Y1):

from ¥ to	0	1	Total	% correct
0	49	68	117	41.88%
1	35	73	108	67.59%
Total	84	141	225	54.22%

ROC Curve (Variable Y1):



Area under the curve: 0.572

Comparison of the categories of the qualitative variables (Variable Y1):

Contrast	DF	Chi-square	Pr > Chi2
Q1-Basic	1	1.694	0.193
Q1-Basic	1	1.438	0.230
Q1-Script	1	0.003	0.954

Appendix 40 Japanese Data Question #12 Analysis

Summary statistics:

Variable	Categories	Frequencies	%
Y1	0	208	94.118
	1	13	5.882

Variable	Categories	Frequencies	%
Q1	Basic	91	41.176
	Script	62	28.054
	Simple	68	30.769

Regression of variable Y1:

Correspondence between the categories of the response variable and the probabilities (Variable Y1):

Categories	Probabilities
0	0
1	1

Appendix 40 Japanese Data Question #12 Analysis

Goodness of fit statistics (Variable Y1):

Statistic	Independent	Full
Observatic	221	221
Sum of we	221.000	221.000
DF	220	218
-2 Log(Lik	98.883	96.833
R2(McFad	0.000	0.021
R2(Cox an	0.000	0.009
R2(Nagelk	0.000	0.026
AIC	100.883	102.833
SBC	104.282	113.028
Iterations	0	6

Test of the null hypothesis H0: Y=0.059 (Variable Y1):

Statistic	DF	Chi-square	Pr > Chi2
-2 Log(Lik	2	2.050	0.359
Score	2	2.242	0.326
Wald	2	2.135	0.344

Type II analysis (Variable Y1):

Source	DF	Chi-square (Wald)	Pr > Wald	Chi-square (LR)	Pr > LR
Q1	2	2.135	0.344	2.050	0.359

Hosmer-Lemeshow test (Variable Y1):

Statistic	Chi-square	DF	Pr > Chi2
Hosmer-L	0.109	2	0.947

Model parameters (Variable Y1):

Source	Value	Standard error	Wald Chi-Square	Pr > Chi2	Wald Lower bound (95%)	Wald Upper bound (95%)	PL Lower bound (95%)	PL Upper bound (95%)	Odds ratio	Odds ratio Lower bound	Odds ratio Upper bound
Intercept	-3.080	0.511	36.269	< 0.0001	-4.082	-2.077	-4.265	-2.206			
Q1-Basic	0.000	0.000									
Q1-Script	0.846	0.668	1.605	0.205	-0.463	2.155			2.330	0.629	8.628
Q1-Simple	0.004	0.781	0.000	0.996	-1.527	1.535			1.004	0.217	4.641

Covariance matrix:

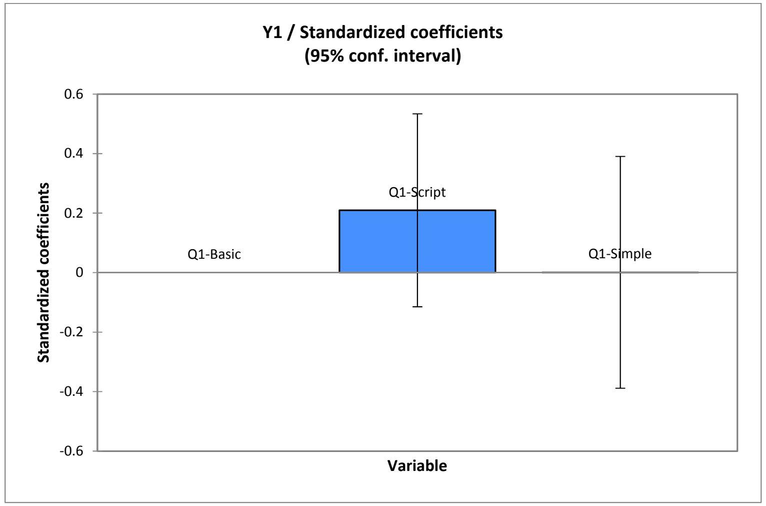
	Intercept	Q1-Basic	Q1-Script	Q1-Simple
Intercept	0.261	0.000	-0.261	-0.261
Q1-Basic	0.000	0.000	0.000	0.000
Q1-Script	-0.261	0.000	0.446	0.261
Q1-Simple	-0.261	0.000	0.261	0.610

Equation of the model (Variable Y1):

Pred(Y1) = 1 / (1 + exp(-(-3.07961375753468+0.846021536307318*Q1-Script+3.83877630716276E-03*Q1-Simple)))

Standardized coefficients (Variable Y1):

