The Validity of Three Neoclassical Canons in Attractive South Korean Faces

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ABSTRACT

Neoclassical thinkers and artists defined several facial proportions that supposedly evaluate the attractiveness of one's face in an objective manner. While these neoclassical canons are highly influential in Western art and beauty cultures, their influences on East Asian perceptions of beauty are unclear. This research paper explores the relevance of three neoclassical canons on South Korean beauty standards by calculating three facial proportions of a list of 31 attractive female South Korean celebrities and comparing the average values of each proportion with the corresponding neoclassical canon. This study presents further insight to anthropologists about the cultural influences on perceptions of beauty. Furthermore, these findings can also help plastic surgeons offer more practical advice to clients of different ethnicities with facial features that may not conform to the beauty standards defined by neoclassical canons or clients who subscribe to different beauty standards.

Introduction

The human pursuit of beauty has existed for as long as the human race itself. While certain facial features and proportions (e.g., facial symmetry) are universally perceived as beautiful, other beauty standards may vary among different cultures. For example, while many Western cultures regard tan skin as attractive, most Asian cultures value paler skin tones. While different beauty standards may suggest that beauty really *is* in the eye of the beholder, some researchers and mathematicians have argued that one's attractiveness can be calculated objectively by using a set of defined measurements for facial proportions like the Golden Ratio, a value represented by the Greek letter Phi (Φ). To provide some background on the Golden Ratio, ancient Greek mathematicians and artists found that people consistently considered rectangles with a length-to-width ratio of approximately 1.61803 (Φ) the most aesthetically pleasing, earning this value the title of the "Golden Ratio." It has applications in geometry, architecture, art, and many more areas. For example, many famous portrait painters and sculptors used subjects whose faces had a length-to-width ratio equal to Phi. The heavy influence of the Golden Ratio in Western art and beauty cultures is still reflected today: many celebrities perceived as beautiful in modern Western cultures have faces that satisfy the Golden Ratio, such as model Bella Hadid. In addition to the Golden Ratio, neoclassical facial canons also supposedly define the proportions and measurements of the ideal face. These neoclassical canons include proportions like the lengths of the nose and the forehead, each being exactly ⅓ of the length of the face.

However, these neoclassical canons,[1] which supposedly objectively measure the attractiveness of one's face, were defined by Western and European beauty standards, artists, mathematicians, and philosophers. Thus, these proportions are significantly more influential in Western and European beauty cultures than other beauty cultures. The disproportionate application of these neoclassical canons throughout the world raises the question of whether or not the beauty standards of East Asian countries align with the values defined by Western and European mathematicians

[1] While the Greeks first calculated the Golden Ratio, this value will be included in the umbrella term of "neoclassical canons" for the sake of conciseness.

and artists. Since beauty standards also vary among East Asian cultures,[2] this question is further narrowed down to explore the relevance of neoclassical canons to the beauty standards of South Korea, which was specifically chosen for its strict and narrow beauty standards. The popularity of plastic surgery most obviously demonstrates the South Korean emphasis on appearance: 20% of Korean women of all ages had some form of plastic surgery (Park et al., par. 12). In addition to having the highest plastic surgery rate per capita globally, South Korea's lookism is also expressed in other ways. For example, all South Koreans in a study agreed that being attractive gives one a considerable advantage in finding a job (Park et al., par. 7), and "roughly 50% of hiring managers in Korea said they had based job offer decisions on applicants' appearances" (Davis, par. 23). Like in most other cultures, South Korean women face stricter beauty standards than South Korean men. Given South Korean culture's high emphasis on attractiveness (especially for females) and its narrow perception of beauty, it is unsurprising that female South Korean celebrities considered beautiful by the public have faces that flawlessly satisfy even the highest cultural beauty standards. While these celebrities are the epitome of Korean beauty ideals, whether or not their facial structures and proportions align with the proportions of neoclassical canons is questionable.

