A STUDY OF FACIAL BEAUTY AND FASHION

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CHAU KWOK PUI

ABSTRACT

The question of whether there is such an entity as beauty that objectively and universally exists, has attracted debates among philosophers, psychologists and biologists for centuries [Etcoff, 1994, Wolf, 1990 & Berys & Dominic, 2001]. One school of thinking believed beauty is in the eye of the beholder. However, this cannot explain why infants would stare at attractive faces [Humphrey, 1973 & Langlois, 1990].

With regard to body attractiveness, BMI (Body mass index), WHR (Waist to hip ratio), and VHI (Volume height index) have been found to be cues to human body attractiveness [Tovee et al., 1999, Tovee et al., 2002, Fan, et al, 2007]. With regard to facial attractiveness, facial activeness and symmetry were tested to be the important cues to facial attractiveness. In addition, some neoclassical cannons and golden ratios of facial measurements have also been proposed to be the ideal proportions and ratios to assess attractive faces, However, such putative criteria have rarely been tested statistically.

This research was therefore aimed at investigating the contributions of different ratios of East Asian female facial features that are combined with hairstyle and neckline to the beauty attractiveness.

Multivariate statistical analysis was applied to identify the key factors of facial features related to facial attractiveness and a non-linear regression model was established to map the general trends of the effect of facial ratios on facial attractiveness.

It concludes that facial beauty was much dependent on certain facial ratios. Having said that, the optimal facial ratios are not the previously proposed golden ratio while and the findings indicate that both genders have different approaches to the judgment of attractiveness.

The analysis also revealed that a proper coordination of hairstyle and neckline can enhance the attractiveness of females.

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CHAPTER 1

Introduction

Beauty is a kind of physical attractiveness [Dion et al., 1972]. The physical attractiveness of a human being may comprise two aspects: body attractiveness and facial attractiveness.

With regard to human body physical attractiveness, past researches showed that the body mass index (BMI) [Tovée et al., 1999; Little & Hancock, 2002] or more precisely the body volume divided by the square of height (VHI) [Fan et al., 2004; Fan et al., 2005] is the primary cue to body attractiveness. There exists an optimum VHI for physical attractiveness, which corresponds to physical fitness and fertility, although the precise values of optimum VHI could be different for different cultures [Fan et al., 2007].

In terms of facial beauty, it relates to the attractiveness of the human face and head. The head is composed of eyes, nose, ears, mouth, facial shape, skin, hair and brows. All these features are unique to every person. The question as to what kind of face or combination of facial features makes one more attractive than others have intrigued many in the past. It was found and is now commonly agreed that – averageness [Langlois & Roggman, 1990] and symmetry [Rhodes et al., 1998] are the two most important criteria for determining facial beauty. Attractiveness improved with an increasing level of averageness and symmetry. This can be understood as evolutionary pressures operating against the extremes of the population [Symons, 1979].

Apart from averageness and symmetry, some extreme traits, such as the peacock's tail, can be a sign of quality and health in a mate and therefore favored in the choice of selection. Using composites of both Caucasian and Japanese faces, Perrett *et al.* [1994] showed that the mean shape of a set of attractive faces is preferred to the mean shape of all the faces in a sample. Attractive composite faces can be made more attractive by exaggerating the shape difference from the sample mean. Therefore, an average face shape is attractive, but optimally not the best attractive. Human preferences could exert a directional selection pressure on the evolution of the shape of a human face. Perrett *et al.* [1998] further showed that more feminine female and male faces are preferred over average faces. Enhanced masculine facial characteristics increased both perceived the dominance and negative attributes, likes the coldness and dishonesty which relevant to relationships and paternal investment. They believed that humans have a selection pressure that limits sexual dimorphism and encourages a diverse neoteny.

It is also believed that, for attractive faces, facial measurements should follow certain defined ratios. Dated back to the Renaissance period in the west, neoclassical cannons have been proposed to be the ideal ratios of beautiful faces. In popular literature, it is also claimed that beautiful faces have facial measurements close to the golden ratio [Marquardt Beauty Analysis, n.d.].

Despite the popular claim that beautiful faces follow neoclassical cannons or golden ratios, it has rarely been experimentally and systematically examined. The only such work is attributed to Schmid [Schmid et al., 2008], who recently attempted to test the above claim by relating the attractiveness of the frontal views of 420 Causasian facial images to the ratios of facial measurements. This work was however not conclusive as the effects of the variations in hairstyles, skin texture, positions and expressions of the facial images on the facial attractiveness could not be completely excluded in the analysis, the linear regression model applied in the analysis could not model the generally nonlinear relationships and the interactions between the ratios of facial measurements. This perhaps explains the very low fitness (R^2=0.2433) of their models even with large number (viz. 78) of independent variables.

In the present study, in order to identify the relationship between ratios of facial measurements and facial attractiveness, facial images with standardized hair styles, same skin texture and neutral expression that are generated by using computer software, and canonical analysis of quadratic response surfaces, were applied to investigate the nonlinear relationship between facial attractiveness and identify the optimum ratios of facial measurements.

1.1 Statement of Problems

The question of whether there is such entity as beauty that objectively and universally exists, has attracted debates among philosophers, psychologists and biologists for centuries [Etcoff, 1994; Wolf, 1990; Gaut & Lopes, 2001] One popular school of thought is that 'beauty is in the eye of the beholder', that individual attraction is a result of personal experience, cultural background and specific circumstances. Nevertheless, the assumption that beauty is just an arbitrary personal preference still cannot explain why even two-month-old infants would gaze at faces that adults find attractive [Humphrey, 1973; Langlois & Roggman, 1990].

If there is objectivity in beauty assessment, what are there? Ancient Greeks believed that the world is beautiful because there is a certain measure, proportion, order and harmony between its elements [Gaut & Lopes, 2001]. For centuries, the Golden Ratio or Golden Proportion, a ratio of 1:1.618 has been considered as the perfect ratio for beauty.

In this regard, is there any relationship between facial details and beauty? Which parts of facial details would affect the overall beauty?

In recent research of facial beauty, some researchers covered the hair and used a mask to cover the facial shape in order to allow the viewer to be more focused on the face [Pallett et al., 2009; Perrett et al., 1998]. However the mask would distort the details of the stimuli and also affect the perception of beauty assessment. Also there is little systematic investigation on the contribution of head hair and neckline towards facial beauty. The variation of hair style and neckline type may have influence on the perception of facial beauty.

The objectives of this study are two folds. The first is to investigate the relationship between the perception of facial attractiveness and facial measurement. The second is to investigate the effect of hair styles and neckline types towards the perception of facial attractiveness.

1.2 Research Objectives

The specific objectives of the present study are as follows:

- To investigate the effect of the proportions of human face and head features on the perception of beauty. These proportions include the ratios between the size and positions of different facial and head features including eyes, nose, ear, and mouth.
- To investigate the effect of fashionable features like hair styles and neckline types on facial attractiveness.
- To develop a model for integrating various fashionable features on facial beauty.
- To investigate gender effect on the judgment of facial beauty.

1.3 Scope of research

The scope of this research is to investigate the perception of facial beauty, in particular the East Asian female facial attractiveness. Computer generated facial images of East Asian females with varying facial dimensions were the stimuli of this study.

In this investigational study, the facial features included eyes, nose, ears, and facial shape. The effects of hairstyle and necklines on facial attractiveness were also examined. Thus, in the preparation of the stimuli, the images had variations in all the above parameters.

These images were viewed and assessed by male and female viewers, who were aged between 20 to 30 and studying or working in The Hong Kong Polytechnic University. The effects of genders, namely the difference between males and females, on the perception of facial attractiveness were studied.

CHAPTER 2

Literature review

2.1 Introduction

Relevant to the present research, this literature review focuses on the fundamentals of beauty and past work on the physical attractiveness of a human being, viz. body attractiveness and facial beauty.

2.2 Definition of beauty

There is a popular view that beauty is in the eye of the beholder. It refers to different people having different expressions about what is beautiful. It argues that the perception of beauty is solely dependent on the viewer, but not dependent on physical attractiveness.

Nevertheless, for centuries people have sought to identify defining principals that underline the judgment of beauty. Searching for factors deeper than personal preferences, fashionable looks, or other more superficial dimensions, artists have endeavored to determine the perfect dimensions for beauty. The response on towards positive emotion and high degree of attraction is related to the quality of beauty.

Beauty can be further classified into inner beauty and outer beauty. Langlois & Roggman [1990] also suggested that outer beauty refers to the physical beauty, such as ‘averageness’. The inner beauty referred to the psychological factors such as personality, intelligence, elegance etc.

Marquardt Beauty Analysis [n.d.] pointed out that facial beauty involves strong positive emotion and a high degree of attraction. A beautiful face gives an intense pleasure to the mind.

2.3 Golden Ratio

The ancient Greeks developed the notion of Golden means. Eventually the proportions were expressed as a mathematical formula that divided the perfect face into a ratio of 1:1.618 [Bates & Cleese, 2001]. That is the beginning of the search for facial beauty.

Book 6 of proposition 30 of Euclid's Elements shows divide a line in mean and extreme ratio. It means to find the golden section point on a line. Also in book 2 of Proposition 11, it shows another reference of golden ratio by cutting a given straight line and the ratio of the divided segments and is same as our known Golden ratio [Posamentier, 2012; Olsen, 2006].

The Mathematician Mark Barr used ϕ to represent the golden ratio. This symbol, call phi, is the initial letter of the Phidias [Posamentier, 2012].

Phidias was a Greek sculptor. He used the golden ratio in his sculptures like Parthenon in Athens. The value of ϕ is 1.618. The lowercase form is ϕ which represent 1/ ϕ and the value is 0.618 [Olsen, 2006].

The Golden Ratio has a great influence on art, inducing artists' perspectives of a pleasant art piece. Why Leonardo Da Vinci's Mona Lisa looks so beautiful? Da Vinci, a painter, mathematician and an inventor, was the first one who called Phi the Golden Ratio. And scientifically, Mona Lisa's face appears in a golden rectangle [Leob, 1993], which also makes her looks beautiful to human eyes. Another masterpiece, the Last Supper, contains Golden Ratios as well. The French Impressionist painter George Seurat is well-known for his new technique of drawing – Pointilism. It was told that he 'attacked every canvas by the golden section.' in figure 2.1 [Leighton et al., 1997]. The boy was placed on the golden intersection point in the drawing.

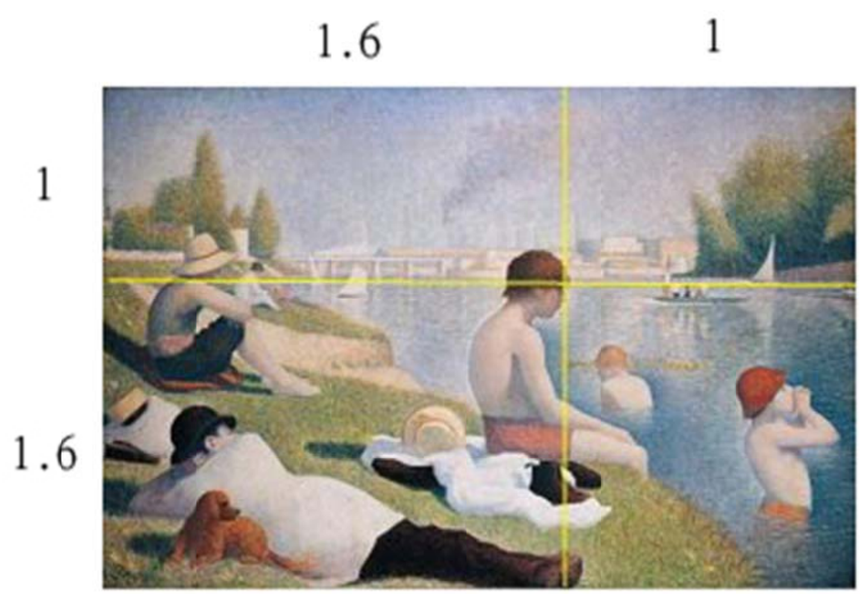


Figure 2.1 'The Bathers at Asnières' [Leighton et al., 1997]

If a body is symmetrical and in proportion, it can draw others people's attention easily. Similarly, if a face is in good proportion, it likely to be realized as beautiful face.

2.4 Body beauty

2.4.1 Body mass index (BMI)

BMI stand for Body Mass Index, an index developed by physicians between 1830 and 1850, to evaluate the health status, the body weight (kg) is calculated, then divided by the square of body height (m) to measure the fat distribution of the body shape. [Eknoyan, 2008]

Past researchers found that BMI is strong related to the attractiveness of the female physical body. Tovée et al. [1999] used a set of two-dimensional (2D) images of actual female bodies and asked 40 male subjects to rate their attractiveness. The study showed that the attractiveness rating of female bodies are strongly related to BMI, then to waist to hip ratio (WHR). This was explained by the evolutionary psychology that, mates prefer partners to be healthy and reproductive and BMI provides a strong cue to the physical fitness and re-productiveness [Tovée et al., 1999].

Tovée et al. [2002] further used waveform analysis to weight the importance of BMI and WHR in determining the attractiveness of the female body. In the experiment, 60 images of actual female bodies are used to outline the torso shape, 23 male and 23 female viewers to rate their attractiveness. This study further confirmed that BMI is more important than WHR in providing the cue to the judgment of the attractiveness of female body shapes.

BMI can be categorized into five different levels, below 15 is emaciated, 15-19 is underweight, 20-24 is normal, 25-30 is overweight and above 30 is obese [Bray, 1978].

If a person's BMI is 22, he/she is considered as normal with good health; in contrast, over 25 are overweight and have great potential for health problems.

Based on the relationship between BMI and physical fitness, a BMI value of 22 would be the most attractive. However, in reality slimmer and thinner body (lower value of BMI than normal) is perceived as the beauty standard nowadays. From the result of the first International Body Project (IBP-1), it was shown that thinness and femininity were most preferred across 10 world regions [Swami et al., 2010]. The problems of favoring extreme thinness around the world should be addressed; it has been suggested societies should promote healthier and more realistic body shape as the new beauty standard.

There are other limitations in using BMI alone to measure the attractiveness of female physical body. BMI is calculated by only using weight and height, and not associated with the circumferential measures (e.g. bust, waist, hip, etc.) of the body. People with lower body fat or little muscle may be considered as ‘normal’ and attractive; people with muscle may be considered as ‘overweight’ and repulsive in body shape.

An athlete or sportsman will tend to have higher BMI and considered as ‘overweight’ and not ‘healthy’; the BMI for elderly or weak people may be rated as ‘normal’ and ‘healthy’ [National Heart Lung and Blood Institute, n.d.]. Thus, the health status of the human cannot be assessed accurately especially for pregnant women, nursing; people, endurance athletes or muscleman [House of Health and Beauty, n.d.). Thus, BMI should not be the sole indicator of the attractiveness of the body shape.

2.4.2 Waist to hip ratio (WHR)

Waist to hip ratio (WHR) is a ratio of the circumference of the waist to that of the hip. The ideal WHR is proposed to be 0.7 for woman and 0.9 for men [Marlowe et al., 2005].

WHR relates to the health factor. If the ratio is more than 1, the waist is bigger than the hip. It implies that the fat distributes around the waist line.

Many studies have showed that for optimum attractiveness, a female body should be slim, but not skinny, with a BMI of approximately 19-20 [Tovée et al., 1999], and should have small waist relative to the hips, and with a WHR of approximately 0.7 [Singh, 1993; Streeter, 2003]. Tovée et al. [1999] showed that WHR and BMI can explain 76% of the total variance in attractiveness judgments.

The body shape is not easy to change. People have used some paddings, corsets and girdles to improve their attractiveness. Such body ‘enhancers’ are still common in the fashion market.

WHR as a cue to body attractiveness is however only appropriate to adults. It is not applicable to babies and children. A WHR value 0.7 would mean malnourished children.

2.4.3 Volume Height Index (VHI)

Volume height index (VHI) is defined as body volume divided by the square of height. It was found that VHI provides a better cue to female body attractiveness than BMI [Fan et al., 2004].

VHI can explain about 90% of the variance of the average attractiveness rating. When compared with BMI, it has more than 10% improvement. It was therefore suggested that, people first use VHI as a cue to body attractiveness before considering other shape parameters such as Waist Height over the Chin height (WHC), Absolute value of the deviation from the optimum Waist to Hip ratio (AWHR), legs length, and body height, etc.

2.5 Facial beauty

2.5.1 Averageness and symmetry

It has long been recognized that averageness and symmetrical faces are more attractive [Bates & Cleese, 2001].

When images of human faces are averaged together to form a composite image, they become gradually nearer to the 'ideal' image and are perceived as more attractive.

Averages and symmetry appear to be paired with regard to facial beauty. However, Rhodes et al. [1999] showed that the attractiveness of average could not be explained by the symmetry. In their research, she invited 48 adults to take a black and white photo and used Gryphon's Morph™ software to manipulate the averageness of face. This method had a weakness in the selection of images for testing. If the amount of less attractive facial images is in high proportion then the output of average beauty would become not attractive.

However, averageness is not the only factor to make a face attractive [Little & Hancock, 2002; Grammer & Thornhill, 1994]

Although average face may be attractive, they cannot be remembered very well because they do not deviate from the prototype used for storing faces. This is why there cannot be a full correlation between attractiveness and prototypical for faces [Rhodes, 2006].

2.5.2 3D Golden Mask

Marquardt Beauty Analysis [n.d.] has proposed a 3D golden mask and advocated that faces fitting the 3D golden mask are 'ideal faces'. This golden mask had a smiling and reposed vision. The front and side views of the repose and smiling version of the 3D golden mask are shown in Figure 2.2 and 2.3, respectively.

The purpose of this mask was not only to identify the 'beauty range' of the facial images, but also to reveal the facial parts which fail to fall close to the mask, which may then need to make-up or facial surgery for improvement [Holland, 2008]. The mask provided guideline of desirable geometry.

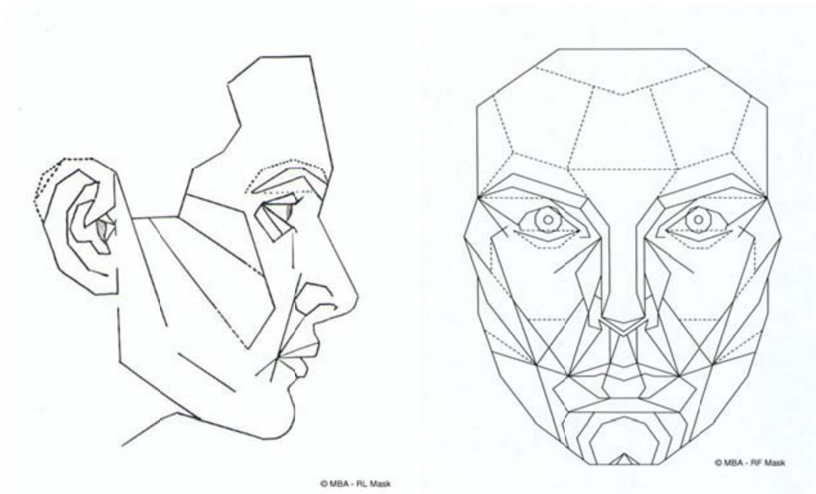


Figure 2.2 The outline of Marquardt's 3D mask [Marquardt Beauty Analysis, n.d.].

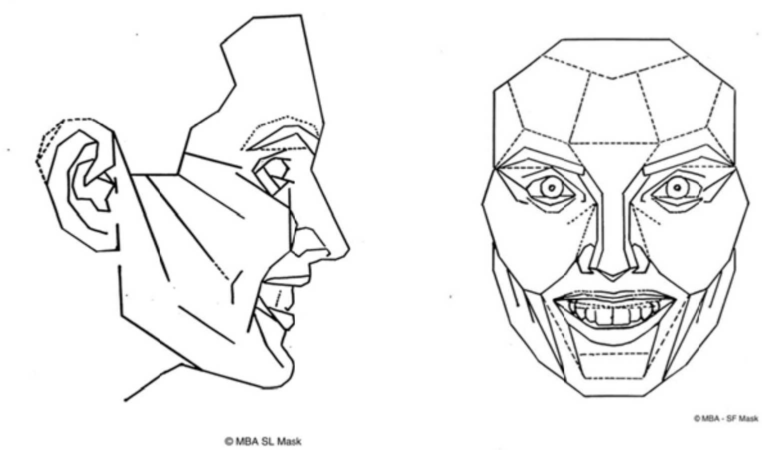


Figure 2.3 The outline of smile version of [Marquardt Beauty Analysis, n.d.].

Figure 2.4 shows the mask being overlaid on an attractive face. Nevertheless, Holland [2008] found that this is not suitable for non-European populations, especially sub-Saharan Africans and East Asians. Holland also pointed out that the facial masks of Marquardt Beauty Analysis [n.d.] are relied heavily on female fashion models. So, the masks have masculinized faces. It was difficult to fit both or either version of the golden mask with attractive Asian females [Holland, 2008].

Another problem with the 3D golden mask is that it does not quantify how the degree of disconformity between the actual face and the mask relates to perception of facial attractiveness.

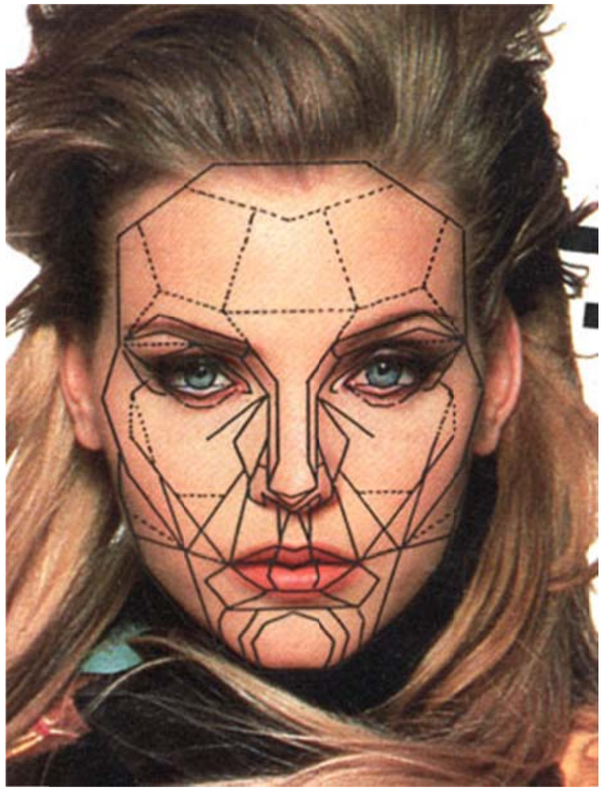


Figure 2.4: Example of application of beauty mask [Marquardt Beauty Analysis, n.d.].

2.5.3 Babyfaceness

Past research also showed that the presence of childlike facial features increases attractiveness. The characteristics of a baby face are large head, large curved forehead, facial elements (eyes, nose, mouth) located relatively low and large round eyes, small short nose, round cheeks and small chin [Gruendl, 2002].

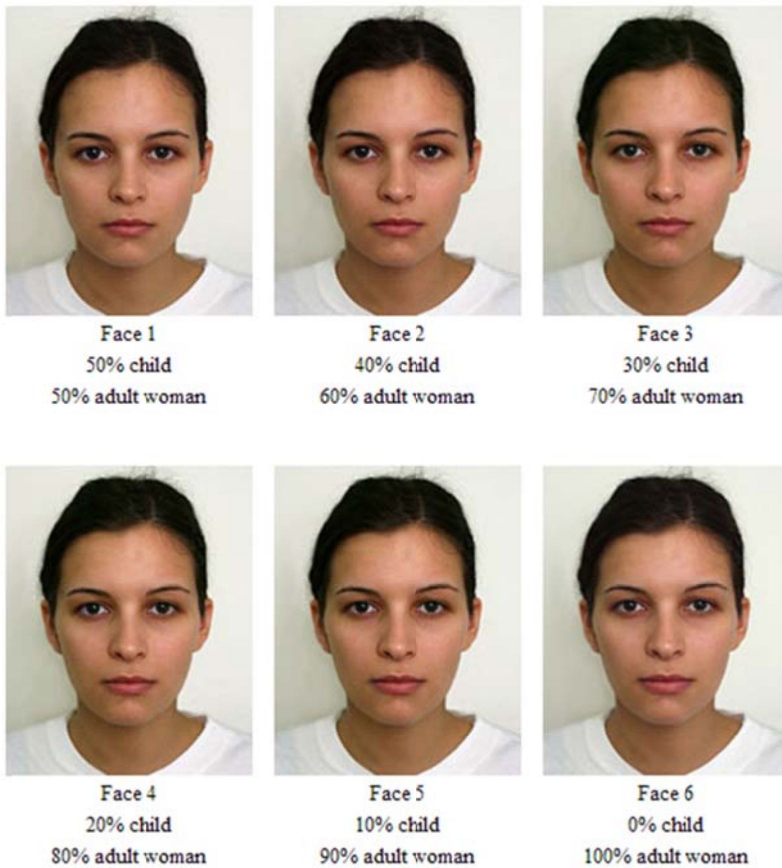


Figure 2.5 Example of baby face [Gruendl, 2002]

From their study, the original images can be deformed to add the childlike characteristics to improve the attractiveness.

In Figure 2.5, the researcher adjusted the fore-head and eyes to chin distance to show their influence on beauty perception. This study however has several weaknesses. The stimulus images are easy to be distorted into unrealistic shape. The original images were assumed less attractive and the original attractiveness was not considered. Once the facial dimension was distorted, many facial details were changed simultaneously. These changes may create a large effect on the perception of beauty, in addition to the childlike characteristics.

2.5.4 Facial shape

The facial shape could be classified in term of oval, square, round, triangular, inverted triangular, diamond and rectangular [Davis, 1996]. In terms of facial beauty, oval and round facial types are commonly preferred. For different kinds of facial shape, matching fashion coordination was suggested.

2.5.5 Hair style

Hair can cover or emphasize certain facial features, hence affect facial attractiveness. Davis [1996] suggested making a proper hair style so that the face looks oval.

However, the question as to how hair style, face features (viz. position and size of eyes, nose, mouth and chin, etc.) and garment silhouette should be better coordinated to enhance facial attractive is still open.

2.6 Good Genes Model

Good genes theory states that attractiveness is meaningful in human interactions because it advertises health and genetic quality, such as heterozygosity and immunocompetence.

The benefit from mating with a healthy partner lies in the acquisition of viability-promoting genes that advance the survival chances of their offspring, usually by conferring hereditary resistance to parasite infections, toxins, or diseases.

A number of recent studies [Grammer et al., 2003; Johnston et al., 1994; Thornhill & Grammer, 1994] have revealed that attractive facial features, such as symmetry, averageness and prominent sex-hormone markers are display traits that honestly signal good physical condition.

2.7 Knowledge gap

VHI or WHR provides a good cue to the perception of body physical attractiveness. However, it falls short of the full description of human beauty, since when we say ‘You are beautiful’, we are mostly referring to the facial beauty instead of the body or waist being beautiful.

Compared with body physical attractiveness, there is a lack of understanding as to how facial beauty is related to the physical features of a face, although we tend to assume that we know what is beautiful by common sense. Such ‘common sense’ is not supported by empirical data and may vary from people to people.

There is only very limited research so far on the effect of facial ratio or proportions on the perception of attractiveness. In the work by Schmid

[2008], the researcher attempted to relate the facial attractiveness to the facial ratios based on the facial images of actual faces. A very weak relationship (R^2 was around 0.23 to 0.20) was found probably due to the fact that hairstyle, skin tones, facial expressions were not controlled in the investigation. In 2009, Pallett et al. investigated the facial beauty in the average face of a Caucasian female face and proposed a new Golden ratio. Pallett et al. [2009] had used four experiments by altering the facial width and height ratio elements to determine the optimal attractiveness of female. The alternation of the facial width and height was by the Adobe Photoshop. In his conclusion, he shows that facial attractiveness would be affected by the facial width and height. And may explain some daily observations, such as changing the hairstyle would increase or decrease the facial attractiveness. In his conclusion the hairstyle would affect the whole facial width and height. So the facial beauty would be influenced by the hairstyle [Pallett et al., 2009].

So far, no work has been carried out on the effect of facial ratios or proportions on the facial attractiveness among The Asian population, and no work on the interaction between facial beauty and hairstyle and dressing.

CHAPTER 3

Development of new research methodology

3.1 Introduction

This chapter is dedicated to describe the preparation of facial stimuli for the present investigation, the protocol for the facial attractiveness assessment and methods for data analysis. The facial stimuli were prepared in such a way that the effect of skin tone and facial expressions are excluded and hairstyles and neckline types are controlled. In this way, we can investigate the relationship between facial ratios and perception of facial beauty, and identify how hair, neckline styles contribute and interact with facial beauty.

3.2 Preparation of Facial Images

By applying the Poser software, an 'Original Face' was created and computer-generated by collecting and averaging the features of the facial images of well-known oriental ladies mainly in Japan, Korea & China.

Total 440 facial images were generated by combining the effects of nine different approaches in facial dimensions and their ratio and addition of four facial features (including the mouth width, eye fissure width, nose width and lip height).

A random sample of 15 Chinese males and 15 Chinese females who are studying in The Hong Kong Polytechnic University were chosen.

By using the E-prime commercial psychology research software tools, the stimuli are prepared and responses of subjects are captured. In phase 1 of the experiment, 440 facial images are randomly shown to subjects. Subjects were required to rate the attractiveness of each facial images by a nine point of scale (1 being least attractive and 9 being the most attractive).

Phase 2 of the experiment, studies the contribution and interaction of the hair and neckline style on facial beauty. Based on 440 facial images in phase 1 and adding the stimulus originated by three different hair styles and three different neckline shaped, total 3960 set of images were generated by the computer. Subjects were required to rate the attractiveness of each facial images by nine point of scale (1 being least attractive and 9 being the most attractive).

As referred in Chapter 2: Literature review, past researchers used facial images of actual persons as stimuli. Such facial stimuli are realistic, but cannot single out the effect of facial ratios or proportions on facial attractiveness due to the uncontrolled effects of skin tone, hairstyle, neckline types and facial expression. In this study, realistic facial images were therefore generated using computer software to provide controlled variations in facial ratios and proportions, hairstyles, necklines types and uniform skin tone and facial expression.

In the preparation of the facial images, the Poser software was used. To generate the facial images with varying facial dimensions and ratios, we first created a so called 'Original Face' (See Figure 3.1), from which some key facial dimensions were altered to create other facial images.

In order to ensure the computer-generated facial images are realistic in facial features, the 'Original Face' was obtained by averaging the features of the facial images of some arbitrarily chosen famous oriental ladies (from Japanese, Korean, and China) available on the internet.

In order to focus the investigation on the effect of facial ratios and proportions on facial beauty in the first phase of the study, the faces were made hairless to eliminate the effects of hairstyles. The effects of hairstyles and neckline shapes on facial attractiveness were investigated in a second phase of the study reported in Chapter 5 and 6.

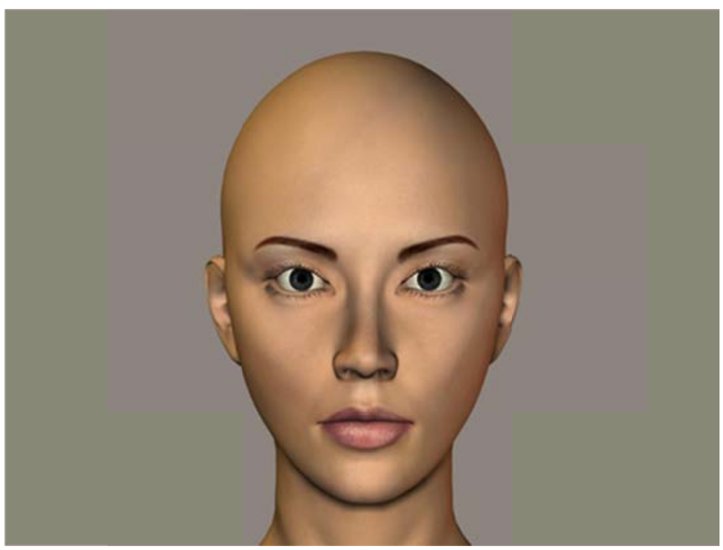


Figure 3.1 'Original Face'

In order to create wide, but realistic variations in the facial dimensions and ratios of the facial images for our experiments, we applied gradual alteration to the ‘original face’ by nine different approaches (to be explained in Section 3.4), each approach created 14 different images.

3.3 Measurements of Facial Dimensions and Calculation of Facial Ratios

For each facial image, 29 important landmarks (See Figure 3.2) were identified by using Photoshop software. The vertical and horizontal distances between the landmarks were measured to derive 21 ratios listed in Table 3.1.

In order to experimentally verify whether a face with almost perfect golden ratios and neoclassical canons is indeed the most attractive, we also created a face having the optimum putative ratios mostly at Golden Ratio or neoclassical canons except for r6, r7, r12, r13 (See putative optimum ratios listed in Table 3.1), which was later visually assessed in terms of attractiveness and compared to other facial images.

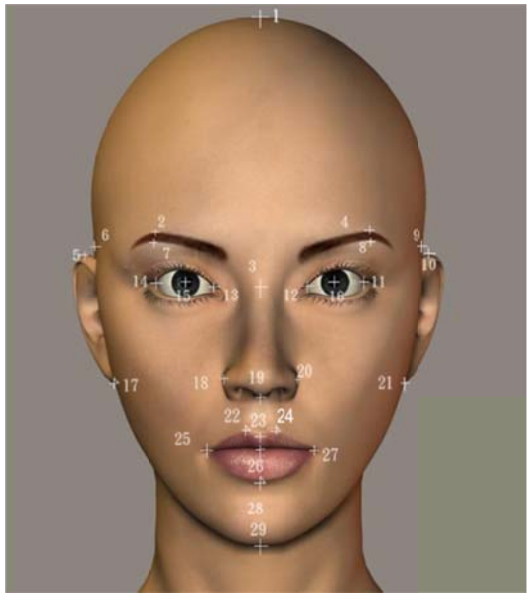


Figure 3.2 Measurements point for calculation of facial ratios

These 21 ratios were considered as important face proportions relevant to facial beauty. It was reported in the popular literature [Meisner, 2006; Narain, 2003] that, attractive faces should have the first 17 ratios (r1 to r17) approaching the golden ratio of 1.618, and the other 4 ratios (representing neoclassical canons) approaching unity [Farkas et al., 1985]. This myth was rarely tested experimentally except from the work by Schmid et al (2008), who, based on 420 real facial images, showed that only some of these ratios were significant. Schmid et al's work was however not conclusive as the influences of the varying hairstyles, expressions, skin appearance and postures of their facial images were not excluded. Furthermore, careful examination of these ratios can reveal that r6, r7, r12, r13 and r16 are interrelated depending on the vertical position of the mouth; it is not possible to set them all at the Golden Ratio of 1.618. If r16 is set at 1.618, the closest ratios of r6, r7, r12 and r13 to the Golden Ratio are 1.280, 1.280, 1.000, and 1.036, respectively.

Table 3.1 Definition of facial ratios

Ratios	Numerator Points	Denominator Points	Description	Optimal Putative Ratios
r1	y10-y21	x12-x13	Ear length to interocular distance	1.618
r2	y10-y21	x18-x20	Ear length to nose width	1.618
r3	x15-x16	x12-x13	Mideye distance to interocular distance	1.618
r4	x15-x16	x18-x20	Mideye distance to nose width	1.618
r5	x25-x27	x12-x13	Mouth width to interocular distance	1.618
r6	y23-y29	x12-x13	Lips-chin distance to interocular distance	1.280
r7	y23-y29	x18-x20	Lips-chin distance to nose with	1.280
r8	x12-x13	x12-x11	Interocular distance to eye fissure width	1.618
r9	x12-x13	y23-y28	Interocular distance to lip height	1.618
r10	x18-x20	x12-x11	Nose width to eye fissure width	1.618
r11	x18-x20	y23-y28	Nose width to lip height	1.618
r12	x12-x11	y19-y26	Eye fissure width to nose-mouth distance	1.000
r13	y23-y28	y19-y26	Lip height to nose-mouth distance	1.036
r14	y1-y29	x6-x9	Length of face to width of face	1.618
r15	y19-y29	y26-y29	Nose-chin distance to lips-chin distance	1.618
r16	x18-x20	y19-y26	Nose width to nose-mouth distance	1.618
r17	x25-x27	x18-x20	Mouth width to nose width	1.618
r18	y3-y19	y19-y29	Nose length to nose-chin distance	1.000
r19	y3-y19	y10-y21	Nose length to ear length	1.000
r20	x12-x13	x18-x20	Interocular distance to nose width	1.000
r21	x6-x9	(x18-x20)*4	Width of face to 4 times of nose with	1.000

3.4 Nine approaches

Approach 1: Mark 4 apex points at the left, right, top and bottom of the face as shown in Figure 3.3(a). Shorten the width (i.e. the distance between the left and right apex points) by 4% of the width of the original face and the length (i.e. the distance between the top and bottom apex points) by 8% of the length of the original face to create a new facial image. Repeat the above procedure 13 times to create a total of 14 facial images. During this alteration, all other facial dimensions were not changed.

Approach 2: Mark 2 apex points at the left and right as shown in Figure 3.3(b). Shorten the width by 4% of the width of the original face to create a new facial image. Repeat the above procedure 13 times to create a total of 14 facial images. During this alteration, all other facial dimensions were not changed.

Approach 3: Mark 2 apex points at the left and right as shown in Figure 3.3(c). Increase the width by 9% of the width of the original face to create a new facial image. Repeat the above procedure 13 times to create a total of

14 facial images. During this alteration, all other facial dimensions were not changed.

Approach 4: Mark 2 apex points at the top and bottom as shown in Figure 3.3(d). Shorten the length by 9% of the length of the original face to create a new facial image. Repeat the above procedure 13 times to create a total of 14 facial images. During this alteration, all other facial dimensions were not changed.

Approach 5: Mark 4 apex points at the left, right, top and bottom of the face as shown in Figure 3.3(e). Increase the width (i.e. the distance between the left and right apex points) and the length (i.e. the distance between the top and bottom apex points) by 3% of the width and length of the original face, respectively, to create a new facial image. Repeat the above procedure 13 times to create a total of 14 facial images. During this alteration, all other facial dimensions were not changed.

Approach 6: Mark 2 apex points as shown in Figure 3.3(f). Shorten the length of the nose by 10% of the original nose length to create a new facial image. Repeat the above procedure 13 times to create a total of 14 facial images. During this alteration, all other dimensions and positions were not changed.

Approach 7: Mark 2 apex points as shown in Figure 3.3(g). Increase the length of the nose by 14% of the original nose length to create a new facial image. Repeat the above procedure 13 times to create a total of 14 facial images. During this alteration, all other dimensions and positions were not changed.

Approach 8: Mark 2 apex points as shown in Figure 3.3(h). Move the positions of the two eyes apart by 22% of the distance of the two eyes of the original face to create a new facial image. Repeat the above procedure 13 times to create a total 14 facial images. During this alteration, all other dimensions are not altered.

Approach 9: Mark 2 apex points as shown in Figure 3.3(i), move the positions of the two eyes closer by 22% of the distance of the two eyes of the original face to create a new facial image. Repeat the above procedure 13 times to create a total 14 facial images. During this alteration, all other dimensions are not altered.

