**Handwriting and Sex Bias**

Student’s Name

Institutional Affiliation

Course Name

Professor’s Name

Assignment Due Date

**Handwriting and Sex Bias**

**Introduction**

There is no scientific evidence indicating the existence of a link between gender and the type of handwriting that one has. This is because all the current research efforts undertaken to determine whether there exists any difference in brain organization between males and females in terms of how handwriting is developed have been inconclusive, showing that the beliefs on the link between handwriting and gender are unfounded (Maken & Gupta, 2021). There have been efforts to determine the link between language and the motor networks that one possesses, with results showing a direct link between these factors. This indicates the role of other factors in determining handwriting, which may not necessarily include the gender of the individuals in question (Maken & Gupta, 2021). Current literature indicates that handwriting is based more on psychology than physiology, given that the brain is responsible for the creation of handwriting, not the gender of the affected people. The brain is fully responsible for the characteristics of one’s handwriting. Therefore this means that while one’s handwriting can be profiled, it can mostly only show the psychological profile of the individual, not their gender (Maken & Gupta, 2021). The stereotypical and biased assumption of one’s gender based on their handwriting has been based on the false association of females being more organized and neater than males.

**Research Questions**

**Question 1:** What factors have been proven to contribute to one’s handwriting? This question will help in identifying the scientifically-proven factors that influence handwriting. It will also be easier to differentiate the facts from fiction, hence understanding the biases that could influence the identification of gender through handwriting.

**Question 2:** How do biases affect the association of handwriting to a specific gender? The role of society will be understood in terms of how the socialization process has affected the association of some traits to either males or females. By understanding the effect of the biases on the general thinking of individuals, it will be easier to overcome them and only rely on tried, tested, and proven handwriting analysis techniques.

**Hypothesis**

This research hypothesizes that biases exist in associating some handwriting with a given gender. While proven methods exist through which a psychological profile can be created from handwriting, there are no scientifically proven ways of determining one’s gender from their penmanship. Secondly, the paper hypothesizes that the biases are based on society's normalized beliefs and practices, especially based on the expectations of neatness and organization. Once proven to be true, the hypothesis will help challenge stereotypical and biased thinking, resulting in better approaches toward the subject matter.

**Literature Review**

The impulsive processes determine an individual’s handwriting within their brain. The brain sends electric impulses to the hand, which then manipulates the writing tool to create handwriting (Gattal et al., 2020). Critically investigating the scripts created makes it easier to understand the factors that have played a direct role in the handwriting of the creator of the scripts. The traits within a script can be analyzed by linking the different characteristics in handwriting to understand the mental and psychological traits of the individual (Gattal et al., 2020). It is through the psychological profile created that the investigators can assume the gender of the writer, although inconclusively.

Graphologists hold different opinions on whether their handwriting can determine one’s gender. While a psychological profile can be created and the probability of one being either male or female determined, a reliable conclusion on one’s gender based on their handwriting is yet to be achieved (Cordasco et al., 2020). Society has played a role in developing biases that have created a false association between handwriting and gender. Males are assumed to be more disorganized and messy, hence the assumption that their handwriting will be messy, hurried, and disorganized (Cordasco et al., 2020). This bias may have stemmed from the assumption that men are expected to be more rugged and disorganized, hence the association between bad handwriting with males. On the other hand, females are thought to be neater and more organized, hence the expectation that females have neater and more organized handwriting (Cordasco et al., 2020). This cultural belief has resulted in a situation whereby generally messy handwritings are thought to be from males while more organized ones are from females.

The biases on male and female differences in handwriting are culturally backed and contribute to negative outcomes, especially when criminal cases are involved. The biases will likely contribute to more negative outcomes than positive outcomes, hence calling for better techniques to identify one’s gender from their handwriting (Maken et al., 2019). The influence of personality has been proven in determining one’s handwriting, while no evidence links personality to gender difference. It can therefore be argued that personality is molded by the society in which one is born, with the personality determining the handwriting used by an individual (Maken et al., 2019). The societal norms on what is masculine and feminine behaviors and expectations have resulted in males being more inclined to messy handwriting. At the same time, females are more inclined to more organized and neater handwriting.

While society has some expectations of acceptable masculine or feminine traits and handwriting, there are some instances when either males or females go against the grain and develop different traits that change their personalities and the handwriting they develop (Kowal & Gupta, 2021). This could result in a situation whereby the people seeing the handwriting could end up wrongfully assuming the gender of a writer from their handwriting, yet the individual may have deviated from the societal norms and expectations on some aspects of life (Kowal & Gupta, 2021). This being the case, the biases blind the likelihood of people developing more informed approaches that will help in determining the gender of a writer from their handwriting.

**Data Analysis**

The purpose of this paper is to analyze two hypotheses about the association of handwriting with gender. The data used to analyze these hypotheses was collected from handwriting samples of individuals belonging to both genders. The analysis of this data was done using the R programming language.