This paper will pursue this inquiry by calculating three facial ratios[3] of a list of female celebrities widely regarded as attractive by the South Korean public and comparing these values to their corresponding neoclassical canons. It is predicted that the average ratio of the length-to-width of attractive female South Korean celebrities' faces will be less than the Golden Ratio because South Koreans tend to prefer smaller faces with slightly shorter facial lengths.[4] In addition, the ratio of nasal length to the facial length of South Korean celebrities is predicted to be less than the ratio of ⅓ or 0.33333 defined by neoclassical canons because South Koreans generally prefer smaller and shorter noses. Finally, the ratio of forehead length to facial length is predicted to be greater than the neoclassical canon ⅓ (0.33333) because of other research that has identified the South Korean preference for long upper faces.[4] This quantitative analysis of female South Korean celebrities' faces presents implications for anthropologists studying the social and cultural influences on perceptions of attractiveness. In addition, it may influence plastic surgeons operating on clients who subscribe to beauty standards from different cultures.

Review of Literature

This paper focuses specifically on female South Korean celebrities for several reasons. First, as mentioned before, South Korea has a very well-defined and specific beauty standard, especially for females. The consistency of South Korean perceptions of beauty make attractive female South Korean faces reliable comparisons to neoclassical canons. Furthermore, South Korean beauty standards play a prominent role in South Korean society, reflected in the popularity of plastic surgery and the influence of attractiveness on social standing and employment. Lastly, the South Korean entertainment industry is exceptionally structured: members of Korean pop groups have designated roles such as Lead Vocalist, Main Dancer, and Main Rapper. One of the roles is the "Visual," which is assigned to the most attractive member of the group. This role is determined by the group's entertainment company based on which member can bring in the most fans based on appearance alone. If a group's fanbase, which consists of thousands to millions of South Koreans, believes that another member of the group is also especially attractive, the fanbase can assign an additional Visual to the group. This characteristic of South Korean pop groups presents a simple and objective way to determine which celebrities are considered the most beautiful by the South Korean public. This paper focuses on female South Korean celebrities rather than male South Korean celebrities because the beauty standards applied to females are significantly stricter, which is true in almost every culture.

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[2] The variation of facial structure preferences and beauty standards among East Asian cultures will be further explored in the Review of Literature.

[3] The three facial ratios calculated in this paper will be facial length to facial width (the proportion defined by the Golden Ratio), nasal length to facial length, and forehead length to facial length.

[4] The specific South Korean facial structure preferences will be further explored in the Review of Literature.

East Asian (South Korean) vs Western

Research that analyzes the differences between Eastern beauty cultures and Western beauty cultures reveal each culture's general attitudes toward beauty. For example, researchers conducted cross-cultural comparisons of "appearance self-schema, body image, self-esteem, and dieting behavior between women from Korea and the United States" (Jung and Lee 350). The study found that "Korean women placed greater importance on appearance, were more critical of their bodies, and revealed lower self-esteem than U.S. women" (Jung and Lee 350). These findings are consistent with the reasoning (discussed in the paragraph above) that made South Korea the focus of this research paper, namely South Korean culture's emphasis on beauty. Another study that compared the facial preferences of people from different cultures found that there was a "high inter-rater reliability in attractiveness judgments across the Korean groups" (Coetzee et al., par. 3), which validates another factor that made South Korea the focus of this paper: the narrowness of the South Korean beauty standards.

The studies discussed above mainly focus on the general perceptions of beauty from people of different cultures. In addition, some research explores the more specific aspects of beauty culture by comparing the facial proportions of East Asian women with Caucasian women. For example, a study by Choe et al. compared the facial proportions of Korean American (KA) women and white North American (NAW) women. The results of this study found that attractive KA women had fewer differences in facial proportions with NAW women than regular KA women: "Compared with NAW women, 24 of the 26 facial measurements in KA women were significantly different. Only 9 of the 26 facial measurements were significantly different when the attractive KA women were compared with the NAW women" (Choe et al., par. 5). Overall, the study concluded that KA women had substantial differences in facial proportions with NAW women, although these differences lessened when attractive KA women replaced the former group. Unfortunately, this study does not clarify how the attractive KA women were distinguished from the regular KA women: it only states that KA women were given aesthetic scores from 10 judges using a visual analog scale. However, this paper neither specifies whether the judges used the Korean beauty standard or the American beauty standard nor explains how the researchers accounted for the subjectivity of the judges. Despite this point of confusion, this study still provides valuable insight into how different facial proportions of women of different ethnicities are in general. However, it also suggests that attractive women of different races have more similar facial proportions than regular women of different races, although this conclusion may be due to the possibility that the 10 judges in the study rated the attractive KA women using western beauty standards.