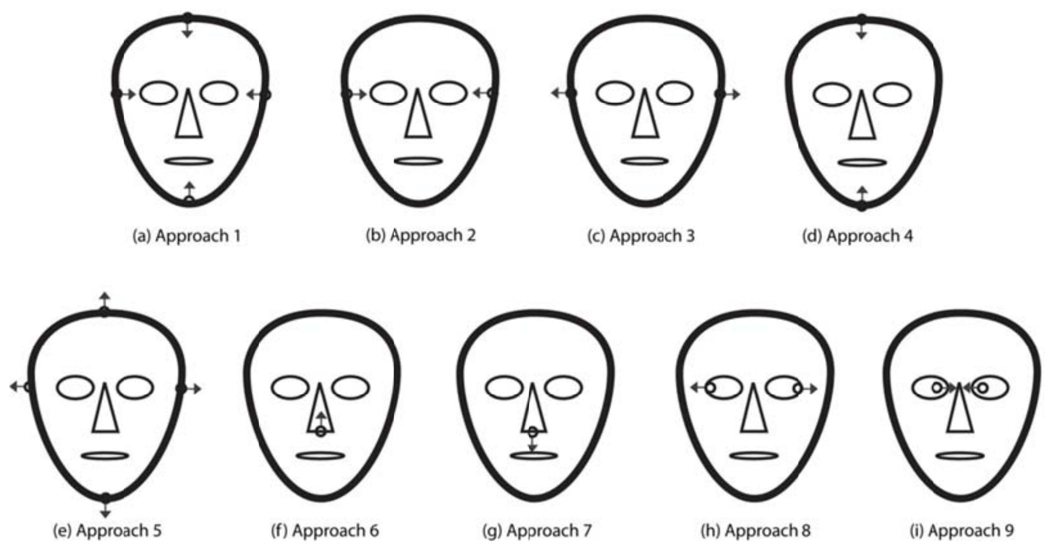


Figure 3.3 Alterations of ‘Original Face’ to generate other facial images

The change in each step of the alterations in the above nine approaches were determined by, first determining the maximum possible alteration of the targeted dimension(s) without being over unrealistic, which was determined by preliminary visual assessment. The maximum possible dimensional alternation was then divided by 14 to determine the change in each step of the alterations so that we can create 14 progressive facial images in each approach.

The ‘Original Face’ and the 126 (9x14) images created above had wide variations in the length and width of the face, the length of the nose, and positions of the eyes, however, other facial features (viz. the size of the eyes, the width of the nose, the size and shape of the mouth) were unchanged. In order to take into account the effects of these facial features, but minimize the sample size, we applied the orthogonal experimental design to create additional 304 (16x19) facial images from the ‘Original Face’ and 18 facial images selected from the above 126 images (two from each lot created by each approach with one having the maximum alteration and one having the medium alternation) by varying mouth width, eye fissure width, nose width and lip height.

For each of the 19 facial images (the 'Original Face' and the selected 18 facial images created by the above 9 approaches), the mouth width, eye fissure width, nose width and lip height were altered in the proportion listed in Table 3.2, which is determined by the (4x4) orthogonal experimental design for four factors and four levels. The four levels of proportional changes of the mouth width were -10%, -5%, +5% and +10%, respectively; those of eye fissure width were -15%, +10%, +20% and +30%, respectively; those of nose width were -20%, -10%, 10% and +20%, respectively; those of lip height were -15%, -10%, -5% and +5%, respectively. These levels were determined so as to have wider range of variation without creating too unrealistic images. For the facial images, please refer to Appendix A.

Every image has variations in four parts: mouth width (x25-x27), eye fissure width (x11-x12), nose width (x18-x20) and lip height (y23-y28) and it was changed in the following way.

Proportion:

Table 3.2 Orthogonal design of facial alternations

No.	Mouth width	Eye fissure width	Nose width	Lip height
1	-5%	-15%	-10%	+5%
2	-5%	+10%	-20%	-5%
3	-5%	+20%	+10%	-10%
4	-5%	+30%	+20%	-15%
5	-10%	-15%	- 20%	-10%
6	-10%	+10%	-10%	-15%
7	-10%	+20%	+20%	+5%
8	-10%	+30%	+10%	-5%
9	+5%	-15%	+10%	-15%
10	+5%	+10%	+20%	-10%
11	+5%	+20%	-10%	-5%
12	+5%	+30%	- 20%	+5%
13	+10%	15%	+20%	-5%
14	+10%	+10%	+10%	+5%
15	+10%	+20%	- 20%	-15%
16	+10%	+30%	-10%	-10%

List of files to apply the orthogonal design: *face_05Jul08_0001.bmp, face_05Jul08_0015.bmp, face_05Jul08_0029.bmp, face_05Jul08_0045.bmp, face_05Jul08_0059.bmp, face_05Jul08_0075.bmp, face_05Jul08_0089.bmp, face_05Jul08_0105.bmp, face_05Jul08_0119.bmp, face_05Jul08_0135.bmp, face_05Jul08_0149.bmp, face_05Jul08_0165.bmp, face_05Jul08_0179.bmp, face_05Jul08_0195.bmp, face_05Jul08_0209.bmp, face_05Jul08_0225.bmp, face_05Jul08_0239.bmp, face_05Jul08_0255.bmp, face_05Jul08_0269.bmp*

3.4.1 Limitations of real people faces

In this study, the stimulus used was computer-generated facial images. By using the computer generated facial stimulus, it could eliminate the uncontrolled factors, such as the angle of taking the photo, hairstyle and facial details. Using real human faces, it is impossible to have this kind of study.

3.4.2 Preparation of hair styles

Three different kinds of hairstyles were created in this study. The most common and simple straight hairstyle was applied, and the curved and some unusual styles were excluded in the experiment. The hairstyle was simply classified in terms of length including long hair, medium hair and short hair.

Figure 3.4 Image of long hair style

Figure 3.5 Image of medium hair style

Figure 3.6 Image of short hair style

The hairstyles are shown in Figure 3.4, 3.5 and 3.6. In the experiment, 440 sets of head stimulus with varying ratios of hair length and width were created and used.

3.4.3 Preparation of neckline styles

Millions of neckline styles are available in the fashion world. It is therefore important to take the most representative styles for this study. Here, only the basic and traditional styles are included in the research. They are the large round neck, normal round neck and turtle neckline styles shown in Figures 3.7, 3.8 and 3.9.

Figure 3.7 Image of large round neck neckline

Figure 3.8 Image of round neck neckline

Figure 3.9 Image of turtle neck neckline

As can be seen in the figures, the necklines were decorated with a series of stitching details to emphasis the style line of the garment.

The size of the image was adjusted so that it was appropriate to show the garment, hair and face together. The computer generated images cover from the head to the waist level and the number of pixels remained unchanged to fit for the display using E-prime program for visual assessment.

3.5 Visual assessment procedure

3.5.1 Phase I: Visual assessment of attractiveness of nude faces

This was the first experiment. The purpose was to find out the relationship between ratios of the face and the perception of facial attractiveness.

Totally 432 images were generated and used for this experiment. They are shown in Appendix A. They composed of 1 'Original Face', 126 facial images created by the 9 approaches, and 304 facial images with varying mouth width, eye fissure width, nose width and lip height and 1 face with putative optimum ratios. The facial images were divided into nine groups: each group consisting of the ‘Original Face’. So in group1, it had 63 sets of stimuli, in group 2 to 9 have 47 sets of stimuli and 1 golden ratio facial images.

By using the E-prime commercial psychology research software tool, the stimulus was presented in a random order to the viewer and the responses of the viewer were captured.

The viewers were asked to make a judgment within 4 seconds. And between each stimulus, it had 2ms for fixation which was intended to reduce the memory effect. Before the formal experiment, the viewers had to go through a training process as illustrated by the diagram shown in Figure 3.10. The procedure for rating the facial images in the formal experiment is shown Figure 3.11.

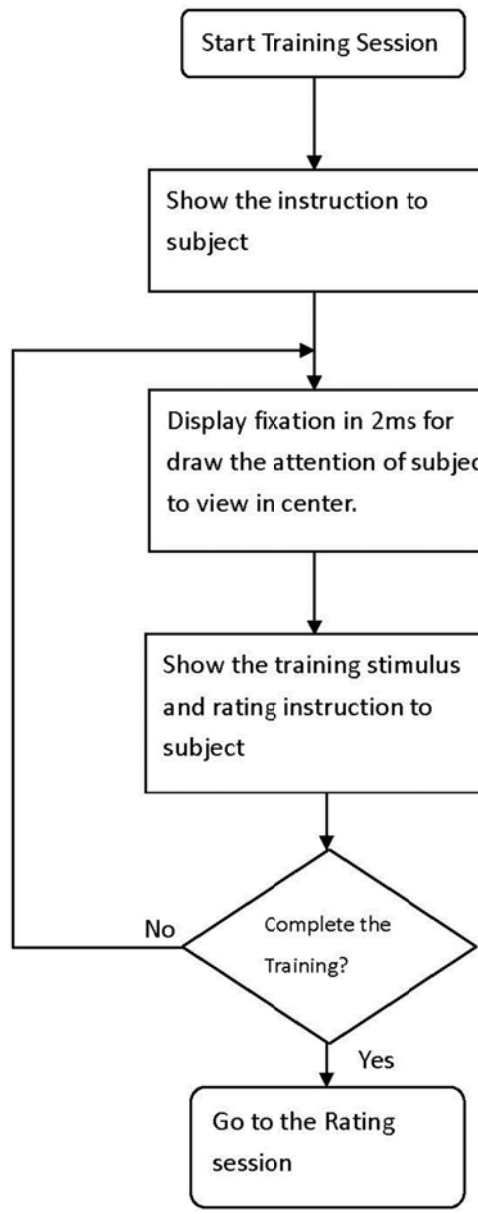


Figure 3.10 Phase I training procedure using E-Prime

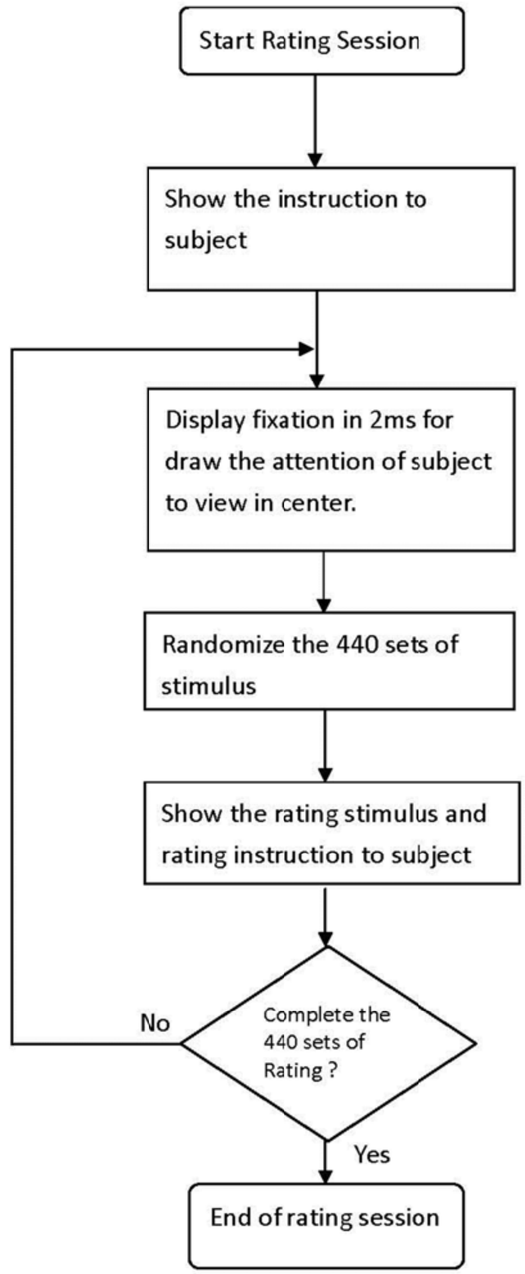


Figure 3.11 Phase I rating procedure using E-Prime

After the fixation, the viewers were asked to rate the facial images in terms of attractiveness in a nine point of scale (1 being least attractive and 9 being the most attractive). The sequence is shown in Figure 3.11. The details of the E-prime software are attached in Appendix C.

There wear 15 male and 15 female viewers to rate the attractiveness. They were university students aged between 20 to 30.

3.5.2 Phase II: Visual assessment of attractiveness of faces with hair and neckline

This experiment was used to find out the effect of hair and neckline on facial attractiveness. In this experiment, three different hairstyles and three different neckline shapes were added onto each of the 440 facial stimulus used in Phase I of the study.

Based on the 440 nude facial images, 3960 facial images with three types of hairstyles and three types of necklines were generated by the computer software. With so many images for rating, it would be was long to view and rate them in one go. The images were therefore split into several groups so that the duration of viewing and rating was not longer than an hour. Based on preliminary experiment, around 400 stimuli could be viewed and rated within an hour. So, 3960 stimulus were split into 9 groups and each session had 440 randomly selected images from total 3960 images. The training procedure was the same as that for Phase I. to obtain the ratings for the entire 3690 stimulus; the rating procedure was modified, as shown in Figure 3.13. For the facial images, please refer to Appendix B.

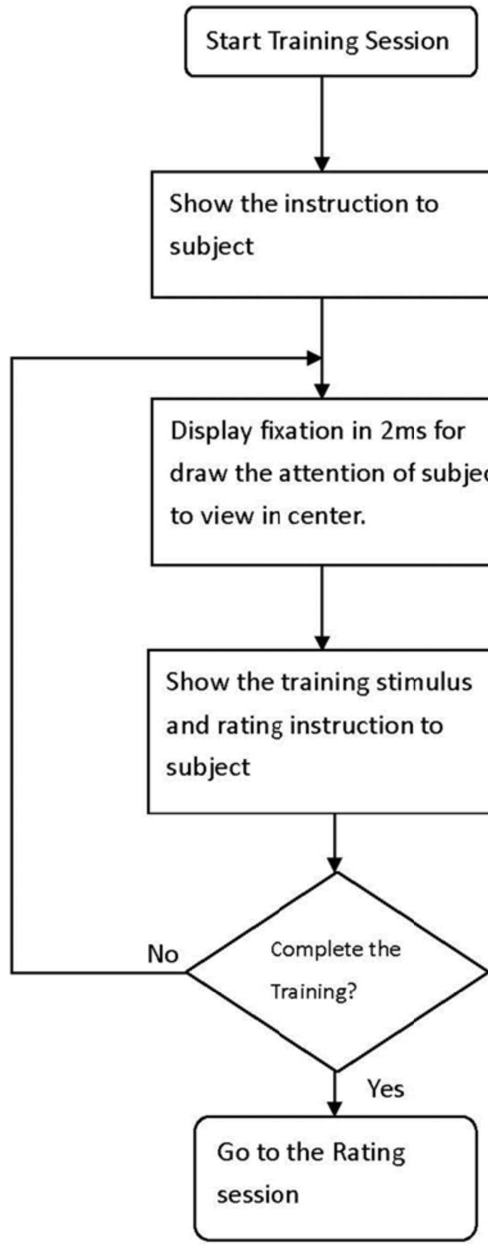


Figure 3.12 Phase II training procedure using E-Prime

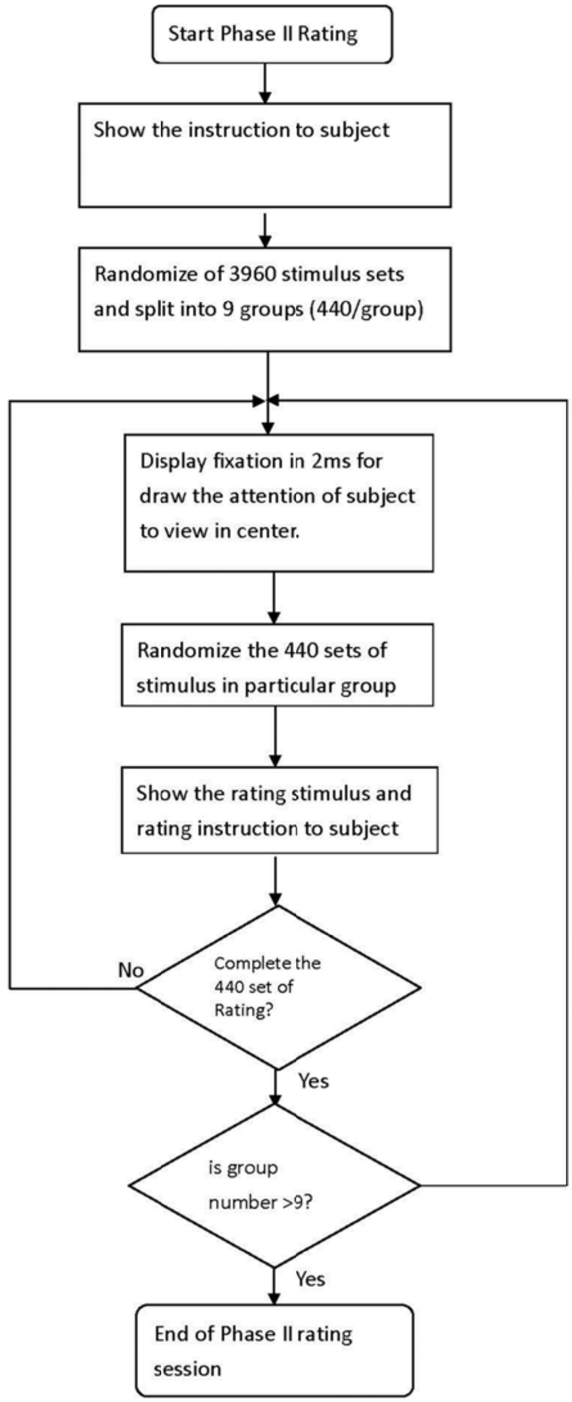


Figure 3.13 Phase II rating procedure using E-Prime

The computer generated images were presented to each viewer individually. The computer resolution was 1920x1080 pixels and 72 dpi. By using the E-PRIME, the displayed images were controlled to 1024 x 768 dpi.

The E-Prime program captured the rating response of each image from the viewer’s inputs in the 1 to 9 scale through the keyboard.

The viewers were requested to complete 9 sessions of the experiment. Each session had 440 images. There was a small break between each session. The duration of the whole test was around 4 hours.

After the experiment, 9 data files were collected. These 9 files were merged together by E-merge, which is a program within the E-prime. The data was finally exported to excel and SPSS for analysis. The 9 programs in E-prime are listed in Appendix C.

15 male and 15 female Chinese viewers were recruited. They are student at The Hong Kong Polytechnic University, studying in different departments and faculties. Their ages were between 21 to 30 with a mean age of 24 and SD of 4.59).

3.6 Reliability of experimental Data

Reliability test is a measure of consistency in measurement of data. The reliability of the raw data from the Phase I and II visual assessments were examined using the Cronbach's Alpha coefficient [DeVellis, 2003]. Cronbach's Alpha coefficient normally ranges between 0 and 1. A coefficient over 0.7 indicates acceptable the reliability and below 0.5 shows unacceptable the reliability. For the coefficient between 0.5 and 0.7 is a questionable area. The higher value of coefficient indicated good internal consistency.

3.6.1 Reliability test in Phase I Nude head visual assessment of facial beauty

The reliability test of the visual assessments of the facial images generated using the nine approaches defined in Chapter 3.4 was examined using calculating the Cronbach alpha coefficients using SPSS. The reliability of the facial images created by each approach is listed in Table 3.3.

Table 3.3 Reliability test on the experimental data from Phase I assessment.

Approach	Reliability (Cronbach alpha coefficient)
1	0.972
2	0.953
3	0.957
4	0.964
5	0.945
6	0.954
7	0.945
8	0.964
9	0.959

From the results shown in Table 3.3, the data of each group of facial stimulus had good internal consistency, with the alpha coefficient of each group well over 0.7, which is the conventional threshold.

3.6.2 Reliability test of experimental data from Phase II Visual assessment of images with varying hairstyle and necklines

The Cronbach alpha coefficients for each group of faces with three types of hairstyles and three types of necklines are listed in Table 3.4.

Table 3.4: Reliability of experimental data from Phase II assessment.

Approach	Long hair			Medium hair			Short hair		
	LRN	RN	TN	LRN	RN	TN	LRN	RN	TN
1	0.966	0.976	0.970	0.967	0.970	0.970	0.975	0.977	0.975
2	0.970	0.968	0.970	0.955	0.957	0.965	0.975	0.971	0.973
3	0.996	0.962	0.972	0.961	0.967	0.965	0.971	0.969	0.969
4	0.970	0.965	0.968	0.969	0.969	0.970	0.970	0.970	0.964
5	0.967	0.967	0.969	0.964	0.956	0.962	0.974	0.976	0.973
6	0.961	0.962	0.964	0.955	0.953	0.962	0.970	0.970	0.967
7	0.960	0.965	0.958	0.958	0.952	0.957	0.972	0.972	0.967
8	0.960	0.962	0.965	0.953	0.960	0.953	0.968	0.968	0.955
9	0.966	0.971	0.973	0.957	0.962	0.968	0.971	0.971	0.972

Note: LRN: Large round neck,
RN: Round neck,
TN: Turtle neck.

From the reliability test conducted using SPSS, the data of each stimulus had a good internal consistency. The data were therefore fit for further analysis.

3.6.3 Statistical methods for analyzing the effect of facial ratios, hairstyles and necklines

Since different facial ratios may be interrelated, principal components analysis was used to extract the major components which have strong contribution towards facial attractiveness. After that, a nonlinear regression model was formed to bridge the relationship between the principal components and the attractiveness rating.

To analysis the data from phase II assessment experiment on the effect of hairstyles and necklines. MANOVA analysis was applied. This analysis was able to detect the desired and undesired combinations of hairstyle and necklines in terms of facial attractiveness.

The effect of gender in the assessment of facial attractiveness was also analyzed using multivariate analysis of variance by treating the gender as a categorical independent variable.

CHAPTER 4

Effect of facial ratios on the attractiveness of nude faces

4.1 Characteristics of facial images using in the study

The facial stimuli with varying facial ratios were created by altering the 'Original Face' using nine approaches described in Chapter 3. The deformation of the facial image created by each of the 9 approaches is summarized in Table 4.1. The effects of each of nine approaches on the change of facial attractiveness are plotted in Figure 4.1.

Table 4.1 Summary of facial deformation created by the nine approaches

Approach	Deformation area
1	Reduce the head wide and length
2	Reduce the head width
3	Increase the head width
4	Reduce the head length
5	Increase the head width and length
6	Reduce the nose length
7	Increase the nose length
8	Increase the eyes interocular distance
9	decrease the eyes interocular distance

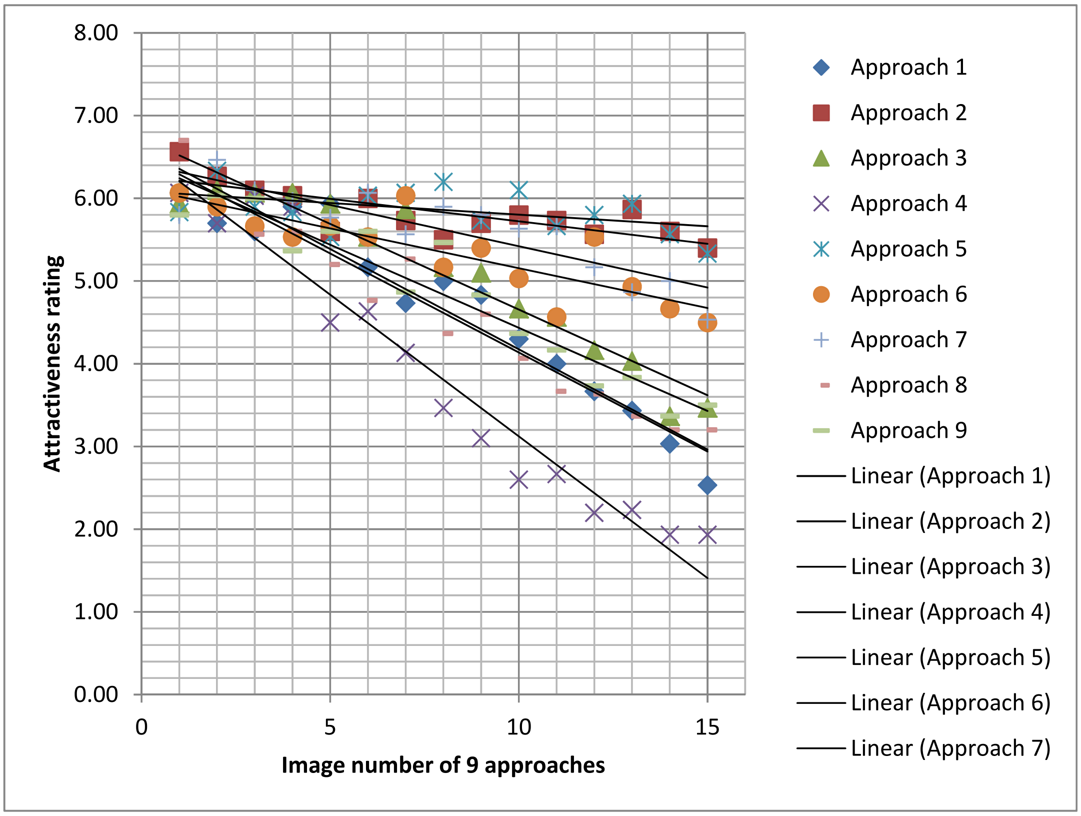


Figure 4.1: Changes of attractiveness rating due to alteration by nine approaches

In order to investigate the effects of facial ratios on facial attractiveness, it is important that the facial ratios of the sample images have a wide variation. Table 4.2 lists the mean values, standard deviations, minimum values and maximum values of the 21 ratios for the 432 sample images. It shows that the ratios had 21% to 123% variation over the mean and cover the golden ratios or neoclassical canons.

Table 4.2 Ranges of the facial ratios of the sample images

Ratios	Min	Max	Mean	Std	Variation over mean
1	1.026	2.43	1.48	0.242	94.9%
2	1.236	2.108	1.701	0.222	51.3%
3	1.364	2.395	1.691	0.214	61.0%
4	1.368	2.75	1.955	0.269	70.7%
5	0.809	2.329	1.279	0.23	118.8%
6	0.796	2.114	1.247	0.212	105.7%
7	0.907	1.892	1.434	0.201	68.7%
8	0.717	2.571	1.505	0.398	123.2%
9	1.112	3.253	2.048	0.329	104.5%
10	0.843	1.900	1.281	0.233	82.5%
11	1.307	2.404	1.771	0.272	61.9%
12	0.789	2.000	1.181	0.199	102.5%
13	0.624	1.289	0.844	0.105	78.8%
14	1.291	1.659	1.577	0.081	23.3%
15	1.392	1.719	1.557	0.058	21.0%
16	1.008	2.509	1.487	0.245	100.9%
17	1.095	1.981	1.469	0.213	60.3%
18	0.67	1.000	0.801	0.062	41.2%
19	0.825	1.022	0.915	0.04	21.5%
20	0.571	2.015	1.177	0.231	122.7%
21	0.83	1.461	1.112	0.148	56.7%

4.2 Sampling Accuracy for Factorial Analysis

To verify the adequacy of the sample for factor analysis, the Kaiser-Meyer-Olkin Measure of Sampling Adequacy was calculated and KMO and Bartlett test was carried out. The results are listed in Table 4.3.

The possibility that the data was not adequate was less than 0.01. The KMO measures the sampling adequacy which should be greater than 0.5, the data gave an satisfactory factor analysis. The Bartlett's test measures the strength of the relationship among of variables. The observed significance level is 0.000, which concluded that the strength of the relationship among the variables is strong and fit for the factor analysis.

Table 4.3: KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.687
Bartlett's Test of Sphericity	Approx. Chi-Square	27620.073
	Df	210
	Sig.	.000

4.3 Principal Component Analysis (PCA)

In Chapter 3.22, 21 set of ratios were defined. These ratios may be interrelated. By using principal component analysis (PCA), independent principal components can be extracted and underlying structure among the variables in the analysis can be defined [Hair, 2010].

The ratios were first normalized and then analyzed by PCA using SPSS. As shown in the scree plot, under the minimum fraction variance of 0.05 (or 5%), four principal components with the eigenvalue greater than 1(see Figure 4.2) was identified, which accounts for a cumulative variance of about 90%.

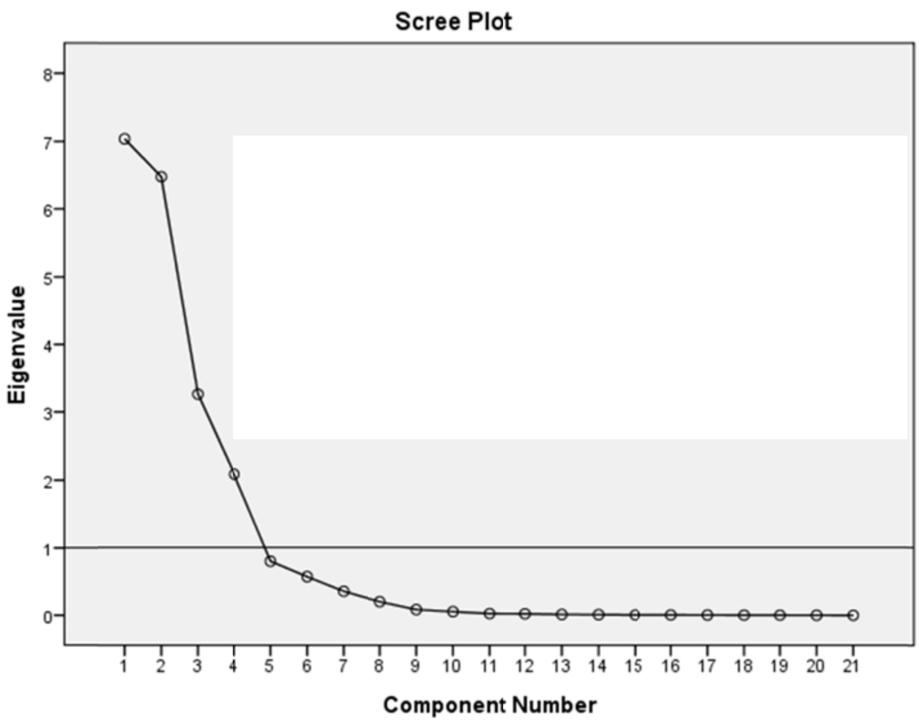


Figure 4.2 Scree plot

Table 4.4 lists the variance explained by each of these four components as well as the accumulative variance.

Table 4.4: Total variance explained from PCA

Component	Initial Eigenvalues		
	Total	% of Variance	Cumulative %
1	7.034	33.494	33.494
2	6.474	30.827	64.321
3	3.262	15.535	79.856
4	2.083	9.917	89.772
5	.798	3.802	93.574
6	.570	2.715	96.289
7	.355	1.688	97.977
8	.201	.957	98.934
9	.084	.402	99.336
10	.053	.253	99.589
11	.025	.119	99.708
12	.022	.104	99.812
13	.012	.057	99.869
14	.009	.042	99.911
15	.006	.027	99.938
16	.005	.021	99.960
17	.004	.018	99.978
18	.002	.010	99.988
19	.002	.008	99.996
20	.001	.003	99.999
21	.000	.001	100.000

Extraction Method: Principal Component Analysis.

Table 4.5 lists the transformation matrix between the four components and the 21 ratios. This matrix was used for the regression analysis.

Table 4.5 Transformation matrix

Ratios	Component			
	1	2	3	4
1	-0.254	-0.269	0.085	-0.033
2	0.262	-0.270	-0.031	-0.086
3	-0.255	-0.275	0.041	0.077
4	0.306	-0.196	-0.085	0.024
5	-0.232	-0.262	0.048	0.085
6	-0.239	-0.268	0.099	-0.141
7	0.249	-0.261	-0.009	-0.212
8	0.246	0.276	-0.027	-0.078
9	0.228	0.254	-0.008	-0.010
10	-0.041	0.357	0.046	-0.076
11	-0.253	0.219	0.096	0.037
12	-0.195	-0.193	-0.302	-0.075
13	-0.026	0.002	-0.448	-0.263
14	0.003	-0.031	0.141	-0.605
15	0.032	0.024	0.280	0.537
16	-0.250	0.202	-0.253	-0.167
17	0.218	-0.266	-0.062	0.066
18	-0.063	0.025	-0.502	0.184
19	-0.057	0.028	-0.484	0.280
20	0.367	0.040	-0.078	-0.034
21	0.256	-0.252	-0.087	0.157

4.4 Estimate the factor matrix

In the table 4.6, the unrotated component analysis was calculated by SPSS. It showed the factor loadings between the variable and the principal components. The range of the factor loadings is from +1 to -1. Take r1 as an example, the factor loadings were -.674, 0.684, -0.154 and 0.048 for components 1, 2, 3 and 4, respectively. The factor loading for Component 1 and 2, -0.674 and 0.684, were almost equal, but in different signs. This makes unclear whether r1 mainly determines Component 1 or Component 2.

Table 4.6: Unrotated component analysis factor matrix

Variables	Component			
	1	2	3	4
r1:Ear length to interocular distance	-.674	.684	-.154	.048
r2:Ear length to nose width	.694	.686	.056	.125
r3:Mideye distance to interocular distance	-.676	.701	-.074	-.111
r4:Mideye distance to nose width	.813	.500	.153	-.035
r5:Mouth width to interocular distance	-.614	.667	-.086	-.122
r6:Lips-chin distance to interocular distance	-.633	.682	-.178	.203
r7:Lips-chin distance to nose with	.661	.663	.016	.306
r8:Interocular distance to eye fissure width	.653	-.702	.048	.113
r9:Interocular distance to lip height	.604	-.645	.015	.015
r10:Nose width to eye fissure width	-.109	-.907	-.083	.110
r11:Nose width to lip height	-.671	-.556	-.174	-.054
r12:Eye fissure width to nose-mouth distance	-.517	.491	.546	.109
r13:Lip height to nose-mouth distance	-.068	-.006	.808	.380
r14:Length of face to width of face	.008	.080	-.255	.873
r15:Nose-chin distance to lips-chin distance	.084	-.062	-.506	-.774
r16:Nose width to nose-mouth distance	-.662	-.513	.458	.242
r17:Mouth width to nose width	.577	.677	.112	-.095
r18:Nose length to nose-chin distance	-.167	-.064	.907	-.265
r19:Nose length to ear length	-.152	-.072	.875	-.405
r20:Interocular distance to nose width	.973	-.101	.141	.049

r21:Width of face to 4 times of nose with	.680	.641	.157	-.227

4.5 Factor rotation

In order to minimize the cross-loading of the variables on the principal components so as to clarify the relationship between the principal components and the variables (i.e. facial ratio), the factor matrix was rotated by Varimax with Kaiser Normalization Rotation Method. Table 4.7 lists factor matrix after rotation. After rotation, each variable is now predominantly related to one principal component and more clearly.

Table 4.7 Rotated component analysis factor matrix
- Full set of variable

	Component			
	1	2	3	4
r1:Ear length to interocular distance	-.031	.967	-.100	.044
r2:Ear length to nose width	.973	.013	-.115	.111
r3:Mideye distance to interocular distance	-.007	.980	.040	-.065
r4:Mideye distance to nose width	.944	-.206	.033	-.005
r5:Mouth width to interocular distance	.013	.915	.027	-.085
r6:Lips-chin distance to interocular distance	-.009	.934	-.194	.170
r7:Lips-chin distance to nose with	.924	.015	-.223	.258
r8:Interocular distance to eye fissure width	-.014	-.962	-.061	.056
r9:Interocular distance to lip height	-.010	-.882	-.044	-.041
r10:Nose width to eye fissure width	-.715	-.579	-.075	.043
r11:Nose width to lip height	-.882	.073	-.029	-.095
r12:Eye fissure width to nose-mouth distance	.029	.660	.487	.382
r13:Lip height to nose-mouth distance	.031	-.039	.566	.692
r14:Length of face to width of face	.010	.041	-.609	.679
r15:Nose-chin distance to lips-chin distance	-.022	-.032	-.126	-.922
r16:Nose width to nose-mouth distance	-.780	.035	.405	.442
r17:Mouth width to nose width	.894	.089	.045	-.056
r18:Nose length to nose-chin distance	-.053	.003	.947	.158
r19:Nose length to ear length	-.047	-.005	.977	.018
r20:Interocular distance to nose width	.642	-.753	-.012	.035
r21:Width of face to 4 times of nose with	.952	-.006	.131	-.164

Table 4.8 Reduced set of variable: rotated component analysis factor matrix sort by component and factor loading

	Component			
	1	2	3	4
r2:Ear length to nose width	.973			
r21:Width of face to 4 times of nose with	.952			
r4:Mideye distance to nose width	.944			
r7:Lips-chin distance to nose with	.924			
r17:Mouth width to nose width	.894			
r11:Nose width to lip height	-.882			
r3:Mideye distance to interocular distance		.980		
r1:Ear length to interocular distance		.967		
r8:Interocular distance to eye fissure width		-.962		
r6:Lips-chin distance to interocular distance		.934		
r5:Mouth width to interocular distance		.915		
r9:Interocular distance to lip height		-.882		
r19:Nose length to ear length			.977	
r18:Nose length to nose-chin distance			.947	
r15:Nose-chin distance to lips-chin distance				-.922
r16:Nose width to nose-mouth distance	-.780		.405	.442
r10:Nose width to eye fissure width	-.715	-.579		
r20:Interocular distance to nose width	.642	-.753		
r13:Lip height to nose-mouth distance			.566	.692
r14:Length of face to width of face			-.609	.679
r12:Eye fissure width to nose-mouth distance		.660	.487	

Factor loading less than 0.40 have not been printed and variables have been sorted by loadings on factor.

Table 4.9 Reduced set of variable: rotated component analysis factor matrix sort by component and factor loading

	Component			
	1	2	3	4
r2:Ear length to nose width	.973			
r21:Width of face to 4 times of nose with	.952			
r4:Mideye distance to nose width	.944			
r7:Lips-chin distance to nose with	.924			
r17:Mouth width to nose width	.894			
r11:Nose width to lip height	-.882			
r3:Mideye distance to interocular distance		.980		
r1:Ear length to interocular distance		.967		
r8:Interocular distance to eye fissure width		-.962		
r6:Lips-chin distance to interocular distance		.934		
r5:Mouth width to interocular distance		.915		
r9:Interocular distance to lip height		-.882		
r19:Nose length to ear length			.977	
r18:Nose length to nose-chin distance			.947	
r15:Nose-chin distance to lips-chin distance				-.922

Factor loading less than 0.40 have not been printed and variables have been sorted by loadings on factor.

Table 4.10 Change of variance after the deletion of cross-link variable

	Component				Total
	1	2	3	4	
21 sets of ratio	34.22%	35.43%	13.25%	6.87%	89.77%
15 sets of ratio	34.72%	36.03%	13.99%	7.64%	92.38%
change	0.51%	0.60%	0.73%	0.77%	2.61%

In Table 4.8, r16, r10, r20, r13, r14 and r12 had substantial cross-loadings on components 1, 2, 3 and 4. After delete r16, r10, r20, r13, r14 and r12 from the analysis, the four components do not have significant change to the component analysis. In Table 4.10, all the components had less than 1% of change and the overall difference was only 2.6%. The number of components and the number of ratios in the each component remained unchanged. After the rotation of the matrix and the elimination of weak loadings, the physical meanings of the components become clearer.

Component 1 is determined by 6 variables, viz, r2, r21, r4, r7, r17 and r11. Component 2 is determined by other 6 variables, viz. r3, r1, r8, r6, r5 and r9. Component 3 are mainly related to two variables r19 and r18 and Component 4 is related to r5.

4.6 Physical meaning of components

4.6.1 Component 1

This component was mainly determined by 6 facial ratio, r2:Ear length to nose width, r21:Width of face to 4 times of nose with, r4:Mideye distance to nose width, r7:Lips-chin distance to nose with, r17:Mouth width to nose width and r11:Nose width to lip height which are related to the facial measurements shown in Figure 4.3. The ratios of r2, r21, r4, r7 and r11 are highly related to nose width and the ratios of r21 and r4 were related to interocular distance.

Therefore, Component 1 was mainly related to the nose width and the interocular distance.