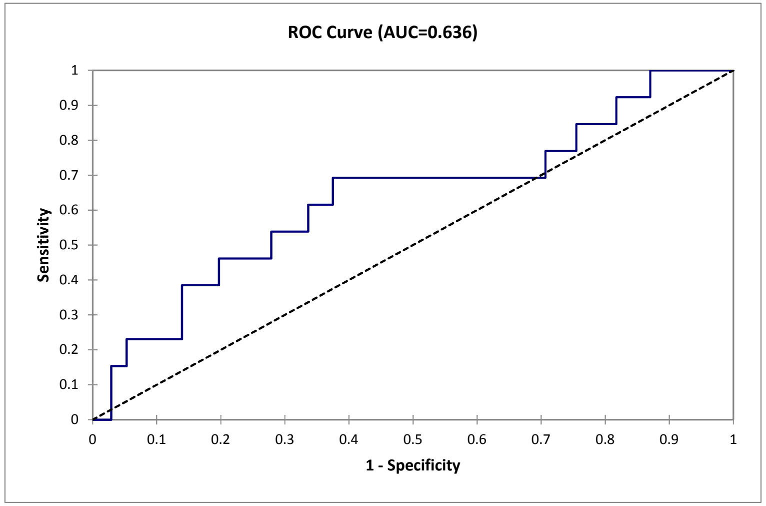
Source	Value	Standard error	Wald Chi-Square	Pr > Chi2	Wald Lower bound (95%)	Wald Upper bound (95%)	PL Lower bound (95%)	PL Upper bound (95%)
Q1-Basic	0.000	0.000						
Q1-Script	0.210	0.165	1.605	0.205	-0.115	0.534		
Q1-Simple	0.001	0.199	0.000	0.996	-0.389	0.391		



Classification table for the estimation sample (Variable Y1):

from ¥ to	0	1	Total	% correct
0	208	0	208	100.00%
1	13	0	13	0.00%
Total	221	0	221	94.12%

ROC Curve (Variable Y1):



Area under the curve: 0.636

Comparison of the categories of the qualitative variables (Variable Y1):

Contrast	DF	Chi-square	Pr > Chi2
Q1-Basic v	1	1.605	0.205
Q1-Basic v	1	0.000	0.996
Q1-Script	1	1.330	0.249

Appendix 40 Japanese Data Analysis Question #13

Summary statistics:

Variable	Categories	Frequencies	%
Y1	0	4	1.754
	1	224	98.246

Variable	Categories	Frequencies	%
Q1	Basic	89	39.035
	Script	61	26.754
	Simple	78	34.211

Regression of variable Y1:

Correspondence between the categories of the response variable and the probabilities (Variable Y1):

Categories	Probabilities
0	0
1	1

Goodness of fit statistics (Variable Y1):

Statistic	Independent	Full
Observatic	228	228
Sum of we	228.000	228.000
DF	227	225
-2 Log(Lik	40.274	39.271
R2(McFad	0.000	0.025
R2(Cox an	0.000	0.004
R2(Nagelk	0.000	0.027
AIC	42.274	45.271
SBC	45.703	55.559
Iterations	0	6

Test of the null hypothesis H0: Y=0.982 (Variable Y1):

Statistic	DF	Chi-square	Pr > Chi2
-2 Log(Lik	2	1.003	0.606
Score	2	1.129	0.569
Wald	2	1.038	0.595

Type II analysis (Variable Y1):

Source	DF	Chi-square (Wald)	Pr > Wald	Chi-square (LR)	Pr > LR
Q1	2	1.038	0.595	1.003	0.606

Hosmer-Lemeshow test (Variable Y1):

Statistic	Chi-square	DF	Pr > Chi2
Hosmer-L	0.011	2	0.994

Model parameters (Variable Y1):

Source	Value	Standard error	Wald Chi-Square	Pr > Chi2	Wald Lower bound (95%)	Wald Upper bound (95%)	PL Lower bound (95%)	PL Upper bound (95%)	Odds ratio	Odds ratio Lower bound	Odds ratio Upper bound
Intercept	4.477	1.006	19.821	< 0.0001	2.506	6.448	2.976	7.346			
Q1-Basic	0.000	0.000									
Q1-Script	-1.093	1.236	0.782	0.377	-3.516	1.330			0.335	0.030	3.781
Q1-Simple	-0.134	1.423	0.009	0.925	-2.922	2.655			0.875	0.054	14.226

Covariance matrix:

	Intercept	Q1-Basic	Q1-Script	Q1-Simple
Intercept	1.011	0.000	-1.011	-1.011
Q1-Basic	0.000	0.000	0.000	0.000
Q1-Script	-1.011	0.000	1.528	1.011