Another more recent study that compares the beauty standards of Eastern and Western countries in terms of facial proportions was performed by Yi et al. In the study, a group of 43 Miss Korea contestants (Group I) represented the East Asian beauty standard, and a group of 22 Miss Paraguay contestants (Group II) represented the Western beauty standard. Through a facial analysis using a 3D photogrammetric analysis tool, the researchers found significant differences in the facial proportions between the two groups: Group I had longer upper and middle faces, wider lower faces, longer and thinner noses, shorter chins, thinner lips, and wider intercanthal distances (Yi et al., par. 3). Overall, the proportions of Group I found in this study are consistent with the South Korean beauty standard: for example, the wide intercanthal distances reflect the preference for large, wide eyes, and the short chins reflect the preference for dainty lower faces. While this study provides a helpful comparison of the facial proportions of attractive women from Eastern and Western countries, the representation of South Korean beauty standards could have been improved by choosing female Korean celebrities from Korean pop groups rather than Miss Korea contestants. Miss Korea contestants are selected by a panel of judges, while the visual role(s) of Korean pop groups is determined by entertainment companies and fan bases consisting of thousands to millions of people. From the sheer number of people, it can be concluded that the Visuals of Korean pop groups are more reliable representations of the South Korean public's aesthetic preferences than are Miss Korea contestants. Moreover, Miss Korea contestants are not chosen entirely based on their facial attractiveness: they must be able to answer standard pageant questions articulately and represent their country well. In contrast, while all Korean pop stars must be able to perform, sing, and dance, the Visual of a group is chosen solely based on attractiveness and no other factors. Given these essential differences between Miss Korea

contestants and Visuals, a study that replaces Miss Korea contestants with attractive South Korean celebrities may be more accurate.

A paper by Gao et al. presents extremely comprehensive and specific comparisons of different facial proportions preferred by Caucasian females versus East Asian females. The researchers compiled 65 academic papers that outlined the facial preferences of East Asians and Caucasians and used the data from the papers to calculate the average facial proportions preferred by people from different cultures. In terms of the eyes, East Asian women preferred eyes with taller and wider palpebral fissure dimensions: the height and width of attractive female Caucasian eyes were 10.12 mm and 27.45 mm, respectively, while the height and width of attractive female East Asian eyes were 12.49 mm and 30-34 mm (Gao et al., 7). The study also found that "the length of the upper eyelid crease should equal the palpebral fissure width in an aesthetic Asian female eye" (Gao et al., 7). When considering the nose, the study found that the ideal nasofrontal angle of East Asian females (140º) was greater than that of Caucasian females (115-130º) (Gao et al., par. 8). Another difference was that "the ideal Asian female nose tip is rounder than their Caucasian counterparts" (Gao et al., 8). For lips, "the Asian population prefers more retruded lips than the Caucasian population" (Gao et al., 8).

In addition to comparing the measurements of facial proportions, this study continuously assesses the application of neoclassical facial canons on attractive Caucasian faces and concludes that attractive Caucasian faces satisfy the Golden Ratio and other neoclassical facial proportions. However, in terms of whether or not these proportions apply to attractive East Asian faces - the topic of this research paper - the study states, "its [neoclassical canon's] validation in the East Asia population needs to be tested more" (Gao et al., 8). In addition to the relevance of the Golden Ratio and other neoclassical proportions on attractive East Asian faces, another area of this research paper that can be made more specific is separating different East Asians instead of grouping them together because significant differences in beauty standards exist even in closely-related cultures. For example, a survey completed by Japanese American and Korean American women found that they preferred different nostril shapes, lip shapes, cheekbone heights, eyebrow shapes, and forehead sizes (Dobke et al. 342).