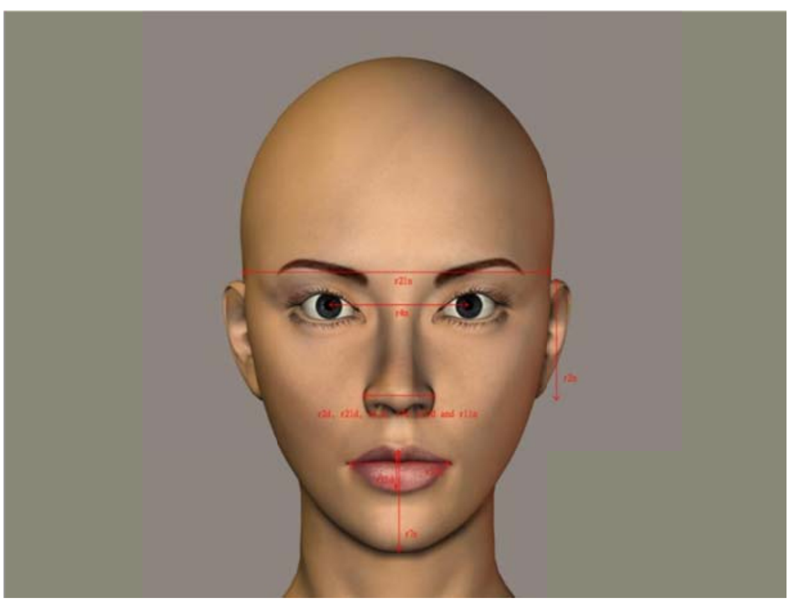


Figure 4.3 Facial measurement related to Component 1

4.6.2 Component 2

This component was determined by 6 ratios. These ratios are r3:Mideye distance to interocular distance, r1:Ear length to interocular distance, r8:Interocular distance to eye fissure width, r6:Lips-chin distance to interocular distance, r5:Mouth width to interocular distance and r9:Interocular distance to lip height which are related to the facial measurements shown in Figure 4.4.

The ratios of r3 related to the nose width and the ratios r8, r3, r1 and r6 were related to eyes size and position.

Component 2 was therefore mainly related to the ratio of nose width over the eye size.

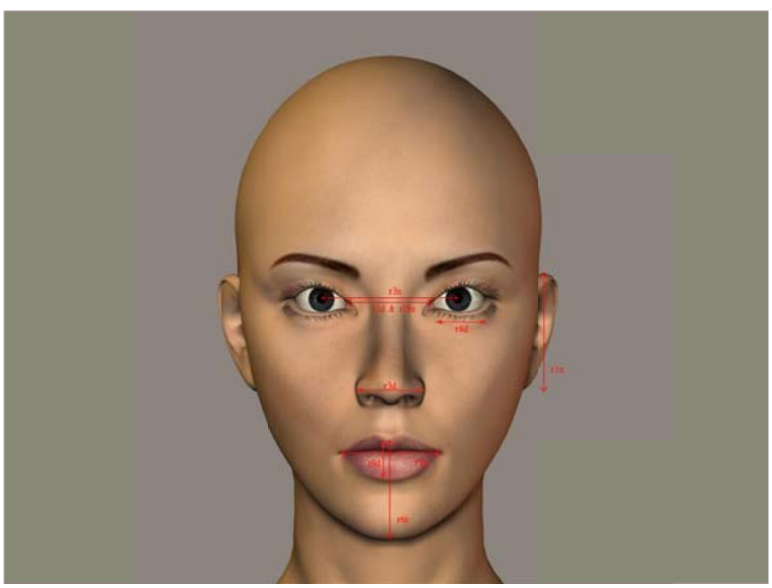


Figure 4.4 Facial measurement related to Component 2

4.6.3 Component 3

This component was determined by 2 facial ratios, viz r19:Nose length to ear length and r18:Nose length to nose-chin distance, which are related to the facial measurements shown in Figure 4.5. The ratios r18 and r19 were related to nose length and the ratio was related to nose to mouth distance.

Therefore, Component 3 was mainly related to the nose length and nose to mouth distance.

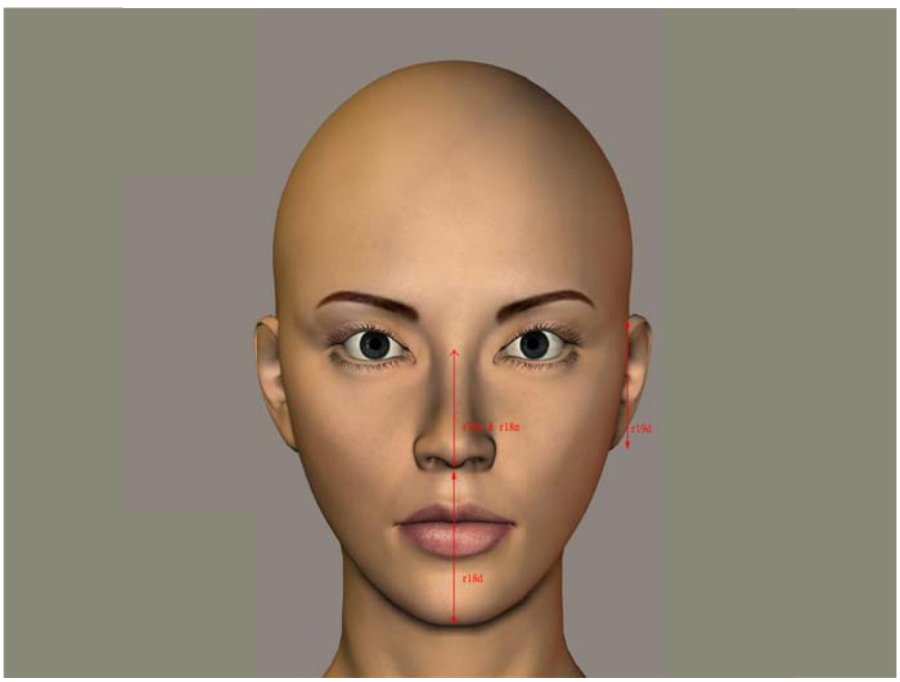


Figure 4.5 Facial measurement related to Component 3

4.6.4 Component 4

This component was mainly related r15: Nose-chin distance to lips-chin distance, which was determined by the facial measurement shown in Figure 4.6.

The component 4 was mainly related to the nose to chin distance to lip-chin distance.

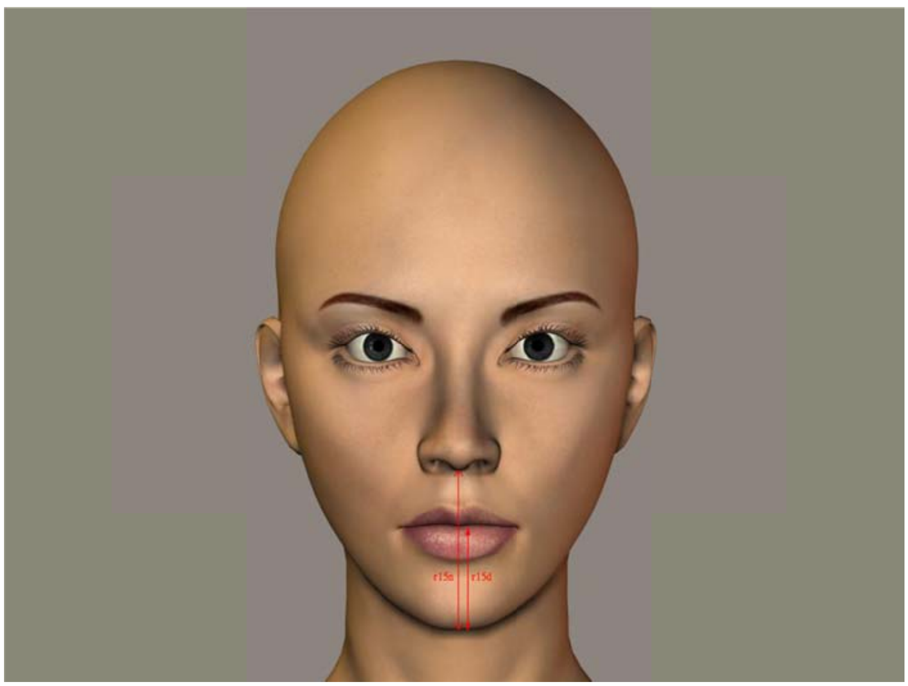


Figure 4.6 Facial measurement related to Component 4

4.7 Relationship between principal components and attractiveness ratings for nude faces

Each of the four principal components is plotted against the attractiveness ratings in Figures 4.6 to 4.9. From these 4 figures, there is generally an optimum value for each of the four components, which makes the highest level in facial attractiveness. The deviation from the optimum value of each of the four components will result in a reduction in facial attractiveness, but the trend of reduction is not symmetrical at both sides of the optimum value.

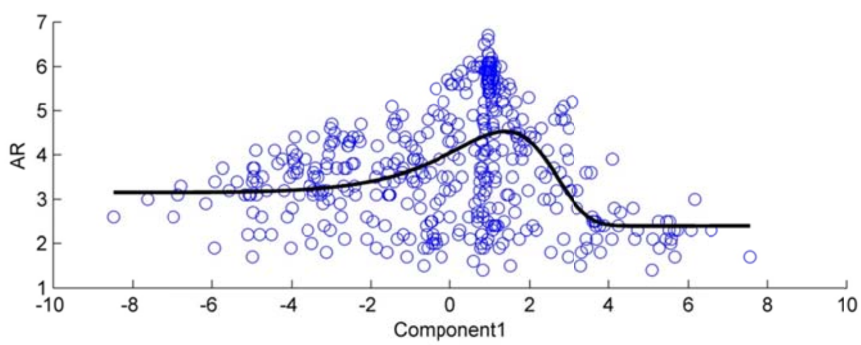


Figure 4.7 Component 1

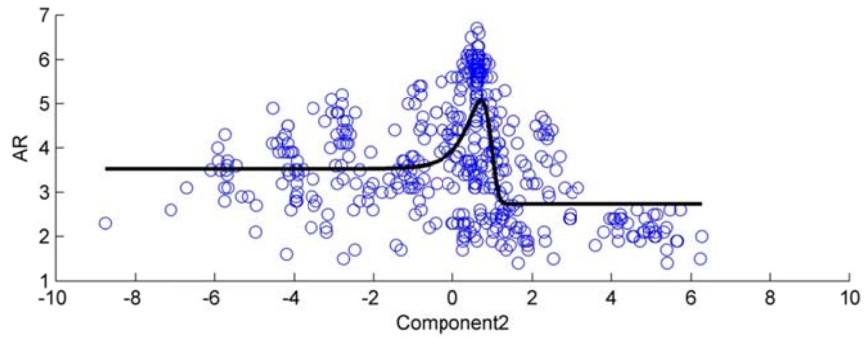


Figure 4.8 Component 2

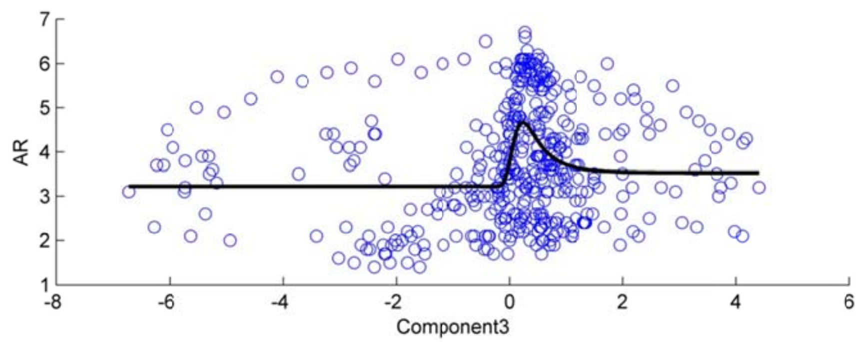


Figure 4.9 Component 3

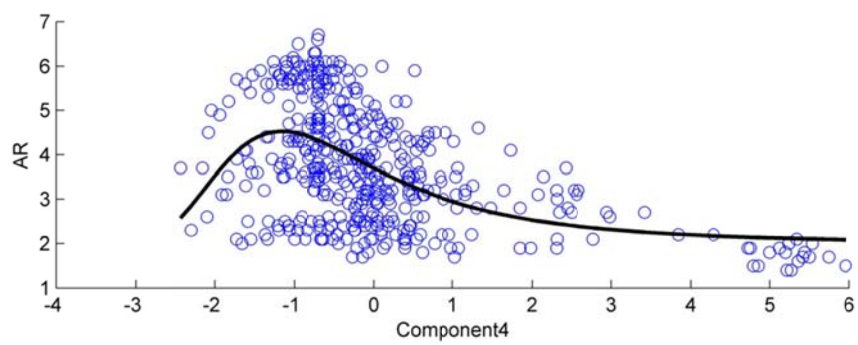


Figure 4.10 Component 4

4.8 New model for the attractiveness of nude faces

The effect of each of the four components on the attractiveness ratings is therefore in a distorted bell shape. To capture the main trend, the following transformed Gauss formula was applied to fit the data plotted in Figures 4.6 to 4.9:

$$AR_i(x_i) = \frac{a_i}{\sigma_i\sqrt{2\pi}}\exp\left(-\frac{x_i^{*2}}{2\sigma_i^{2}}\right) + c_i, \qquad \text{(i=1, 2, 3, 4)} \qquad (1)$$

where x_i^* is the transformed value of each of the four components applying the Box-Cox transformation function, viz.

$$x_i^* = \begin{cases} \frac{(x')^{r_i} - 1}{r_i} & r_i \neq 0 \\ \ln(x') & r_i = 0 \end{cases} \qquad (2)$$

where x' is converted from the original value of each of the four components through

$$x_i' = \frac{x_i - x_m}{u_i - x_m} \qquad (3)$$

x_m is an arbitrary value which is chosen to ensure that the value of the independent variable of the Box-Cox function (x') is positive, and u_i is a value to be determined by the nonlinear regression. By the nature of the above formulae, when x_i is equal to u_i, the $AR_i(x_i)$ is at its maximum. Therefore u_i is the optimum value of ith component resulting in the maximum facial attractiveness.

By applying nonlinear regression, the values of a_i, c_i, u_i, σ_i and r_i are determined and they are listed in Table 4.11.

Table 4.11 Parameters obtained from nonlinear regression for each component

Component (i)	a_i	r_i	σ_i	c_i	u_i
1	0.68959	5.4094	0.12881	2.3933	1.3804
2	0.17894	22.317	0.030573	2.7365	0.7103
3	0.082028	-25.075	0.022657	3.219	0.2397
4	0.76185	-2.9297	0.1175	1.9371	-1.1598

By assuming that the overall facial attractiveness is the linear combination of the contributions of each of the four components, we have the following equation:

$$AR = b_0 + b_1 AR_1(x_1) + b_2 AR_2(x_2) + b_3 AR_3(x_3) + b_4 AR_4(x_4) \qquad (4)$$

The coefficients in Eq. (4), viz. b0, b1, b2, b3, and b4, can be obtained by multiple linear regressions. In this study, the multiple linear regressions was carried out based on the least-squares model, i.e. the best-fitting line for the observed data is calculated by minimizing the sum of the squares of the vertical deviations from each data point to the line. We obtained b0=-4.89, b1=0.73, b2=0.67, b3=0.19, and b4=0.69.

Figure 4.11 plots the mean attractiveness ratings of the 440 facial images against the predicted attractiveness rating from the four principal components (derived from the 21 facial ratios) using the regression Equations (1) and (4).

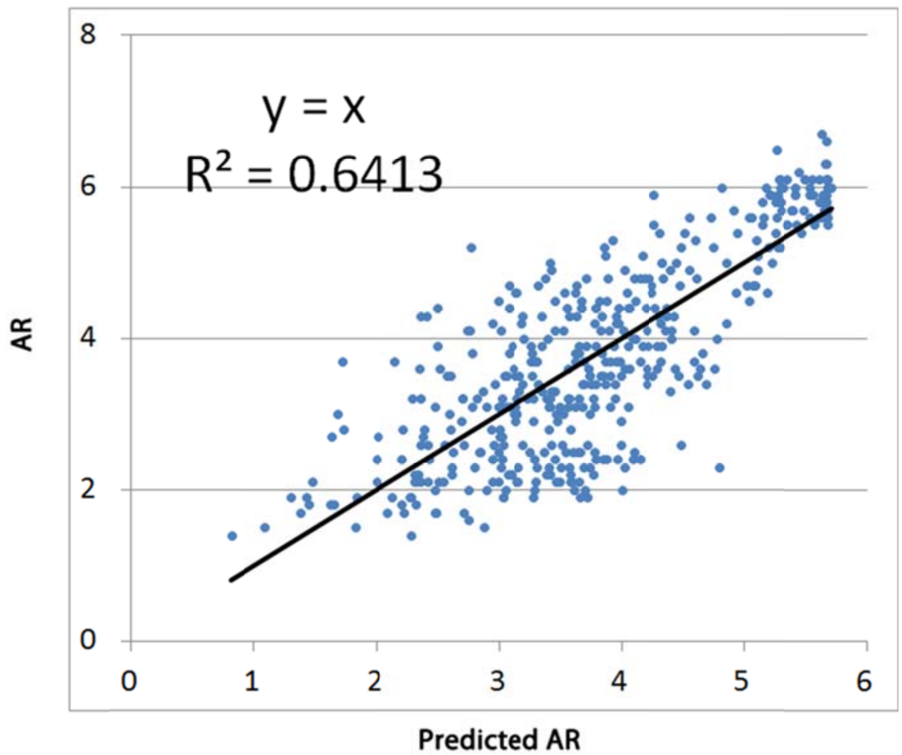


Figure 4.11 Visually assessed mean attractiveness ratings (AR) vs. the predicted attractiveness ratings (Predicted AR)

As can be seen there is a strong one to one linear relationship between the visually assessed mean attractiveness ratings and the predicted attractiveness ratings. The percentage of fit of the model, R2, is 0.6413. The percentage of fit of our model with just four independent predictor variables is significantly improved over that of the model of Schmid et al. [2008], which had a percentage of fit (R2) of 0.1923 requiring 16 predictor variables.

4.9 Verification of prediction model

In order to examine whether the established model has mapped the general trends of the effects of facial proportions on the facial attractiveness, instead of memorizing the data, it is necessary to test the model against the samples not included in building the model.

We hence generated additional 113 facial images with randomly chosen facial dimensions using the same software and procedures as those for the previous 440 facial images. The attractiveness ratings of these 113 facial images were rated by other 15 male and 15 female viewers, who were aged between 20 to 30 years. Before rating, the viewers were first trained by exposing them to a selection of facial images of varying attractiveness with known ratings rated previously. This ensures that the new group of viewers will have the equivalent scale of rating as the previous group who rated the attractiveness of the facial images used in building the prediction model. The standard deviation of the average attractiveness ratings ranged from 0.07 to 0.35.

Figure 4.10 plots the actual AR (attractiveness ratings) against the predicted AR using the model for the additional 113 facial images not used for building the model. It can be seen, there is a close to 1:1 relationship between the actual AR and predicted AR with a R2 (or percentage of fit) of 0.6463. This means that the model has effectively mapped the effects of facial proportions on the facial attractiveness for the facial images with dimensions and proportions varied from an average oriental face.

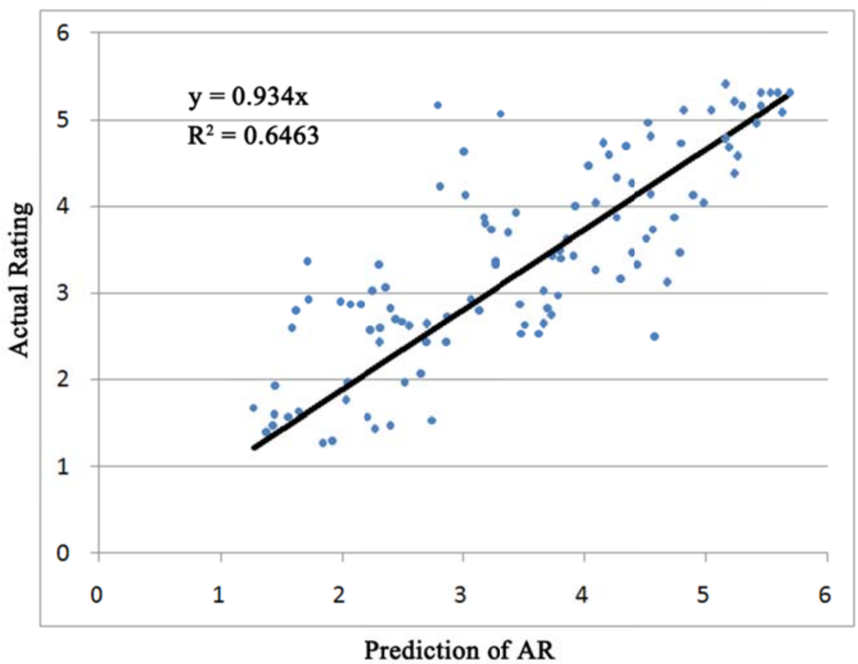


Figure 4.12 Actual AR (attractiveness ratings) against the predicted AR using the model for the additional 113 facial images not used for building the model.

4.10 Discussion

The prediction model enables us to find the optimum facial proportions for attractiveness. The principal component vector of the optimally attractive face is (1.3804, 0.7103, 0.2397, -1.1598) and the corresponding facial ratios for this optimum face is (r1, r2, r3,… r21) = (1.3631, 1.7595, 1.5565, 2.0182, 1.1425, 1.1763, 1.5151, 1.7522, 2.2138, 1.3496, 1.7127, 1.1039, 0.86206, 1.635, 1.5281, 1.4705, 1.4739, 0.77602, 0.89479, 1.3057, 1.1075). Figure 4.13 shows the facial image with the optimum ratios.

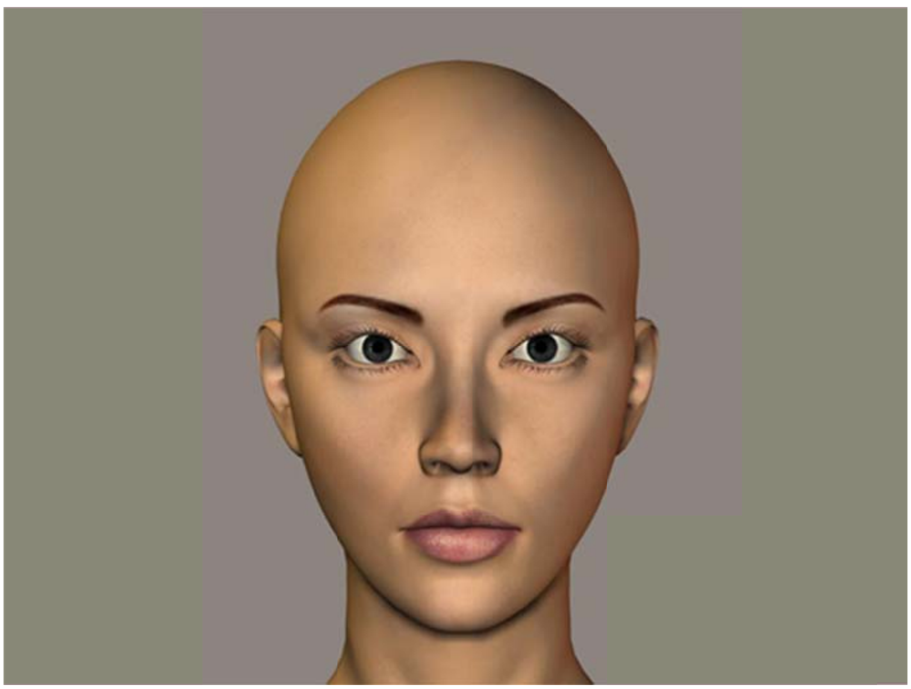


Figure 4.13 The facial image with the optimum ratios (AR=6.33).

The face with the optimum putative ratios (mostly at the Golden Ratio except for r18 to r21, i.e. the optimum ratios of which were believed to be the neoclassical canons of 1, and r6, r7, r12, r13, which cannot be set to the golden ratio when r16 is at the golden ratio) was only rated 2.6. Its image is shown in Figure 4.14. Clearly, the popular claim that faces are the most beautiful when the facial ratios are at the Golden Ratio cannot be established. In Meisner [2006], the facial images used to illustrate the golden ratios on faces have different expressions (The male face has a neutral expression, but the female face has a big smile). As the expression of the face alter the facial ratios or proportions, it is important to define the expression when considering the effects of facial proportions on facial attractiveness. In our present investigation, the facial images were all controlled at neutral.

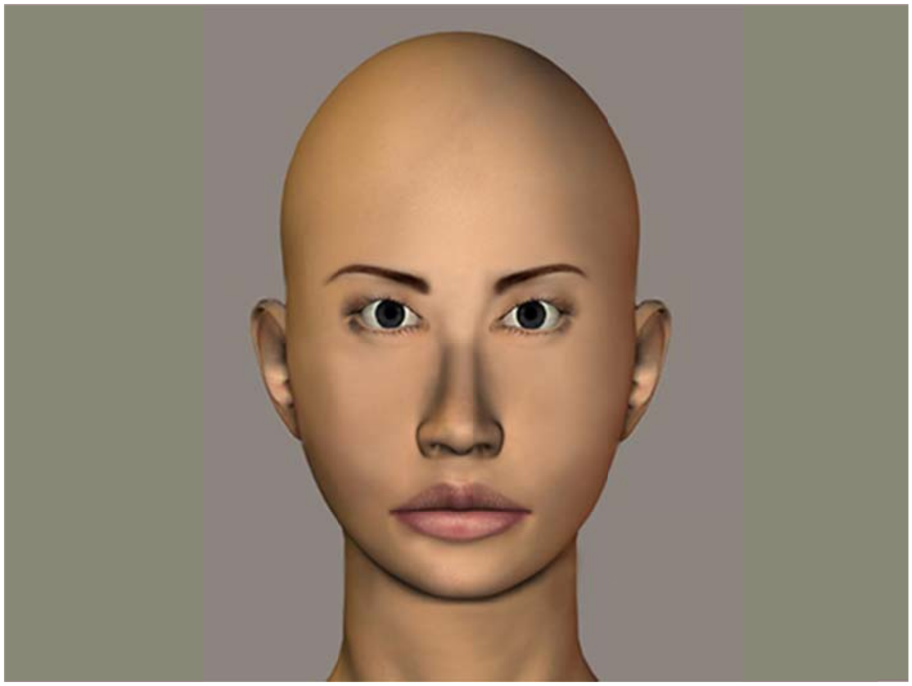


Figure 4.14 The face having neoclassical canons and most possible golden ratios

Marquardt Beauty Analysis' website [n.d.] claimed that beautiful faces conform to the Golden Facial Mask derived from Golden Decagon Matrices composed of complex relationship of the Golden ratio phi. Figure 4.15 shows the most attractive face found in our investigation covered by the proposed Golden Facial Mask. It can see that the attractive face generally conform to the Golden Facial Mask. However, it could not be statistically tested in the present investigation due to the difficulty in defining the facial landmarks to make measurements corresponding to the geometrical lines of the proposed Golden Facial Mask.

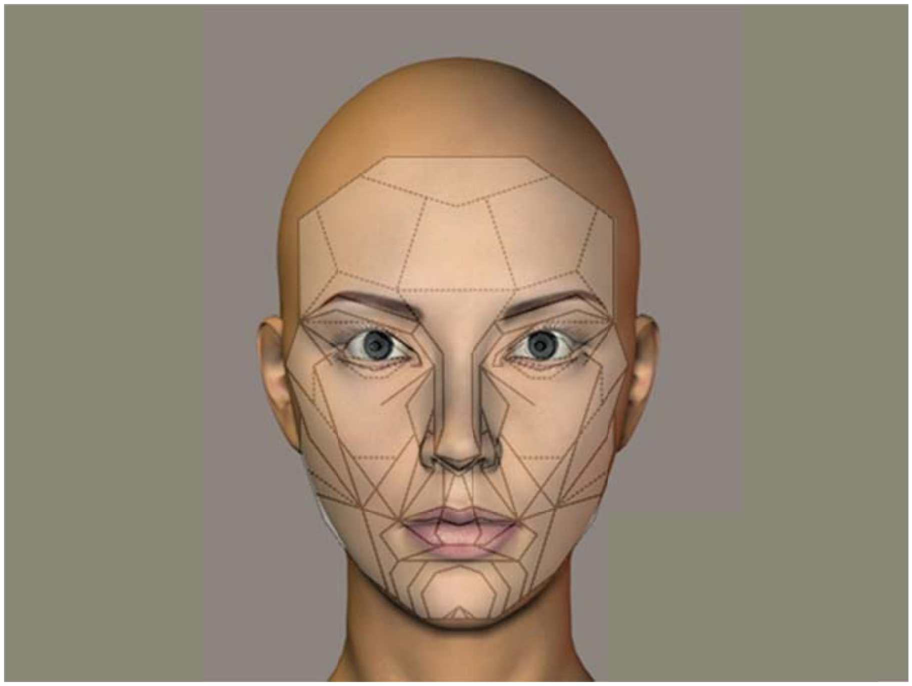


Figure 4.15 The most attractive face found in our investigation covered with the Golden Facial Mask of Marquardt Beauty Analysis [n.d.]

In the present study, the effects of facial proportions on facial attractiveness are investigated by using computer generated facial images. Computer generated facial images have the advantage of excluding the influence of hairstyle, facial expression as well as skin tone and texture.

However, the applicability of the findings and developed model to real faces should be tested in future work. Besides, the future work will face a big challenge on how to control and quantify the influence of facial proportion, hairstyle, facial expression, skin tone and texture.

CHAPTER 5

Effect of hairstyle and neckline on facial beauty

5.1 Introduction

Head hair is an essential part of the body and neckline are the basic characteristics of garment and personal style. As discussed in Chapter 2: Literature Review, the head hair and the neckline can affect facial beauty. Head hair can emphasize or camouflage the facial features in order to enhance the perception of beauty.

This chapter reports on the investigation on the effect of hairstyle and necklines on facial attractiveness. In this part of the work, facial images are more realistic as they are covered with hair and combined with dresses of specific necklines.

5.2 Set of stimulus and viewers

In this part of the work, the same facial images of nude faces for the study report in the previous chapter were used, but these facial images were added with three different types of the hairstyle and necklines. Therefore we had totally 440x3x3=3960 facial stimulus. The facial images may be divided in nine groups as listed in Table 5.1

In assessing the attractiveness of the facial images, 30 students of Hong Kong Polytechnic University were invited to view and rate the attractiveness in 1-to-9 scale. These 30 viewer included 15 female (Mean age=21.40, SD=1.55) and 15 male (Mean age=22.13, SD=0.99).

Table 5.1 Nine groups of stimulus

Group number	Hair description	Neckline description	Qty of stimulus
1	Long hair	Large round neck	440
2	Long hair	Round neck	440
3	Long hair	Turtle neck	440
4	Medium hair	Large round neck	440
5	Medium hair	Round neck	440
6	Medium hair	Turtle neck	440
7	Short hair	Large round neck	440
8	Short hair	Round neck	440
9	Short hair	Turtle neck	440

The stimuli were shown to the viewer in a random order. The ratings were captured by the E-PRIME for further analysis.

5.3 New ratio variables

In order to represent this two addition variables, 2 additional ratios were defined in each stimuli. The ratio number of 22 is the ratio of hair height over the hair width. The ratio number of 23 was the ratio of neckline height over the neckline width.

5.4 Factorial Analysis of new hair and neckline model

For the new model of hair and neckline, the ratio number was increased to 23. The Kaiser-Meyer-Olkin Measure of Sampling Adequacy was 0.662 and the Bartlett's test measures the strength of the relationship among of variables. The observed significance level is 0.000, which can concluded that the model is fit for factor analysis.

For the Principal Component analysis of the new hair and neckline model, five components with the eigenvalues greater than 1 was identified. The cumulative variance was about 90%. The scree Plot was shown in Figure 5.1.

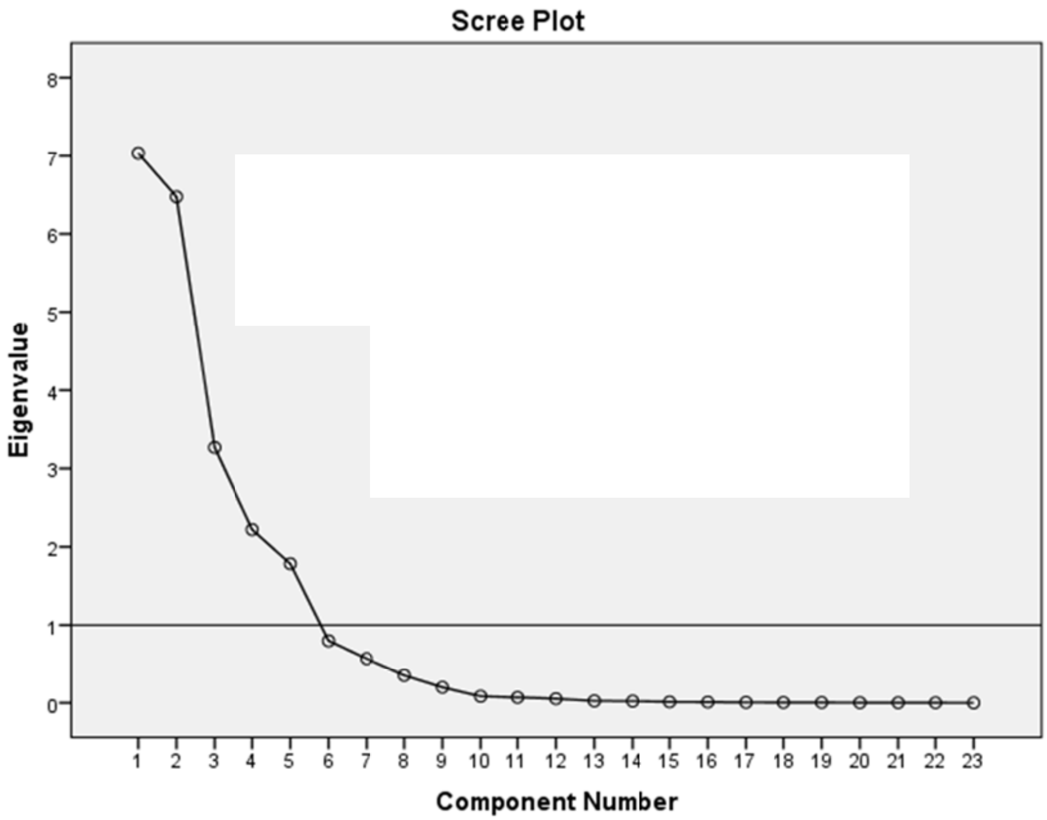


Figure 5.1: Scree plot of the new head and neckline model

Table 5.2: Rotated component analysis factor matrix

	Component				
	1	2	3	4	5
r1:Ear length to interocular distance	-.031	.967	-.100	.043	.008
r2:Ear length to nose width	.973	.013	-.113	.111	.011
r3:Mideye distance to interocular distance	-.007	.980	.039	-.066	.001
r4:Mideye distance to nose width	.944	-.206	.034	-.005	.003
r5:Mouth width to interocular distance	.013	.915	.026	-.086	.001
r6:Lips-chin distance to interocular distance	-.009	.934	-.193	.170	.013
r7:Lips-chin distance to nose with	.924	.015	-.221	.259	.017
r8:Interocular distance to eye fissure width	-.014	-.962	-.060	.058	.000
r9:Interocular distance to lip height	-.010	-.882	-.044	-.040	.008
r10:Nose width to eye fissure width	-.715	-.579	-.075	.044	-.001
r11:Nose width to lip height	-.882	.073	-.030	-.095	.007
r12:Eye fissure width to nose-mouth distance	.028	.661	.489	.378	.007
r13:Lip height to nose-mouth distance	.030	-.038	.570	.689	-.001
r14:Length of face to width of face	.011	.042	-.604	.681	.066
r15:Nose-chin distance to lips-chin distance	-.021	-.033	-.131	-.920	-.033
r16:Nose width to nose-mouth distance	-.781	.035	.406	.440	.005
r17:Mouth width to nose width	.894	.089	.046	-.056	.003
r18:Nose length to nose-chin distance	-.054	.003	.947	.154	-.021
r19:Nose length to ear length	-.048	-.005	.976	.013	-.031
r20:Interocular distance to nose width	.642	-.753	-.010	.036	.002
r21:Width of face to 4 times of nose with	.952	-.006	.131	-.164	-.016
r22:Hair ratio (H/W)	.004	.011	-.102	.109	.970
r23:Neckline ratio(H/W)	.000	-.003	.038	-.046	.980

Table 5.3 lists the factor matric after rotation. In this rotation format, each variable is predominately related to one principal component.

The ratio 10, 12, 13, 14, 16 and 20 have more than one above 0.4 loading factor. By eliminating the cross loading factors, the effects of the various ratios can be better visualized.

Table 5.4 provides a reduced set of variables, in which loading factors less than 0.40 and the cross loading variable are hidden and factors are sorted by magnitude loading factor.

Table 5.3: Reduced set of variable: rotated component analysis factor matrix sort by component and factor loading

	Component				
	1	2	3	4	5
r2:Ear length to nose width	.973				
r21:Width of face to 4 times of nose with	.952				
r4:Mideye distance to nose width	.944				
r7:Lips-chin distance to nose with	.924				
r17:Mouth width to nose width	.894				
r11:Nose width to lip height	-.882				
r3:Mideye distance to interocular distance		.980			
r1:Ear length to interocular distance		.967			
r6:Lips-chin distance to interocular distance		.934			
r5:Mouth width to interocular distance		.915			
r9:Interocular distance to lip height		-.882			
r8:Interocular distance to eye fissure width		-.962			
r19:Nose length to ear length			.976		
r18:Nose length to nose-chin distance			.947		
r15:Nose-chin distance to lips-chin distance				-.920	
r22:Hair ratio (H/W)					.970
r23:Neckline ratio(H/W)					.980

5.5 The contribution of hairstyle and neckline to facial beauty

For facial images combined with different head hairstyles and necklines, the effect of the first four principal components had similar trends, but shifted due to the presence of head hair and necklines.