**Results**

Welch Two Sample t-test

data: data$size by data$gender

t = -0.21372, df = 97.899, p-value = 0.8312

alternative hypothesis: true difference in means between group female and group male is not equal to 0

95 percent confidence interval:

-1.1148393 0.8980589

sample estimates:

mean in group female mean in group male

5.042553 5.150943

Welch Two Sample t-test

data: data$lines by data$gender

t = -1.8911, df = 93.136, p-value = 0.06172

alternative hypothesis: true difference in means between group female and group male is not equal to 0

95 percent confidence interval:

-4.4433519 0.1085466

sample estimates:

mean in group female mean in group male

9.021277 11.188679

Welch Two Sample t-test

data: data$speed by data$gender

t = -0.69655, df = 91.782, p-value = 0.4878

alternative hypothesis: true difference in means between group female and group male is not equal to 0

95 percent confidence interval:

-1.4526505 0.6983022

sample estimates:

mean in group female mean in group male

5.604110 5.981285

Welch Two Sample t-test

data: data$consistency by data$gender

t = -0.53415, df = 97.88, p-value = 0.5944

alternative hypothesis: true difference in means between group female and group male is not equal to 0

95 percent confidence interval:

-0.06907547 0.03977662

sample estimates:

mean in group female mean in group male

0.7325936 0.7472431

Welch Two Sample t-test

data: data$corrections by data$gender

t = -0.60215, df = 93.159, p-value = 0.5485

alternative hypothesis: true difference in means between group female and group male is not equal to 0

95 percent confidence interval:

-0.6901255 0.3689694

sample estimates:

mean in group female mean in group male

1.914894 2.075472

The results of the analysis of the data gathered from the handwriting samples of individuals belonging to both genders showed that there were no significant differences in the corrections parameter between the two genders. This suggests that there are no biases in associating handwriting with a given gender based on the number of corrections in the sample. However, the results of the analysis of the other parameters showed that there were no significant differences between the two genders. This suggests that there are no biases in associating some handwriting with a given gender and that there are no biases based on society's normalized beliefs and practices, especially based on the expectations of neatness and organization.

**Hypothesis 1**

The first hypothesis is that biases exist in associating some handwriting with a given gender. To analyze this hypothesis, the data was analyzed for the size, shape, lines, speed, consistency, and corrections of the handwriting. The size of the handwriting was measured by the number of letters per line. The shape of the handwriting was measured by the type of shapes used in the handwriting, which were circles, squares, or triangles. The lines were measured by the number of lines in each handwriting sample. The speed was measured by the time it took to write the sample. The consistency was measured by the amount of deviation from the baseline of the handwriting. Finally, the corrections were measured by the number of corrections in the sample.

The results of the analysis show that there were no significant differences in any of the parameters between the two genders. This suggests that there are no biases in associating some handwriting with a given gender.

**Hypothesis 2**

The second hypothesis is that biases are based on society's normalized beliefs and practices, especially based on the expectations of neatness and organization. To analyze this hypothesis, the data was analyzed for the size, shape, lines, speed, consistency, and corrections of the handwriting. The size of the handwriting was measured by the number of letters per line. The shape of the handwriting was measured by the type of shapes used in the handwriting, which were circles, squares, or triangles. The lines were measured by the number of lines in each handwriting sample. The speed was measured by the time it took to write the sample. The consistency was measured by the amount of deviation from the baseline of the handwriting. Finally, the corrections were measured by the number of corrections in the sample.

The results of the analysis show that there were no significant differences in any of the parameters between the two genders. This suggests that there are no biases based on society's normalized beliefs and practices, especially based on the expectations of neatness and organization.

**Conclusion**

The results of the analysis of the data gathered from the handwriting samples of individuals belonging to both genders showed that there were no significant differences in any of the parameters between the two genders. This suggests that there are no biases in associating some handwriting with a given gender and that there are no biases based on society's normalized beliefs and practices, especially based on the expectations of neatness and organization.

Generally, the results of the analysis of the two hypotheses do not support the hypotheses. This suggests that more research is needed to determine if biases exist in associating some handwriting with a given gender. Further, since the results found above shows that there is no significant difference in the handwriting characteristics between males and females. This indicates that there is no scientific proof that the biases are based on society's normalized beliefs and practices. Therefore, this hypothesis is not supported by the data.

**References**

Cordasco, G., Buonanno, M., Faundez-Zanuy, M., Riviello, M. T., Likforman-Sulem, L., & Esposito, A. (2020, September). Gender identification through handwriting: an online approach. In *2020 11th IEEE International Conference on Cognitive Infocommunications (CogInfoCom)* (pp. 000197-000202). IEEE.

Gattal, A., Djeddi, C., Bensefia, A., & Ennaji, A. (2020). Handwriting based gender classification using cold and hinge features. In *Image and Signal Processing: 9th International Conference, ICISP 2020, Marrakesh, Morocco, June 4–6, 2020, Proceedings 9* (pp. 233-242). Springer International Publishing.

Kowal, D. S., & Gupta, P. K. (2021). Handwriting analysis: A psychopathic viewpoint. *International Journal of Indian Psychȯlogy*, *9*(1).

Maken, P., & Gupta, A. (2021). A method for automatic classification of gender based on text-independent handwriting. *Multimedia Tools and Applications*, *80*, 24573-24602.

Maken, P., Gupta, A., & Gupta, M. K. (2019). A study on various techniques involved in gender prediction system: a comprehensive review. *Cybernetics and Information Technologies*, *19*(2), 51-73.