East Asian vs Neoclassical

As exemplified by the findings of the previous research papers, the differences in facial proportions of attractive East Asian women and attractive Caucasian women are already adequately established. The paper by Gao et al. relates attractive Caucasian faces with neoclassical beauty standards, which suggests an indirect connection between East Asian beauty standards and neoclassical canons. However, the direct relationship between neoclassical and East Asian beauty standards has yet to be thoroughly explored since most of the current literature only compares the beauty standards between Western and East Asian cultures. Despite this, a few research papers have directly compared neoclassical canons to East Asian faces. For example, a paper by Jayaratne et al. explores the relevance of neoclassical canons on southern Chinese faces. Through applying several canons on 3D photographs of 103 southern Chinese young adults, the researchers found that "neoclassical canons seldom applied to individuals [from southern China]" (Jayaratne et al., par. 4). Unfortunately, this paper did not specify which cultural beauty standard (if any at all) the participants satisfied. Furthermore, previous studies mentioned in this section have demonstrated that beauty standards are not uniform among East Asian cultures, so the results of a paper that focuses on southern Chinese individuals may not necessarily be valid for South Korean individuals. Thus, exploring the relevance of neoclassical canons on attractive South Korean women is still a gap in the literature, which this paper attempts to address.

Methodology

The first step to exploring this paper's research question was compiling a list of attractive female South Korean celebrities. During this process, several measures were taken to make the selection of celebrities the most

objective and comprehensive representation of modern South Korean beauty standards possible. Most of the celebrities chosen to be part of the list are Visuals[5] of influential Korean girl groups.

To make the list of "influential" Korean girl groups as complete as possible, several different sources were consulted. First, a list of 10 girl groups was taken from the Billboard article "10 Best K-Pop Girl Groups of the Past Decade: Critic's Picks." As the Billboard chart specializes in ranking the popularity of songs and artists, its list of Korean pop groups is considered credible. In addition to the groups identified on the Billboard list, the girl groups from the three Korean entertainment companies[6] that consistently generate the most profitable groups were also added to the list. Furthermore, two other girl groups were added to the list due to their considerable number of music show wins. Music show wins are determined by factors including album sales, music video views, and fan votes, so girl groups with a significant number of music show wins qualify as "influential." Lastly, five more girl groups were added because they were featured as part of the top 50 groups in the "Hanteo Global K-Pop Report: 2021 Semi-Annual Summary #1." This ranking aligns with this paper's definition of "influential" as the rankings were based on factors like album sales, digital music chart rankings, music video statistics, and social media followings (Chung, par. 10). Based on these criteria, a list of 23 female Korean pop groups was generated:

List of Female South Korean Girl Groups and Justifications

Group Name	Justification
Miss A	Defined by Billboard
Apink	Defined by Billboard
4minute	Defined by Billboard
F(x)	Defined by Billboard
Kara	Defined by Billboard
After School	Defined by Billboard
Orange Caramel (Subunit of After School)	Defined by Billboard
Brown Eyed Girls	Defined by Billboard
Wonder Girls	Defined by Billboard
2NE1	Defined by Billboard
Girls' Generation	Defined by Billboard
Red Velvet	Girl Group Under SM Entertainment
Aespa	Girl Group Under SM Entertainment

[5] The position "Visual" and the process of selecting one are explained in the Review of Literature.
[6] SM Entertainment, JYP Entertainment, and YG Entertainment are known as the "Big Three" of the South Korean entertainment industry because they consistently generate the highest revenues.

Twice	Girl Group Under JYP Entertainment
Itzy	Girl Group Under JYP Entertainment
Blackpink	Girl Group Under YG Entertainment
Sistar	Notable Number of Music Show Wins
GFriend	Notable Number of Music Show Wins
(G)I-DLE	Listed in Hanteo Global K-Pop Report
Mamamoo	Listed in Hanteo Global K-Pop Report
Oh My Girl	Listed in Hanteo Global K-Pop Report
Brave Girls	Listed in Hanteo Global K-Pop Report
Dreamcatcher	Listed in Hanteo Global K-Pop Report