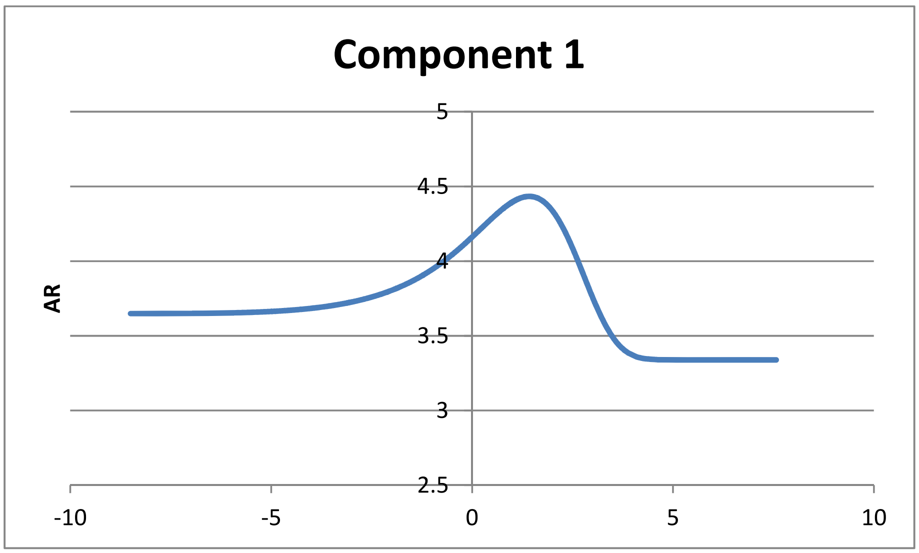


Figure 5.2 Effect of Component 1 of facial images

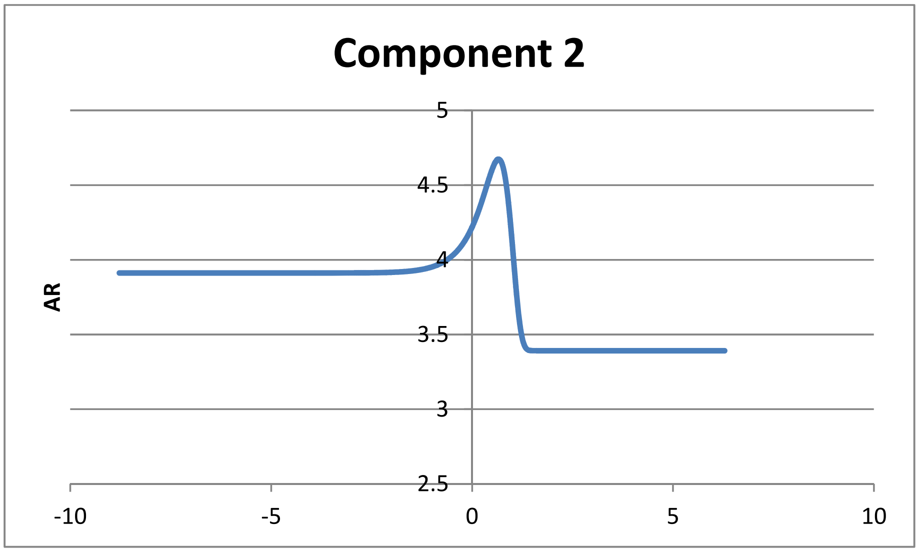


Figure 5.3 Effect of Component 2 of facial images

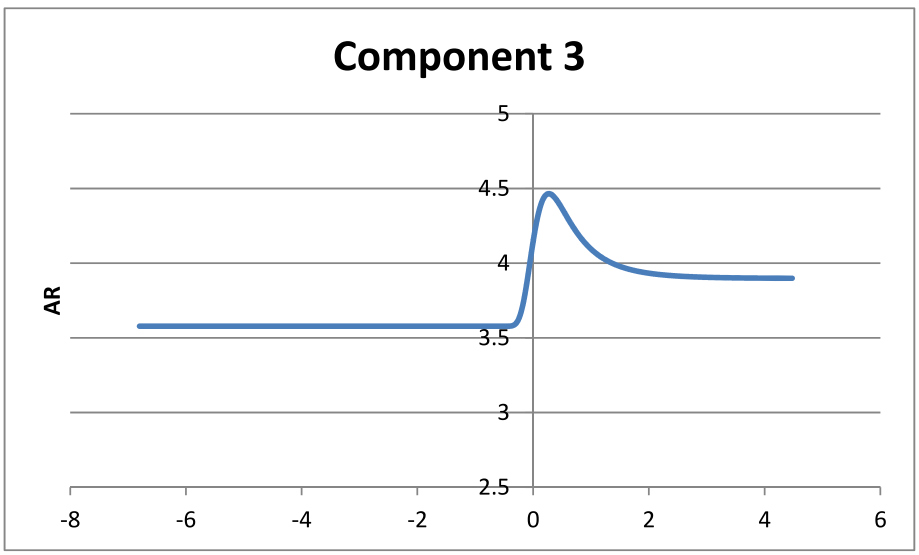


Figure 5.4 Effect of Component 3 of facial images

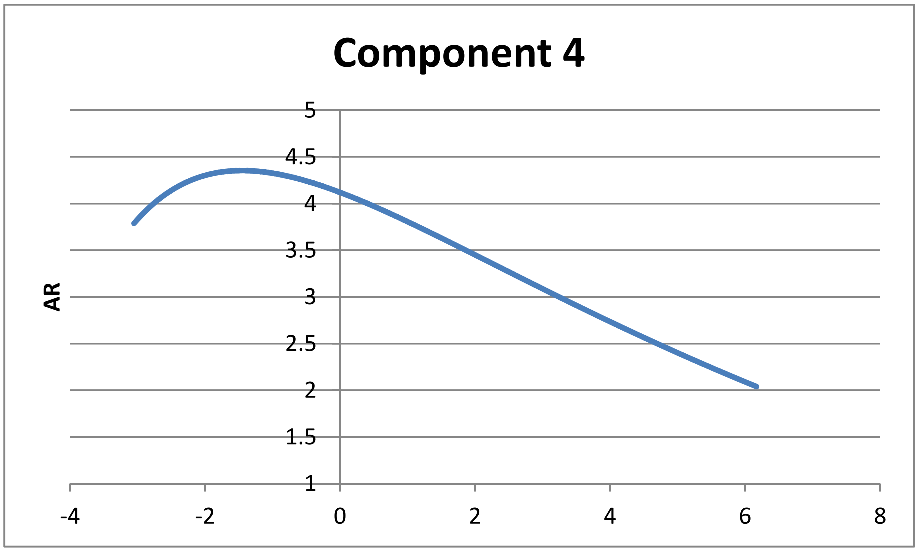


Figure 5.5 Effect of Component 4 of facial images

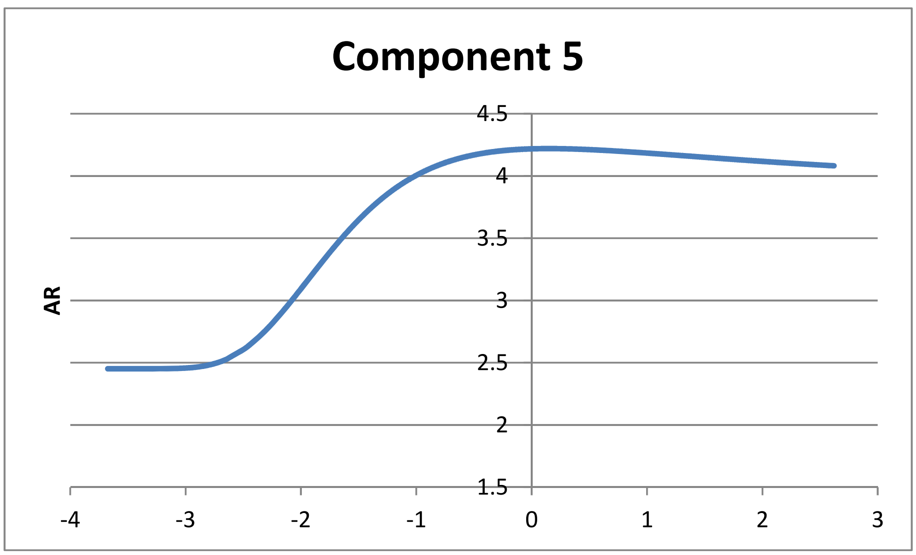


Figure 5.6 Effect of Component 5 of the facial images

Among these five principal components, Components 1 and 2 explained 29% of variance respectively which is about in half of the total and component 3, 4 and 5 explained 14%, 10% and 8% respectively. (See the Figure 5.6)

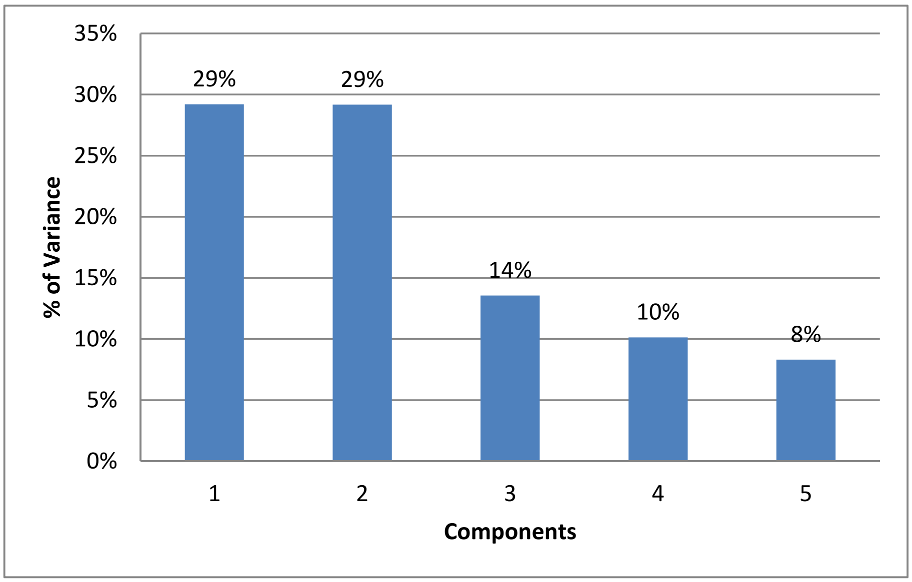


Figure 5.6 Total variance of components

The changes become obvious in the long hair with turtle neck style. Component 1 was mainly related to the nose width or interocular distance and component 2 was mainly related to the ratio of nose width over the eye size.

The related ratio for the components 3 and 4 are the ratio of r19, r18 and r15. These three ratios referred to the nose length to ear length, nose length to nose-chin distance and nose-chin distance to lip-chin distance. (Please refer to the chapter 4.6.3 and 4.6.4.) Both components are mainly distributed around the center and the lower part of the face. As can be seen from Figure 5.4 and 5.5, the effects of Component 3 and 4 on facial attractiveness were little influenced by neckline types and hairstyles. So, we can assume that the r19, r18 and r15 did not have much interaction between the neckline and hairstyles.

In comparison with the nude head model and the model for the head with hair and neckline, component 5 is additional. It related to the neckline and neckline ratio and involved 8% of variance. The ratio numbers of first 4 components of both models are the same. From this factor analysis, the hair and neckline ratios had additional effect on the facial attractiveness. These two items have their own contribution and override the previous components scores.

The loading factor of the component 5 of hair ratio and neckline ratio are 0.97 and 0.98 respectively. Referred to Figure 5.6, as can be seen, higher value of component 5 results better facial attractiveness. By the definition of hair ratio, it is implied that longer hairstyle is generally more attractive than the short hair.

The neckline have the same finding, the deeper of neckline are more attractive than the shallower neckline style.

Table 5.4: Total variance of components of nude head model

Components	Nude model	% of variance(Total:90%)
1	r2, r21, r4, r7, r17 and r11	32%
2	r3, r1, r8, r6, r5 and r9	32%
3	r18 and r19	15%
4	r15	11%

Table 5.5: Total variance of components of hair and neckline model

Components	Hair and neckline model	% of variance (Total:90%)
1	r2, r21, r4, r7, r17 and r11	29%
2	r3, r1, r8, r6, r5 and r9	29%
3	r18 and r19	14%
4	r15	10%
5	r22 and r23	8%

Table 5.6 The means of ARs of faces with by hairstyles and neckline types

	Large Round neck	Round Neck	Turtle Neck
Long hair	4.13	4.10	4.04
Medium hair	3.94	3.94	3.89
Short hair	4.13	4.09	4.00

5.6 Changes of facial attractiveness resulted from hairstyle and necklines

Table 5.7 compares the attractiveness ratings of nude face with those of faces combined with different hairstyles and necklines. The mean value of attractiveness ratings of facial images with hair and necklines were higher (see table 5.8). This implies facial attractiveness was enhanced by hairstyles and necklines to a varying degree. Table 5.8 lists the percentage increase in facial attractiveness due to different hairstyles and dresses of necklines, as can be seen the increase ranged from 2.91 to 9.26%.

Table 5.7 Hair style and neckline type ranking by AR increment

Hair Style	neckline Type	Percentage of AR increment
Long hair	Large Round Neck	9.26%
Short hair	Large Round Neck	9.26%
Long hair	Regular Round Neck	8.47%
Short hair	Regular Round Neck	8.20%
Long hair	Turtle Neck	6.88%
Short hair	Turtle Neck	5.82%
Medium hair	Large Round Neck	4.23%
Medium hair	Regular Round Neck	4.23%
Medium hair	Turtle Neck	2.91%

As can be seen, no matter the medium hair was combined with what types of neckline, the faces with the medium were relatively less attractive. That may be due to the characteristic of the medium hair designed in the work.

When the large round neck and the regular round neck were combined with long or short hairstyle, the attractiveness was improved by 8 to 9%. This implies that both long and short hairstyles match with large round neck and round neck.

Or, large round neck with long or short hair is the most attractiveness combination. By using quick cluster analysis to compare the means, we can get two clusters. As shown in the Table 5.9, face with long and short hairs are in one group and face with the medium hair is in another group.

Table 5.8 Cluster membership of quick clustering

Case		Means	Cluster	Distance
Long hair	Large round neck	4.13	1	0.032
Short hair	Large round neck	4.13	1	0.032
Long hair	Round neck	4.1	1	0.002
Short hair	Round neck	4.09	1	0.008
Long hair	Turtle neck	4.04	1	0.058
Short hair	Turtle neck	4	2	0.0575
Medium hair	Large round neck	3.94	2	0.0025
Medium hair	Round neck	3.94	2	0.0025
Medium hair	Turtle neck	3.89	2	0.0525

So, the long hair and short hair style had a strong contribution towards facial attractiveness, whereas the medium hair had less contribution towards facial attractiveness. Figure 5.7 illustrates the different contribution of the two groups.

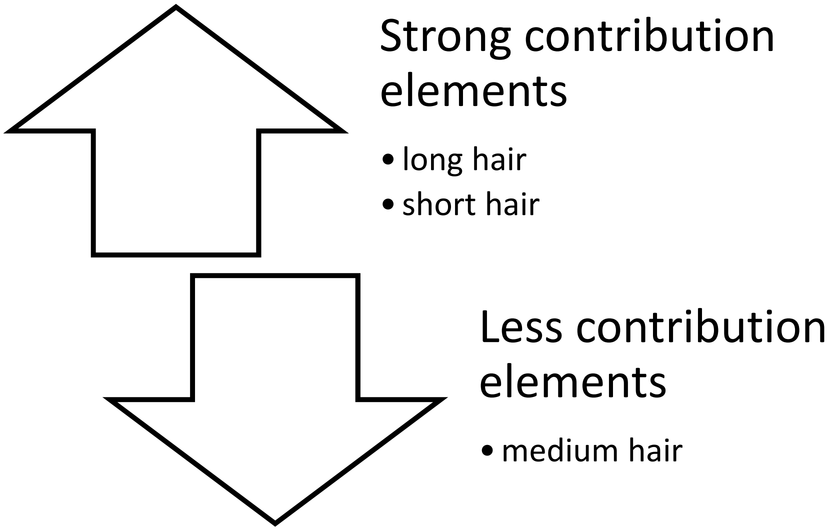


Figure 5.7 Clustering of the contribution by hair group

5.7 New regression model of facial beauty with hair and neckline

Two additional variables were added to the stimuli. The attractiveness of the stimuli was re-rated. There may be interactions between various factors. In order to capture the main trend of the relationship between the attractiveness ratings and each of the five components, we once again applied the transformed Gauss formula, which was described in detail in Chapter 4.7.

The new regression parameters of the model for each component were generated by running the nonlinear regression program in MATLAB and are listed in Table 5.9.

Table 5.9 Parameters obtained from nonlinear regression for each component (with neckline and hair)

Component (i)	a_i	r_i	σ_i	c_i	u_i
1	0.3555	4.8587	0.1296	3.3389	1.4239
2	0.1278	18.7210	0.0398	3.3917	0.6588
3	0.0820	-18.9981	0.0369	3.5778	0.2715
4	22.3339	-0.9250	0.7381	-7.7183	-1.4500
5	1.4446	-5.1072	0.3259	2.4521	0.1486

By assuming that the overall facial attractiveness is the linear combination of the contributions of each of the five components, we have the following equation:

$$AR = b_0 + b_1 AR_1(x_1) + b_2 AR_2(x_2) + b_3 AR_3(x_3) + b_4 AR_4(x_4) + b_5 AR_5(x_5) \qquad (5)$$

By carrying out the multiple linear regression, the values of the bj (j=0, 1..5) are obtained and they are $(b_0, b_1, b_2, b_3, b_4, b_5) = (-6.45, 0.76, 0.66, 0.24, 0.31)$

Figure 5.8 plots the mean attractiveness ratings of the 3960 facial images against the predicted attractiveness ratings from the five principal components (derived from the 23 facial ratios) using the regression Equations (1) to (3) and (5).

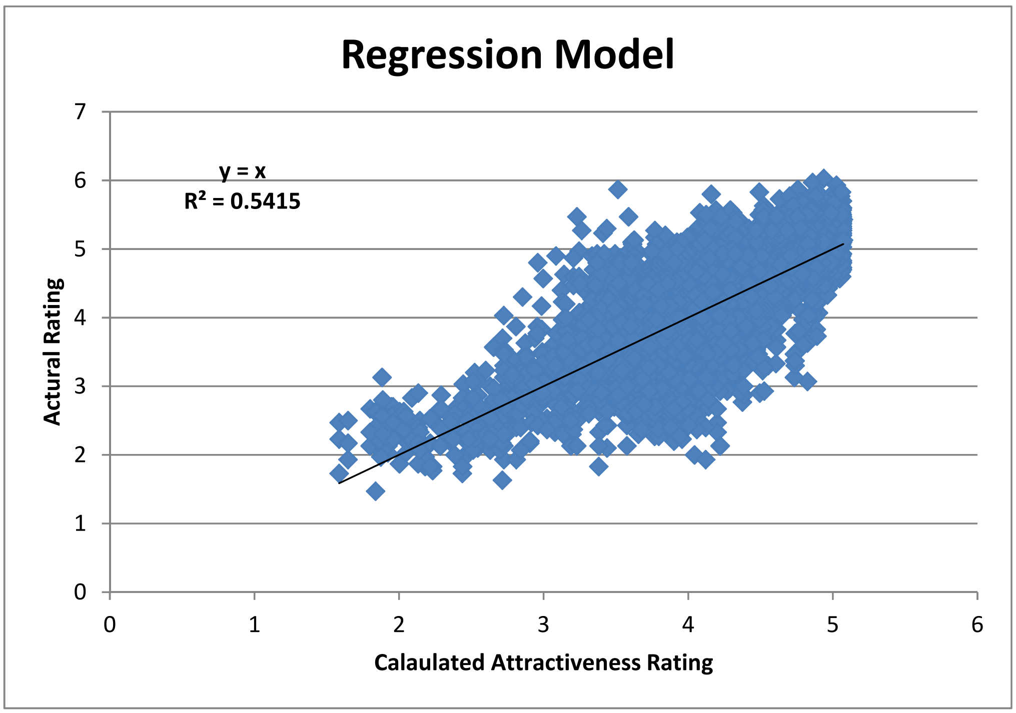


Figure 5.8 Visually assessed mean attractiveness ratings (AR) vs. the predicted attractiveness ratings (Predicted AR) by new regression model

The percentage of fit R2 is 0.5415; it dropped slightly 8% in comparison with the nude head model. Nevertheless, as shown in Figure 5.8, there is still strong one to one linear relationship between the visually assessed mean attractiveness ratings and the predicted attractiveness ratings.

5.8 Discussion

Long hair and large round neck are the most attractive combination. They have 8% in the variance of influence of total attractiveness. On the other hand, about 80% of variance is related to the head ratio. The good coordination of the hairstyle and dressing is a key factor of achieving the higher score of facial attractiveness.

In the prediction of hair and neckline model, the principal component vector of the optimally attractive face is (-6.45, 0.76, 0.66, 0.24 and 0.31). The optimum attractiveness rating is 5.07 and it is related to the long hair and large round neckline's group.

In the Principal component analysis, the first four components in the nude model and hair and neckline model did not have significant difference (see table 5.5 and 5.6). However, the 5th component, representing the hair and neckline ratios seems to have little interaction with other facial ratios. The contribution of the 5th component has 8% of influence on hair and neckline attractiveness model. For the loading factors of hair and neckline ratios, they indicate that long hair and deep neckline represent more attractive. The findings are aligned with the cover theory by hidden the negative beauty contribution features.

The negative sign of the loading factors of the r11, r9, r8 and r15 indicate that smaller the ratios, the more attractive the faces. It implies that small nose, thick lip and mouth position closer to the nose are relatively more attractive.

For facial images with hair with necklines, Component 1 and 2 have dominated 58% of variance of the facial attractiveness. With regard to the effect of hairstyle and neckline type, long hair and turtle neck have the highest positive effect on facial attractiveness. Based on the Quick Clustering, it shows that the medium hair is not as significant as the short and long hair in the enhancement of facial attractiveness. The long hair and short hair style have higher contribution in the coordination of neckline styles.

CHAPTER 6

Gender difference in facial beauty perception

6.1 Introduction

This chapter is devoted to investigate the differences in perception of facial beauty between male and female viewer and whether such differences are interacted with different hairstyles and neckline types.

In this investigation, the same data used for the study reported in Chapter 5 are further analyzed to examine the gender differences in perception.

6.2 General comparison of the attractiveness rating by two genders

Wilcoxon Signed Rank test was used to compare the differences between the attractiveness ratings of male and female viewers. The Wilcoxon Signed Rank test is the 'nonparametric alternative' test which can identify whether the paired distribution is an independent distribution or not. Table 6.1 shows the descriptive Statistics of the 3960 facial images rated by 15 male and 15 female viewers, which was generated by SPSS.

Table 6.1 Descriptive statistics in male and female in attractive rating

	N	Mean	Std. Deviation	Minimum	Maximum	Percentiles		
						25th	50th (Median)	75th
male	3960	3.8785	.73912	1.53	5.87	3.4000	3.9300	4.4700
female	3960	4.1802	1.05531	1.40	7.00	3.3300	4.1300	5.0000

Table 6.2 lists the results of Wilcoxon Signal Rank Test. It shows that, our of 3960 facial images wearing different hairstyles and necklines, male viewers give higher attractiveness ratings to 1233 facial images, whereas female viewer gave higher attractiveness rating to 2554 facial images and there are only 173 facial images which were given the same attractiveness rating by both male and female viewer.

Table 6.2 Ranks of male and female attractiveness rating

		N	Mean Rank	Sum of Ranks
female – male	Negative Ranks	1233[a]	1403.64	1730691.50
	Positive Ranks	2554[b]	2130.73	5441886.50
	Ties	173[c]		
	Total	3960		

Note: a. female < male,
b. female > male,
c. female = male

Table 6.3 lists the results of the Test Statistics from the Wilcoxon Signal Rank test. As can be seen, there is a significant difference between the ratings provided by the male and female viewer (Z=-27.585, P<0.000). The median of the ratings by male and female viewers were 3.90 and 4.13, respectively.

Table 6.3 Wilcoxon signed ranks test

	female – male
Z	-27.585[a]
Asymp. Sig. (2-tailed)	.000

a. Based on negative ranks.

6.3 MANOVA analysis on the interaction between hair, neckline and gender

MANOVA (multivariate ANOVA) was applied to analysis the interaction of hairstyle, neckline type and gender with regard to facial attractiveness ratings. The means and standard deviations of the attractiveness ratings of the facial images grouped by gender, neckline type and hairstyles are listed Table 4.6.

Table 6.4 Descriptive statistics of attractiveness ratings grouped by gender, hairstyles and neckline

	Hair type	neckline type	Mean	Std. Deviation	N
Male	Long Hair	Large round neck	4.0256	.73961	440
		Round neck	4.0212	.68607	440
		Turtle round neck	3.9866	.69241	440
		Overall	4.0111	.70611	1320
	Medium hair	Large round neck	3.8604	.76640	440
		Round neck	3.8638	.72554	440
		Turtle round neck	3.8392	.69454	440
		Overall	3.8544	.72895	1320
	Short hair	Large round neck	3.8012	.79078	440
		Round neck	3.7900	.74769	440
		Turtle round neck	3.7190	.74412	440
		Overall	3.7701	.76145	1320
	Total	Large round neck	3.8957	.77117	1320
		Round neck	3.8917	.72610	1320
		Turtle round neck	3.8483	.71861	1320
		Overall	3.8785	.73912	3960
Female	Long Hair	Large round neck	4.2246	1.01296	440
		Round neck	4.1877	.97460	440

		Turtle round neck	4.0971	.95238	440
		Overall	4.1698	.98102	1320
	Medium hair	Large round neck	4.0231	.98010	440
		Round neck	4.0157	.97395	440
		Turtle round neck	3.9453	.90865	440
		Overall	3.9947	.95470	1320
	Shorthair	Large round neck	4.4522	1.18463	440
		Round neck	4.3890	1.17764	440
		Turtle round neck	4.2876	1.17899	440
		Overall	4.3762	1.18148	1320
	Total	Large round neck	4.2333	1.07659	1320
		Round neck	4.1974	1.05675	1320
		Turtle round neck	4.1100	1.02905	1320
		Overall	4.1802	1.05531	3960

From Table 6.4, it is apparent that the mean values of attractiveness ratings of facial images in different groups by male and female viewers are different. However, further analysis in needed to ascertain whether these differences are statistically significant.

Table 6.5 Multivariate tests for facial attractiveness among different groups

Effect		Value	F	Hypothesis df	Error df	Sig.
Intercept	Pillai's Trace	.967	57648.648[a]	2.000	3954.000	.000
	Wilks' Lambda	.033	57648.648[a]	2.000	3954.000	.000
	Hotelling's Trace	29.160	57648.648[a]	2.000	3954.000	.000
	Roy's Largest Root	29.160	57648.648[a]	2.000	3954.000	.000
Hair	Pillai's Trace	.173	187.555	4.000	7910.000	.000
	Wilks' Lambda	.828	195.854[a]	4.000	7908.000	.000
	Hotelling's Trace	.207	204.182	4.000	7906.000	.000
	Roy's Largest Root	.200	395.338[b]	2.000	3955.000	.000
Neckline	Pillai's Trace	.003	3.301	4.000	7910.000	.010
	Wilks' Lambda	.997	3.302[a]	4.000	7908.000	.010
	Hotelling's Trace	.003	3.304	4.000	7906.000	.010
	Roy's Largest Root	.003	6.397[b]	2.000	3955.000	.002

a. Exact statistic

b. The statistic is an upper bound on F that yields a lower bound on the significance level.

c. Design: Intercept + Hair + neckline

Table 6.5 lists the results of four commonly used tests in multivariate analysis for examining the between group different. All four tests indicated statistically significant differences between the groups having different hairstyle and neckline types. For each dependent variable, it indicated that it had significant main effects. The neckline and hair groups were at a statistically significant level.

6.4 Groups identification – Post hoc tests

The Student Neuman-Keuls Post hoc test was applied to examine the significance of the differences in terms of the dependent variable between all possible pairs of the subset groups. In this Student Neuman–Keuls Post hoc test, the harmonic means and the sample size was 1320. And the statistical significance level (alpha α) was 0.05.

Table 6.6 Post hoc test of different hair style groups viewed by males

Hair type	N	Subset		
		1	2	3
Short hair	1320	3.7701		
Medium hair	1320		3.8544	
Long Hair	1320			4.0111
Sig.		1.000	1.000	1.000

Means for groups in homogeneous subsets are displayed.

Based on observed means.

The error term is Mean Square(Error) = .536.

Table 6.7 Post hoc test of different hair style groups viewed by females

Hair type	N	Subset		
		1	2	3
Medium hair	1320	3.9947		
Long Hair	1320		4.1698	
Short hair	1320			4.3762
Sig.		1.000	1.000	1.000

Means for groups in homogeneous subsets are displayed.
Based on observed means.
The error term is Mean Square(Error) = 1.088.

Table 6.8 Post hoc test of different neckline type groups viewed by males

Neckline type	N	Subset
		1
Turtle round neck	1320	3.8483
Round neck	1320	3.8917
Large round neck	1320	3.8957
Sig.		.219

Means for groups in homogeneous subsets are displayed.
Based on observed means.
The error term is Mean Square(Error) = .536.

Table 6.9 Post hoc test of different neckline type groups viewed by females

Neckline type	N	Subset	
		1	2
Turtle round neck	1320	4.1100	
Round neck	1320		4.1974
Large round neck	1320		4.2333
Sig.		1.000	.377

Means for groups in homogeneous subsets are displayed.
Based on observed means.
The error term is Mean Square(Error) = 1.088.

From Table 6.6 and 6.7, for the attractiveness ratings viewed by both genders, the facial images wearing the short, medium and long hairs could form their own subset. In other words, different hairstyles are statistically different in terms of facial attractiveness.

From the results in Table 6.8, for facial images wearing necklines, the attractiveness ratings by male viewers had the common variance and could not be differentiated. From Table 6.9, for facial images wearing necklines, the attractiveness ratings by female viewers had two common variances and could be classified into two subsets.

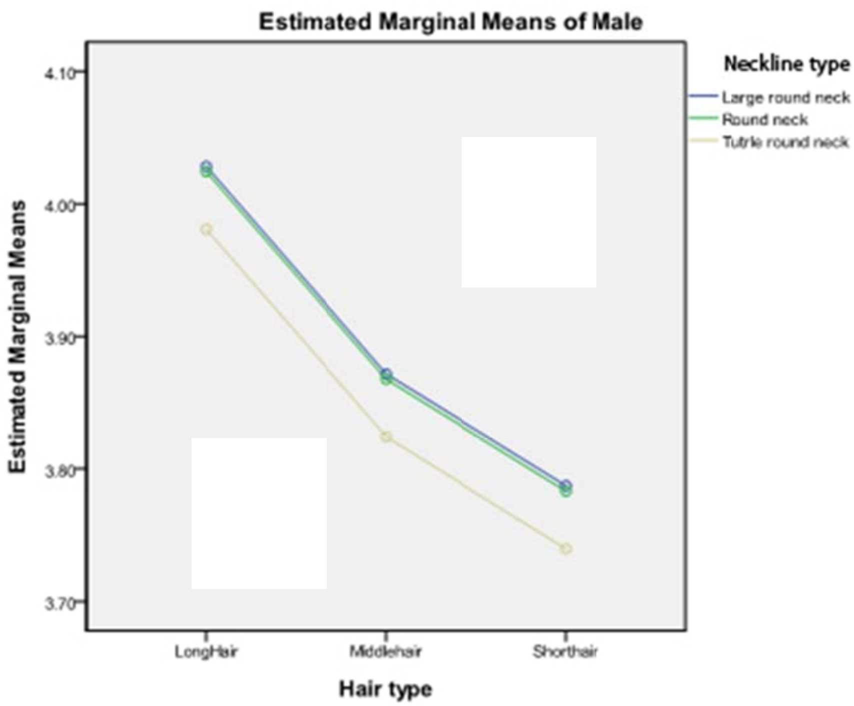


Figure 6.1 Male profile plots – by hair

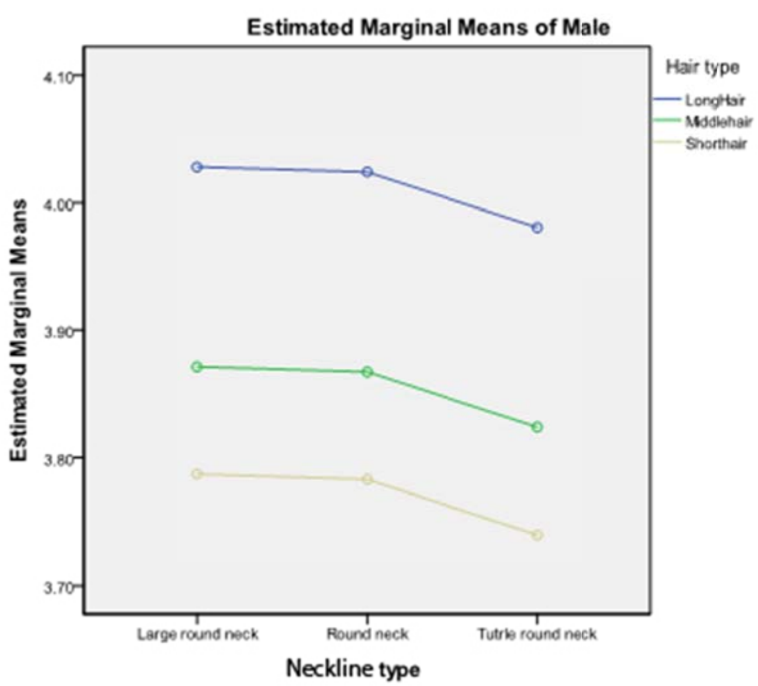


Figure 6.2 Male profile plots – by neckline

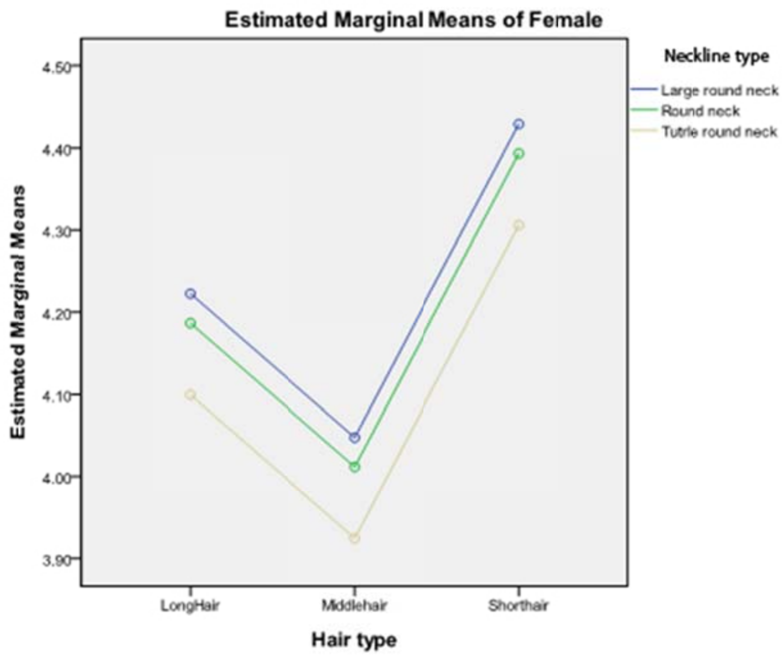


Figure 6.3 Female profile plots – by hair

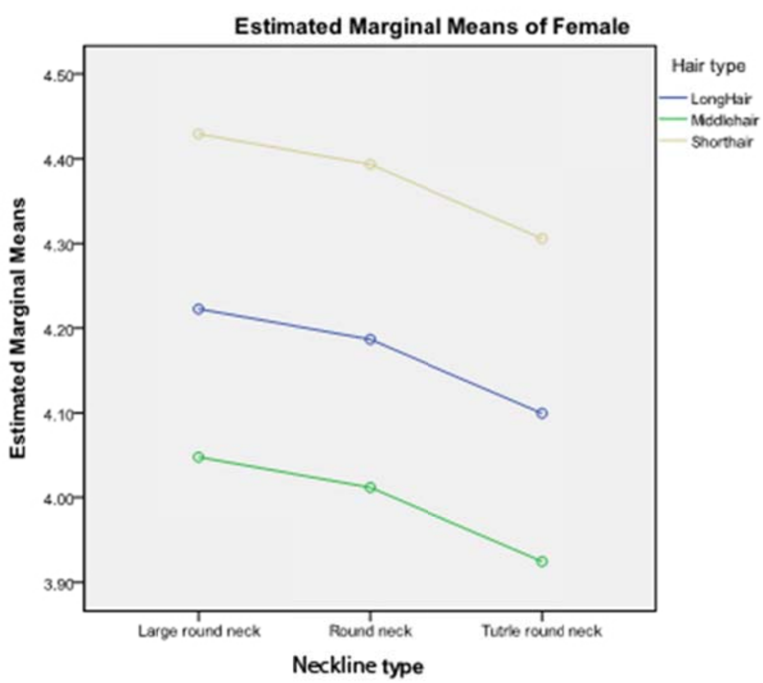


Figure 6.4 Female profile plots – by neckline

6.5 Discussion

The male and female profile plots shown in Figure 6.1 and 6.4 indicated that there is no interaction between the groups wearing different necklines and hair style. The neckline types and hair styles had their independent contribution on facial attractiveness.

For the facial attractiveness rated by males, it showed that the longhair style had an advantage over the medium and short hair style in terms of facial attractiveness. The male viewers could not distinguish the differences between the different neckline types. They would classify the different types of necklines as in one group.

When the facial images were viewed and rate by females in terms of attractiveness, the response was different. Female viewers can differentiate the differences among the different hairstyles in terms of attractiveness. In general, they favored short hairstyle. Female viewer could also differentiate the differences among the different neckline types, even the difference was small. This shows females are more sensitive to differences in hairstyles and dressing.

In comparison, men would favor long hair, but do not pay attention to dressing. On the other hand, women favor short hair and pay attention to the details of dressing.

Among the three hairstyles, the medium hairstyle was the most common style; however female viewers had the least preference over this hairstyle. It seemed that the females do not like the common style, but rather prefer the extreme hairstyles to emphasize their personality.

There appears to be no interactions between the contributions of hairstyle and neckline type on facial attractiveness for both male and female viewers. For example, the turtle round neck style was viewed to be the least attractive to both genders. The contributions of necklines and hairstyles for viewer of both genders are summarized Table 6.10.

Table 6.10 Summary of findings

	Male	Female
Interaction effect of neckline and hairstyle	No	No
Most attractive hair style	Long hair	Short hair
Most attractive neckline style	Large round neck	Large round neck
Most undesirable hair style	Short hair	Middle hair
Most undesirable neckline style	Turtle neck	Turtle neck
Can distinguish the neckline types?	No	Yes
Can distinguish the hair styles?	Yes	Yes

CHAPTER 7

Conclusions and suggestions for further work

7.1 Summary of work

Judgment of beauty is an ever interesting topic. This research investigates how female facial beauty relates to facial ratios or proportions and hairstyles and dressing.

The present work is focused on Asian female facial images. In this study, the facial images are computer generated so as to control the uniform facial expression, skin tone, hairstyle and type of dressing. In generating these facial images, the first step was to create an 'Original Face' from averaging the facial features of several Asian famous artists. Then 440 nude head facial images with varying facial ratios were created by altering the facial images using nine approaches.

The facial attractiveness of the 440 nude head facial images was rated by 15 female and 15 male university students. The attractiveness ratings were then related to the facial ratios through principal component analysis and nonlinear regression using transformed Gauss formula. Through this study, the key facial ratios related to facial attractiveness were identified and their relationship to facial attractiveness was modeled.

The nude head facial images were then combined with three types of hairstyles and neckline types to the investigate the effect of hairstyles and neckline types on facial attractiveness A new model was established, which relates the facial ratios to the facial attractiveness when the facial image was wearing hair and a dress with specific neckline. Furthermore, differences between the male and female viewers on the perception of facial attractiveness were identified and compared.

7.2 General conclusions

7.2.1 Four principal components and nude head model

Based on the analysis of the facial attractiveness of nude heads, it was found that many of the facial ratios are interrelated. By carrying out principal component analysis, four principal components were identified. Component 1 was mainly related to the ratio to the nose width and the interocular distance, components 2 was mainly related to the ratio of nose width over the eye size, component 3 was mainly related to the ratio of nose length to nose to mouth distance and component 4 was mainly related to the ratio of nose-chin distance to lip-chin distance. These four components can explain 79% of the variance.

By plotting the facial attractiveness against each of the four principal components, it was found that the effect of each of the four components on the attractiveness ratings is in a distorted bell shape, which may be model using the transformed Gauss formula.

The facial attractiveness model for nude head based on the transformed Gauss formula provide very good fit to the experimental data with an r2 of 0.6463. The model was also validated with 113 facial images not included in the model building.

7.2.2 The contribution of hair and neckline to facial beauty

Base on Multivariate analysis on the attractiveness of facial images wearing three types of hairstyle (viz. long hair, medium hair and short hair) and three types of necklines (viz. round neck, large round neck and turtle neck), there is little interactive effects between the facial ratios on one hand and hairstyles and necklines on the other.

According to the factor analysis in Chapter 5, the hair and neckline ratio formed the 5th principal components for the attractiveness and account for 8% of the variance.

The effect of each of these five components on facial attractiveness of heads wearing different hairstyles and necklines is different. By fitting the transformed Gauss formula, model for facial attractiveness of heads wearing different hairstyles and necklines were established with reasonably good predictability.

From the study, it becomes clear that, facial attractiveness can be enhanced by wearing hair and dresses of different necklines; however the level of enhancement is different for different types of hairs and necklines. It was found that, the medium length hair had the least contribution towards facial attractiveness in comparison with long and short hairs; best enhancement in facial attractiveness was found when the large round neck was combined with long or short hair. The improvement of attractiveness rating was around 30%. This study provides a guideline for the coordination of hairstyle and dress.

7.2.3 Gender behaviors

Based on multivariate analysis, it was found that the perception of facial attractiveness by male and female viewers were significantly different ($z=-27.585$, $P<0.000$ the Wilcoxon Signal Rank test).

It was shown that, male could not tell the difference in terms of facial attractiveness resulted from changing neckline styles. With regard to hairstyle, the male viewer preferred the female to have a long hair style.

On the other hand, female viewers are more sensitive to the details of dress. They could tell differences in facial attractiveness resulting from changing the neckline styles. With regard to the hair style, short hair and long hair are their favorites while the medium length hair style seemed to be less popular among females.

7.3 Limitation of study

This study is limited to the cultural background and geographical region under which the investigation is undertaken. The study was conducted within the Hong Kong region. Since Hong Kong is located in Eastern Asia, the results, namely the perception of beauty simply reflected the preferences of the Eastern Asian population.

Different races in different countries may have their own preferences in the perception of beauty due to the different cultural backgrounds and geographical circumstances. In order to better understand the influence of cultural and geographical differences, future study should be extended to participants from different cultures and different countries. Faces of different races should also be included. This, of course, will require much more funding longer timespan to accomplish.