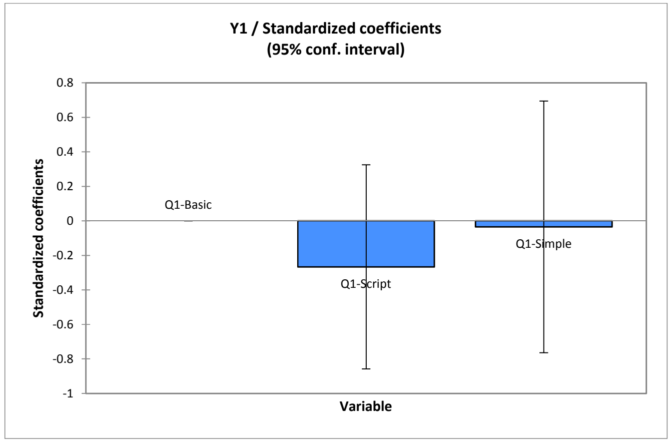
Q1-Simple	-1.011	0.000	1.011	2.024

Equation of the model (Variable Y1):

Pred(Y1) = 1 / (1 + exp(-(4.47733681446494-1.09294658235621*Q1-Script-0.133531392611321*Q1-Simple)))

Standardized coefficients (Variable Y1):

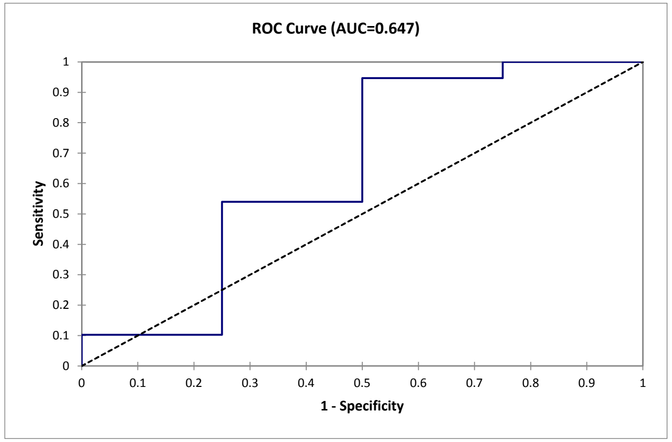
Source	Value	Standard error	Wald Chi-Square	Pr > Chi2	Wald Lower bound (95%)	Wald Upper bound (95%)	PL Lower bound (95%)	PL Upper bound (95%)
Q1-Basic	0.000	0.000						
Q1-Script	-0.267	0.302	0.782	0.377	-0.858	0.325		
Q1-Simple	-0.035	0.372	0.009	0.925	-0.764	0.694		



Classification table for the estimation sample (Variable Y1):

from ¥ to	0	1	Total	% correct
0	0	4	4	0.00%
1	0	224	224	100.00%
Total	0	228	228	98.25%

ROC Curve (Variable Y1):



Area under the curve: 0.647

Comparison of the categories of the qualitative variables (Variable Y1):

Contrast	DF	Chi-square	Pr > Chi2
Q1-Basic	1	0.782	0.377
Q1-Basic	1	0.009	0.925
Q1-Script	1	0.602	0.438

Appendix 40 Japanese Data Text Density

Question 1			Question 2			Question 3			Question 4			Question 5		
Simple	Basic	Script	Simple	Basic	Script	Simple	Basic	Script	Simple	Basic	Script	Simple	Basic	Script
0	0	0	X	1	1	X	0	0	1	1	0	1	0	0
0	0	0	0	1	1	0	0	0	X	1	X	1	0	0
0	0	0	1	1	1	0	0	0	0	1	0	1	0	0
0	0	0	1	1	1	X	0	0	X	1	1	0	0	1
0	0	0	1	1	1	0	0	0	1	1	1	1	0	1
0	0	0	1	1	1	0	0	0	0	X	1	0	0	0
0	0	0	1	1	X	1	0	X	X	1	1	1	0	1
0	0	0	1	1	1	0	1	0	X	X	1	1	1	0
0	0	0	1	1	0	0	0	X	1	1	X	0	1	1
0	0	0	1	1	1	0	0	0	1	1	X	1	0	1
0	0	0	1	1	X	0	0	X	1	0	X	0	0	0
0	0	0	1	1	1	0	0	0	X	0	1	0	0	1
0	0	1	1	1	1	0	0	0	X	1	X	0	0	0
0	0	0	1	1	0	0	0	0	X	1	1	0	0	1
0	0	0	X	1	1	X	0	1	1	0	0	X	0	0
0	0	0	1	1	1	0	0	1	X	1	1	0	0	1
0	0	0	1	1	0	0	0	1	1	1	1	1	0	1
0	0	0	1	1	X	0	0	X	X	0	X	0	0	0
0	0	0	1	1	1	0	0	1	1	1	X	1	0	X
0	0	0	1	1	1	0	0	0	1	1	1	0	0	1
0	0	0	1	1	1	0	0	0	1	1	X	X	1	1
0	0	0	1	1	0	0	1	0	0	1	X	0	0	0
0	0	0	X	1	0	X	0	0	X	1	1	X	0	0
0	0	0	1	1	1	0	0	1	X	1	X	0	0	1
0	0	0	0	1	1	1	0	0	1	1	1	1	0	X
0	0	0	1	1	1	X	0	0	1	0	X	1	0	0
0	0	0	1	1	1	X	0	0	X	1	1	1	0	0
0	0	0	1	1	1	0	0	1	1	1	X	1	0	1
0	0	0	1	1	1	0	0	X	1	1	X	1	0	1
0	0	1	1	1	1	1	0	1	X	1	0	1	0	0
0	0	0	1	1	0	1	0	1	0	1	X	1	0	1
0	0	0	1	1	1	0	1	0	0	X	0	1	1	0
0	0	0	1	1	1	0	0	0	1	1	X	1	0	1
0	0	0	1	1	1	0	0	0	1	0	1	1	0	1
0	0	0	1	1	1	1	0	0	1	1	X	0	0	0
0	0	0	X	1	1	1	0	0	X	1	X	0	0	0
0	0	0	X	1	1	1	1	X	X	1	1	0	0	0