In addition to the 28 Visuals of the 23 girl groups, three other celebrities were added to the list despite being actresses instead of Visuals to create an even more comprehensive list of attractive South Korean celebrities. These three celebrities are widely regarded as beauty icons by the Korean public and include Kim Tae-hee, Song Hye-Kyo, and Jun Ji-Hyun. While all three women are praised as great representations of Korean beauty standards, Kim Tae-hee's appearance is especially notable: "A survey of 290 young South Korean men and women cited Kim Tae-hee as the most attractive female celebrity…plastic surgeon Kwon Seung-Taik claims that '[her] features are the ones that are requested the most often by [plastic surgery] patients'" (Jin, par. 16). After adding these three actresses, the final list consisted of 31 people:

List of Attractive Female South Korean Celebrities and Justifications

(Stage) Name	Justification
Suzy	Visual of Miss A
Naeun	Visual of Apink
Jihyun	Visual of 4Minute
Victoria[7]	Visual of f(x)
Hara	Visual of Kara
Juyeon	Visual of After School
Nana	Visual of After School and Orange Caramel

[7] These celebrities are not South Korean but were still included in the list because they are mainly involved in the South Korean entertainment industry and are widely considered beautiful by the South Korean public.

Gain	Visual of Brown Eyed Girls
Sohee	Visual of Wonder Girls
Dara	Visual of 2NE1
Yoona	Visual of Girls' Generation (SNSD)
Irene	Visual of Red Velvet
Winter	Visual of Aespa
Karina	Visual of Aespa
Tzuyu[7]	Visual of Twice
Yuna	Visual of Itzy
Jisoo	Visual of Blackpink
Bora	Visual of Sistar
Dasom	Visual of Sistar
Sowon	Visual of GFriend
Miyeon	Visual of (G)I-DLE
Shuhua[7]	Visual of (G)I-DLE
Yuqi[7]	Visual of (G)I-DLE
Solar	Visual of Mamamoo
Jiho	Visual of Oh My Girl
Yujeong	Visual of Brave Girls
Eunyoung	Former Visual of Brave Girls
JiU	Visual of Dreamcatcher
Kim Tae-hee	Popular actress, widely considered to be the most beautiful woman in Korea. Most requested features by plastic surgery patients.
Song Hye-kyo	Popular actress, widely considered to be one of the most beautiful women in Korea.
Jun Ji-hyun	Popular actress, widely considered to be one of the most beautiful women in Korea.

After finalizing the list of attractive female South Korean celebrities, a photo of each celebrity was found. It was essential for the photo to be taken from a direct and level frontal angle to minimize inaccuracies when measuring the width and length of the face. While non-smiling photos were preferred, photos in which the celebrity is smiling were also accepted as long as the celebrity's bottom and top teeth are touching, so the facial length and width remain accurate.

After a qualified photo of each celebrity was found, the needed measurements were accomplished using an application named "Free Ruler," which is available for download on the Apple MacBook's App Store. The Free Ruler application was last updated on February 4, 2021, and it has 36 reviews on the Apple App store, with 33 reviews being five-star reviews. For the purposes of this study, the Free Ruler application was set to measure pixels. Since the sizes of the celebrities' faces could not be accurately determined through the photos, only the three ratios,[8] and not the raw measurements, were recorded.

When all the necessary ratios were calculated, the data were compiled into a table that separated the values based on the facial proportion it represented (facial length to facial width, nasal length to facial length, and forehead length to facial length). Next, the important statistical measures for each group, including the mean and the standard deviation, were determined. Finally, to determine whether or not there were any significant differences between the average facial proportions of the attractive female South Korean celebrities and the corresponding neoclassical canon, a one-sample t-test was conducted.

Data and Analysis

This section of the research paper is split into three separate sections, each one dedicated to presenting the data and analysis of one facial proportion. In addition to providing a statistical summary of the data set that corresponds to the section, this paper also presents the master table that records the three facial ratios of each of the 31 celebrities:

Measurements of Three Facial Proportions in Attractive South Korean Faces

Name	Facial Length to Width Ratio (Golden Ratio=1.618)	Nose length to facial length ratio (0.33)	Forehead length to facial length ratio (0.33)
Suzy	1.35677	0.25777	0.33679
Naeun	1.37721	0.26676	0.34522
Jihyun	1.40157	0.27949	0.34410
Victoria	1.43719	0.26674	0.41430
Hara	1.42645	0.25492	0.35689
Juyeon	1.48819	0.25265	0.37566
Nana	1.32721	0.28809	0.34072

[8] As mentioned in previous sections, the three ratios that this paper focuses on are: facial length to facial width (defined by the Golden Ratio), nasal length to facial length, and forehead length to facial length.