7.4 Suggestions for Future Work

7.4.1 Perception of beauty by different races

This research is focused on the facial attractiveness of females in East Asia. Future research can investigate the perception of facial beauty in other countries. It can explore the behaviors of the perception of beauty of people in different races and ethnic backgrounds.

7.4.2 Male attractiveness

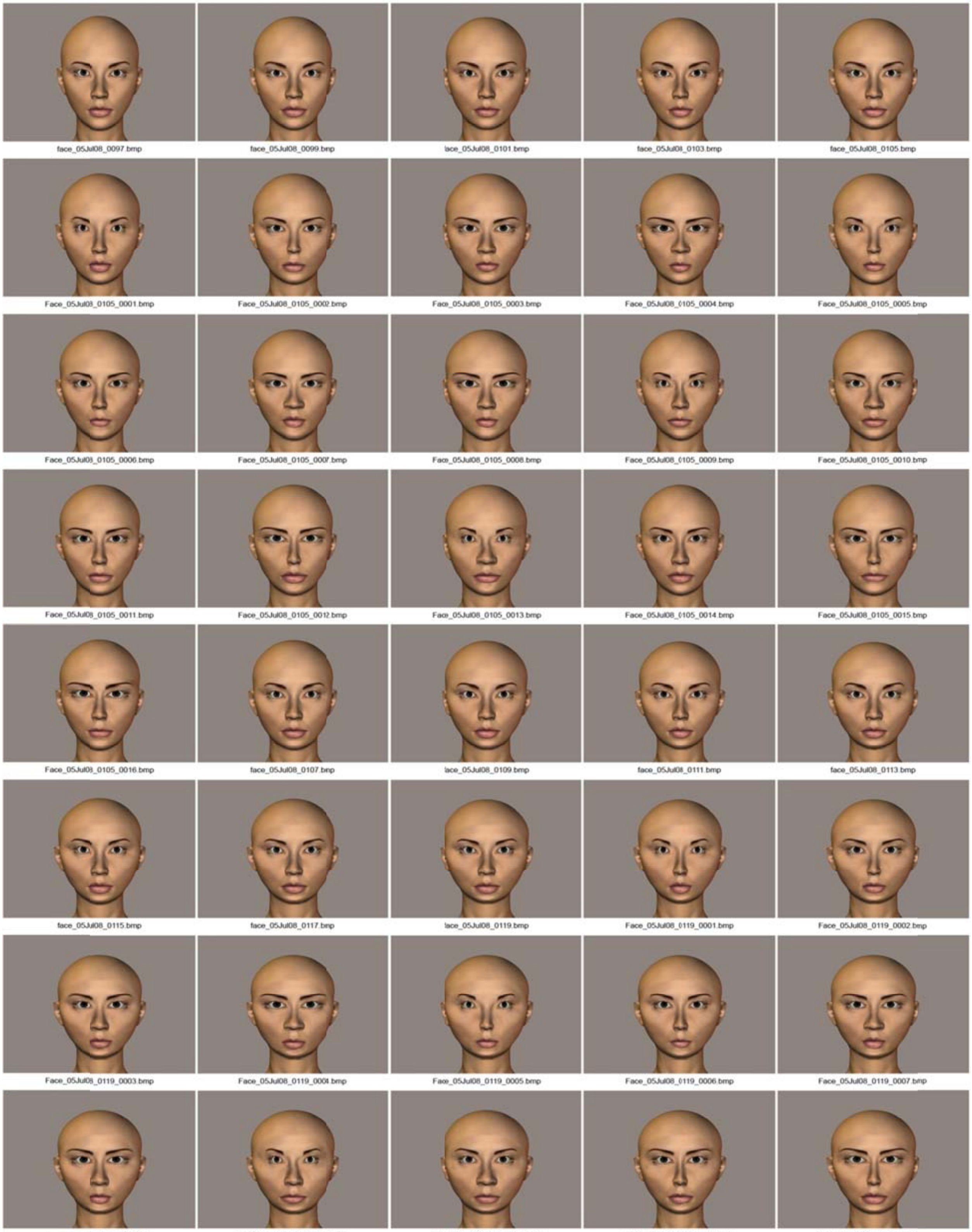
This research is concentrated on analyzing female facial beauty and attractiveness. However, people now not only pay attention to female beauty but also the attractiveness of male. Nowadays, male beauty and attractiveness has become a popular topic.

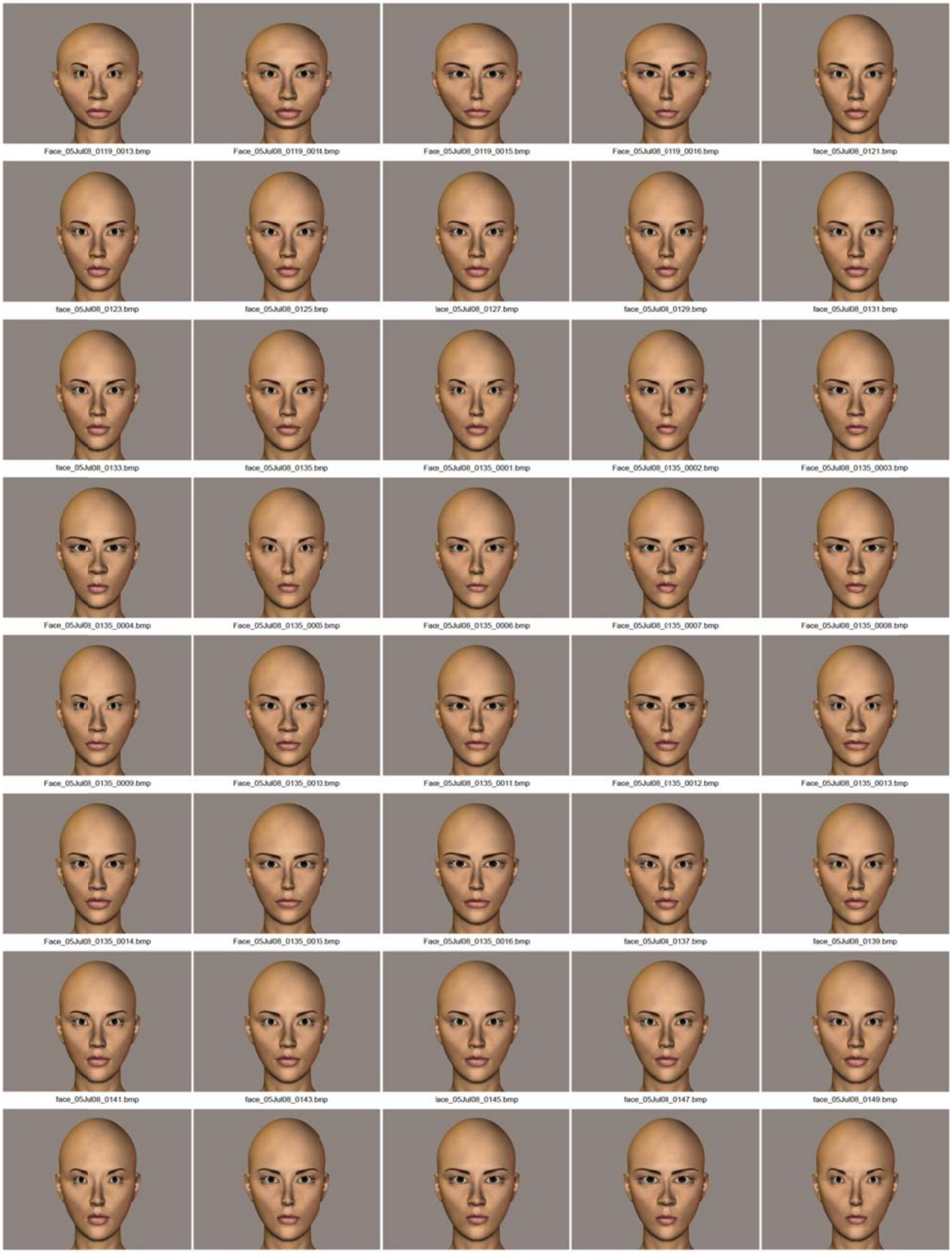
Furthermore, it will also be interesting to investigate the effects of other factors such as the facial expression, skin tone and texture, on facial beauty.

APPENDICES

The appendices will list out partialy of images and programs. For further information please contact Desmond and the email is desmond.chau@

Appendix A: List of Stimuli of Phase I assessment

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face_05Jul08_0129.bmp
face_05Jul08_0131.bmp
face_05Jul08_0133.bmp
face_05Jul08_0135.bmp
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Face_05Jul08_0135_0003.bmp
Face_05Jul08_0135_0004.bmp
Face_05Jul08_0135_0005.bmp
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face_05Jul08_0149.bmp
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Face_05Jul08_0149_0015.bmp

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Face_05Jul08_0225_0005.bmp

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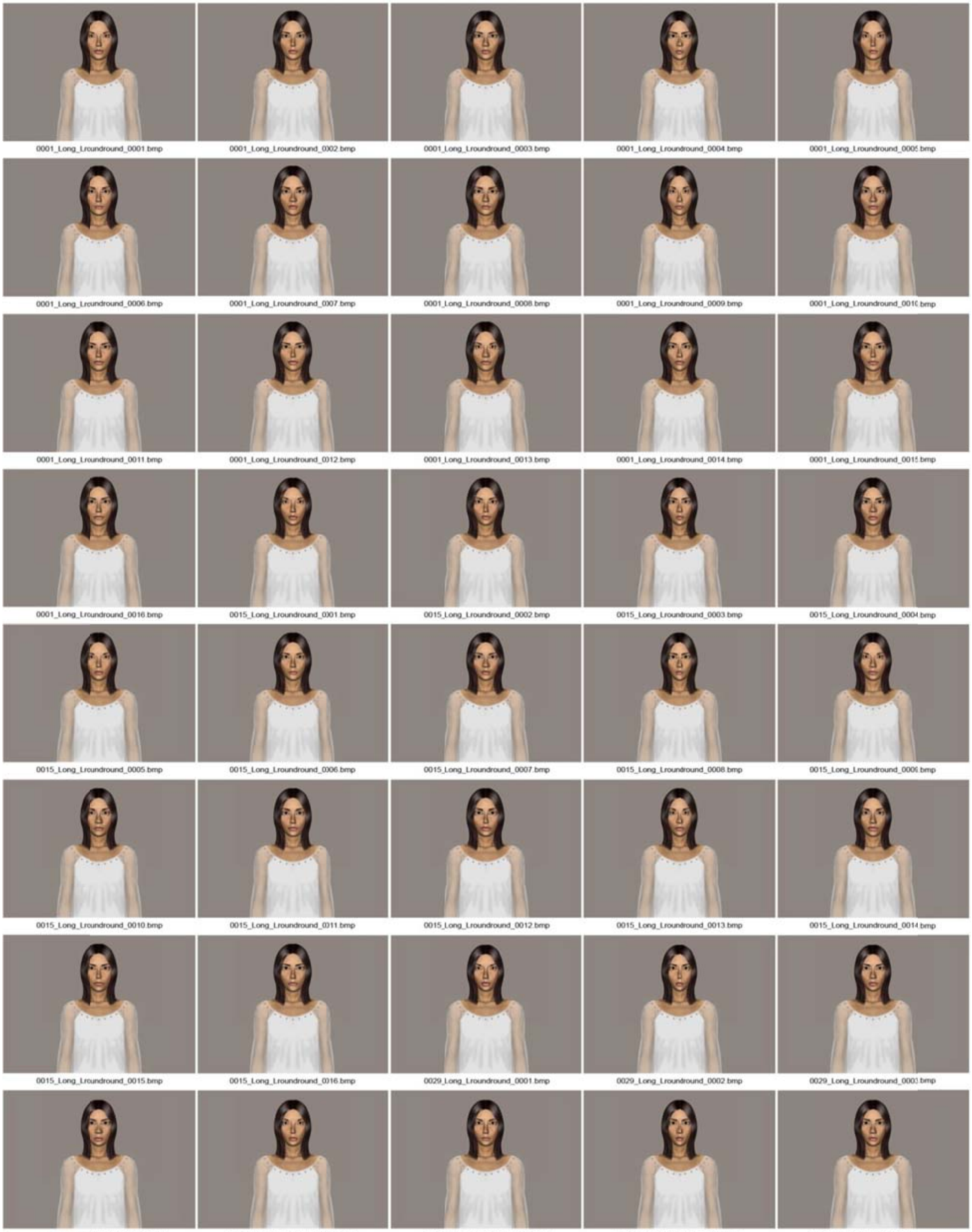
Appendix B :Stimuli of Phase II assessment

B.1 List of stimuli of Phase II assessment – Group 1

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0029_Long_Lroundround_0016.bmp

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B.2 List of stimuli of Phase II assessment – Group 2


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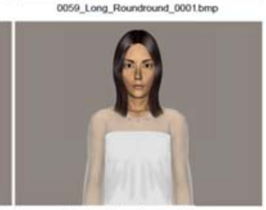
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0059_Long_Roundround_0011.bmp


0059_Long_Roundround_0012.bmp


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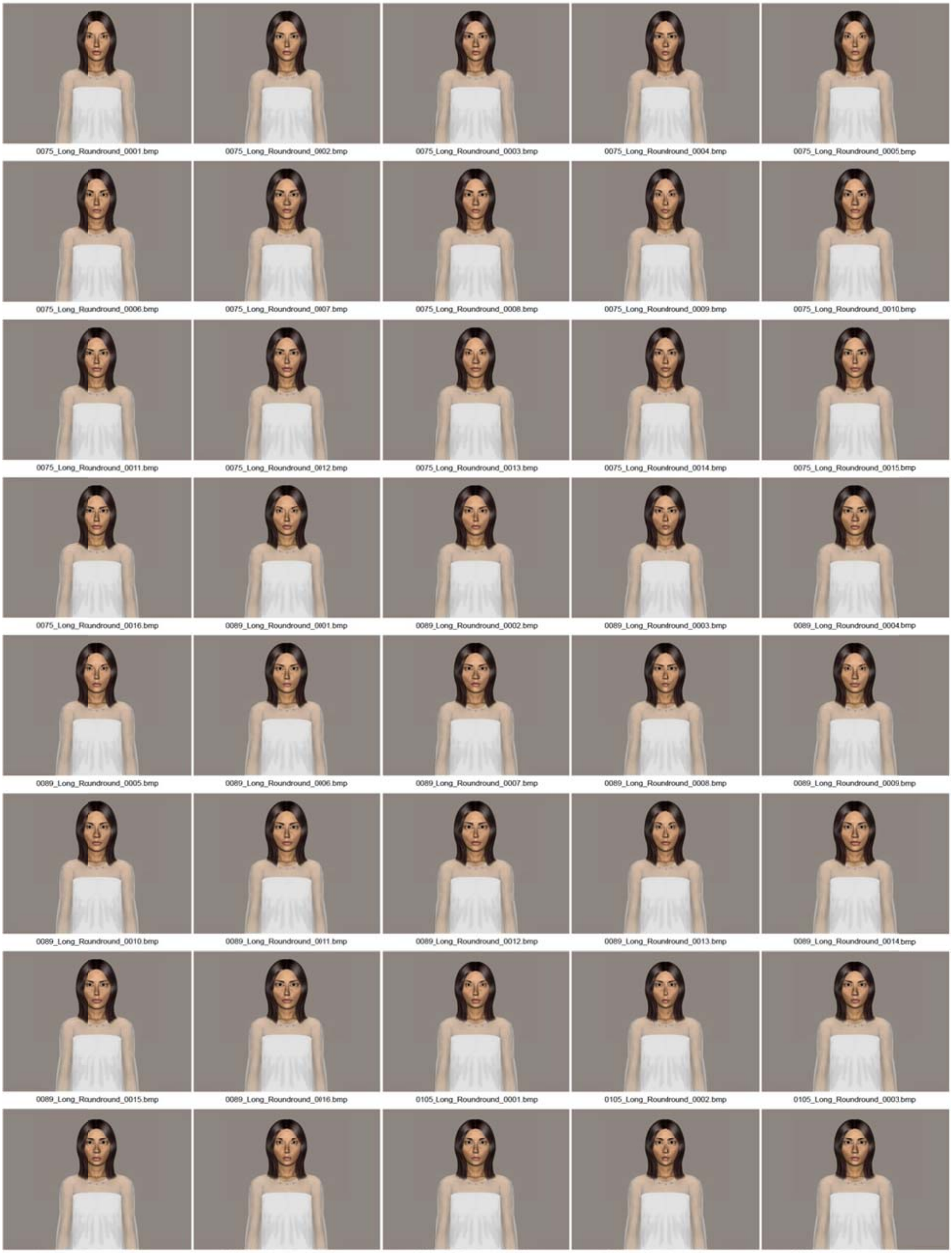
0059_Long_Roundround_0014.bmp


0059_Long_Roundround_0015.bmp


0059_Long_Roundround_0016.bmp



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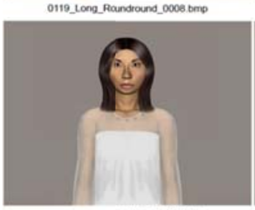
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0149_Long_Roundround_0016.bmp

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0179_Long_Roundround_0008.bmp

B.3 List of stimuli of Phase II assessment – Group 3


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0015_Long_Tutrleround_0007.bmp


0015_Long_Tutrleround_0008.bmp


0015_Long_Tutrleround_0009bmp


0015_Long_Tutrleround_0010.bmp


0015_Long_Tutrleround_0011.bmp


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0015_Long_Tutrleround_0014bmp


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0029_Long_Tutrleround_0006.bmp


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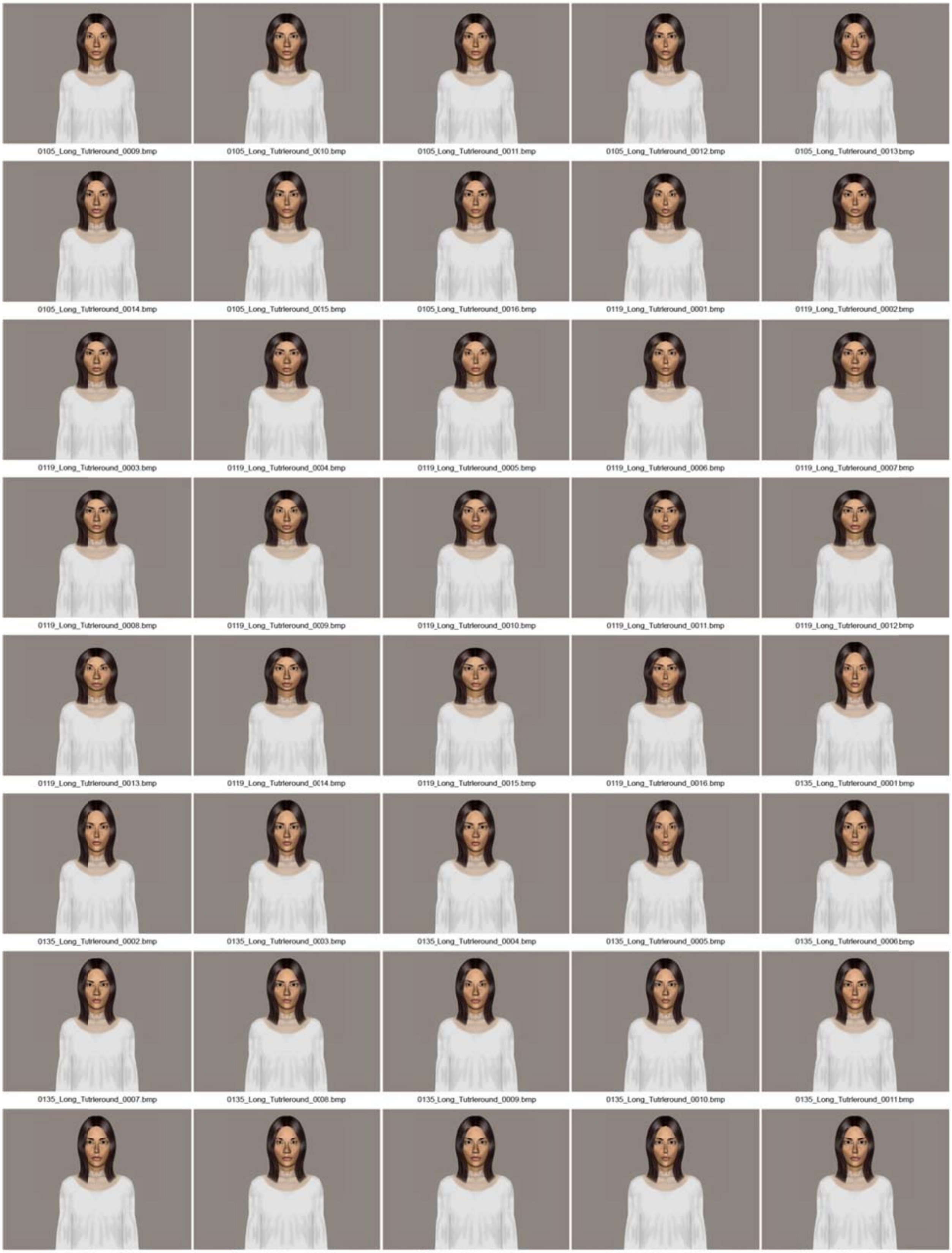
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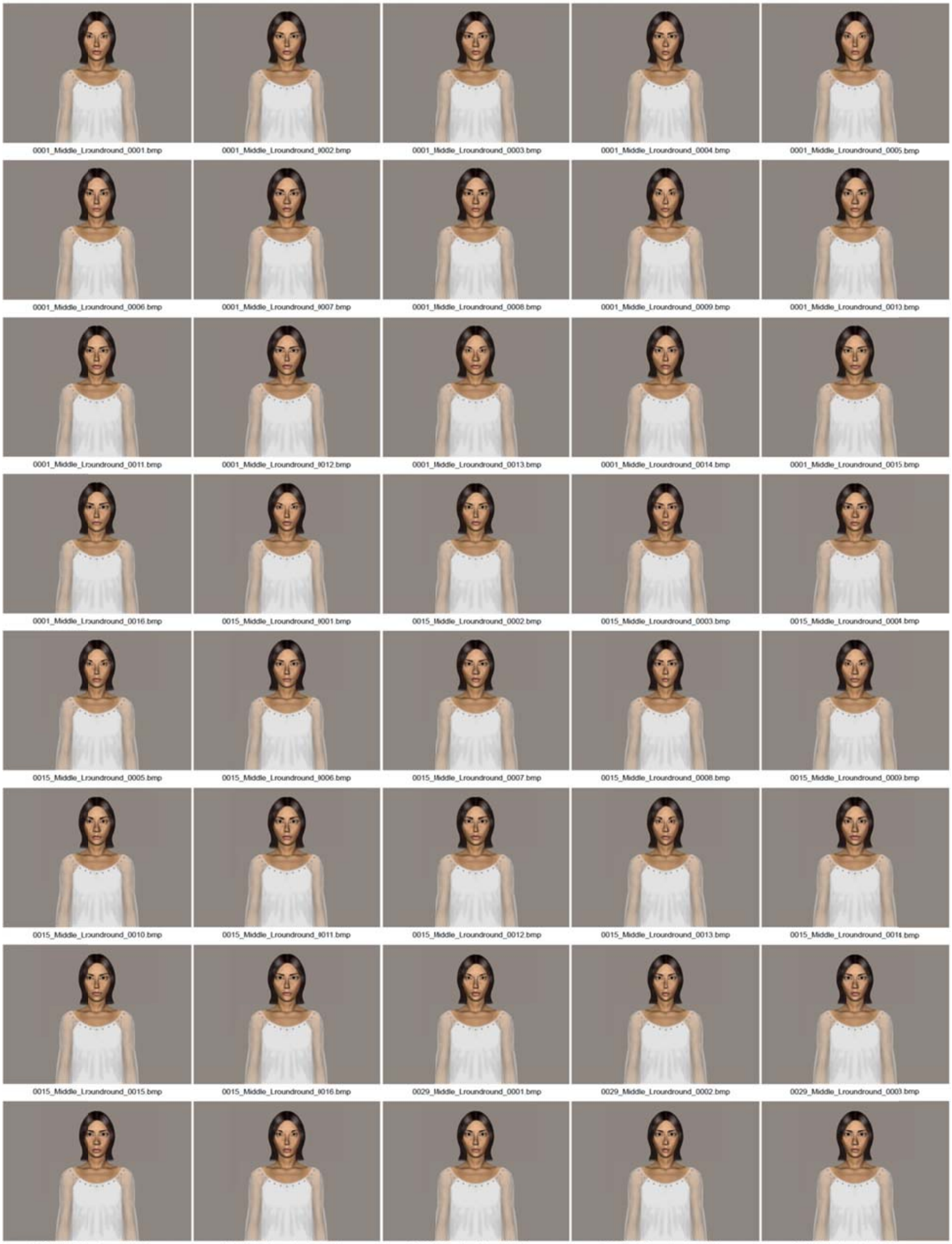
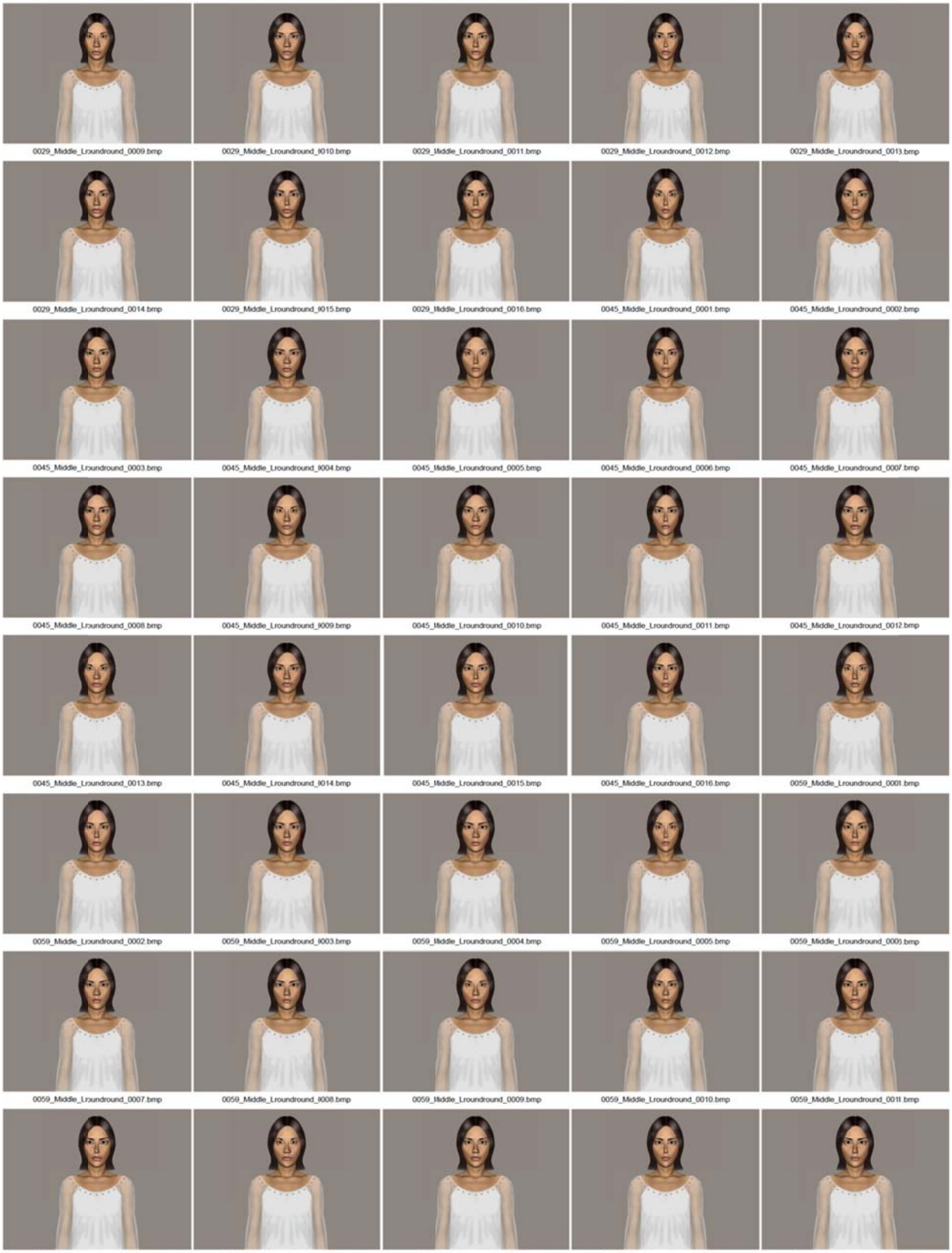
B.4 List of stimuli of Phase II assessment – Group 4

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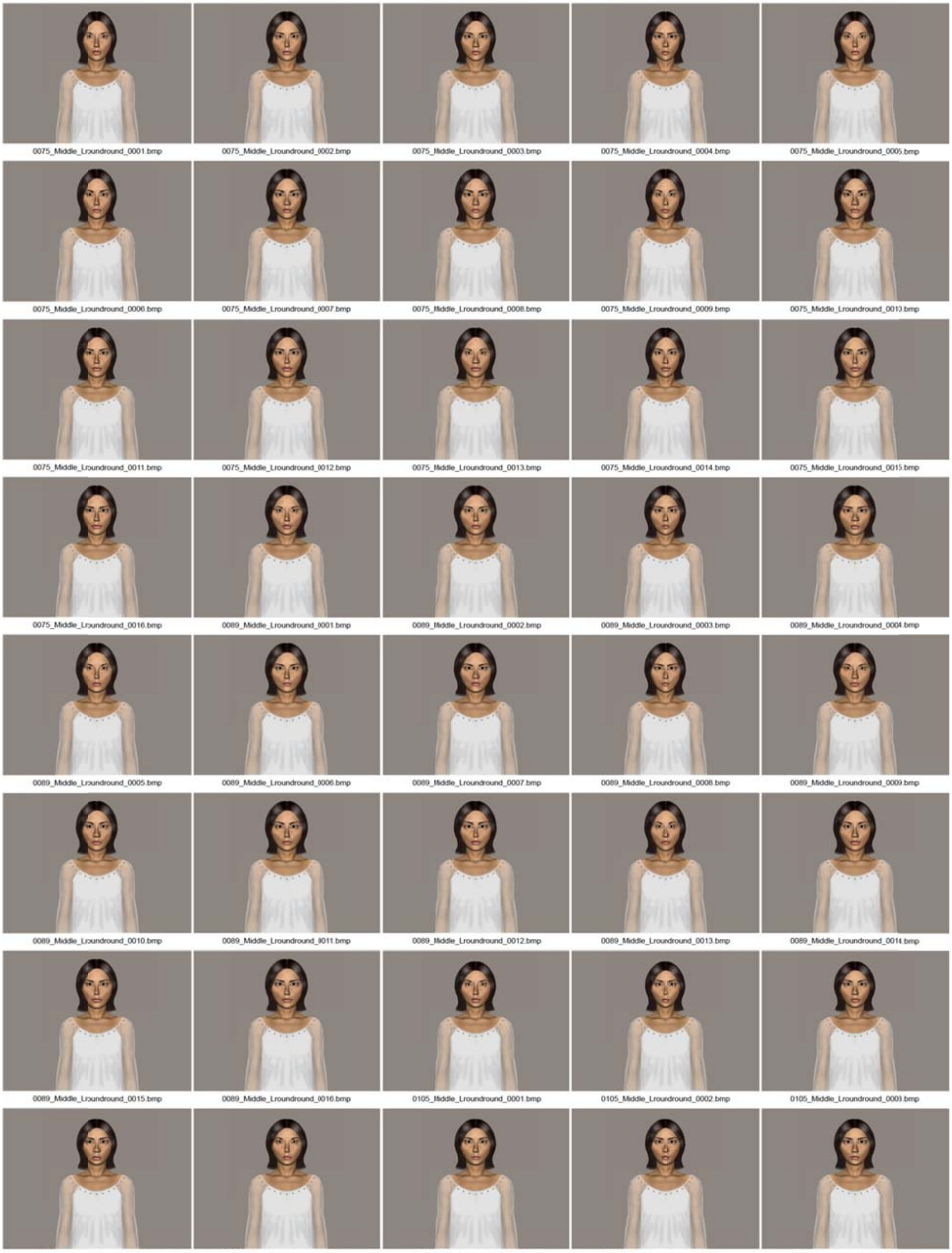

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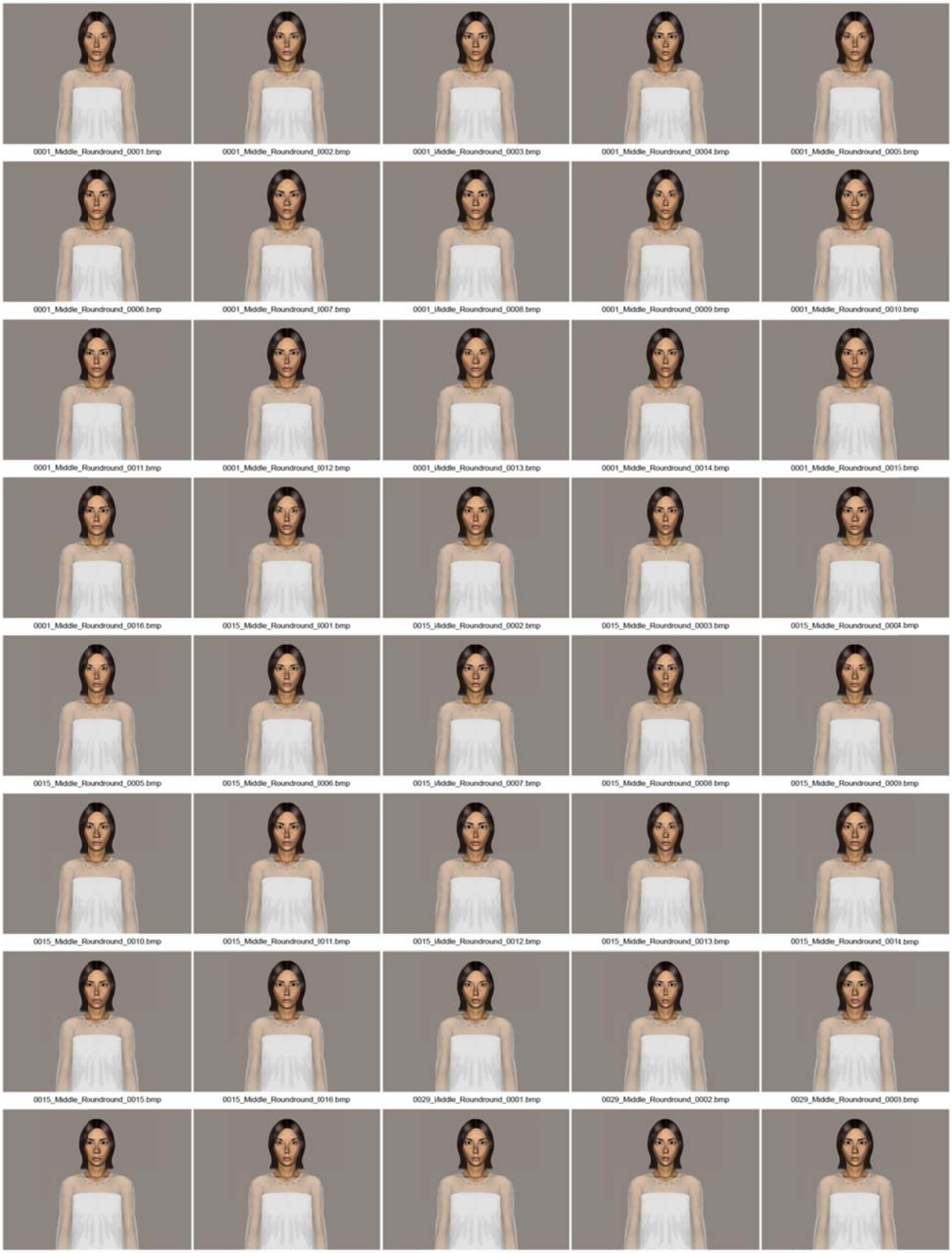
B.5 List of stimuli of Phase II assessment – Group 5

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0179_Middle_Roundround_0004.bmp

0179_Middle_Roundround_0005.bmp

0179_Middle_Roundround_0006.bmp

0179_Middle_Roundround_0007.bmp

0179_Middle_Roundround_0008.bmp

B.6 List of stimuli of Phase II assessment – Group 6


0029_Middle_Tutrleround_0009.bmp


0029_Middle_Tutrleround_0010.bmp


0029_Middle_Tutrleround_0011.bmp


0029_Middle_Tutrleround_0012.bmp


0029_Middle_Tutrleround_0013.bmp


0029_Middle_Tutrleround_0014.bmp


0029_Middle_Tutrleround_0015.bmp


0029_Middle_Tutrleround_0016.bmp


0045_Middle_Tutrleround_0001.bmp


0045_Middle_Tutrleround_0002.bmp


0045_Middle_Tutrleround_0003.bmp


0045_Middle_Tutrleround_0004.bmp


0045_Middle_Tutrleround_0005.bmp


0045_Middle_Tutrleround_0006.bmp


0045_Middle_Tutrleround_0007.bmp


0045_Middle_Tutrleround_0008.bmp


0045_Middle_Tutrleround_0009.bmp


0045_Middle_Tutrleround_0010.bmp


0045_Middle_Tutrleround_0011.bmp


0045_Middle_Tutrleround_0012.bmp


0045_Middle_Tutrleround_0013.bmp


0045_Middle_Tutrleround_0014.bmp


0045_Middle_Tutrleround_0015.bmp


0045_Middle_Tutrleround_0016.bmp


0059_Middle_Tutrleround_0001.bmp


0059_Middle_Tutrleround_0002.bmp


0059_Middle_Tutrleround_0003.bmp


0059_Middle_Tutrleround_0004.bmp


0059_Middle_Tutrleround_0005.bmp


0059_Middle_Tutrleround_0006.bmp


0059_Middle_Tutrleround_0007.bmp


0059_Middle_Tutrleround_0008.bmp


0059_Middle_Tutrleround_0009.bmp


0059_Middle_Tutrleround_0010.bmp


0059_Middle_Tutrleround_0011.bmp


0059_Middle_Tutrleround_0012.bmp


0059_Middle_Tutrleround_0013.bmp


0059_Middle_Tutrleround_0014.bmp


0059_Middle_Tutrleround_0015.bmp


0059_Middle_Tutrleround_0016.bmp


0075_Middle_Tutrleround_0001.bmp

0075_Middle_Tutrleround_0002.bmp

0075_Middle_Tutrleround_0003.bmp

0075_Middle_Tutrleround_0004.bmp

0075_Middle_Tutrleround_0005.bmp

0075_Middle_Tutrleround_0006.bmp

0075_Middle_Tutrleround_0007.bmp

0075_Middle_Tutrleround_0008.bmp

0075_Middle_Tutrleround_0009.bmp

0075_Middle_Tutrleround_0010.bmp

0075_Middle_Tutrleround_0011.bmp

0075_Middle_Tutrleround_0012.bmp

0075_Middle_Tutrleround_0013.bmp

0075_Middle_Tutrleround_0014.bmp

0075_Middle_Tutrleround_0015.bmp

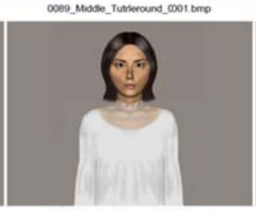
0075_Middle_Tutrleround_0016.bmp

0089_Middle_Tutrleround_0001.bmp

0089_Middle_Tutrleround_0002.bmp

0089_Middle_Tutrleround_0003.bmp

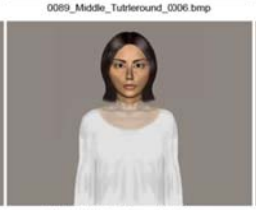
0089_Middle_Tutrleround_0004.bmp

0089_Middle_Tutrleround_0005.bmp

0089_Middle_Tutrleround_0006.bmp

0089_Middle_Tutrleround_0007.bmp

0089_Middle_Tutrleround_0008.bmp

0089_Middle_Tutrleround_0009.bmp

0089_Middle_Tutrleround_0010.bmp

0089_Middle_Tutrleround_0011.bmp

0089_Middle_Tutrleround_0012.bmp

0089_Middle_Tutrleround_0013.bmp

0089_Middle_Tutrleround_0014.bmp

0089_Middle_Tutrleround_0015.bmp

0089_Middle_Tutrleround_0016.bmp

0105_Middle_Tutrleround_0001.bmp

0105_Middle_Tutrleround_0002.bmp

0105_Middle_Tutrleround_0003.bmp

0105_Middle_Tutrleround_0004.bmp

0105_Middle_Tutrleround_0005.bmp

0105_Middle_Tutrleround_0006.bmp

0105_Middle_Tutrleround_0007.bmp

0105_Middle_Tutrleround_0008.bmp

0105_Middle_Tutrleround_0009.bmp
0105_Middle_Tutrleround_0010.bmp
0105_Middle_Tutrleround_0011.bmp
0105_Middle_Tutrleround_0012.bmp
0105_Middle_Tutrleround_0013.bmp
0105_Middle_Tutrleround_0014.bmp
0105_Middle_Tutrleround_0015.bmp
0105_Middle_Tutrleround_0016.bmp
0119_Middle_Tutrleround_0001.bmp
0119_Middle_Tutrleround_0002.bmp
0119_Middle_Tutrleround_0003.bmp
0119_Middle_Tutrleround_0004.bmp
0119_Middle_Tutrleround_0005.bmp
0119_Middle_Tutrleround_0006.bmp
0119_Middle_Tutrleround_0007.bmp
0119_Middle_Tutrleround_0008.bmp
0119_Middle_Tutrleround_0009.bmp
0119_Middle_Tutrleround_0010.bmp
0119_Middle_Tutrleround_0011.bmp
0119_Middle_Tutrleround_0012.bmp
0119_Middle_Tutrleround_0013.bmp
0119_Middle_Tutrleround_0014.bmp
0119_Middle_Tutrleround_0015.bmp
0119_Middle_Tutrleround_0016.bmp
0135_Middle_Tutrleround_0001.bmp
0135_Middle_Tutrleround_0002.bmp
0135_Middle_Tutrleround_0003.bmp
0135_Middle_Tutrleround_0004.bmp
0135_Middle_Tutrleround_0005.bmp
0135_Middle_Tutrleround_0006.bmp
0135_Middle_Tutrleround_0007.bmp
0135_Middle_Tutrleround_0008.bmp
0135_Middle_Tutrleround_0009.bmp
0135_Middle_Tutrleround_0010.bmp
0135_Middle_Tutrleround_0011.bmp
0135_Middle_Tutrleround_0012.bmp
0135_Middle_Tutrleround_0013.bmp
0135_Middle_Tutrleround_0014.bmp
0135_Middle_Tutrleround_0015.bmp
0135_Middle_Tutrleround_0016.bmp