Appendix 40 Japanese Data Text Density

Question 1			Question 2			Question 3			Question 4			Question 5		
Simple	Basic	Script	Simple	Basic	Script	Simple	Basic	Script	Simple	Basic	Script	Simple	Basic	Script
0	0	0	1	1	X	0	0	0	1	1	X	0	0	1
0	0	0	1	1	1	0	0	0	0	1	X	0	0	0
0	0	0	1	1	1	0	0	0	X	1	1	1	0	0
0	0	0	1	1	1	0	X	1	X	X	0	1	0	1
0	0	X	X	X	1	1	X	X	1	X	X	1	0	0
0	0	1	1	1	1	0	X	1	1	1	X	1	0	1
0	0	0	1	1	1	1	0	X	0	X	X	0	X	0
0	0	0	1	1	0	0	0	1	X	1	1	1	0	1
1	0	0	1	1	1	1	1	0	1	X	X	0	0	0
0	0	0	0	1	0	1	X	0	1	0	X	0	1	1
0	0	0	0	1	1	0	0	0	1	1	0	0	0	0
0	0	0	X	0	1	0	0	0	1	1	1	0	0	0
0	0	0	0	1	1	1	0	0	0	X	1	1	X	1
0	0	0	1	1	1	0	0	1	0	1	1	1	0	0
0	0	0	X	1	1	1	0	X	1	1	1	0	1	1
0	0	0	0	1	1	0	1	0	1	0	X	0	0	X
0	0	0	1	1	1	X	1	0	1	1	0	0	1	0
X	0	0	1	1	1	1	1	0	X	0	1	1	0	0
0	0	0	1	1	1	0	0	0	1	X	1	0	1	1
0	0	0	X	X	0	1	0	0	X	X	X	0	0	1
0	0	0	0	1	1	1	0	1	0	X	1	1	0	1
0	0	0	1	0	0	0	1	1	1	1	1	1	0	1
0	0	0	1	1	0	0	0	1	1	1	1	0	0	0
0	0	0	1	1	1	0	0	1	1	1	X	0	0	1
0	0	0	0	0	1	1	0	X	X	1	X	0	0	0
0	0	0	1	1	1	1	0	1	X	X	X	1	0	0
0	0	0	1	0	1	0	0	X	1	1	X	1	0	X
0	0	0	1	0	1	0	1	0	1	1	0	0	0	1
0	0	0	X	1	1	0	0	X	1	1	X	1	0	1
X	0	0	1	1	1	1	1	0	X	X	1	0	0	0
X	0	0	1	1	1	0	1	1	1	0	1	1	1	0
0	0	0	0	1	1	0	0	1	0	0	1	0	1	0
0	0	0	1	1	1	0	0	1	X	1	1	0	1	0
0	0	0	1	X	1	0	0	1	X	1	X	0	0	0
0	0	0	1	1	1	1	0	0	0	X	1	1	1	0
0	0	0	1	1	1	0	0	0	X	X	1	0	1	X
0	0	0	1	1	X	0	0	1	X	X	X	1	0	1