Gain	1.38497	0.27467	0.33882
Sohee	1.36328	0.24785	0.35244
Dara	1.41272	0.27136	0.32910
Yoona	1.36282	0.30363	0.36744
Irene	1.33166	0.27547	0.34465
Winter	1.43953	0.28595	0.36995
Karina	1.35475	0.30309	0.37113
Tzuyu	1.25725	0.26945	0.34006
Yuna	1.29904	0.26151	0.31860
Jisoo	1.38835	0.26340	0.36131
Bora	1.33667	0.29835	0.33883
Dasom	1.38591	0.30691	0.37195
Sowon	1.34669	0.29237	0.32730
Miyeon	1.32249	0.26434	0.32992
Shuhua	1.40234	0.28571	0.33810
Yuqi	1.34864	0.31734	0.33127
Solar	1.44972	0.26782	0.31214
Jiho	1.38384	0.29927	0.32603
Yujeong	1.31890	0.25672	0.31343
Eunyoung	1.39459	0.30620	0.33333
JiU	1.28684	0.28834	0.35378
Kim Tae-hee	1.50590	0.26428	0.34714
Song Hye-kyo	1.41296	0.26648	0.37106
Jun Ji-hyun	1.36408	0.25860	0.30842
Neoclassical Canonical Value	1.61803	0.33333	0.33333

Mean	1.37640	0.27728	034548
Median	1.37721	0.27136	0.34072
Minimum	1.25725	0.24785	0.30842
Maximum	1.50590	0.31734	0.41430
Standard Error	0.00999	0.00339	0.00406
Standard Deviation (sample)	0.05565	0.01885	0.02259

Facial Length to Facial Width

The table below shows several statistical calculations representing the ratios of facial length to facial width of the 31 attractive female South Korean celebrities in this study.

Statistical Summary of the Data for Facial Length to Facial WIdth

Calculation	Value
Mean	1.37640
Median	1.37721
Neoclassical Canon (the Golden Ratio)	1.61803
Sample Standard Deviation	0.05565
Standard Error	0.00999
Minimum	1.25725
Maximum	1.50590

While the variability of this data set is still relatively small, the ratios of facial length to facial width have the largest standard deviation among the three ratios studied in this paper. The standard deviation suggests that while the South Korean beauty standard is overall very specific, facial length to facial width ratio preferences are broader than other facial proportion preferences like nasal length to facial length. The average facial length to facial width ratio of an attractive South Korean face was calculated to be 1.37640. Moreover, the individual values in this data set were all less than 1.61803 (the Golden Ratio), with the maximum value being 1.50590. Upon conducting a one-sample t-test, the average facial length to width ratio of attractive South Korean faces was found to be significantly less than the Golden Ratio, $t(30)=-24.17363$, $p<0.00001$. This finding remains consistent with both the hypothesis and South Korean beauty standards, which emphasize a small, dainty face. In addition to a small face, South Koreans tend to prefer oval face shapes, a beauty standard that is almost universal among different cultures. Ultimately, while the general face shape preferences remain consistent between neoclassical beauty standards and South Korean beauty standards,

the average facial length to width ratio of attractive South Korean faces differ significantly from the Golden Ratio, suggesting that the Golden Ratio is not as relevant in South Korean faces as it is in Caucasian faces.

Nasal Length to Facial Length

The table below shows several statistical calculations representing the ratios of nasal length to facial length of the 31 attractive female South Korean celebrities in this study.