0149_Middle_Tutrleround_0001.bmp

0149_Middle_Tutrleround_0002.bmp

0149_Middle_Tutrleround_0003.bmp

0149_Middle_Tutrleround_0004.bmp

0149_Middle_Tutrleround_0005.bmp

0149_Middle_Tutrleround_0006.bmp

0149_Middle_Tutrleround_0007.bmp

0149_Middle_Tutrleround_0008.bmp

0149_Middle_Tutrleround_0009.bmp

0149_Middle_Tutrleround_0010.bmp

0149_Middle_Tutrleround_0011.bmp

0149_Middle_Tutrleround_0012.bmp

0149_Middle_Tutrleround_0013.bmp

0149_Middle_Tutrleround_0014.bmp

0149_Middle_Tutrleround_0015.bmp

0149_Middle_Tutrleround_0016.bmp

0165_Middle_Tutrleround_0001.bmp

0165_Middle_Tutrleround_0002.bmp

0165_Middle_Tutrleround_0003.bmp

0165_Middle_Tutrleround_0004.bmp

0165_Middle_Tutrleround_0005.bmp

0165_Middle_Tutrleround_0006.bmp

0165_Middle_Tutrleround_0007.bmp

0165_Middle_Tutrleround_0008.bmp

0165_Middle_Tutrleround_0009.bmp

0165_Middle_Tutrleround_0010.bmp

0165_Middle_Tutrleround_0011.bmp

0165_Middle_Tutrleround_0012.bmp

0165_Middle_Tutrleround_0013.bmp

0165_Middle_Tutrleround_0014.bmp

0165_Middle_Tutrleround_0015.bmp

0165_Middle_Tutrleround_0016.bmp

0179_Middle_Tutrleround_0001.bmp

0179_Middle_Tutrleround_0002.bmp

0179_Middle_Tutrleround_0003.bmp

0179_Middle_Tutrleround_0004.bmp

0179_Middle_Tutrleround_0005.bmp

0179_Middle_Tutrleround_0006.bmp

0179_Middle_Tutrleround_0007.bmp

0179_Middle_Tutrleround_0008.bmp

B.7 List of stimuli of Phase II assessment – Group 7


0001_Short_Lroundround_0001.bmp

0001_Short_Lroundround_0002.bmp

0001_Short_Lroundround_0003.bmp

0001_Short_Lroundround_0004.bmp

0001_Short_Lroundround_0005.bmp

0001_Short_Lroundround_0006.bmp

0001_Short_Lroundround_0007.bmp

0001_Short_Lroundround_0008.bmp

0001_Short_Lroundround_0009.bmp

0001_Short_Lroundround_0010.bmp

0001_Short_Lroundround_0011.bmp

0001_Short_Lroundround_0012.bmp

0001_Short_Lroundround_0013.bmp

0001_Short_Lroundround_0014.bmp

0001_Short_Lroundround_0015.bmp

0001_Short_Lroundround_0016.bmp

0015_Short_Lroundround_0001.bmp

0015_Short_Lroundround_0002.bmp

0015_Short_Lroundround_0003.bmp

0015_Short_Lroundround_0004.bmp

0015_Short_Lroundround_0005.bmp

0015_Short_Lroundround_0006.bmp

0015_Short_Lroundround_0007.bmp

0015_Short_Lroundround_0008.bmp

0015_Short_Lroundround_0009.bmp

0015_Short_Lroundround_0010.bmp

0015_Short_Lroundround_0011.bmp

0015_Short_Lroundround_0012.bmp

0015_Short_Lroundround_0013.bmp

0015_Short_Lroundround_0014.bmp

0015_Short_Lroundround_0015.bmp

0015_Short_Lroundround_0016.bmp

0029_Short_Lroundround_0001.bmp

0029_Short_Lroundround_0002.bmp

0029_Short_Lroundround_0003.bmp

0029_Short_Lroundround_0004.bmp

0029_Short_Lroundround_0005.bmp

0029_Short_Lroundround_0006.bmp

0029_Short_Lroundround_0007.bmp

0029_Short_Lroundround_0008.bmp


0029_Short_Lroundround_0009.bmp

0029_Short_Lroundround_0010.bmp

0029_Short_Lroundround_0011.bmp

0029_Short_Lroundround_0012.bmp

0029_Short_Lroundround_0013.bmp

0029_Short_Lroundround_0014.bmp

0029_Short_Lroundround_0015.bmp

0029_Short_Lroundround_0016.bmp

0045_Short_Lroundround_0001.bmp

0045_Short_Lroundround_0002.bmp

0045_Short_Lroundround_0003.bmp

0045_Short_Lroundround_0004.bmp

0045_Short_Lroundround_0005.bmp

0045_Short_Lroundround_0006.bmp

0045_Short_Lroundround_0007.bmp

0045_Short_Lroundround_0008.bmp

0045_Short_Lroundround_0009.bmp

0045_Short_Lroundround_0010.bmp

0045_Short_Lroundround_0011.bmp

0045_Short_Lroundround_0012.bmp

0045_Short_Lroundround_0013.bmp

0045_Short_Lroundround_0014.bmp

0045_Short_Lroundround_0015.bmp

0045_Short_Lroundround_0016.bmp

0059_Short_Lroundround_0001.bmp

0059_Short_Lroundround_0002.bmp

0059_Short_Lroundround_0003.bmp

0059_Short_Lroundround_0004.bmp

0059_Short_Lroundround_0005.bmp

0059_Short_Lroundround_0006.bmp

0059_Short_Lroundround_0007.bmp

0059_Short_Lroundround_0008.bmp

0059_Short_Lroundround_0009.bmp

0059_Short_Lroundround_0010.bmp

0059_Short_Lroundround_0011.bmp

0059_Short_Lroundround_0012.bmp

0059_Short_Lroundround_0013.bmp

0059_Short_Lroundround_0014.bmp

0059_Short_Lroundround_0015.bmp

0059_Short_Lroundround_0016.bmp


0075_Short_Lroundround_0001.bmp

0075_Short_Lroundround_0002.bmp

0075_Short_Lroundround_0003.bmp

0075_Short_Lroundround_0004.bmp

0075_Short_Lroundround_0005.bmp

0075_Short_Lroundround_0006.bmp

0075_Short_Lroundround_0007.bmp

0075_Short_Lroundround_0008.bmp

0075_Short_Lroundround_0009.bmp

0075_Short_Lroundround_0010.bmp

0075_Short_Lroundround_0011.bmp

0075_Short_Lroundround_0012.bmp

0075_Short_Lroundround_0013.bmp

0075_Short_Lroundround_0014.bmp

0075_Short_Lroundround_0015.bmp

0075_Short_Lroundround_0016.bmp

0089_Short_Lroundround_0001.bmp

0089_Short_Lroundround_0002.bmp

0089_Short_Lroundround_0003.bmp

0089_Short_Lroundround_0004.bmp

0089_Short_Lroundround_0005.bmp

0089_Short_Lroundround_0006.bmp

0089_Short_Lroundround_0007.bmp

0089_Short_Lroundround_0008.bmp

0089_Short_Lroundround_0009.bmp

0089_Short_Lroundround_0010.bmp

0089_Short_Lroundround_0011.bmp

0089_Short_Lroundround_0012.bmp

0089_Short_Lroundround_0013.bmp

0089_Short_Lroundround_0014.bmp

0089_Short_Lroundround_0015.bmp

0089_Short_Lroundround_0016.bmp

0105_Short_Lroundround_0001.bmp

0105_Short_Lroundround_0002.bmp

0105_Short_Lroundround_0003.bmp

0105_Short_Lroundround_0004.bmp

0105_Short_Lroundround_0005.bmp

0105_Short_Lroundround_0006.bmp

0105_Short_Lroundround_0007.bmp

0105_Short_Lroundround_0008.bmp


0105_Short_Lroundround_0009.bmp

0105_Short_Lroundround_0010.bmp

0105_Short_Lroundround_0011.bmp

0105_Short_Lroundround_0012.bmp

0105_Short_Lroundround_0013.bmp

0105_Short_Lroundround_0014.bmp

0105_Short_Lroundround_0015.bmp

0105_Short_Lroundround_0016.bmp

0119_Short_Lroundround_0001.bmp

0119_Short_Lroundround_0002.bmp

0119_Short_Lroundround_0003.bmp

0119_Short_Lroundround_0004.bmp

0119_Short_Lroundround_0005.bmp

0119_Short_Lroundround_0006.bmp

0119_Short_Lroundround_0007.bmp

0119_Short_Lroundround_0008.bmp

0119_Short_Lroundround_0009.bmp

0119_Short_Lroundround_0010.bmp

0119_Short_Lroundround_0011.bmp

0119_Short_Lroundround_0012.bmp

0119_Short_Lroundround_0013.bmp

0119_Short_Lroundround_0014.bmp

0119_Short_Lroundround_0015.bmp

0119_Short_Lroundround_0016.bmp

0135_Short_Lroundround_0001.bmp

0135_Short_Lroundround_0002.bmp

0135_Short_Lroundround_0003.bmp

0135_Short_Lroundround_0004.bmp

0135_Short_Lroundround_0005.bmp

0135_Short_Lroundround_0006.bmp

0135_Short_Lroundround_0007.bmp

0135_Short_Lroundround_0008.bmp

0135_Short_Lroundround_0009.bmp

0135_Short_Lroundround_0010.bmp

0135_Short_Lroundround_0011.bmp

0135_Short_Lroundround_0012.bmp

0135_Short_Lroundround_0013.bmp

0135_Short_Lroundround_0014.bmp

0135_Short_Lroundround_0015.bmp

0135_Short_Lroundround_0016.bmp


0149_Short_Lroundround_0001.bmp
0149_Short_Lroundround_0002.bmp
0149_Short_Lroundround_0003.bmp
0149_Short_Lroundround_0004.bmp
0149_Short_Lroundround_0005.bmp
0149_Short_Lroundround_0006.bmp
0149_Short_Lroundround_0007.bmp
0149_Short_Lroundround_0008.bmp
0149_Short_Lroundround_0009.bmp
0149_Short_Lroundround_0010.bmp
0149_Short_Lroundround_0011.bmp
0149_Short_Lroundround_0012.bmp
0149_Short_Lroundround_0013.bmp
0149_Short_Lroundround_0014.bmp
0149_Short_Lroundround_0015.bmp
0149_Short_Lroundround_0016.bmp
0165_Short_Lroundround_0001.bmp
0165_Short_Lroundround_0002.bmp
0165_Short_Lroundround_0003.bmp
0165_Short_Lroundround_0004.bmp
0165_Short_Lroundround_0005.bmp
0165_Short_Lroundround_0006.bmp
0165_Short_Lroundround_0007.bmp
0165_Short_Lroundround_0008.bmp
0165_Short_Lroundround_0009.bmp
0165_Short_Lroundround_0010.bmp
0165_Short_Lroundround_0011.bmp
0165_Short_Lroundround_0012.bmp
0165_Short_Lroundround_0013.bmp
0165_Short_Lroundround_0014.bmp
0165_Short_Lroundround_0015.bmp
0165_Short_Lroundround_0016.bmp
0179_Short_Lroundround_0001.bmp
0179_Short_Lroundround_0002.bmp
0179_Short_Lroundround_0003.bmp
0179_Short_Lroundround_0004.bmp
0179_Short_Lroundround_0005.bmp
0179_Short_Lroundround_0006.bmp
0179_Short_Lroundround_0007.bmp
0179_Short_Lroundround_0008.bmp

B.8 List of stimuli of Phase II assessment – Group 8


0029_Short_Roundround_0009.bmp

0029_Short_Roundround_0010.bmp

0029_Short_Roundround_0011.bmp

0029_Short_Roundround_0012.bmp

0029_Short_Roundround_0013.bmp

0029_Short_Roundround_0014.bmp

0029_Short_Roundround_0015.bmp

0029_Short_Roundround_0016.bmp

0045_Short_Roundround_0001.bmp

0045_Short_Roundround_0002.bmp

0045_Short_Roundround_0003.bmp

0045_Short_Roundround_0004.bmp

0045_Short_Roundround_0005.bmp

0045_Short_Roundround_0006.bmp

0045_Short_Roundround_0007.bmp

0045_Short_Roundround_0008.bmp

0045_Short_Roundround_0009.bmp

0045_Short_Roundround_0010.bmp

0045_Short_Roundround_0011.bmp

0045_Short_Roundround_0012.bmp

0045_Short_Roundround_0013.bmp

0045_Short_Roundround_0014.bmp

0045_Short_Roundround_0015.bmp

0045_Short_Roundround_0016.bmp

0059_Short_Roundround_0001.bmp

0059_Short_Roundround_0002.bmp

0059_Short_Roundround_0003.bmp

0059_Short_Roundround_0004.bmp

0059_Short_Roundround_0005.bmp

0059_Short_Roundround_0006.bmp

0059_Short_Roundround_0007.bmp

0059_Short_Roundround_0008.bmp

0059_Short_Roundround_0009.bmp

0059_Short_Roundround_0010.bmp

0059_Short_Roundround_0011.bmp

0059_Short_Roundround_0012.bmp

0059_Short_Roundround_0013.bmp

0059_Short_Roundround_0014.bmp

0059_Short_Roundround_0015.bmp

0059_Short_Roundround_0016.bmp


0075_Short_Roundround_0001.bmp

0075_Short_Roundround_0002.bmp

0075_Short_Roundround_0003.bmp

0075_Short_Roundround_0004.bmp

0075_Short_Roundround_0005.bmp

0075_Short_Roundround_0006.bmp

0075_Short_Roundround_0007.bmp

0075_Short_Roundround_0008.bmp

0075_Short_Roundround_0009.bmp

0075_Short_Roundround_0010.bmp

0075_Short_Roundround_0011.bmp

0075_Short_Roundround_0012.bmp

0075_Short_Roundround_0013.bmp

0075_Short_Roundround_0014.bmp

0075_Short_Roundround_0015.bmp

0075_Short_Roundround_0016.bmp

0089_Short_Roundround_0001.bmp

0089_Short_Roundround_0002.bmp

0089_Short_Roundround_0003.bmp

0089_Short_Roundround_0004.bmp

0089_Short_Roundround_0005.bmp

0089_Short_Roundround_0006.bmp

0089_Short_Roundround_0007.bmp

0089_Short_Roundround_0008.bmp

0089_Short_Roundround_0009.bmp

0089_Short_Roundround_0010.bmp

0089_Short_Roundround_0011.bmp

0089_Short_Roundround_0012.bmp

0089_Short_Roundround_0013.bmp

0089_Short_Roundround_0014.bmp

0089_Short_Roundround_0015.bmp

0089_Short_Roundround_0016.bmp

0105_Short_Roundround_0001.bmp

0105_Short_Roundround_0002.bmp

0105_Short_Roundround_0003.bmp

0105_Short_Roundround_0004.bmp

0105_Short_Roundround_0005.bmp

0105_Short_Roundround_0006.bmp

0105_Short_Roundround_0007.bmp

0105_Short_Roundround_0008.bmp


0105_Short_Roundround_0009.bmp

0105_Short_Roundround_0010.bmp

0105_Short_Roundround_0011.bmp

0105_Short_Roundround_0012.bmp

0105_Short_Roundround_0013.bmp

0105_Short_Roundround_0014.bmp

0105_Short_Roundround_0015.bmp

0105_Short_Roundround_0016.bmp

0119_Short_Roundround_0001.bmp

0119_Short_Roundround_0002.bmp

0119_Short_Roundround_0003.bmp

0119_Short_Roundround_0004.bmp

0119_Short_Roundround_0005.bmp

0119_Short_Roundround_0006.bmp

0119_Short_Roundround_0007.bmp

0119_Short_Roundround_0008.bmp

0119_Short_Roundround_0009.bmp

0119_Short_Roundround_0010.bmp

0119_Short_Roundround_0011.bmp

0119_Short_Roundround_0012.bmp

0119_Short_Roundround_0013.bmp

0119_Short_Roundround_0014.bmp

0119_Short_Roundround_0015.bmp

0119_Short_Roundround_0016.bmp

0135_Short_Roundround_0001.bmp

0135_Short_Roundround_0002.bmp

0135_Short_Roundround_0003.bmp

0135_Short_Roundround_0004.bmp

0135_Short_Roundround_0005.bmp

0135_Short_Roundround_0006.bmp

0135_Short_Roundround_0007.bmp

0135_Short_Roundround_0008.bmp

0135_Short_Roundround_0009.bmp

0135_Short_Roundround_0010.bmp

0135_Short_Roundround_0011.bmp

0135_Short_Roundround_0012.bmp

0135_Short_Roundround_0013.bmp

0135_Short_Roundround_0014.bmp

0135_Short_Roundround_0015.bmp

0135_Short_Roundround_0016.bmp


0149_Short_Roundround_0001.bmp

0149_Short_Roundround_0002.bmp

0149_Short_Roundround_0003.bmp

0149_Short_Roundround_0004.bmp

0149_Short_Roundround_0005.bmp

0149_Short_Roundround_0006.bmp

0149_Short_Roundround_0007.bmp

0149_Short_Roundround_0008.bmp

0149_Short_Roundround_0009.bmp

0149_Short_Roundround_0010.bmp

0149_Short_Roundround_0011.bmp

0149_Short_Roundround_0012.bmp

0149_Short_Roundround_0013.bmp

0149_Short_Roundround_0014.bmp

0149_Short_Roundround_0015.bmp

0149_Short_Roundround_0016.bmp

0165_Short_Roundround_0001.bmp

0165_Short_Roundround_0002.bmp

0165_Short_Roundround_0003.bmp

0165_Short_Roundround_0004.bmp

0165_Short_Roundround_0005.bmp

0165_Short_Roundround_0006.bmp

0165_Short_Roundround_0007.bmp

0165_Short_Roundround_0008.bmp

0165_Short_Roundround_0009.bmp

0165_Short_Roundround_0010.bmp

0165_Short_Roundround_0011.bmp

0165_Short_Roundround_0012.bmp

0165_Short_Roundround_0013.bmp

0165_Short_Roundround_0014.bmp

0165_Short_Roundround_0015.bmp

0165_Short_Roundround_0016.bmp

0179_Short_Roundround_0001.bmp

0179_Short_Roundround_0002.bmp

0179_Short_Roundround_0003.bmp

0179_Short_Roundround_0004.bmp

0179_Short_Roundround_0005.bmp

0179_Short_Roundround_0006.bmp

0179_Short_Roundround_0007.bmp

0179_Short_Roundround_0008.bmp

B.9 List of stimuli of Phase II assessment – Group 9


0001_Short_Tutrleround_0001.bmp


0001_Short_Tutrleround_0002.bmp


0001_Short_Tutrleround_0003.bmp


0001_Short_Tutrleround_0004.bmp


0001_Short_Tutrleround_0005.bmp


0001_Short_Tutrleround_0006.bmp


0001_Short_Tutrleround_0007.bmp


0001_Short_Tutrleround_0008.bmp


0001_Short_Tutrleround_0009.bmp


0001_Short_Tutrleround_0010.bmp


0001_Short_Tutrleround_0011.bmp


0001_Short_Tutrleround_0012.bmp


0001_Short_Tutrleround_0013.bmp


0001_Short_Tutrleround_0014.bmp


0001_Short_Tutrleround_0015.bmp


0001_Short_Tutrleround_0016.bmp


0015_Short_Tutrleround_0001.bmp


0015_Short_Tutrleround_0002.bmp


0015_Short_Tutrleround_0003.bmp


0015_Short_Tutrleround_0004.bmp


0015_Short_Tutrleround_0005.bmp


0015_Short_Tutrleround_0006.bmp


0015_Short_Tutrleround_0007.bmp


0015_Short_Tutrleround_0008.bmp


0015_Short_Tutrleround_0009.bmp


0015_Short_Tutrleround_0010.bmp


0015_Short_Tutrleround_0011.bmp


0015_Short_Tutrleround_0012.bmp


0015_Short_Tutrleround_0013.bmp


0015_Short_Tutrleround_0014.bmp


0015_Short_Tutrleround_0015.bmp


0015_Short_Tutrleround_0016.bmp


0029_Short_Tutrleround_0001.bmp


0029_Short_Tutrleround_0002.bmp


0029_Short_Tutrleround_0003.bmp

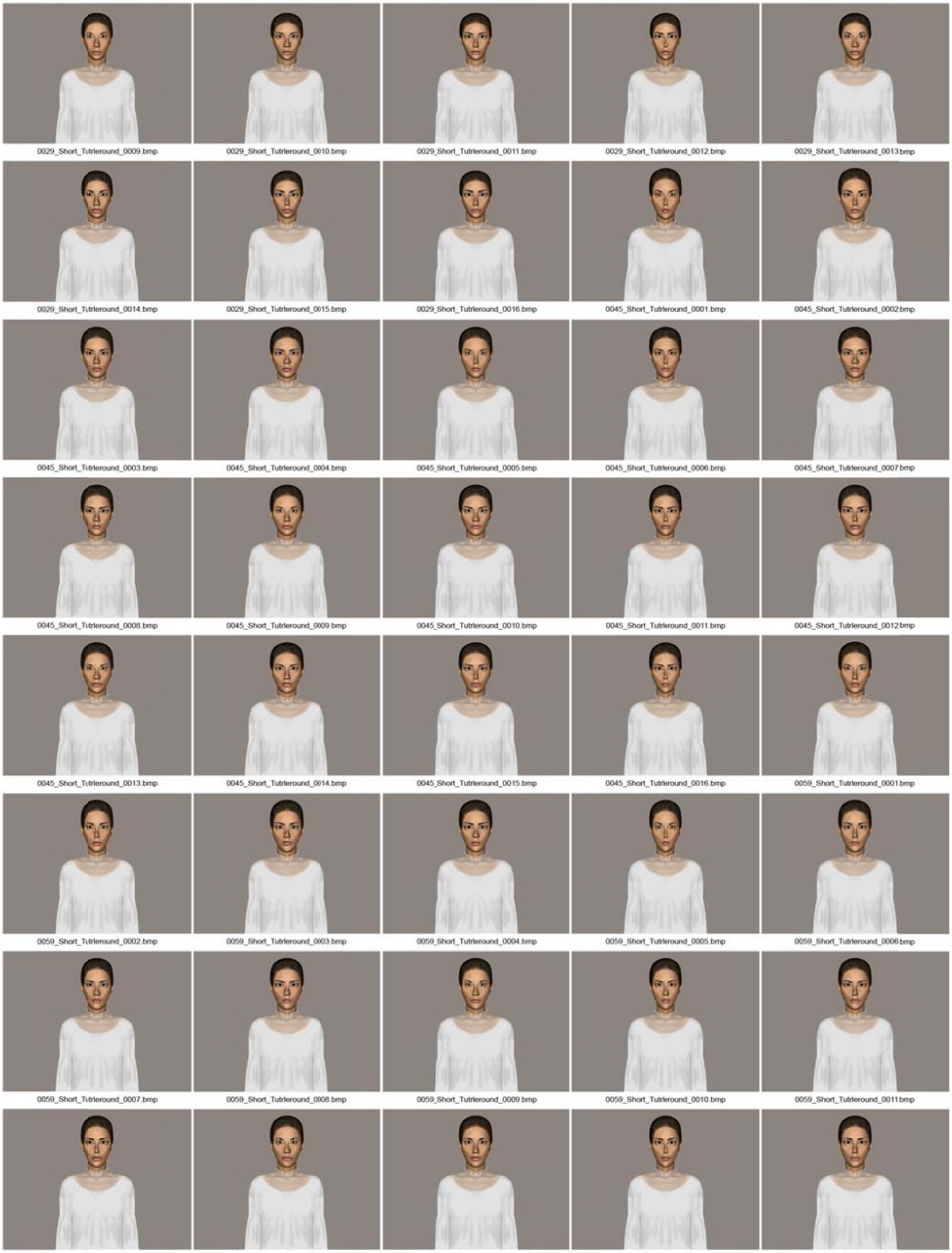

0029_Short_Tutrleround_0004.bmp


0029_Short_Tutrleround_0005.bmp


0029_Short_Tutrleround_0006.bmp


0029_Short_Tutrleround_0007.bmp


0029_Short_Tutrleround_0008.bmp


0029_Short_Tutrleround_0009.bmp
0029_Short_Tutrleround_0010.bmp
0029_Short_Tutrleround_0011.bmp
0029_Short_Tutrleround_0012.bmp
0029_Short_Tutrleround_0013.bmp
0029_Short_Tutrleround_0014.bmp
0029_Short_Tutrleround_0015.bmp
0029_Short_Tutrleround_0016.bmp
0045_Short_Tutrleround_0001.bmp
0045_Short_Tutrleround_0002.bmp
0045_Short_Tutrleround_0003.bmp
0045_Short_Tutrleround_0004.bmp
0045_Short_Tutrleround_0005.bmp
0045_Short_Tutrleround_0006.bmp
0045_Short_Tutrleround_0007.bmp
0045_Short_Tutrleround_0008.bmp
0045_Short_Tutrleround_0009.bmp
0045_Short_Tutrleround_0010.bmp
0045_Short_Tutrleround_0011.bmp
0045_Short_Tutrleround_0012.bmp
0045_Short_Tutrleround_0013.bmp
0045_Short_Tutrleround_0014.bmp
0045_Short_Tutrleround_0015.bmp
0045_Short_Tutrleround_0016.bmp
0059_Short_Tutrleround_0001.bmp
0059_Short_Tutrleround_0002.bmp
0059_Short_Tutrleround_0003.bmp
0059_Short_Tutrleround_0004.bmp
0059_Short_Tutrleround_0005.bmp
0059_Short_Tutrleround_0006.bmp
0059_Short_Tutrleround_0007.bmp
0059_Short_Tutrleround_0008.bmp
0059_Short_Tutrleround_0009.bmp
0059_Short_Tutrleround_0010.bmp
0059_Short_Tutrleround_0011.bmp
0059_Short_Tutrleround_0012.bmp
0059_Short_Tutrleround_0013.bmp
0059_Short_Tutrleround_0014.bmp
0059_Short_Tutrleround_0015.bmp
0059_Short_Tutrleround_0016.bmp