Appendix 40 Japanese Data Text Density

	Question 1			Question 2			Question 3			Question 4			Question 5	
Simple	Basic	Script	Simple	Basic	Script	Simple	Basic	Script	Simple	Basic	Script	Simple	Basic	Script
0	0	0	0	X	1	1	0	1	1	1	1	0	1	X
1	0	0	0	1	1	0	0	0	1	1	1	0	0	1
0	0	X	x	1	1	0	1	0	x	1	X	x	0	1
0	0		0	1		1	0		0	0		1	1	
	0			1			X			X			0	
	0			1			1			1			0	
	0	% Correct		0	% Correct		X	% Correct		X	% Correct		X	% Correct
% Correct	0		% Correct	1		% Correct	1		% Correct	0		% Correct	X	
	0	% Not Answered		1	% Not Answered		0	% Not Answered		1	% Not Answered		0	% Not Answered
% Not Answered	0	0.00	% Not Answered	1	0.00	% Not Answered	0	0.00	% Not Answered	X	0.00	% Not Answered	0	0.00
0.00	0		0.00	1		0.00	0		0.00	X			0	
	0			1			0			X			1	
	0			0			0			1			1	
	0			1			0			X			0	
	0			1			X			1			0	
	0			1			0			1			0	
	0			1			1			X			0	
				% Correct			% Correct			% Correct			% Correct	
				92%			82.60%			84.50%			81.60%	
				% Not Answered			% Not Answered			% Not Answered			% Not Answered	
				4.30%			5.40%			24.20%			4.40%	

Appendix 40 Japanese Data Text Density

Question 6			Question 7			Question 8			Question 9			Question 10		
Simple	Basic	Script	Simple	Basic	Script	Simple	Basic	Script	Simple	Basic	Script	Simple	Basic	Script
0	0	0	1	1	1	1	1	0	0	1	1	X	0	1
0	0	0	1	1	1	0	1	1	1	1	1	X	0	0
0	0	0	1	1	1	1	0	0	1	1	1	0	0	0
0	0	0	1	1	1	1	1	1	1	1	1	0	1	0
0	0	0	1	1	1	0	1	1	X	1	1	X	0	0
0	0	0	1	1	1	X	X	1	0	X	1	X	X	0
0	0	0	1	1	1	1	0	0	1	1	X	X	X	1
1	0	0	1	1	1	1	X	0	1	X	1	1	1	0
0	0	0	1	1	1	0	X	1	1	X	1	1	1	X
0	0	0	1	1	1	0	1	X	1	1	X	X	X	1
0	0	X	1	1	X	1	1	X	1	1	1	0	0	X
0	0	0	1	1	0	0	0	1	1	1	1	0	X	0
0	0	0	1	1	1	1	1	0	1	1	1	1	0	1
0	0	0	1	1	1	0	1	X	1	1	1	0	0	0
X	0	1	1	1	1	0	0	1	X	X	1	X	0	0
X	0	0	0	1	1	0	0	1	1	1	1	X	0	0
0	1	0	1	1	1	0	0	0	1	0	1	0	1	1
0	1	0	1	0	1	1	1	1	X	1	X	0	X	0
0	0	0	1	1	1	1	1	1	1	1	1	0	0	0
0	0	0	1	1	1	X	1	1	X	1	1	0	0	1
X	0	0	1	1	1	1	1	1	X	1	X	0	1	0
0	0	1	1	1	1	1	1	1	1	1	1	0	0	0
0	0	0	0	1	1	0	1	0	1	X	1	0	1	1
0	0	0	1	1	1	1	1	X	1	1	X	0	0	0
X	0	0	1	1	1	1	1	1	1	1	1	1	0	0
0	0	0	1	1	1	X	1	1	0	1	1	0	0	0
X	0	0	1	1	1	0	1	1	1	1	1	0	0	0
0	0	0	0	1	1	0	1	0	1	1	1	1	0	0
0	0	0	1	1	1	1	1	X	0	1	X	1	0	X
0	0	0	0	1	1	X	1	1	1	1	1	1	0	1
1	0	X	X	1	1	X	0	1	X	1	1	0	0	0
0	0	0	1	1	1	0	1	1	1	1	1	1	0	1
X	0	0	X	1	X	X	1	1	1	1	1	0	0	1
0	0	0	0	1	1	0	1	1	1	1	1	0	0	1
0	0	0	1	1	1	1	1	0	1	1	X	1	0	0
1	0	0	1	1	1	X	1	1	0	1	1	1	0	1
1	0	0	1	1	1	X	0	X	X	1	1	0	0	0