Statistical Summary of the Data for Nasal Length to Facial WIdth

Calculation	Value
Mean	0.27728
Median	0.27136
Neoclassical Canon	0.33333
Sample Standard Deviation	0.01885
Standard Error	0.00339
Minimum	0.24785
Maximum	0.31734

Of the three data sets in this paper, the data set containing the nasal length to facial length ratios has the smallest standard deviation, suggesting that the South Korean beauty standards for nasal length to facial length are the narrowest preferences compared to the two other ratios examined in this study. Both the mean (0.27728) and the median (0.27136) were less than 0.33333, the ratio in the neoclassical canon that describes the nasal length to facial length ratio. Similar to the previous data set, all individual ratios for nasal length to facial length were less than the neoclassical canon value of 0.33333, with the maximum value being 0.31734. Upon conducting a one-sample t-test, the average facial length to width ratio of attractive South Korean faces was found to be significantly less than the neoclassical canon value, $t(30)=-16.55504$, $p<0.00001$. While this finding remains consistent with this paper's hypothesis, the conclusion that South Koreans prefer a shorter nose differs from the findings of the paper by Yi et al. In this paper, Yi et al. measured the facial ratios of 43 Miss Korea contestants (Group I), who represent the East Asian standard, and 22 Miss Paraguay contestants (Group II), who represent the Western standard, and the researchers found that "Group I had longer noses." (Yi et al., par. 3). This paradox can be explained by the fact that while the Miss Paraguay contestants are probably closer portrayals of Western beauty standards than the Miss Korea contestants, Miss Paraguay contestants don't wholly represent the neoclassical canons either: neoclassical canons largely originate and apply to Europe and North America, and Paraguay is a South American country. Thus, this paper's data continue to provide evidence that the South Korean preference for nasal length to facial length ratio is significantly less than the neoclassical standards, again suggesting that not all neoclassical canons, if any, apply to South Korean beauty standards.

Forehead Length to Facial Length

The table below shows several statistical calculations representing the ratios of forehead length to facial length of the 31 attractive female South Korean celebrities in this study.

Statistical Summary of the Data for Forehead Length to Facial WIdth

Calculation	Value
Mean	0.34548
Median	0.34072
Neoclassical Canon	0.33333
Sample Standard Deviation	0.02259
Standard Error	0.00406
Minimum	0.30842
Maximum	0.41430

Of the three data sets examined in this paper, this ratio is the only one in which the neoclassical canon value is in between the minimum and maximum ratios. Even so, both the mean (0.34548) and median (0.34072) values are greater than the neoclassical canon value (0.33333). Through a one-sample t-test, the average forehead length to facial length of the 31 South Korean faces in this study was found to be significantly greater than the neoclassical canon value, $t(30)=2.99369$, $p<0.05$. This finding remains consistent with this paper's hypothesis and provides further evidence that the neoclassical canons may not be as universally applicable as their creators claimed.

Overall Summary of Data

For all three facial proportions examined in this paper (facial length to facial width, nasal length to facial length, and forehead length to facial length), the average facial ratio of the 31 attractive South Korean faces were significantly different from the value defined by the neoclassical canons. For facial length to facial width and nasal length to facial length, the ratio from the 31 faces was significantly less than the neoclassical-defined values of 1.61803 and 0.33333 respectively. The forehead length to facial length ratio of the 31 South Korean faces was significantly greater than the neoclassical-defined value of 0.33333.

Discussion and Conclusion

Since this paper used 2D photographs of celebrities, only facial ratios where measurements differed negligibly between 3D photographs and 2D photographs could be considered; for example, measurements like facial length and nasal length change insignificantly when the subject being measured is 3D versus 2D. Thus, no side profile measurements could be considered in this paper, as these measurements are prone to error when examined only through a 2D photograph. Since only three neoclassical canons were examined, this paper cannot claim that all neoclassical canons do not apply to attractive South Korean faces. However, this paper *can* conclude that the three neoclassical

canons examined are not valid among attractive South Korean faces. Furthermore, this paper can also claim that neo-classical canons, in general, are not universally applicable.

The findings of the research have implications in the plastic surgery industry: specifically, the findings of this paper advise plastic surgeons to alter their advice accordingly when operating on clients who may subscribe more closely to other cultural beauty standards. In general, this paper's findings present further insight into the cultural influences on perceptions of beauty, while evaluating whether or not the claim that facial beauty can be measured objectively is valid. The findings of this paper support the claim that perceptions of attractiveness vary to some extent from culture to culture. For future directions of research, the author recommends studies that examine more neoclassical canons.

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