0075_Short_Tutrleround_0001.bmp

0075_Short_Tutrleround_0002.bmp

0075_Short_Tutrleround_0003.bmp

0075_Short_Tutrleround_0004.bmp

0075_Short_Tutrleround_0005.bmp

0075_Short_Tutrleround_0006.bmp

0075_Short_Tutrleround_0007.bmp

0075_Short_Tutrleround_0008.bmp

0075_Short_Tutrleround_0009.bmp

0075_Short_Tutrleround_0010.bmp

0075_Short_Tutrleround_0011.bmp

0075_Short_Tutrleround_0012.bmp

0075_Short_Tutrleround_0013.bmp

0075_Short_Tutrleround_0014.bmp

0075_Short_Tutrleround_0015.bmp

0075_Short_Tutrleround_0016.bmp

0089_Short_Tutrleround_0001.bmp

0089_Short_Tutrleround_0002.bmp

0089_Short_Tutrleround_0003.bmp

0089_Short_Tutrleround_0004.bmp

0089_Short_Tutrleround_0005.bmp

0089_Short_Tutrleround_0006.bmp

0089_Short_Tutrleround_0007.bmp

0089_Short_Tutrleround_0008.bmp

0089_Short_Tutrleround_0009.bmp

0089_Short_Tutrleround_0010.bmp

0089_Short_Tutrleround_0011.bmp

0089_Short_Tutrleround_0012.bmp

0089_Short_Tutrleround_0013.bmp

0089_Short_Tutrleround_0014.bmp

0089_Short_Tutrleround_0015.bmp

0089_Short_Tutrleround_0016.bmp

0105_Short_Tutrleround_0001.bmp

0105_Short_Tutrleround_0002.bmp

0105_Short_Tutrleround_0003.bmp

0105_Short_Tutrleround_0004.bmp

0105_Short_Tutrleround_0005.bmp

0105_Short_Tutrleround_0006.bmp

0105_Short_Tutrleround_0007.bmp

0105_Short_Tutrleround_0008.bmp


0105_Short_Tutrleround_0009.bmp

0105_Short_Tutrleround_0010.bmp

0105_Short_Tutrleround_0011.bmp

0105_Short_Tutrleround_0012.bmp

0105_Short_Tutrleround_0013.bmp

0105_Short_Tutrleround_0014.bmp

0105_Short_Tutrleround_0015.bmp

0105_Short_Tutrleround_0016.bmp

0119_Short_Tutrleround_0001.bmp

0119_Short_Tutrleround_0002.bmp

0119_Short_Tutrleround_0003.bmp

0119_Short_Tutrleround_0004.bmp

0119_Short_Tutrleround_0005.bmp

0119_Short_Tutrleround_0006.bmp

0119_Short_Tutrleround_0007.bmp

0119_Short_Tutrleround_0008.bmp

0119_Short_Tutrleround_0009.bmp

0119_Short_Tutrleround_0010.bmp

0119_Short_Tutrleround_0011.bmp

0119_Short_Tutrleround_0012.bmp

0119_Short_Tutrleround_0013.bmp

0119_Short_Tutrleround_0014.bmp

0119_Short_Tutrleround_0015.bmp

0119_Short_Tutrleround_0016.bmp

0135_Short_Tutrleround_0001.bmp

0135_Short_Tutrleround_0002.bmp

0135_Short_Tutrleround_0003.bmp

0135_Short_Tutrleround_0004.bmp

0135_Short_Tutrleround_0005.bmp

0135_Short_Tutrleround_0006.bmp

0135_Short_Tutrleround_0007.bmp

0135_Short_Tutrleround_0008.bmp

0135_Short_Tutrleround_0009.bmp

0135_Short_Tutrleround_0010.bmp

0135_Short_Tutrleround_0011.bmp

0135_Short_Tutrleround_0012.bmp

0135_Short_Tutrleround_0013.bmp

0135_Short_Tutrleround_0014.bmp

0135_Short_Tutrleround_0015.bmp

0135_Short_Tutrleround_0016.bmp


0149_Short_Tutrleround_0001.bmp

0149_Short_Tutrleround_0002.bmp

0149_Short_Tutrleround_0003.bmp

0149_Short_Tutrleround_0004.bmp

0149_Short_Tutrleround_0005.bmp

0149_Short_Tutrleround_0006.bmp

0149_Short_Tutrleround_0007.bmp

0149_Short_Tutrleround_0008.bmp

0149_Short_Tutrleround_0009.bmp

0149_Short_Tutrleround_0010.bmp

0149_Short_Tutrleround_0011.bmp

0149_Short_Tutrleround_0012.bmp

0149_Short_Tutrleround_0013.bmp

0149_Short_Tutrleround_0014.bmp

0149_Short_Tutrleround_0015.bmp

0149_Short_Tutrleround_0016.bmp

0165_Short_Tutrleround_0001.bmp

0165_Short_Tutrleround_0002.bmp

0165_Short_Tutrleround_0003.bmp

0165_Short_Tutrleround_0004.bmp

0165_Short_Tutrleround_0005.bmp

0165_Short_Tutrleround_0006.bmp

0165_Short_Tutrleround_0007.bmp

0165_Short_Tutrleround_0008.bmp

0165_Short_Tutrleround_0009.bmp

0165_Short_Tutrleround_0010.bmp

0165_Short_Tutrleround_0011.bmp

0165_Short_Tutrleround_0012.bmp

0165_Short_Tutrleround_0013.bmp

0165_Short_Tutrleround_0014.bmp

0165_Short_Tutrleround_0015.bmp

0165_Short_Tutrleround_0016.bmp

0179_Short_Tutrleround_0001.bmp

0179_Short_Tutrleround_0002.bmp

0179_Short_Tutrleround_0003.bmp

0179_Short_Tutrleround_0004.bmp

0179_Short_Tutrleround_0005.bmp

0179_Short_Tutrleround_0006.bmp

0179_Short_Tutrleround_0007.bmp

0179_Short_Tutrleround_0008.bmp

Appendix C: E-prime program listing

C.1 E-prime program listing of Phase I visual assessment

```
'
'
'
'	C:\Documents and Settings\desmond\®à-±\Head Golder ratio\original  -images-
extra Version 2\440head-eprime\440.ebs
'	Generated on: 4/28/2009		17:04:18
'
'
'	This file generated with E-Studio interface.
'	E-Prime Copyright © 1996-2005 Psychology Software Tools.
'	ALL RIGHTS RESERVED
'
'	Legal use of this experiment script requires a full E-Prime or Runtime License.
'
'
'	Author:
'		PST
'
'
'
'

Option CStrings On
Dim ebContext as Context


'--------------------------------------------------------------------------
' Class Declarations
'--------------------------------------------------------------------------



'--------------------------------------------------------------------------
'InitTextDisplayDefaults
'--------------------------------------------------------------------------
Sub InitTextDisplayDefaults(theTextDisplay As TextDisplay)

	If theTextDisplay Is Nothing Then Exit Sub

	theTextDisplay.X = "center"
	theTextDisplay.Y = "center"
	theTextDisplay.Width = "100%"
	theTextDisplay.Height = "100%"
	theTextDisplay.ForeColor = CColor("black")
	theTextDisplay.BackColor = CColor("white")
	theTextDisplay.BackStyle = "opaque"
	theTextDisplay.BorderColor = CColor("black")
	theTextDisplay.BorderWidth = CLng("0")
	theTextDisplay.XAlign = "center"
	theTextDisplay.YAlign = "center"
	theTextDisplay.AlignHorizontal = "center"
	theTextDisplay.AlignVertical = "center"
	theTextDisplay.WordWrap = True
	theTextDisplay.ClearAfter = CLogical("No")
	theTextDisplay.FontName = "Courier New"
	theTextDisplay.FontSize = "18"
	theTextDisplay.FontBold = CLogical("Yes")
	theTextDisplay.FontItalic = CLogical("No")
	theTextDisplay.FontUnderline = CLogical("No")
	theTextDisplay.FontStrikeout = CLogical("No")

End Sub



'--------------------------------------------------------------------------
'InitSlideStateDefaults
'--------------------------------------------------------------------------
Sub InitSlideStateDefaults(theSlideState As SlideState)

	If theSlideState Is Nothing Then Exit Sub

	theSlideState.X = "center"
	theSlideState.Y = "center"
	theSlideState.Width = "100%"
	theSlideState.Height = "100%"
	theSlideState.BackColor = CColor("white")
	theSlideState.BackStyle = "opaque"
	theSlideState.BorderColor = CColor("black")
	theSlideState.BorderWidth = CLng("0")
	theSlideState.XAlign = "center"
	theSlideState.YAlign = "center"
	theSlideState.ClearAfter = CLogical("No")
	theSlideState.Enabled = CLogical("Yes")

End Sub

'--------------------------------------------------------------------------
'InitSlideVisualStimDefaults
'--------------------------------------------------------------------------
Sub InitSlideVisualStimDefaults(theSlideVisualStim As SlideVisualStim)

	If theSlideVisualStim Is Nothing Then Exit Sub

	theSlideVisualStim.X = "center"
	theSlideVisualStim.Y = "center"
	theSlideVisualStim.Width = "25%"
	theSlideVisualStim.Height = "25%"
	theSlideVisualStim.ForeColor = CColor("black")
	theSlideVisualStim.BackColor = CColor("white")
	theSlideVisualStim.BackStyle = "opaque"
	theSlideVisualStim.BorderColor = CColor("black")
	theSlideVisualStim.BorderWidth = CLng("0")
	theSlideVisualStim.XAlign = "center"
	theSlideVisualStim.YAlign = "center"
	theSlideVisualStim.AlignHorizontal = "center"
	theSlideVisualStim.AlignVertical = "center"

End Sub

'--------------------------------------------------------------------------
'InitSlideTextDefaults
'--------------------------------------------------------------------------
Sub InitSlideTextDefaults(theSlideText As SlideText)

	If theSlideText Is Nothing Then Exit Sub

	InitSlideVisualStimDefaults theSlideText

	theSlideText.WordWrap = True
	theSlideText.FontName = "Courier New"
	theSlideText.FontSize = "18"
	theSlideText.FontBold = CLogical("Yes")
	theSlideText.FontItalic = CLogical("No")
	theSlideText.FontUnderline = CLogical("No")
	theSlideText.FontStrikeout = CLogical("No")

End Sub

'--------------------------------------------------------------------------
'InitSlideImageDefaults
'--------------------------------------------------------------------------
Sub InitSlideImageDefaults(theSlideImage As SlideImage)

	If theSlideImage Is Nothing Then Exit Sub

	InitSlideVisualStimDefaults theSlideImage

	theSlideImage.Stretch = CLogical("No")
	theSlideImage.MirrorLeftRight = CLogical("No")
	theSlideImage.MirrorUpDown = CLogical("No")
	theSlideImage.UseSourceColorKey = CLogical("No")
	theSlideImage.SourceColorKey = CColor("black")

End Sub

'--------------------------------------------------------------------------
'InitSlideSoundBufferDefaults
'--------------------------------------------------------------------------
Sub InitSlideSoundBufferDefaults(theSoundBuffer As SoundBuffer)

	If theSoundBuffer Is Nothing Then Exit Sub

	theSoundBuffer.Loop = CLogical("No")
	theSoundBuffer.StopAfter = CLogical("Yes")
	theSoundBuffer.StartOffset = "0"
	theSoundBuffer.StopOffset = "0"

End Sub
```

```
'------------------------------------------------------------------------------
'InitImageDisplayDefaults
'------------------------------------------------------------------------------
Sub InitImageDisplayDefaults(theImageDisplay As ImageDisplay)

	If theImageDisplay Is Nothing Then Exit Sub

	theImageDisplay.X = "center"
	theImageDisplay.Y = "center"
	theImageDisplay.Width = "100%"
	theImageDisplay.Height = "100%"
	theImageDisplay.BackColor = CColor("black")
	theImageDisplay.BackStyle = "opaque"
	theImageDisplay.BorderColor = CColor("black")
	theImageDisplay.BorderWidth = CLng("0")
	theImageDisplay.XAlign = "center"
	theImageDisplay.YAlign = "center"
	theImageDisplay.AlignHorizontal = "center"
	theImageDisplay.AlignVertical = "center"
	theImageDisplay.ClearAfter = CLogical("No")
	theImageDisplay.UseSourceColorKey = CLogical("No")
	theImageDisplay.SourceColorKey = CColor("black")
	theImageDisplay.MirrorLeftRight = CLogical("No")
	theImageDisplay.MirrorUpDown = CLogical("No")
	theImageDisplay.Stretch = CLogical("No")

End Sub




'------------------------------------------------------------------------------
' Instance Declarations
'------------------------------------------------------------------------------
Dim Keyboard As KeyboardDevice
Dim Mouse As MouseDevice
Dim Display As DisplayDevice
Dim Sound As SoundDevice
Dim SessionProc As Procedure

Dim Instructions As TextDisplay
Dim InstructionsEchoClients As EchoClientCollection

Dim BlockList As List

Dim Goodbye As TextDisplay

Dim BlockProc As Procedure

Dim Fixation As TextDisplay

Dim Feedback As FeedbackDisplay
Dim Feedback_State As SlideState
Dim Feedback_SlideText As SlideText

Dim TrialList As List

Dim TrialProc As Procedure

Dim Stimulus As ImageDisplay
Dim StimulusEchoClients As EchoClientCollection

Dim Stimulus2 As ImageDisplay



'------------------------------------------------------------------------------
' Package Declare Script
'------------------------------------------------------------------------------



'------------------------------------------------------------------------------
' User Script
'------------------------------------------------------------------------------



'------------------------------------------------------------------------------
' Package Global Script
'------------------------------------------------------------------------------
```

```
'------------------------------------------------------------------------------
' Package Routines
'------------------------------------------------------------------------------



'------------------------------------------------------------------------------
' Implementation
'------------------------------------------------------------------------------
Sub SessionProc_Run(c as Context)


	Instructions.InputMasks.Reset

	If Keyboard.GetState() = ebStateOpen Then
		InstructionsEchoClients.RemoveAll
		Instructions.InputMasks.Add Keyboard.CreateInputMask("{ANY}", "",
CLng(Instructions.Duration), CLng("1"), ebEndResponseActionTerminate, CLogical("Yes"),
"", "", "ResponseMode:All ProcessBackspace:Yes")


	End If

	Instructions.Run
	BlockList.Run c

	Goodbye.Run



#If RUNTIME_VERSION_MAJOR > 1  Or (RUNTIME_VERSION_MAJOR = 1 And
RUNTIME_VERSION_MINOR >= 2) Then
	' Log clock timing information
	c.SetAttrib "Clock.Information", Clock.Information
#End If


	c.Log
End Sub

Sub BlockProc_Run(c as Context)
	TrialList.Run c

	c.Log
End Sub



Sub TrialProc_Run(c as Context)

	Fixation.Run

	Stimulus.Filename = c.GetAttrib("Stimulus")
	Stimulus.Load

	Stimulus.InputMasks.Reset

	If Keyboard.GetState() = ebStateOpen Then
		StimulusEchoClients.RemoveAll
		Stimulus.InputMasks.Add Keyboard.CreateInputMask("123456789",
c.GetAttrib("CorrectAnswer"), CLng(Stimulus.Duration), CLng("1"),
ebEndResponseActionTerminate, CLogical("Yes"), "", "", "ResponseMode:All
ProcessBackspace:Yes")


	End If

	Stimulus.Run
	c.SetAttrib Stimulus.Name & ".OnsetDelay", Stimulus.OnsetDelay
	c.SetAttrib Stimulus.Name & ".OnsetTime", Stimulus.OnsetTime
	c.SetAttrib Stimulus.Name & ".DurationError", Stimulus.DurationError
	c.SetAttrib Stimulus.Name & ".RTTime", Stimulus.RTTime
	c.SetAttrib Stimulus.Name & ".ACC", Stimulus.ACC
	c.SetAttrib Stimulus.Name & ".RT", Stimulus.RT
	c.SetAttrib Stimulus.Name & ".RESP", Stimulus.RESP
	c.SetAttrib Stimulus.Name & ".CRESP", Stimulus.CRESP



	If Stimulus.ACC = 1 Then
		'Set the ActiveState to Correct
		Feedback.ActiveState = "Correct"

		'Add an observation to the accuracy stats
		Feedback.AccStats.AddObservation Stimulus.Acc
```

```
			'Add an observation to the response time stats
			' unless the user did not respond and the author
			' does not want us to add the no response RT
			If Len(Stimulus.RESP) > 0 Then
				Feedback.RTStats.AddObservation Stimulus.RT
				Feedback.CorrectRTStats.AddObservation Stimulus.RT
			End If
		Else
			'Is it incorrect or no response?
			If Len(Stimulus.RESP) > 0 Then
				'Set the ActiveState to Incorrect
				Feedback.ActiveState = "Incorrect"

				'Set the accuracy stats
				Feedback.AccStats.AddObservation Stimulus.Acc

				'Set the RT stats
				Feedback.RTStats.AddObservation Stimulus.RT
				Feedback.IncorrectRTStats.AddObservation Stimulus.RT
			Else
				'Set the ActiveState to NoResponse
				Feedback.ActiveState = "NoResponse"

				'Does the author want to consider a NoResponse
				' to sum as an incorrect response in the ACC stats?
				If Feedback.CollectNoRespACCStats = True Then
					Feedback.AccStats.AddObservation
Stimulus.Acc
				End If
			End If
		End If

		Select Case Feedback.ActiveState
			Case "Correct"


				Set Feedback_SlideText =
CSlideText(Feedback.States.Item("Correct").Objects(1))
				Feedback_SlideText.Text = "" & _
			Format$((Stimulus.RT / Feedback.RTDivisor), Feedback.RTFormat) & _
			" Seconds Response Time"
				Set Feedback_SlideText = Nothing

				Set Feedback_SlideText =
CSlideText(Feedback.States.Item("Correct").Objects(2))
				Set Feedback_SlideText = Nothing
			Case "Incorrect"


				Set Feedback_SlideText =
CSlideText(Feedback.States.Item("Incorrect").Objects(1))
				Feedback_SlideText.Text = "" & _
			Format$((Stimulus.RT / Feedback.RTDivisor), Feedback.RTFormat) & _
			" Seconds Response Time"
				Set Feedback_SlideText = Nothing

				Set Feedback_SlideText =
CSlideText(Feedback.States.Item("Incorrect").Objects(2))
				Set Feedback_SlideText = Nothing
			Case "NoResponse"


				Set Feedback_SlideText =
CSlideText(Feedback.States.Item("NoResponse").Objects(1))
				Set Feedback_SlideText = Nothing
			Case "Pending"

		End Select



		Feedback.Run


		c.SetAttrib Stimulus.Name & ".OnsetDelay", Stimulus.OnsetDelay
		c.SetAttrib Stimulus.Name & ".OnsetTime", Stimulus.OnsetTime
		c.SetAttrib Stimulus.Name & ".DurationError", Stimulus.DurationError
		c.SetAttrib Stimulus.Name & ".RTTime", Stimulus.RTTime
		c.SetAttrib Stimulus.Name & ".ACC", Stimulus.ACC
		c.SetAttrib Stimulus.Name & ".RT", Stimulus.RT
		c.SetAttrib Stimulus.Name & ".RESP", Stimulus.RESP
		c.SetAttrib Stimulus.Name & ".CRESP", Stimulus.CRESP


		c.Log
End Sub

'--------------------------------------------------------------------------
' InitDevices
'
'--------------------------------------------------------------------------
Sub InitDevices(c As Context)



	SetOSThreadPriority 3


	Set Keyboard = New KeyboardDevice
	Keyboard.Name = "Keyboard"

	Dim KeyboardKeyboardDeviceInfo as KeyboardDeviceInfo
	KeyboardKeyboardDeviceInfo.CollectionMode = ebPressesOnly
	KeyboardKeyboardDeviceInfo.CapsLock = ebCapsLockOff
	KeyboardKeyboardDeviceInfo.NumLock = ebNumLockOff
	'Load values from context if they exist
	If c.AttribExists(Keyboard.Name & ".CollectionMode") Then
KeyboardKeyboardDeviceInfo.CollectionMode = CLng(c.GetAttrib(Keyboard.Name &
".CollectionMode"))
	If c.AttribExists(Keyboard.Name & ".CapsLock") Then
KeyboardKeyboardDeviceInfo.CapsLock = CLng(c.GetAttrib(Keyboard.Name &
".CapsLock"))
	If c.AttribExists(Keyboard.Name & ".NumLock") Then
KeyboardKeyboardDeviceInfo.NumLock = CLng(c.GetAttrib(Keyboard.Name &
".NumLock"))
	If c.AttribExists(Keyboard.Name & ".EmulateDeviceName") Then
KeyboardKeyboardDeviceInfo.EmulateDeviceName = c.GetAttrib(Keyboard.Name &
".EmulateDeviceName")

	'Open the device, unless the context values indicate otherwise
	Dim KeyboardOpen As Boolean
	KeyboardOpen = True
	If c.AttribExists(Keyboard.Name & ".Open") Then KeyboardOpen =
CLogical(c.GetAttrib(Keyboard.Name & ".Open"))
	If KeyboardOpen = True Then
		Keyboard.Open KeyboardKeyboardDeviceInfo
	End If

	Set Mouse = New MouseDevice
	Mouse.Name = "Mouse"

	Dim MouseMouseDeviceInfo as MouseDeviceInfo
	MouseMouseDeviceInfo.OpenMode = ebMouseOpenModeDirect
	MouseMouseDeviceInfo.CollectionMode = ebPressesOnly
	MouseMouseDeviceInfo.ShowCursor = False
	'Load values from context if they exist
	If c.AttribExists(Mouse.Name & ".OpenMode") Then
MouseMouseDeviceInfo.OpenMode = CLng(c.GetAttrib(Mouse.Name & ".OpenMode"))
	If c.AttribExists(Mouse.Name & ".CollectionMode") Then
MouseMouseDeviceInfo.CollectionMode = CLng(c.GetAttrib(Mouse.Name &
".CollectionMode"))
	If c.AttribExists(Mouse.Name & ".ShowCursor") Then
MouseMouseDeviceInfo.ShowCursor = CLogical(c.GetAttrib(Mouse.Name &
".ShowCursor"))
	If c.AttribExists(Mouse.Name & ".EmulateDeviceName") Then
MouseMouseDeviceInfo.EmulateDeviceName = c.GetAttrib(Mouse.Name &
".EmulateDeviceName")

	'Open the device, unless the context values indicate otherwise
	Dim MouseOpen As Boolean
	MouseOpen = True
	If c.AttribExists(Mouse.Name & ".Open") Then MouseOpen =
CLogical(c.GetAttrib(Mouse.Name & ".Open"))
	If MouseOpen = True Then
		Mouse.Open MouseMouseDeviceInfo
	End If

	Set Display = New DisplayDevice
	Display.Name = "Display"

	Dim DisplayDisplayDeviceInfo As DisplayDeviceInfo
	DisplayDisplayDeviceInfo.XRes = 640
	DisplayDisplayDeviceInfo.YRes = 480
	DisplayDisplayDeviceInfo.ColorDepth = 16
	DisplayDisplayDeviceInfo.RefreshRate = 0
	DisplayDisplayDeviceInfo.NumPages = 0

	'Load values from context if they exist
	If c.AttribExists(Display.Name & ".XRes") Then DisplayDisplayDeviceInfo.XRes =
CLng(c.GetAttrib(Display.Name & ".XRes"))
	If c.AttribExists(Display.Name & ".YRes") Then DisplayDisplayDeviceInfo.YRes =
CLng(c.GetAttrib(Display.Name & ".YRes"))
	If c.AttribExists(Display.Name & ".ColorDepth") Then
DisplayDisplayDeviceInfo.ColorDepth = CLng(c.GetAttrib(Display.Name & ".ColorDepth"))
```

```
	'Open the device, unless the context values indicate otherwise
	Dim DisplayOpen As Boolean
	DisplayOpen = True
	If c.AttribExists(Display.Name & ".Open") Then DisplayOpen =
CLogical(c.GetAttrib(Display.Name & ".Open"))
	If DisplayOpen = True Then
		Display.Open DisplayDisplayDeviceInfo
		c.SetAttrib Display.Name & ".RefreshRate",
Format$(Display.CalculatedRefreshRate, "0.000")
	End If

	Set Sound = New SoundDevice
	Sound.Name = "Sound"

	Dim SoundSoundOutDeviceInfo As SoundDeviceInfo
	SoundSoundOutDeviceInfo.Channels = 2
	SoundSoundOutDeviceInfo.SamplesPerSecond = 22050
	SoundSoundOutDeviceInfo.BitsPerSample = 16
	'Load values from context if they exist
	If c.AttribExists(Sound.Name & ".Channels") Then
SoundSoundOutDeviceInfo.Channels = CLng(c.GetAttrib(Sound.Name & ".Channels"))
	If c.AttribExists(Sound.Name & ".SamplesPerSecond") Then
SoundSoundOutDeviceInfo.SamplesPerSecond = CLng(c.GetAttrib(Sound.Name &
".SamplesPerSecond"))
	If c.AttribExists(Sound.Name & ".BitsPerSample") Then
SoundSoundOutDeviceInfo.BitsPerSample = CLng(c.GetAttrib(Sound.Name &
".BitsPerSample"))


	SetOSThreadPriority 0

End Sub



'--------------------------------------------------------------------------
' InitObjects
'
'--------------------------------------------------------------------------
Sub InitObjects(c As Context)

	Set SessionProc = New Procedure
	SessionProc.Name = "SessionProc"
	SessionProc.Tag = ""
	SessionProc.Subroutine = "SessionProc_Run"

	Set Instructions = New TextDisplay
	Instructions.Name = "Instructions"
	Instructions.Tag = ""

	Set InstructionsEchoClients = New EchoClientCollection

	InitTextDisplayDefaults Instructions

	Instructions.Text = "Welcome to the experiment\n\nYou will see a fixation followed
by a picture.\n\n\nPress '9' if you feel beautiful, and '1' otherwise.\n\nUgly  <-->    " &_
					"average  <-->  beautiful\n1---2---3---4---5---
6---7---8---9\n\nPress any key to continue"
	Instructions.BackColor = CColor("black")
	Instructions.ForeColor = CColor("white")
	Instructions.FontSize = "16"
	Instructions.Duration = CLng("10000")
	Instructions.TimingMode = ebTimingModeEvent
	Instructions.PreRelease = Val("0")

	Instructions.OnsetSync = 1
	Instructions.OffsetSync = 0

	Set BlockList = New List
	BlockList.Name = "BlockList"
	BlockList.Tag = ""

	'Initialization for BlockList

	Set BlockList.Order = New SequentialOrder
	Set BlockList.Deletion = NoDeletion
	BlockList.ResetEveryRun = False

	' Create the column headings
	BlockList.AddAttrib "PracticeMode"
	BlockList.Filename = ""
	BlockList.LoadMethod = ebLoadMethodEmbedded

	BlockList.Load

	Set BlockList.TerminateCondition = Cycles(1)
	Set BlockList.ResetCondition = Samples(1)
	BlockList.Reset

	Set Goodbye = New TextDisplay
	Goodbye.Name = "Goodbye"
	Goodbye.Tag = ""

	InitTextDisplayDefaults Goodbye

	Goodbye.Text = "Thank you for participating.\n\n\nGoodbye!"
	Goodbye.BackColor = CColor("black")
	Goodbye.ForeColor = CColor("white")
	Goodbye.ClearAfter = CLogical("yes")
	Goodbye.Duration = CLng("2000")
	Goodbye.TimingMode = ebTimingModeEvent
	Goodbye.PreRelease = Val("0")

	Goodbye.OnsetSync = 1
	Goodbye.OffsetSync = 0

	Set BlockProc = New Procedure
	BlockProc.Name = "BlockProc"
	BlockProc.Tag = ""
	BlockProc.Subroutine = "BlockProc_Run"

	Set Fixation = New TextDisplay
	Fixation.Name = "Fixation"
	Fixation.Tag = ""

	InitTextDisplayDefaults Fixation

	Fixation.Text = "\n\n\n\n\n+\n\n\n\n\n\n\n\nUgly    <-->   average   <-->
beautiful\n1---2---3---4---5---6---7---8---9"
	Fixation.BackColor = CColor("black")
	Fixation.ForeColor = CColor("white")
	Fixation.Duration = CLng("500")
	Fixation.TimingMode = ebTimingModeEvent
	Fixation.PreRelease = Val("0")

	Fixation.OnsetSync = 1
	Fixation.OffsetSync = 0

	Set Feedback = New FeedbackDisplay
	Feedback.Name = "Feedback"
	Feedback.Tag = ""

	Feedback.ACCDivisor = "1.0"
	Feedback.ACCFormat = "Percent"
	Feedback.RTDivisor = "1000.0"
	Feedback.RTFormat = "###0.000"
	Feedback.CorrectRTDivisor = "1000.0"
	Feedback.CorrectRTFormat = "###0.000"
	Feedback.IncorrectRTDivisor = "1000.0"
	Feedback.IncorrectRTFormat = "###0.000"
	Feedback.CollectNoRespACCStats = True
	Feedback.Duration = CLng("1500")
	Feedback.TimingMode = ebTimingModeEvent
	Feedback.PreRelease = Val("0")

	Feedback.OnsetSync = 1
	Feedback.OffsetSync = 0

	Set Feedback_State = New SlideState
	Feedback_State.Name = "Correct"

	InitSlideStateDefaults Feedback_State

	Feedback_State.BackColor = CColor("black")

	Feedback.States.Add Feedback_State, "Correct"


	Set Feedback_SlideText = New SlideText
	Feedback_SlideText.Name = "Text2"

	InitSlideTextDefaults Feedback_SlideText

	Feedback_SlideText.Y = "35%"
	Feedback_SlideText.Width = "75%"
	Feedback_SlideText.Height = "10%"
	Feedback_SlideText.ForeColor = CColor("blue")
	Feedback_SlideText.BackStyle = "transparent"
	Feedback_SlideText.AlignHorizontal = "left"
	Feedback.States.Item("Correct").Objects.Add Feedback_SlideText, "Text2"

	Set Feedback_SlideText = New SlideText
	Feedback_SlideText.Name = "Text1"

	InitSlideTextDefaults Feedback_SlideText
```

```
Feedback_SlideText.Text = "Thanks for your response."
Feedback_SlideText.Y = "20%"
Feedback_SlideText.Width = "75%"
Feedback_SlideText.Height = "10%"
Feedback_SlideText.ForeColor = CColor("blue")
Feedback_SlideText.BackStyle = "transparent"
Feedback_SlideText.AlignHorizontal = "left"
Feedback.States.Item("Correct").Objects.Add Feedback_SlideText, "Text1"

Set Feedback_State = New SlideState
Feedback_State.Name = "Incorrect"

InitSlideStateDefaults Feedback_State

Feedback_State.BackColor = CColor("black")

Feedback.States.Add Feedback_State, "Incorrect"


Set Feedback_SlideText = New SlideText
Feedback_SlideText.Name = "Text2"

InitSlideTextDefaults Feedback_SlideText

Feedback_SlideText.Y = "35%"
Feedback_SlideText.Width = "75%"
Feedback_SlideText.Height = "10%"
Feedback_SlideText.ForeColor = CColor("red")
Feedback_SlideText.BackStyle = "transparent"
Feedback_SlideText.AlignHorizontal = "left"
Feedback.States.Item("Incorrect").Objects.Add Feedback_SlideText, "Text2"

Set Feedback_SlideText = New SlideText
Feedback_SlideText.Name = "Text1"

InitSlideTextDefaults Feedback_SlideText

Feedback_SlideText.Text = "Thanks for your answer"
Feedback_SlideText.Y = "20%"
Feedback_SlideText.Width = "75%"
Feedback_SlideText.Height = "10%"
Feedback_SlideText.ForeColor = CColor("red")
Feedback_SlideText.BackStyle = "transparent"
Feedback_SlideText.AlignHorizontal = "left"
Feedback.States.Item("Incorrect").Objects.Add Feedback_SlideText, "Text1"

Set Feedback_State = New SlideState
Feedback_State.Name = "NoResponse"

InitSlideStateDefaults Feedback_State

Feedback_State.BackColor = CColor("black")

Feedback.States.Add Feedback_State, "NoResponse"


Set Feedback_SlideText = New SlideText
Feedback_SlideText.Name = "Text1"

InitSlideTextDefaults Feedback_SlideText

Feedback_SlideText.Text = "No response detected."
Feedback_SlideText.Y = "20%"
Feedback_SlideText.Width = "75%"
Feedback_SlideText.Height = "10%"
Feedback_SlideText.ForeColor = CColor("red")
Feedback_SlideText.BackStyle = "transparent"
Feedback_SlideText.AlignHorizontal = "left"
Feedback.States.Item("NoResponse").Objects.Add Feedback_SlideText, "Text1"

Set Feedback_State = New SlideState
Feedback_State.Name = "Pending"

InitSlideStateDefaults Feedback_State

Feedback_State.BackColor = CColor("black")

Feedback.States.Add Feedback_State, "Pending"


Set TrialList = New List
TrialList.Name = "TrialList"
TrialList.Tag = ""

'Initialization for TrialList

Set TrialList.Order = New RandomOrder
	Set TrialList.Deletion = NoDeletion
	TrialList.ResetEveryRun = True

	' Create the column headings
	TrialList.AddAttrib "Stimulus"
	TrialList.AddAttrib "CorrectAnswer"
	TrialList.Filename = ""
	TrialList.LoadMethod = ebLoadMethodEmbedded

	TrialList.Load

	Set TrialList.TerminateCondition = Cycles(1)
	Set TrialList.ResetCondition = Samples(440)
	TrialList.Reset

	Set TrialProc = New Procedure
	TrialProc.Name = "TrialProc"
	TrialProc.Tag = ""
	TrialProc.Subroutine = "TrialProc_Run"

	Set Stimulus = New ImageDisplay
	Stimulus.Name = "Stimulus"
	Stimulus.Tag = ""

	Set StimulusEchoClients = New EchoClientCollection

	InitImageDisplayDefaults Stimulus

	Stimulus.BackStyle = "transparent"
	Stimulus.AlignVertical = "top"
	Stimulus.Duration = CLng("900000")
	Stimulus.TimingMode = ebTimingModeEvent
	Stimulus.PreRelease = Val("0")

	Stimulus.OnsetSync = 0
	Stimulus.OffsetSync = 0

	Set Stimulus2 = New ImageDisplay
	Stimulus2.Name = "Stimulus2"
	Stimulus2.Tag = ""

	InitImageDisplayDefaults Stimulus2

	Stimulus2.BackColor = CColor("white")
	Stimulus2.X = "right"
	Stimulus2.Width = "50%"
	Stimulus2.XAlign = "right"
	Stimulus2.Duration = CLng("1000")
	Stimulus2.TimingMode = ebTimingModeEvent
	Stimulus2.PreRelease = Val("0")

	Stimulus2.OnsetSync = 1
	Stimulus2.OffsetSync = 0

End Sub

'--------------------------------------------------------------------------
' InitPackages
'
'--------------------------------------------------------------------------
Sub InitPackages(c As Context)

End Sub



'--------------------------------------------------------------------------
' InitGlobals
'
'--------------------------------------------------------------------------
Sub InitGlobals(c As Context)

End Sub



'--------------------------------------------------------------------------


'--------------------------------------------------------------------------
'--------------------------------------------------------------------------
' UnInitGlobals
'--------------------------------------------------------------------------
Sub UnInitGlobals()
End Sub
'--------------------------------------------------------------------------
```

```
' UnInitDevices
'-------------------------------------------------------------------------
Sub UnInitDevices()

	Keyboard.Close
	Set Keyboard = Nothing

	Mouse.Close
	Set Mouse = Nothing

	Display.Close
	Set Display = Nothing
End Sub


'-------------------------------------------------------------------------
'-------------------------------------------------------------------------
' UnInitPackages
'-------------------------------------------------------------------------
Sub UnInitPackages()
End Sub


'-------------------------------------------------------------------------
' UnInitObjects
'
'-------------------------------------------------------------------------
Sub UnInitObjects()

	Set SessionProc = Nothing

	Set Instructions = Nothing

	Set InstructionsEchoClients = Nothing

	Set BlockList = Nothing

	Set Goodbye = Nothing

	Set BlockProc = Nothing

	Set Fixation = Nothing

	Set Feedback = Nothing

	Set TrialList = Nothing

	Set TrialProc = Nothing

	Set Stimulus = Nothing

	Set StimulusEchoClients = Nothing

	Set Stimulus2 = Nothing


End Sub


'-------------------------------------------------------------------------
' Main
'
'-------------------------------------------------------------------------
Sub Main()

	' Create and initialize the default context, data file,
	' and provide global access to the context.
	Dim c As Context
	Set c = New Context
	Set c.DataFile = New DataFile
	c.PushNewFrame
	Set ebContext = c

	' Set the log level names
	c.SetLogLevelName 1, "Session"
	c.SetLogLevelName 2, "Block"
	c.SetLogLevelName 3, "Trial"
	c.SetLogLevelName 4, "SubTrial"
	c.SetLogLevelName 5, "LogLevel5"
	c.SetLogLevelName 6, "LogLevel6"
	c.SetLogLevelName 7, "LogLevel7"
	c.SetLogLevelName 8, "LogLevel8"
	c.SetLogLevelName 9, "LogLevel9"
	c.SetLogLevelName 10, "LogLevel10"

	' Set standard logging items
	ebContext.SetAttrib "Experiment", "440"
	ebContext.SetAttrib "SessionDate", Date$
	ebContext.SetAttrib "SessionTime", Time$
	ebContext.SetAttrib "RandomSeed", PRNG.GetSeed()
	' Set default for GroupNumber
	c.SetAttrib "Group", "1"

	'Initialize global variables for packages
	InitGlobals c

	CreateDefaultPort

	If Basic.OS = ebWin32 Then
		WinActivate "E-Run Experiment Window"
	End If

	' Get the StartupInfo

	' Set the defaults for all of the StartupInfo
	If Not c.AttribExists("Subject") Then c.SetAttrib "Subject", "1"
	If Not c.AttribExists("Session") Then c.SetAttrib "Session", "1"

	' Determine if StartupInfo.UseDefaults exists and is True/False to override prompts
for StartupInfo parameters
	Dim bStartupInfoUseDefaults As Boolean
	bStartupInfoUseDefaults = False
	If c.AttribExists("StartupInfo.UseDefaults") Then bStartupInfoUseDefaults =
CLogical(c.GetAttrib("StartupInfo.UseDefaults"))
	If Not bStartupInfoUseDefaults Then

		Dim vAnswer As Variant
StartupInfo_Begin:

StartupInfoPrompt_Subject:
		vAnswer = AskBox("Please enter the Subject Number (0-32767):",
c.GetAttrib("Subject"))
		If Not IsEmpty(vAnswer) then
			If Not IsNumeric(vAnswer) then
				MsgBox "Please enter an integer value"
				GoTo StartupInfoPrompt_Subject
			ElseIf CLng(vAnswer) < 0 Then
				MsgBox "The value for Subject must not be
less than 0"
				GoTo StartupInfoPrompt_Subject
			ElseIf CLng(vAnswer) > 32767 Then
				MsgBox "The value for Subject must be not
be greater than 32767"
				GoTo StartupInfoPrompt_Subject
			End If
		Else
			GoTo ExperimentAbort
		End if

		c.SetAttrib "Subject", CStr(vAnswer)

StartupInfoPrompt_Session:
		vAnswer = AskBox("Please enter the Session Number (0-32767):",
c.GetAttrib("Session"))
		If Not IsEmpty(vAnswer) then
			If Not IsNumeric(vAnswer) then
				MsgBox "Please enter an integer value"
				GoTo StartupInfoPrompt_Session
			ElseIf CLng(vAnswer) < 0 Then
				MsgBox "The value for Session must not be
less than 0"
				GoTo StartupInfoPrompt_Session
			ElseIf CLng(vAnswer) > 32767 Then
				MsgBox "The value for Session must be not
be greater than 32767"
				GoTo StartupInfoPrompt_Session
			End If
		Else
			GoTo ExperimentAbort
		End if

		c.SetAttrib "Session", CStr(vAnswer)

		' Display the summary
		Dim strSummary As String
		strSummary = "Subject:    " & c.GetAttrib("Subject") & "\n"
		strSummary = strSummary & "Session:    " & c.GetAttrib("Session") & "\n"
		strSummary = strSummary & "\nContinue with the above startup info?"

		Dim nSummaryAnswer As Integer
		nSummaryAnswer = MsgBox(strSummary, ebYesNoCancel + ebQuestion,
"Summary of Startup Info")
		If nSummaryAnswer = ebNo Then
				GoTo StartupInfo_Begin
		ElseIf nSummaryAnswer = ebCancel Then
				GoTo ExperimentAbort
```

```
		End If
	End If


	'If the attribute Clock.Scale.Override exists
	'  then use it for to set the Clock.Scale value
	If c.AttribExists("Clock.Scale.Override") Then
		Clock.Scale = CDbl(c.GetAttrib("Clock.Scale.Override"))
	End If

	' Set the Filenames for the data files
	Dim strFilenameRecovery As String
	Dim strFilenameEDAT As String

	'If the attribute DataFile.Filename.Override exists
	'  then use it for the .txt and .edat filenames
	If c.AttribExists("DataFile.Filename.Override") Then

		' Set the default Data Filename
		strFilenameRecovery = CStr(c.GetAttrib("DataFile.Filename.Override")) &
".txt"
		strFilenameEDAT = CStr(c.GetAttrib("DataFile.Filename.Override")) &
".edat"

	Else

		' Set the default Data Filename
		strFilenameRecovery = CStr(c.GetAttrib("Experiment")) & "-" &
CStr(c.GetAttrib("Subject")) & "-" & CStr(c.GetAttrib("Session")) & ".txt"
		strFilenameEDAT = CStr(c.GetAttrib("Experiment")) & "-" &
CStr(c.GetAttrib("Subject")) & "-" & CStr(c.GetAttrib("Session")) & ".edat"

	End If

	'Set the name of the data file
	c.DataFile.Filename = strFilenameRecovery

	' If we are logging data, then prompt to overwrite the data file if it exists
	If CLng(c.GetAttrib("Subject")) <> 0 Then
		If FileExists(c.DataFile.Filename) Or FileExists(strFilenameEDAT) Then
			If ebYes <> MsgBox("WARNING: The data file and/or
recovery file already exists:\nFILE: " & c.DataFile.Filename & "\n\nDo you want to
overwrite?", ebYesNo + ebQuestion) Then
				GoTo ExperimentAbort
			End If
		End If
	End If

	' Initialize all system devices, packages, and objects
	InitDevices c
	InitPackages c
	InitObjects c

	' If we are logging data, then open the datafile
	If CLng(c.GetAttrib("Subject")) <> 0 Then
		c.DataFile.Open
		c.LogHeader
	End If



#If RUNTIME_VERSION_MAJOR > 1  Or (RUNTIME_VERSION_MAJOR = 1 And
RUNTIME_VERSION_MINOR >= 2) Then
	' Log clock timing information
	c.SetAttrib "Clock.Information", Clock.Information
#End If

	' Start the running of the Experiment
	SessionProc.Run c

	' Clean up the context and close the datafile
	If CLng(c.GetAttrib("Subject")) <> 0 Then
		c.DataFile.Close
		' Attempt to convert the recovery file into a data file
		Dim nConvert As Long
		nConvert = c.DataFile.Convert(ebProgressSimple)
		If nConvert = 0 Then
			' Settings in E-Studio are set to not remove E-Recovery file
		Else
			' The datafile failed to convert!
			MsgBox "ERROR: The datafile did not convert!\nFILE: " &
c.DataFile.Filename & "\n\nIt is recommended that you recover your data with the E-
Recovery utility"
			MsgBox c.DataFile.GetLastErrorMessage()
		End If
	End If
ExperimentFinish:

	UnInitObjects

	UnInitPackages
	UnInitDevices

	UnInitGlobals

ExperimentAbort:

	' Clean up the context
	c.PopFrame
	Set c = Nothing
	Set ebContext = Nothing

	DestroyDefaultPort

End Sub
```

[DataSection_BlockList(1)]

Weight	Procedure	Nested	PracticeMode
1	BlockProc		No\0

[DataSection_TrialList(1)]

Weight	Procedure	Nested	Stimulus	CorrectAnswer
1	TrialProc		Face_05Jul08_0001_0001.bmp	1
1	TrialProc		Face_05Jul08_0001_0002.bmp	1
1	TrialProc		Face_05Jul08_0001_0003.bmp	1
1	TrialProc		Face_05Jul08_0001_0004.bmp	1
1	TrialProc		Face_05Jul08_0001_0005.bmp	1
1	TrialProc		Face_05Jul08_0001_0006.bmp	1
1	TrialProc		Face_05Jul08_0001_0007.bmp	1
1	TrialProc		Face_05Jul08_0001_0008.bmp	1
1	TrialProc		Face_05Jul08_0001_0009.bmp	1
1	TrialProc		Face_05Jul08_0001_0010.bmp	1
1	TrialProc		Face_05Jul08_0001_0011.bmp	1
1	TrialProc		Face_05Jul08_0001_0012.bmp	1
1	TrialProc		Face_05Jul08_0001_0013.bmp	1
1	TrialProc		Face_05Jul08_0001_0014.bmp	1
1	TrialProc		Face_05Jul08_0001_0015.bmp	1
1	TrialProc		Face_05Jul08_0001_0016.bmp	1
1	TrialProc		Face_05Jul08_0015_0001.bmp	1
1	TrialProc		Face_05Jul08_0015_0002.bmp	1
1	TrialProc		Face_05Jul08_0015_0003.bmp	1
1	TrialProc		Face_05Jul08_0015_0004.bmp	1
1	TrialProc		Face_05Jul08_0015_0005.bmp	1
1	TrialProc		Face_05Jul08_0015_0006.bmp	1
1	TrialProc		Face_05Jul08_0015_0007.bmp	1
1	TrialProc		Face_05Jul08_0015_0008.bmp	1
1	TrialProc		Face_05Jul08_0015_0009.bmp	1
1	TrialProc		Face_05Jul08_0015_0010.bmp	1
1	TrialProc		Face_05Jul08_0015_0011.bmp	1
1	TrialProc		Face_05Jul08_0015_0012.bmp	1
1	TrialProc		Face_05Jul08_0015_0013.bmp	1
1	TrialProc		Face_05Jul08_0015_0014.bmp	1
1	TrialProc		Face_05Jul08_0015_0015.bmp	1
1	TrialProc		Face_05Jul08_0015_0016.bmp	1
1	TrialProc		Face_05Jul08_0029_0001.bmp	1
1	TrialProc		Face_05Jul08_0029_0002.bmp	1
1	TrialProc		Face_05Jul08_0029_0003.bmp	1
1	TrialProc		Face_05Jul08_0029_0004.bmp	1
1	TrialProc		Face_05Jul08_0029_0005.bmp	1
1	TrialProc		Face_05Jul08_0029_0006.bmp	1
1	TrialProc		Face_05Jul08_0029_0007.bmp	1
1	TrialProc		Face_05Jul08_0029_0008.bmp	1
1	TrialProc		Face_05Jul08_0029_0009.bmp	1
1	TrialProc		Face_05Jul08_0029_0010.bmp	1
1	TrialProc		Face_05Jul08_0029_0011.bmp	1
1	TrialProc		Face_05Jul08_0029_0012.bmp	1
1	TrialProc		Face_05Jul08_0029_0013.bmp	1
1	TrialProc		Face_05Jul08_0029_0014.bmp	1
1	TrialProc		Face_05Jul08_0029_0015.bmp	1
1	TrialProc		Face_05Jul08_0029_0016.bmp	1
1	TrialProc		Face_05Jul08_0045_0001.bmp	1
1	TrialProc		Face_05Jul08_0045_0002.bmp	1
1	TrialProc		Face_05Jul08_0045_0003.bmp	1
1	TrialProc		Face_05Jul08_0045_0004.bmp	1
1	TrialProc		Face_05Jul08_0045_0005.bmp	1
1	TrialProc		Face_05Jul08_0045_0006.bmp	1
1	TrialProc		Face_05Jul08_0045_0007.bmp	1
1	TrialProc		Face_05Jul08_0045_0008.bmp	1
1	TrialProc		Face_05Jul08_0045_0009.bmp	1
1	TrialProc		Face_05Jul08_0045_0010.bmp	1
1	TrialProc		Face_05Jul08_0045_0011.bmp	1
1	TrialProc		Face_05Jul08_0045_0012.bmp	1
1	TrialProc		Face_05Jul08_0045_0013.bmp	1
1	TrialProc		Face_05Jul08_0045_0014.bmp	1

1	TrialProc	Face_05Jul08_0045_0015.bmp	1
1	TrialProc	Face_05Jul08_0045_0016.bmp	1
1	TrialProc	Face_05Jul08_0059_0001.bmp	1
1	TrialProc	Face_05Jul08_0059_0002.bmp	1
1	TrialProc	Face_05Jul08_0059_0003.bmp	1
1	TrialProc	Face_05Jul08_0059_0004.bmp	1
1	TrialProc	Face_05Jul08_0059_0005.bmp	1
1	TrialProc	Face_05Jul08_0059_0006.bmp	1
1	TrialProc	Face_05Jul08_0059_0007.bmp	1
1	TrialProc	Face_05Jul08_0059_0008.bmp	1
1	TrialProc	Face_05Jul08_0059_0009.bmp	1
1	TrialProc	Face_05Jul08_0059_0010.bmp	1
1	TrialProc	Face_05Jul08_0059_0011.bmp	1
1	TrialProc	Face_05Jul08_0059_0012.bmp	1
1	TrialProc	Face_05Jul08_0059_0013.bmp	1
1	TrialProc	Face_05Jul08_0059_0014.bmp	1
1	TrialProc	Face_05Jul08_0059_0015.bmp	1
1	TrialProc	Face_05Jul08_0059_0016.bmp	1
1	TrialProc	Face_05Jul08_0075_0001.bmp	1
1	TrialProc	Face_05Jul08_0075_0002.bmp	1
1	TrialProc	Face_05Jul08_0075_0003.bmp	1
1	TrialProc	Face_05Jul08_0075_0004.bmp	1
1	TrialProc	Face_05Jul08_0075_0005.bmp	1
1	TrialProc	Face_05Jul08_0075_0006.bmp	1
1	TrialProc	Face_05Jul08_0075_0007.bmp	1
1	TrialProc	Face_05Jul08_0075_0008.bmp	1
1	TrialProc	Face_05Jul08_0075_0009.bmp	1
1	TrialProc	Face_05Jul08_0075_0010.bmp	1
1	TrialProc	Face_05Jul08_0075_0011.bmp	1
1	TrialProc	Face_05Jul08_0075_0012.bmp	1
1	TrialProc	Face_05Jul08_0075_0013.bmp	1
1	TrialProc	Face_05Jul08_0075_0014.bmp	1
1	TrialProc	Face_05Jul08_0075_0015.bmp	1
1	TrialProc	Face_05Jul08_0075_0016.bmp	1
1	TrialProc	Face_05Jul08_0089_0001.bmp	1
1	TrialProc	Face_05Jul08_0089_0002.bmp	1
1	TrialProc	Face_05Jul08_0089_0003.bmp	1
1	TrialProc	Face_05Jul08_0089_0004.bmp	1
1	TrialProc	Face_05Jul08_0089_0005.bmp	1
1	TrialProc	Face_05Jul08_0089_0006.bmp	1
1	TrialProc	Face_05Jul08_0089_0007.bmp	1
1	TrialProc	Face_05Jul08_0089_0008.bmp	1
1	TrialProc	Face_05Jul08_0089_0009.bmp	1
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1	TrialProc	face_05Jul08_0267.bmp	1
1	TrialProc	face_05Jul08_0269.bmp	1
1	TrialProc	Situation2_Ratio1618.bmp	1\0