Appendix 40 Japanese Data Text Density

Question 6			Question 7			Question 8			Question 9			Question 10		
Simple	Basic	Script	Simple	Basic	Script	Simple	Basic	Script	Simple	Basic	Script	Simple	Basic	Script
0	0	0	0	1	0	1	0	1	1	0	0	1	1	1
X	0	0	1	1	0	1	1	0	1	0	1	0	0	1
0	0	0	1	0	1	0	1	1	0	1	1	0	0	0
0	0	0	1	1	0	1	0	1	1	1	1	0	0	0
0	1	0	X	1	1	0	1	1	X	X	X	1	0	X
0	0	0	1	0	0	0	0	1	0	1	1	1	0	0
1	0	X	0	1	1	0	0	X	X	1	1	1	0	0
0	0	0	1	1	1	X	1	1	X	1	0	1	0	X
0	0	0	1	1	1	0	0	1	1	1	1	1	1	1
0	0	0	1	1	1	0	1	1	1	1	X	1	0	0
0	0	0	0	0	1	1	0	0	1	1	0	0	0	0
0	0	1	1	1	1	1	X	0	1	1	1	0	1	0
0	0	0	0	1	1	0	X	1	0	1	1	1	X	0
X	0	0	X	1	1	X	1	1	0	1	1	1	0	0
0	0	0	X	1	0	1	1	1	X	1	X	X	0	0
0	0	0	0	1	1	0	0	X	0	1	1	0	0	1
0	0	X	1	1	1	X	0	0	1	1	0	0	0	0
0	0	0	1	1	1	1	0	1	0	0	1	1	0	0
0	0	0	1	1	1	1	1	1	0	X	1	1	X	0
0	0	X	1	1	0	X	1	X	X	1	1	0	0	0
0	0	0	0	1	1	0	0	0	0	X	1	1	0	0
0	0	0	1	1	0	1	1	0	1	0	1	X	0	1
0	1	0	1	1	1	0	1	0	1	0	1	0	X	1
X	0	0	1	1	1	0	X	1	1	1	1	1	0	1
0	0	0	1	1	1	0	0	X	0	0	X	1	0	0
X	0	0	1	0	1	X	1	1	1	X	X	X	X	0
0	0	0	1	1	X	1	0	1	0	1	X	1	0	1
0	1	0	1	0	1	0	1	1	1	1	1	0	1	0
0	0	0	0	1	0	1	1	X	1	0	0	0	1	X
0	0	0	0	X	1	X	1	1	1	X	1	X	X	0
0	0	1	1	1	0	0	1	0	1	0	1	X	0	1
1	0	0	0	1	0	1	0	1	1	X	1	0	0	0
0	0	0	1	0	1	1	1	1	X	1	1	X	0	0
0	X	1	1	0	0	0	1	X	1	X	X	0	1	0
0	0	0	X	1	1	0	1	1	X	X	0	X	1	0
0	0	0	1	1	1	X	1	0	X	1	X	0	0	X
0	0	0	1	1	1	1	1	1	X	1	1	0	0	0

Appendix 40 Japanese Data Text Density

Question 6

Simple	Basic	Script
0	0	0
1	0	0
0	0	0
0	0	
	0	
	0	
	0	% Correct
% Correct	1	
	0	% Not Answered
% Not Answered	0	0.00
0.00	X	
	0	
	0	
	0	
	0	
	0	
	0	

% Correct
93.30%
% Not Answered
2.20%

Question 7

Simple	Basic	Script
1	1	1
0	1	1
0	0	1
0	1	
	1	
	1	
	1	% Correct
% Correct	0	
	1	% Not Answered
% Not Answered	1	0.00
0.00	X	
	1	
	1	
	1	
	0	
	1	
	1	

% Correct
87.60%
% Not Answered
2.20%

Question 8

Simple	Basic	Script
1	1	0
0	X	0
0	X	X
0	X	
	0	
	1	
	1	% Correct
% Correct	X	
	1	% Not Answered
% Not Answered	1	0.00
0.00	0	
	X	
	1	
	1	
	1	
	1	
	0	

% Correct
71.30%
% Not Answered
12.10%

Question 9

Simple	Basic	Script
0	0	0
1	1	1
x	1	1
1	0	
	X	
	1	
	X	% Correct
% Correct	1	
	1	% Not Answered
% Not Answered	0	0.00
0.00	0	
	0	
	0	
	1	
	0	
	0	
	1	

% Correct
78.90%
% Not Answered
16.50%

Question 10

Simple	Basic	Script
1	1	0
1	X	1
x	0	X
0	0	
	X	
	0	
	X	% Correct
% Correct	0	
	0	% Not Answered
% Not Answered	0	0.00
0.00	0	
	0	
	1	
	0	
	1	
	0	
	0	

% Correct
79.50%
% Not Answered
14.30%

Appendix 40 Japanese Data Text Density

Question 11			Question 12			Question 13		
Simple	Basic	Script	Simple	Basic	Script	Simple	Basic	Script
0	1	1	0	0	0	1	1	0
X	0	1	0	0	0	1	1	1
0	0	0	0	0	0	1	1	1
1	0	0	0	0	0	1	1	1
0	0	1	0	0	0	1	1	1
0	1	1	0	0	0	1	1	1
1	0	1	0	0	X	1	1	1
1	0	0	0	0	0	1	1	1
0	1	0	0	0	0	1	1	1
0	0	1	0	0	X	1	1	1
0	0	0	0	0	0	1	1	1
1	0	1	0	0	0	1	1	1
0	0	0	0	0	0	1	1	X
0	0	0	0	0	0	1	1	1
X	1	0	0	0	0	1	1	0
0	0	1	0	0	X	1	1	1
0	0	1	0	0	0	1	1	1
0	0	1	0	0	0	1	1	1
1	0	1	0	0	1	1	1	X
1	0	0	0	0	0	1	1	1
0	1	X	0	0	0	1	1	1
1	0	1	0	0	0	1	1	1
0	1	0	0	0	0	1	1	1
1	0	1	0	0	0	1	1	X
1	0	0	0	0	0	1	1	1
X	1	0	0	0	0	1	1	1
1	1	0	0	0	0	1	1	1
1	1	0	0	1	0	1	1	1
0	0	1	0	0	0	1	1	1
0	0	1	0	0	0	1	1	1
0	0	1	0	0	X	1	1	1
1	0	0	0	0	0	1	1	1
0	0	1	0	0	1	1	1	1
0	0	1	0	0	1	1	1	1
1	0	0	0	0	0	1	1	X
1	0	1	X	0	X	1	1	1
1	0	1	0	0	0	1	1	1

Appendix 40 Japanese Data Text Density

Question 11			Question 12			Question 13		
Simple	Basic	Script	Simple	Basic	Script	Simple	Basic	Script
0	1	0	0	0	0	1	1	1
1	0	1	0	0	0	1	1	1
1	0	1	0	1	0	1	1	1
1	1	0	0	0	0	1	1	1
0	1	0	0	0	0	1	1	1
1	0	0	0	0	0	1	1	1
1	1	1	0	0	0	1	1	1
1	X	0	1	0	X	0	1	1
0	0	1	0	0	0	1	1	1
1	1	0	0	0	0	1	1	X
0	1	0	0	0	0	1	1	1
0	1	1	0	0	0	1	1	1
1	0	1	0	0	0	1	1	1
0	1	0	0	0	0	1	1	1
X	1	0	0	0	0	1	1	1
0	0	1	0	0	0	1	1	1
1	1	0	1	1	0	1	1	1
0	0	0	0	0	0	1	1	1
1	X	0	0	0	0	1	1	1
X	1	1	X	0	1	1	1	X
1	1	1	0	0	X	1	1	1
1	1	1	0	0	0	1	1	1
0	1	1	0	0	0	1	1	1
1	1	0	X	0	0	1	1	1
X	1	0	X	0	0	1	1	1
1	0	0	0	0	0	1	1	1
1	1	1	0	0	0	1	1	X
1	1	1	0	1	0	1	1	1
1	1	0	1	0	0	1	1	0
1	0	0	0	0	0	X	1	1
1	0	1	0	0	1	1	1	1
0	1	0	0	0	0	1	1	1
1	1	0	0	0	0	1	1	1
1	0	1	0	0	0	1	1	X
1	1	1	0	0	0	1	X	1
0	0	X	0	0	0	1	1	1
0	1	0	0	0	0	1	1	1

Question 11			Question 12			Question 13		
Simple	Basic	Script	Simple	Basic	Script	Simple	Basic	Script
1	1	1	0	0	0	1	1	1
1	1	0	1	0	0	1	1	1
0	1	1	0	0	X	1	1	1
1	0		0	0		1	1	
	0			0			1	
	0			0			1	
	0			0			1	
	X			0			1	
	0			0			1	
	0			0			1	
	0			0			1	
	1			0			1	
	0			0			1	
	% Correct			% Correct			% Correct	
	56.80%			95.60%			100	
	% Not Answered			% Not Answered			% Not Answered	
	3.30%			0.00%			2.20%	

Appendix 40 Question #3 Analysis

Summary statistics:

Variable	Categories	Frequencies	%
Y1	0	157	72.350
	1	60	27.650

Variable	Categories	Frequencies	%
Q1	Basic	81	37.327
	Script	65	29.954
	Simple	71	32.719

Regression of variable Y1:

Correspondence between the categories of the response variable and the probabilities (Variable Y1):

Categories	Probabilities
0	0
1	1

Goodness of fit statistics (Variable Y1):

Statistic	Independent	Full
Observations	217	217
Sum of weights	217.000	217.000
DF	216	214
-2 Log(Likelihood)	255.893	248.085
R2(McFadden)	0.000	0.031
R2(Cox and Snell)	0.000	0.035
R2(Nagelkerke)	0.000	0.051
AIC	257.893	254.085
SBC	261.273	264.225
Iterations	0	6

Test of the null hypothesis H0: Y=0.276 (Variable Y1):

Statistic	DF	Chi-square	Pr > Chi2
-2 Log(Likelihood)	2	7.807	0.020
Score	2	7.540	0.023
Wald	2	7.280	0.026