C.2 E-prime program listing of Phase II visual assessment (example of Group 1)

```
'       C:\Users\Desmond\Desktop\collar test Final\complete\01.ebs
'       Generated on: 6/29/2011         22:01:48
'
'
'       This file generated with E-Studio interface.
'       E-Prime Copyright © 1996-2005 Psychology Software Tools.
'       ALL RIGHTS RESERVED
'
'       Legal use of this experiment script requires a full E-Prime or Runtime License.
'
'
'       Author:
'               PST
'
'
'
'

Option CStrings On
Dim ebContext as Context


'--------------------------------------------------------------------------
' Class Declarations
'--------------------------------------------------------------------------



'--------------------------------------------------------------------------
'InitTextDisplayDefaults
'--------------------------------------------------------------------------
Sub InitTextDisplayDefaults(theTextDisplay As TextDisplay)

        If theTextDisplay Is Nothing Then Exit Sub

        theTextDisplay.X = "center"
        theTextDisplay.Y = "center"
        theTextDisplay.Width = "100%"
        theTextDisplay.Height = "100%"
        theTextDisplay.ForeColor = CColor("black")
        theTextDisplay.BackColor = CColor("white")
        theTextDisplay.BackStyle = "opaque"
        theTextDisplay.BorderColor = CColor("black")
        theTextDisplay.BorderWidth = CLng("0")
        theTextDisplay.XAlign = "center"
        theTextDisplay.YAlign = "center"
        theTextDisplay.AlignHorizontal = "center"
        theTextDisplay.AlignVertical = "center"
        theTextDisplay.WordWrap = True
        theTextDisplay.ClearAfter = CLogical("No")
        theTextDisplay.FontName = "Courier New"
        theTextDisplay.FontSize = "18"
        theTextDisplay.FontBold = CLogical("Yes")
        theTextDisplay.FontItalic = CLogical("No")
        theTextDisplay.FontUnderline = CLogical("No")
        theTextDisplay.FontStrikeout = CLogical("No")

End Sub





'--------------------------------------------------------------------------
'InitImageDisplayDefaults
'--------------------------------------------------------------------------
Sub InitImageDisplayDefaults(theImageDisplay As ImageDisplay)

        If theImageDisplay Is Nothing Then Exit Sub

        theImageDisplay.X = "center"
        theImageDisplay.Y = "center"
        theImageDisplay.Width = "100%"
        theImageDisplay.Height = "100%"
        theImageDisplay.BackColor = CColor("black")
        theImageDisplay.BackStyle = "opaque"
        theImageDisplay.BorderColor = CColor("black")
        theImageDisplay.BorderWidth = CLng("0")
        theImageDisplay.XAlign = "center"
        theImageDisplay.YAlign = "center"
        theImageDisplay.AlignHorizontal = "center"
        theImageDisplay.AlignVertical = "center"
        theImageDisplay.ClearAfter = CLogical("No")
        theImageDisplay.UseSourceColorKey = CLogical("No")
        theImageDisplay.SourceColorKey = CColor("black")
        theImageDisplay.MirrorLeftRight = CLogical("No")
        theImageDisplay.MirrorUpDown = CLogical("No")
        theImageDisplay.Stretch = CLogical("No")

End Sub




'--------------------------------------------------------------------------
' Instance Declarations
'--------------------------------------------------------------------------
Dim Keyboard As KeyboardDevice
Dim Mouse As MouseDevice
Dim Display As DisplayDevice
Dim Sound As SoundDevice
Dim SessionProc As Procedure

Dim Instructions As TextDisplay
Dim InstructionsEchoClients As EchoClientCollection

Dim BlockList As List

Dim Goodbye As TextDisplay

Dim BlockProc As Procedure

Dim Fixation As TextDisplay

Dim TrialList As List

Dim TrialProc As Procedure

Dim Stimulus As ImageDisplay
Dim StimulusEchoClients As EchoClientCollection

Dim countdown As TextDisplay



'--------------------------------------------------------------------------
' Package Declare Script
'--------------------------------------------------------------------------



'--------------------------------------------------------------------------
' User Script
'--------------------------------------------------------------------------



'--------------------------------------------------------------------------
' Package Global Script
'--------------------------------------------------------------------------



'--------------------------------------------------------------------------
' Package Routines
'--------------------------------------------------------------------------



'--------------------------------------------------------------------------
' Implementation
'--------------------------------------------------------------------------
Sub SessionProc_Run(c as Context)


        Instructions.InputMasks.Reset

        If Keyboard.GetState() = ebStateOpen Then
                InstructionsEchoClients.RemoveAll
                Instructions.InputMasks.Add Keyboard.CreateInputMask("{ANY}", "",
CLng(Instructions.Duration), CLng("1"), ebEndResponseActionTerminate, CLogical("Yes"),
"", "", "ResponseMode:All ProcessBackspace:Yes")
```

```
	End If

	Instructions.Run
	BlockList.Run c

	Goodbye.Run



#If RUNTIME_VERSION_MAJOR > 1  Or (RUNTIME_VERSION_MAJOR = 1 And
RUNTIME_VERSION_MINOR >= 2) Then
	' Log clock timing information
	c.SetAttrib "Clock.Information", Clock.Information
#End If


	c.Log
End Sub

Sub BlockProc_Run(c as Context)
	TrialList.Run c

	c.Log
End Sub

Sub TrialProc_Run(c as Context)

	Fixation.Run

	countdown.Text = c.GetAttrib("" &_
					c.GetAttrib("running") &_
					".sample") &_
					"/440"
	countdown.Run

	Stimulus.Filename = c.GetAttrib("Stimulus")
	Stimulus.Load

	Stimulus.InputMasks.Reset

	If Keyboard.GetState() = ebStateOpen Then
		StimulusEchoClients.RemoveAll
		Stimulus.InputMasks.Add Keyboard.CreateInputMask("123456789",
c.GetAttrib("CorrectAnswer"), CLng(Stimulus.Duration), CLng("1"),
ebEndResponseActionTerminate, CLogical("Yes"), "", "", "ResponseMode:All
ProcessBackspace:Yes")


	End If

	Stimulus.Run
	c.SetAttrib Stimulus.Name & ".OnsetDelay", Stimulus.OnsetDelay
	c.SetAttrib Stimulus.Name & ".OnsetTime", Stimulus.OnsetTime
	c.SetAttrib Stimulus.Name & ".DurationError", Stimulus.DurationError
	c.SetAttrib Stimulus.Name & ".RTTime", Stimulus.RTTime
	c.SetAttrib Stimulus.Name & ".ACC", Stimulus.ACC
	c.SetAttrib Stimulus.Name & ".RT", Stimulus.RT
	c.SetAttrib Stimulus.Name & ".RESP", Stimulus.RESP
	c.SetAttrib Stimulus.Name & ".CRESP", Stimulus.CRESP

	c.SetAttrib Stimulus.Name & ".OnsetDelay", Stimulus.OnsetDelay
	c.SetAttrib Stimulus.Name & ".OnsetTime", Stimulus.OnsetTime
	c.SetAttrib Stimulus.Name & ".DurationError", Stimulus.DurationError
	c.SetAttrib Stimulus.Name & ".RTTime", Stimulus.RTTime
	c.SetAttrib Stimulus.Name & ".ACC", Stimulus.ACC
	c.SetAttrib Stimulus.Name & ".RT", Stimulus.RT
	c.SetAttrib Stimulus.Name & ".RESP", Stimulus.RESP
	c.SetAttrib Stimulus.Name & ".CRESP", Stimulus.CRESP


	c.Log
End Sub


'--------------------------------------------------------------------------
' InitDevices
'
'--------------------------------------------------------------------------
Sub InitDevices(c As Context)



	SetOSThreadPriority 3

	Set Keyboard = New KeyboardDevice
	Keyboard.Name = "Keyboard"

	Dim KeyboardKeyboardDeviceInfo as KeyboardDeviceInfo
	KeyboardKeyboardDeviceInfo.CollectionMode = ebPressesOnly
	KeyboardKeyboardDeviceInfo.CapsLock = ebCapsLockOff
	KeyboardKeyboardDeviceInfo.NumLock = ebNumLockOff
	'Load values from context if they exist
	If c.AttribExists(Keyboard.Name & ".CollectionMode") Then
KeyboardKeyboardDeviceInfo.CollectionMode = CLng(c.GetAttrib(Keyboard.Name &
".CollectionMode"))
	If c.AttribExists(Keyboard.Name & ".CapsLock") Then
KeyboardKeyboardDeviceInfo.CapsLock = CLng(c.GetAttrib(Keyboard.Name &
".CapsLock"))
	If c.AttribExists(Keyboard.Name & ".NumLock") Then
KeyboardKeyboardDeviceInfo.NumLock = CLng(c.GetAttrib(Keyboard.Name &
".NumLock"))
	If c.AttribExists(Keyboard.Name & ".EmulateDeviceName") Then
KeyboardKeyboardDeviceInfo.EmulateDeviceName = c.GetAttrib(Keyboard.Name &
".EmulateDeviceName")

	'Open the device, unless the context values indicate otherwise
	Dim KeyboardOpen As Boolean
	KeyboardOpen = True
	If c.AttribExists(Keyboard.Name & ".Open") Then KeyboardOpen =
CLogical(c.GetAttrib(Keyboard.Name & ".Open"))
	If KeyboardOpen = True Then
		Keyboard.Open KeyboardKeyboardDeviceInfo
	End If

	Set Mouse = New MouseDevice
	Mouse.Name = "Mouse"

	Dim MouseMouseDeviceInfo as MouseDeviceInfo
	MouseMouseDeviceInfo.OpenMode = ebMouseOpenModeDirect
	MouseMouseDeviceInfo.CollectionMode = ebPressesOnly
	MouseMouseDeviceInfo.ShowCursor = False
	'Load values from context if they exist
	If c.AttribExists(Mouse.Name & ".OpenMode") Then
MouseMouseDeviceInfo.OpenMode = CLng(c.GetAttrib(Mouse.Name & ".OpenMode"))
	If c.AttribExists(Mouse.Name & ".CollectionMode") Then
MouseMouseDeviceInfo.CollectionMode = CLng(c.GetAttrib(Mouse.Name &
".CollectionMode"))
	If c.AttribExists(Mouse.Name & ".ShowCursor") Then
MouseMouseDeviceInfo.ShowCursor = CLogical(c.GetAttrib(Mouse.Name &
".ShowCursor"))
	If c.AttribExists(Mouse.Name & ".EmulateDeviceName") Then
MouseMouseDeviceInfo.EmulateDeviceName = c.GetAttrib(Mouse.Name &
".EmulateDeviceName")

	'Open the device, unless the context values indicate otherwise
	Dim MouseOpen As Boolean
	MouseOpen = True
	If c.AttribExists(Mouse.Name & ".Open") Then MouseOpen =
CLogical(c.GetAttrib(Mouse.Name & ".Open"))
	If MouseOpen = True Then
		Mouse.Open MouseMouseDeviceInfo
	End If

	Set Display = New DisplayDevice
	Display.Name = "Display"

	Dim DisplayDisplayDeviceInfo As DisplayDeviceInfo
	DisplayDisplayDeviceInfo.XRes = 640
	DisplayDisplayDeviceInfo.YRes = 480
	DisplayDisplayDeviceInfo.ColorDepth = 16
	DisplayDisplayDeviceInfo.RefreshRate = 0
	DisplayDisplayDeviceInfo.NumPages = 0

	'Load values from context if they exist
	If c.AttribExists(Display.Name & ".XRes") Then DisplayDisplayDeviceInfo.XRes =
CLng(c.GetAttrib(Display.Name & ".XRes"))
	If c.AttribExists(Display.Name & ".YRes") Then DisplayDisplayDeviceInfo.YRes =
CLng(c.GetAttrib(Display.Name & ".YRes"))
	If c.AttribExists(Display.Name & ".ColorDepth") Then
DisplayDisplayDeviceInfo.ColorDepth = CLng(c.GetAttrib(Display.Name & ".ColorDepth"))

	'Open the device, unless the context values indicate otherwise
	Dim DisplayOpen As Boolean
	DisplayOpen = True
	If c.AttribExists(Display.Name & ".Open") Then DisplayOpen =
CLogical(c.GetAttrib(Display.Name & ".Open"))
	If DisplayOpen = True Then
		Display.Open DisplayDisplayDeviceInfo
		c.SetAttrib Display.Name & ".RefreshRate",
Format$(Display.CalculatedRefreshRate, "0.000")
	End If
```

```
	Set Sound = New SoundDevice
	Sound.Name = "Sound"

	Dim SoundSoundOutDeviceInfo As SoundDeviceInfo
	SoundSoundOutDeviceInfo.Channels = 2
	SoundSoundOutDeviceInfo.SamplesPerSecond = 22050
	SoundSoundOutDeviceInfo.BitsPerSample = 16
	'Load values from context if they exist
	If c.AttribExists(Sound.Name & ".Channels") Then
SoundSoundOutDeviceInfo.Channels = CLng(c.GetAttrib(Sound.Name & ".Channels"))
	If c.AttribExists(Sound.Name & ".SamplesPerSecond") Then
SoundSoundOutDeviceInfo.SamplesPerSecond = CLng(c.GetAttrib(Sound.Name &
".SamplesPerSecond"))
	If c.AttribExists(Sound.Name & ".BitsPerSample") Then
SoundSoundOutDeviceInfo.BitsPerSample = CLng(c.GetAttrib(Sound.Name &
".BitsPerSample"))


	SetOSThreadPriority 0

End Sub



'--------------------------------------------------------------------------
' InitObjects
'
'--------------------------------------------------------------------------
Sub InitObjects(c As Context)

	Set SessionProc = New Procedure
	SessionProc.Name = "SessionProc"
	SessionProc.Tag = ""
	SessionProc.Subroutine = "SessionProc_Run"

	Set Instructions = New TextDisplay
	Instructions.Name = "Instructions"
	Instructions.Tag = ""

	Set InstructionsEchoClients = New EchoClientCollection

	InitTextDisplayDefaults Instructions

	Instructions.Text = "Welcome to the experiment\n\nYou will see a fixation followed
by a picture.\n\n\nPress '9' if you feel beautiful, and '1' otherwise.\n\nUgly  <-->    " &_
							"average  <-->  beautiful\n1---2---3---4---5---
6---7---8---9\n\nPress any key to continue"
	Instructions.BackColor = CColor("black")
	Instructions.ForeColor = CColor("white")
	Instructions.FontSize = "16"
	Instructions.Duration = CLng("10000")
	Instructions.TimingMode = ebTimingModeEvent
	Instructions.PreRelease = Val("0")

	Instructions.OnsetSync = 1
	Instructions.OffsetSync = 0

	Set BlockList = New List
	BlockList.Name = "BlockList"
	BlockList.Tag = ""

	'Initialization for BlockList

	Set BlockList.Order = New RandomOrder
	Set BlockList.Deletion = NoDeletion
	BlockList.ResetEveryRun = False

	' Create the column headings
	BlockList.AddAttrib "PracticeMode"
	BlockList.Filename = ""
	BlockList.LoadMethod = ebLoadMethodEmbedded

	BlockList.Load

	Set BlockList.TerminateCondition = Cycles(1)
	Set BlockList.ResetCondition = Samples(1)
	BlockList.Reset

	Set Goodbye = New TextDisplay
	Goodbye.Name = "Goodbye"
	Goodbye.Tag = ""

	InitTextDisplayDefaults Goodbye

	Goodbye.Text = "Thank you for participating.\n\n\nGoodbye!"
	Goodbye.BackColor = CColor("black")
	Goodbye.ForeColor = CColor("white")
	Goodbye.ClearAfter = CLogical("yes")
	Goodbye.Duration = CLng("2000")
	Goodbye.TimingMode = ebTimingModeEvent
	Goodbye.PreRelease = Val("0")

	Goodbye.OnsetSync = 1
	Goodbye.OffsetSync = 0

	Set BlockProc = New Procedure
	BlockProc.Name = "BlockProc"
	BlockProc.Tag = ""
	BlockProc.Subroutine = "BlockProc_Run"

	Set Fixation = New TextDisplay
	Fixation.Name = "Fixation"
	Fixation.Tag = ""

	InitTextDisplayDefaults Fixation

	Fixation.Text = "\n\n\n\n\n+\n\n\n\n\n\n\n\nUgly    <-->   average   <-->
beautiful\n1---2---3---4---5---6---7---8---9"
	Fixation.BackColor = CColor("black")
	Fixation.ForeColor = CColor("white")
	Fixation.Duration = CLng("500")
	Fixation.TimingMode = ebTimingModeEvent
	Fixation.PreRelease = Val("0")

	Fixation.OnsetSync = 1
	Fixation.OffsetSync = 0

	Set TrialList = New List
	TrialList.Name = "TrialList"
	TrialList.Tag = ""

	'Initialization for TrialList

	Set TrialList.Order = New RandomOrder
	Set TrialList.Deletion = NoDeletion
	TrialList.ResetEveryRun = True

	' Create the column headings
	TrialList.AddAttrib "Stimulus"
	TrialList.AddAttrib "CorrectAnswer"
	TrialList.Filename = ""
	TrialList.LoadMethod = ebLoadMethodEmbedded

	TrialList.Load

	Set TrialList.TerminateCondition = Cycles(1)
	Set TrialList.ResetCondition = Samples(440)
	TrialList.Reset

	Set TrialProc = New Procedure
	TrialProc.Name = "TrialProc"
	TrialProc.Tag = ""
	TrialProc.Subroutine = "TrialProc_Run"

	Set Stimulus = New ImageDisplay
	Stimulus.Name = "Stimulus"
	Stimulus.Tag = ""

	Set StimulusEchoClients = New EchoClientCollection

	InitImageDisplayDefaults Stimulus

	Stimulus.BackStyle = "transparent"
	Stimulus.AlignVertical = "top"
	Stimulus.Duration = CLng("6000000")
	Stimulus.TimingMode = ebTimingModeEvent
	Stimulus.PreRelease = Val("0")

	Stimulus.OnsetSync = 0
	Stimulus.OffsetSync = 0

	Set countdown = New TextDisplay
	countdown.Name = "countdown"
	countdown.Tag = ""

	InitTextDisplayDefaults countdown

	countdown.BackStyle = "transparent"
	countdown.ForeColor = CColor("silver")
	countdown.AlignVertical = "bottom"
	countdown.AlignHorizontal = "right"
	countdown.FontSize = "10"
	countdown.Duration = CLng("10")
	countdown.TimingMode = ebTimingModeEvent
	countdown.PreRelease = Val("0")
```

```
	countdown.OnsetSync = 1
	countdown.OffsetSync = 0


End Sub


'--------------------------------------------------------------------------
' InitPackages
'
'--------------------------------------------------------------------------
Sub InitPackages(c As Context)

End Sub



'--------------------------------------------------------------------------
' InitGlobals
'
'--------------------------------------------------------------------------
Sub InitGlobals(c As Context)

End Sub



'--------------------------------------------------------------------------



'--------------------------------------------------------------------------
'--------------------------------------------------------------------------
' UnInitGlobals
'--------------------------------------------------------------------------
Sub UnInitGlobals()
End Sub
'--------------------------------------------------------------------------
' UnInitDevices
'--------------------------------------------------------------------------
Sub UnInitDevices()

	Keyboard.Close
	Set Keyboard = Nothing

	Mouse.Close
	Set Mouse = Nothing

	Display.Close
	Set Display = Nothing
End Sub


'--------------------------------------------------------------------------
'--------------------------------------------------------------------------
' UnInitPackages
'--------------------------------------------------------------------------
Sub UnInitPackages()
End Sub


'--------------------------------------------------------------------------
' UnInitObjects
'
'--------------------------------------------------------------------------
Sub UnInitObjects()

	Set SessionProc = Nothing

	Set Instructions = Nothing

	Set InstructionsEchoClients = Nothing

	Set BlockList = Nothing

	Set Goodbye = Nothing

	Set BlockProc = Nothing

	Set Fixation = Nothing

	Set TrialList = Nothing

	Set TrialProc = Nothing

	Set Stimulus = Nothing

	Set StimulusEchoClients = Nothing
```

```
	Set countdown = Nothing


End Sub


'--------------------------------------------------------------------------
' Main
'
'--------------------------------------------------------------------------
Sub Main()

	' Create and initialize the default context, data file,
	' and provide global access to the context.
	Dim c As Context
	Set c = New Context
	Set c.DataFile = New DataFile
	c.PushNewFrame
	Set ebContext = c

	' Set the log level names
	c.SetLogLevelName 1, "Session"
	c.SetLogLevelName 2, "Block"
	c.SetLogLevelName 3, "Trial"
	c.SetLogLevelName 4, "SubTrial"
	c.SetLogLevelName 5, "LogLevel5"
	c.SetLogLevelName 6, "LogLevel6"
	c.SetLogLevelName 7, "LogLevel7"
	c.SetLogLevelName 8, "LogLevel8"
	c.SetLogLevelName 9, "LogLevel9"
	c.SetLogLevelName 10, "LogLevel10"

	' Set standard logging items
	ebContext.SetAttrib "Experiment", "01"
	ebContext.SetAttrib "SessionDate", Date$
	ebContext.SetAttrib "SessionTime", Time$
	ebContext.SetAttrib "RandomSeed", PRNG.GetSeed()
	' Set default for GroupNumber
	c.SetAttrib "Group", "1"

	'Initialize global variables for packages
	InitGlobals c

	CreateDefaultPort

	If Basic.OS = ebWin32 Then
		WinActivate "E-Run Experiment Window"
	End If

	' Get the StartupInfo

	' Set the defaults for all of the StartupInfo
	If Not c.AttribExists("Subject") Then c.SetAttrib "Subject", "1"
	If Not c.AttribExists("Session") Then c.SetAttrib "Session", "1"

	' Determine if StartupInfo.UseDefaults exists and is True/False to override prompts
for StartupInfo parameters
	Dim bStartupInfoUseDefaults As Boolean
	bStartupInfoUseDefaults = False
	If c.AttribExists("StartupInfo.UseDefaults") Then bStartupInfoUseDefaults =
CLogical(c.GetAttrib("StartupInfo.UseDefaults"))
	If Not bStartupInfoUseDefaults Then

		Dim vAnswer As Variant
StartupInfo_Begin:

StartupInfoPrompt_Subject:
		vAnswer = AskBox("Please enter the Subject Number (0-32767):",
c.GetAttrib("Subject"))
		If Not IsEmpty(vAnswer) then
			If Not IsNumeric(vAnswer) then
				MsgBox "Please enter an integer value"
				GoTo StartupInfoPrompt_Subject
			ElseIf CLng(vAnswer) < 0 Then
				MsgBox "The value for Subject must not be
less than 0"
				GoTo StartupInfoPrompt_Subject
			ElseIf CLng(vAnswer) > 32767 Then
				MsgBox "The value for Subject must be not
be greater than 32767"
				GoTo StartupInfoPrompt_Subject
			End If
		Else
			GoTo ExperimentAbort
		End if

		c.SetAttrib "Subject", CStr(vAnswer)
```

```
StartupInfoPrompt_Session:
		vAnswer = AskBox("Please enter the Session Number (0-32767):", 
c.GetAttrib("Session"))
		If Not IsEmpty(vAnswer) then
			If Not IsNumeric(vAnswer) then
				MsgBox "Please enter an integer value"
				GoTo StartupInfoPrompt_Session
			ElseIf CLng(vAnswer) < 0 Then
				MsgBox "The value for Session must not be 
less than 0"
				GoTo StartupInfoPrompt_Session
			ElseIf CLng(vAnswer) > 32767 Then
				MsgBox "The value for Session must be not 
be greater than 32767"
				GoTo StartupInfoPrompt_Session
			End If
		Else
			GoTo ExperimentAbort
		End if

		c.SetAttrib "Session", CStr(vAnswer)

		' Display the summary
		Dim strSummary As String
		strSummary = "Subject:    " & c.GetAttrib("Subject") & "\n"
		strSummary = strSummary & "Session:    " & c.GetAttrib("Session") & "\n"
		strSummary = strSummary & "\nContinue with the above startup info?"

		Dim nSummaryAnswer As Integer
		nSummaryAnswer = MsgBox(strSummary, ebYesNoCancel + ebQuestion, 
"Summary of Startup Info")
		If nSummaryAnswer = ebNo Then
				GoTo StartupInfo_Begin
		ElseIf nSummaryAnswer = ebCancel Then
				GoTo ExperimentAbort
		End If

	End If


	'If the attribute Clock.Scale.Override exists
	'  then use it for to set the Clock.Scale value
	If c.AttribExists("Clock.Scale.Override") Then
		Clock.Scale = CDbl(c.GetAttrib("Clock.Scale.Override"))
	End If

	' Set the Filenames for the data files
	Dim strFilenameRecovery As String
	Dim strFilenameEDAT As String

	'If the attribute DataFile.Filename.Override exists
	'  then use it for the .txt and .edat filenames
	If c.AttribExists("DataFile.Filename.Override") Then

		' Set the default Data Filename
		strFilenameRecovery = CStr(c.GetAttrib("DataFile.Filename.Override")) & 
".txt"
		strFilenameEDAT = CStr(c.GetAttrib("DataFile.Filename.Override")) & 
".edat"

	Else

		' Set the default Data Filename
		strFilenameRecovery = CStr(c.GetAttrib("Experiment")) & "-" & 
CStr(c.GetAttrib("Subject")) & "-" & CStr(c.GetAttrib("Session")) & ".txt"
		strFilenameEDAT = CStr(c.GetAttrib("Experiment")) & "-" & 
CStr(c.GetAttrib("Subject")) & "-" & CStr(c.GetAttrib("Session")) & ".edat"

	End If

	'Set the name of the data file
	c.DataFile.Filename = strFilenameRecovery

	' If we are logging data, then prompt to overwrite the data file if it exists
	If CLng(c.GetAttrib("Subject")) <> 0 Then
		If FileExists(c.DataFile.Filename) Or FileExists(strFilenameEDAT) Then
			If ebYes <> MsgBox("WARNING: The data file and/or 
recovery file already exists:\nFILE: " & c.DataFile.Filename & "\n\nDo you want to 
overwrite?", ebYesNo + ebQuestion) Then
				GoTo ExperimentAbort
			End If
		End If
	End If

	' Initialize all system devices, packages, and objects
	InitDevices c
	InitPackages c
	InitObjects c
```

```
	' If we are logging data, then open the datafile
	If CLng(c.GetAttrib("Subject")) <> 0 Then
		c.DataFile.Open
		c.LogHeader
	End If



#If RUNTIME_VERSION_MAJOR > 1  Or (RUNTIME_VERSION_MAJOR = 1 And 
RUNTIME_VERSION_MINOR >= 2) Then
	' Log clock timing information
	c.SetAttrib "Clock.Information", Clock.Information
#End If

	' Start the running of the Experiment
	SessionProc.Run c

	' Clean up the context and close the datafile
	If CLng(c.GetAttrib("Subject")) <> 0 Then
		c.DataFile.Close
		' Attempt to convert the recovery file into a data file
		Dim nConvert As Long
		nConvert = c.DataFile.Convert(ebProgressSimple)
		If nConvert = 0 Then
			' Settings in E-Studio are set to not remove E-Recovery file
		Else
			' The datafile failed to convert!
			MsgBox "ERROR: The datafile did not convert!\nFILE: " & 
c.DataFile.Filename & "\n\nIt is recommended that you recover your data with the E-
Recovery utility"
			MsgBox c.DataFile.GetLastErrorMessage()
		End If
	End If
ExperimentFinish:

	UnInitObjects

	UnInitPackages
	UnInitDevices

	UnInitGlobals

ExperimentAbort:

	' Clean up the context
	c.PopFrame
	Set c = Nothing
	Set ebContext = Nothing

	DestroyDefaultPort

End Sub


[DataSection_BlockList(1)]
Weight	Procedure	Nested	PracticeMode
1	BlockProc		No\0

[DataSection_TrialList(1)]
Weight	Procedure	Nested	Stimulus	CorrectAnswer
1  TrialProc	01LongLroundround\\0001_Long_Lroundround_0001.bmp1
1  TrialProc	01LongLroundround\\0001_Long_Lroundround_0002.bmp1
1  TrialProc	01LongLroundround\\0001_Long_Lroundround_0003.bmp1
1  TrialProc	01LongLroundround\\0001_Long_Lroundround_0004.bmp1
1  TrialProc	01LongLroundround\\0001_Long_Lroundround_0005.bmp1
1  TrialProc	01LongLroundround\\0001_Long_Lroundround_0006.bmp1
1  TrialProc	01LongLroundround\\0001_Long_Lroundround_0007.bmp1
1  TrialProc	01LongLroundround\\0001_Long_Lroundround_0008.bmp1
1  TrialProc	01LongLroundround\\0001_Long_Lroundround_0009.bmp1
1  TrialProc	01LongLroundround\\0001_Long_Lroundround_0010.bmp1
1  TrialProc	01LongLroundround\\0001_Long_Lroundround_0011.bmp1
1  TrialProc	01LongLroundround\\0001_Long_Lroundround_0012.bmp1
1  TrialProc	01LongLroundround\\0001_Long_Lroundround_0013.bmp1
1  TrialProc	01LongLroundround\\0001_Long_Lroundround_0014.bmp1
1  TrialProc	01LongLroundround\\0001_Long_Lroundround_0015.bmp1
1  TrialProc	01LongLroundround\\0001_Long_Lroundround_0016.bmp1
1  TrialProc	01LongLroundround\\0015_Long_Lroundround_0001.bmp1
1  TrialProc	01LongLroundround\\0015_Long_Lroundround_0002.bmp1
1  TrialProc	01LongLroundround\\0015_Long_Lroundround_0003.bmp1
1  TrialProc	01LongLroundround\\0015_Long_Lroundround_0004.bmp1
1  TrialProc	01LongLroundround\\0015_Long_Lroundround_0005.bmp1
1  TrialProc	01LongLroundround\\0015_Long_Lroundround_0006.bmp1
1  TrialProc	01LongLroundround\\0015_Long_Lroundround_0007.bmp1
1  TrialProc	01LongLroundround\\0015_Long_Lroundround_0008.bmp1
1  TrialProc	01LongLroundround\\0015_Long_Lroundround_0009.bmp1
1  TrialProc	01LongLroundround\\0015_Long_Lroundround_0010.bmp1
1  TrialProc	01LongLroundround\\0015_Long_Lroundround_0011.bmp1
```

1	TrialProc	01LongLroundround\\0015_Long_Lroundround_0012.bmp1
1	TrialProc	01LongLroundround\\0015_Long_Lroundround_0013.bmp1
1	TrialProc	01LongLroundround\\0015_Long_Lroundround_0014.bmp1
1	TrialProc	01LongLroundround\\0015_Long_Lroundround_0015.bmp1
1	TrialProc	01LongLroundround\\0015_Long_Lroundround_0016.bmp1
1	TrialProc	01LongLroundround\\0029_Long_Lroundround_0001.bmp1
1	TrialProc	01LongLroundround\\0029_Long_Lroundround_0002.bmp1
1	TrialProc	01LongLroundround\\0029_Long_Lroundround_0003.bmp1
1	TrialProc	01LongLroundround\\0029_Long_Lroundround_0004.bmp1
1	TrialProc	01LongLroundround\\0029_Long_Lroundround_0005.bmp1
1	TrialProc	01LongLroundround\\0029_Long_Lroundround_0006.bmp1
1	TrialProc	01LongLroundround\\0029_Long_Lroundround_0007.bmp1
1	TrialProc	01LongLroundround\\0029_Long_Lroundround_0008.bmp1
1	TrialProc	01LongLroundround\\0029_Long_Lroundround_0009.bmp1
1	TrialProc	01LongLroundround\\0029_Long_Lroundround_0010.bmp1
1	TrialProc	01LongLroundround\\0029_Long_Lroundround_0011.bmp1
1	TrialProc	01LongLroundround\\0029_Long_Lroundround_0012.bmp1
1	TrialProc	01LongLroundround\\0029_Long_Lroundround_0013.bmp1
1	TrialProc	01LongLroundround\\0029_Long_Lroundround_0014.bmp1
1	TrialProc	01LongLroundround\\0029_Long_Lroundround_0015.bmp1
1	TrialProc	01LongLroundround\\0029_Long_Lroundround_0016.bmp1
1	TrialProc	01LongLroundround\\0045_Long_Lroundround_0001.bmp1
1	TrialProc	01LongLroundround\\0045_Long_Lroundround_0002.bmp1
1	TrialProc	01LongLroundround\\0045_Long_Lroundround_0003.bmp1
1	TrialProc	01LongLroundround\\0045_Long_Lroundround_0004.bmp1
1	TrialProc	01LongLroundround\\0045_Long_Lroundround_0005.bmp1
1	TrialProc	01LongLroundround\\0045_Long_Lroundround_0006.bmp1
1	TrialProc	01LongLroundround\\0045_Long_Lroundround_0007.bmp1
1	TrialProc	01LongLroundround\\0045_Long_Lroundround_0008.bmp1
1	TrialProc	01LongLroundround\\0045_Long_Lroundround_0009.bmp1
1	TrialProc	01LongLroundround\\0045_Long_Lroundround_0010.bmp1
1	TrialProc	01LongLroundround\\0045_Long_Lroundround_0011.bmp1
1	TrialProc	01LongLroundround\\0045_Long_Lroundround_0012.bmp1
1	TrialProc	01LongLroundround\\0045_Long_Lroundround_0013.bmp1
1	TrialProc	01LongLroundround\\0045_Long_Lroundround_0014.bmp1
1	TrialProc	01LongLroundround\\0045_Long_Lroundround_0015.bmp1
1	TrialProc	01LongLroundround\\0045_Long_Lroundround_0016.bmp1
1	TrialProc	01LongLroundround\\0059_Long_Lroundround_0001.bmp1
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1	TrialProc	01LongLroundround\\Long_Lroundround_0127.bmp	1
1	TrialProc	01LongLroundround\\Long_Lroundround_0129.bmp	1
1	TrialProc	01LongLroundround\\Long_Lroundround_0131.bmp	1
1	TrialProc	01LongLroundround\\Long_Lroundround_0133.bmp	1
1	TrialProc	01LongLroundround\\Long_Lroundround_0135.bmp	1
1	TrialProc	01LongLroundround\\Long_Lroundround_0137.bmp	1
1	TrialProc	01LongLroundround\\Long_Lroundround_0139.bmp	1
1	TrialProc	01LongLroundround\\Long_Lroundround_0141.bmp	1
1	TrialProc	01LongLroundround\\Long_Lroundround_0143.bmp	1
1	TrialProc	01LongLroundround\\Long_Lroundround_0145.bmp	1
1	TrialProc	01LongLroundround\\Long_Lroundround_0147.bmp	1
1	TrialProc	01LongLroundround\\Long_Lroundround_0149.bmp	1

1	TrialProc	01LongLroundround\\Long_Lroundround_0151.bmp	1
1	TrialProc	01LongLroundround\\Long_Lroundround_0153.bmp	1
1	TrialProc	01LongLroundround\\Long_Lroundround_0155.bmp	1
1	TrialProc	01LongLroundround\\Long_Lroundround_0157.bmp	1
1	TrialProc	01LongLroundround\\Long_Lroundround_0159.bmp	1
1	TrialProc	01LongLroundround\\Long_Lroundround_0161.bmp	1
1	TrialProc	01LongLroundround\\Long_Lroundround_0163.bmp	1
1	TrialProc	01LongLroundround\\Long_Lroundround_0165.bmp	1
1	TrialProc	01LongLroundround\\Long_Lroundround_0167.bmp	1
1	TrialProc	01LongLroundround\\Long_Lroundround_0169.bmp	1
1	TrialProc	01LongLroundround\\Long_Lroundround_0171.bmp	1
1	TrialProc	01LongLroundround\\Long_Lroundround_0173.bmp	1
1	TrialProc	1LongLroundround\\Long_Lroundround_0175.bmp	1
1	TrialProc	01LongLroundround\\Long_Lroundround_0177.bmp	1
1	TrialProc	01LongLroundround\\Long_Lroundround_0179.bmp	1
1	TrialProc	01LongLroundround\\Long_Lroundround_0181.bmp	1
1	TrialProc	01LongLroundround\\Long_Lroundround_0183.bmp	1
1	TrialProc	01LongLroundround\\Long_Lroundround_0185.bmp	1
1	TrialProc	01LongLroundround\\Long_Lroundround_0187.bmp	1
1	TrialProc	01LongLroundround\\Long_Lroundround_0189.bmp	1
1	TrialProc	01LongLroundround\\Long_Lroundround_0191.bmp	1
1	TrialProc	01LongLroundround\\Long_Lroundround_0193.bmp	1
1	TrialProc	01LongLroundround\\Long_Lroundround_0195.bmp	1
1	TrialProc	01LongLroundround\\Long_Lroundround_0197.bmp	1
1	TrialProc	01LongLroundround\\Long_Lroundround_0199.bmp	1
1	TrialProc	01LongLroundround\\Long_Lroundround_0201.bmp	1
1	TrialProc	01LongLroundround\\Long_Lroundround_0203.bmp	1
1	TrialProc	01LongLroundround\\Long_Lroundround_0205.bmp	1
1	TrialProc	01LongLroundround\\Long_Lroundround_0207.bmp	1
1	TrialProc	01LongLroundround\\Long_Lroundround_0209.bmp	1
1	TrialProc	01LongLroundround\\Long_Lroundround_0211.bmp	1
1	TrialProc	01LongLroundround\\Long_Lroundround_0213.bmp	1
1	TrialProc	01LongLroundround\\Long_Lroundround_0215.bmp	1
1	TrialProc	01LongLroundround\\Long_Lroundround_0217.bmp	1
1	TrialProc	01LongLroundround\\Long_Lroundround_0219.bmp	1
1	TrialProc	01LongLroundround\\Long_Lroundround_0221.bmp	1
1	TrialProc	01LongLroundround\\Long_Lroundround_0223.bmp	1
1	TrialProc	01LongLroundround\\Long_Lroundround_0225.bmp	1
1	TrialProc	01LongLroundround\\Long_Lroundround_0227.bmp	1
1	TrialProc	01LongLroundround\\Long_Lroundround_0229.bmp	1
1	TrialProc	01LongLroundround\\Long_Lroundround_0231.bmp	1
1	TrialProc	01LongLroundround\\Long_Lroundround_0233.bmp	1
1	TrialProc	01LongLroundround\\Long_Lroundround_0235.bmp	1
1	TrialProc	01LongLroundround\\Long_Lroundround_0237.bmp	1
1	TrialProc	01LongLroundround\\Long_Lroundround_0239.bmp	1
1	TrialProc	01LongLroundround\\Long_Lroundround_0241.bmp	1
1	TrialProc	01LongLroundround\\Long_Lroundround_0243.bmp	1
1	TrialProc	01LongLroundround\\Long_Lroundround_0245.bmp	1
1	TrialProc	01LongLroundround\\Long_Lroundround_0247.bmp	1
1	TrialProc	01LongLroundround\\Long_Lroundround_0249.bmp	1
1	TrialProc	01LongLroundround\\Long_Lroundround_0251.bmp	1
1	TrialProc	01LongLroundround\\Long_Lroundround_0253.bmp	1
1	TrialProc	01LongLroundround\\Long_Lroundround_0255.bmp	1
1	TrialProc	01LongLroundround\\Long_Lroundround_0257.bmp	1
1	TrialProc	01LongLroundround\\Long_Lroundround_0259.bmp	1
1	TrialProc	01LongLroundround\\Long_Lroundround_0261.bmp	1
1	TrialProc	01LongLroundround\\Long_Lroundround_0263.bmp	1
1	TrialProc	01LongLroundround\\Long_Lroundround_0265.bmp	1
1	TrialProc	01LongLroundround\\Long_Lroundround_0267.bmp	1
1	TrialProc	01LongLroundround\\Long_Lroundround_0269.bmp	1
1	TrialProc	01LongLroundround\\Situation2_Ratio1618_Long_Lroundround.bmp	1\0

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