Type II analysis (Variable Y1):

Source	DF	Chi-square (Wald)	Pr > Wald	Chi-square (LR)	Pr > LR
Q1	2	7.280	0.026	7.807	0.020

Hosmer-Lemeshow test (Variable Y1):

Statistic	Chi-square	DF	Pr > Chi2
Hosmer-Lemeshow Statistic	0.595	2	0.743

Model parameters (Variable Y1):

Appendix 40 Question #3 Analysis

Source	Value	Standard error	Wald Chi-Square	Pr > Chi2	Wald Lower bound (95%)	Wald Upper bound (95%)	PL Lower bound (95%)	PL Upper bound (95%)	Odds ratio	Odds ratio Lower bound	Odds ratio Upper bound
Intercept	−1.566	0.294	28.386	< 0.0001	−2.142	−0.990	−2.183	−1.022			
Q1-Basic	0.000	0.000									
Q1-Script	1.030	0.390	6.962	0.008	0.265	1.795	0.277	1.815	2.801	1.303	6.021
Q1-Simple	0.765	0.390	3.843	0.050	0.000	1.530	0.009	1.548	2.149	1.000	4.616

Covariance matrix:

	Intercept	Q1-Basic	Q1-Script	Q1-Simple
Intercept	0.086	0.000	−0.086	−0.086
Q1-Basic	0.000	0.000	0.000	0.000
Q1-Script	−0.086	0.000	0.152	0.086
Q1-Simple	−0.086	0.000	0.086	0.152

Equation of the model (Variable Y1):

Pred(Y1) = 1 / (1 + exp(−(−1.56563528977535+1.03011705341898*Q1-Script+0.764857445023035*Q1-Simple)))

Standardized coefficients (Variable Y1):

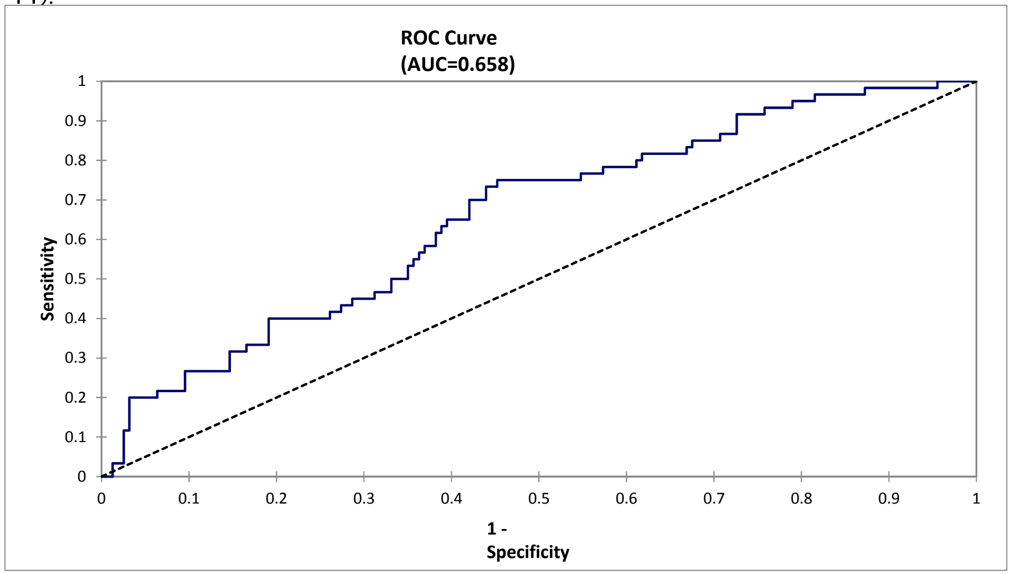
Source	Value	Standard error	Wald Chi-Square	Pr > Chi2	Wald Lower bound (95%)	Wald Upper bound (95%)	PL Lower bound (95%)	PL Upper bound (95%)
Q1-Basic	0.000	0.000						
Q1-Script	0.260	0.099	6.962	0.008	0.067	0.453	0.127	0.832
Q1-Simple	0.198	0.101	3.843	0.050	0.000	0.396	0.004	0.726

Appendix 40 Question #3 Analysis

Classification table for the estimation sample (Variable Y1):

from \ to	0	1	Total	% correct
0	157	0	157	100.00%
1	60	0	60	0.00%
Total	217	0	217	72.35%

ROC Curve (Variable Y1):



Area under the curve: 0.658

Comparison of the categories of the qualitative variables (Variable Y1):

Contrast	DF	Chi-square	Pr > Chi2
Q1-Basic vs Q1-Script	1	6.963	0.008
Q1-Basic vs Q1-Simple	1	3.842	0.050
Q1-Script vs Q1-Simple	1	0.533	0.465