

Age Difference in Stereotypical Semantic Activation: A Priming Study

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Introduction

This is a psycholinguistic study that aims to use lexical priming to detect societal implicit stereotypes. We also aimed to discover how age differences exist in stereotypical concepts, which are linked to wider social issues. The semantic activation measured by reaction time helps us contribute to social problems that have not yet been solved. As a teenage global citizen, it is our responsibility to enhance society's open-mindedness and break down typical social norms (e.g., when long hair is mentioned, people often think of females faster than males). Males are often described as solemn, powerful, and courageous, and the societies have shaped themselves to forget gender equality. Stereotypical activation is a condition in which stereotyped trait phrases are easily visible to a perceiver (Kunda & Spencer, 2003; Sherman et al., 2000). The following experiment is designed based on the purpose of testing different age groups' semantic activations towards stereotypical concept bonding.

Literature Review

In an early psycholinguistic study of stereotypical gender in role nouns, Carreiras et al. (1996) indicated that conceptual gender activation is influenced by the representations conveyed by certain role nouns. According to a further investigation (Oakhill et al., 2005), which instructed the participants on a decision task of whether a passage included two terms that contradict gender stereotypes referring to the same object, participants showed a tendency for them to take longer reaction times when the paired terms are incongruent. In addition, Cacciari and Padovani (2007) provided a semantic priming experiment in Italian, a language with a grammatical gender system. In the experiment, paired prime-target words were shown in three different conditions: congruent, incongruent, and gender-neutral. Participants were asked to ignore the prime, which conveyed the stereotypes, and to answer the grammatical pronoun (target). The study ultimately found a gender stereotypical effect emerged in which the reaction times on gender decisions were prolonged when the grammatical gender violated the gender stereotype associated with the prime. As in an event-related potential study (Wang et al., 2017), the experiment attempted to identify whether human brains can distinguish lexical activation and stereotypical activation. The results showed that stereotypical primes do have a significant effect in brains, which provided further proof that stereotypical effect also emerges in activations of brain signals.

However, the previous experiments have particularly focused on role nouns and the associated stereotypes. In this study, we explore more with various prime words to observe how stereotypical activation is incorporated into daily life. Furthermore, stereotypical activation has rarely been put into discussion for psycholinguistic study in Mandarin, which is a language that shares different grammatical constraints. We hypothesized that participants from an Asian country, which is frequently labeled as conservative, would show significant results in a gender-stereotypical priming experiment. In addition, the subject of gender stereotypes is often discussed as the gap between an older and younger age group. Yet the two groups of teenagers and middle-aged adults are not frequently involved in such studies. Therefore, our goal is to examine if participants from different age groups in Taiwan will react alternatively when asked for the same decision task.

Method

Participants Twenty-four Mandarin native speakers were involved in the norming phase (12 aged 15 to 18 years old; 12 aged 40 to 55 years old male and female) and 32 (16 aged 15 to 18 years old; 16 aged 40 to 55 years old) in the main experiment. The two groups are categorized as teenagers and middle-aged adults.

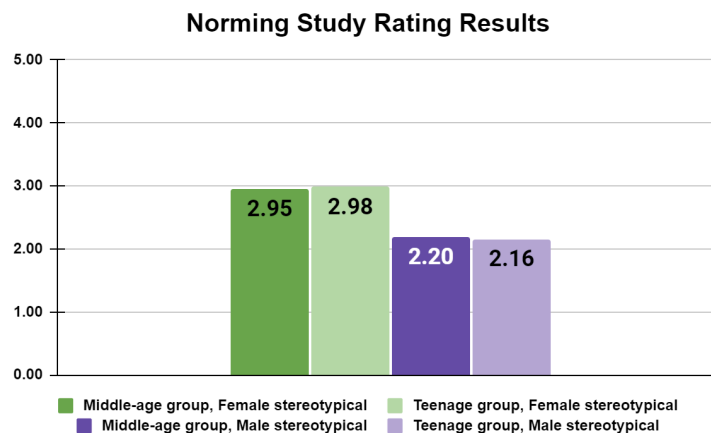
Stimuli The stimuli were words in Mandarin that included a stereotypical prime word followed by a target word. The prime words were gender-related words from five categories: personal products, sports, apparel, accessories, and adjectives. Half of the prime words are organized as female-related stereotypical words, and the other half is male-related. The kinship nouns (e.g., *father*, *sister*) were neglected since they were inherently assigned gender by definition (Cacciari & Padovani, 2007). The target words are *female* (女性) and *male* (男性).

Norming study We created 80 prime words from daily use and separated them into two lists on the Google form, each displaying 40 words to be rated. Considering the fact that human patience is not infinite, participants, especially teenagers, would not have the patience to fill in all 80 words, so splitting into 2 lists can effectively avoid the questionnaires being too long. Each word was rated 6 times by both age groups. In the online questionnaire, we designed a five-point Likert

scale for the participants to decide the stereotypical degree of the words listed in the form (1 = strongly disagree, 5 = strongly agree).

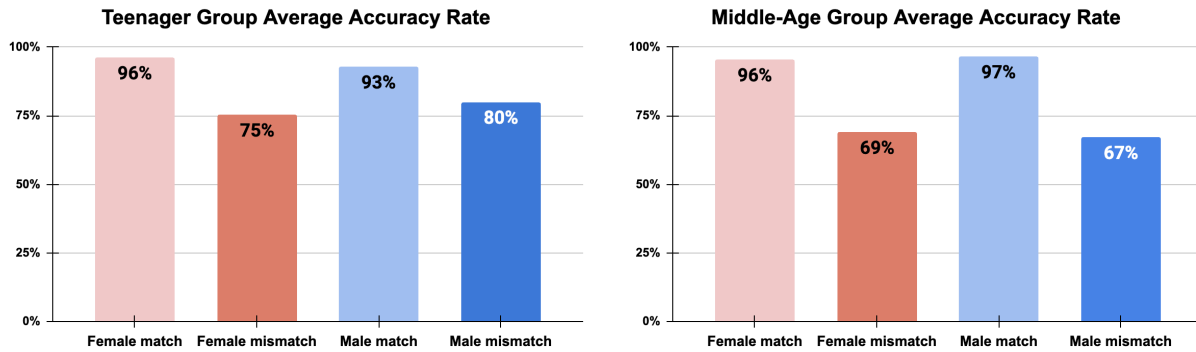
Procedures We designed a code-based testing program on PsychoPy and applied it to Pavlovian to turn the experiment into a website-based online study. Upon clicking the online testing program, the instructions were shown in written form on the screen, demonstrating the upcoming task our participants needed to complete. Each participant was asked to neglect the prime word and react accordingly to the target word. In each of the following trials, two words will appear in succession, meanwhile, our participants were requested to practice four trials to be familiar with the experiment session. After the practice trials, the program will bring the participants into the main experiment. In the main experiment, a fixation point (+) will be displayed for 500ms, followed by a prime word appearing for 300ms; then a 200ms blank screen. Finally, a target word remained on the screen until the response was received. If the word *male* (男性) appears on the screen, the participants should press the right button as a proper response; accordingly, if the word *female* (女性) appears, press the left button. The whole experiment lasted about 4 to 5 minutes while all the words were shown randomly on the participants' screens.

Results & Analysis

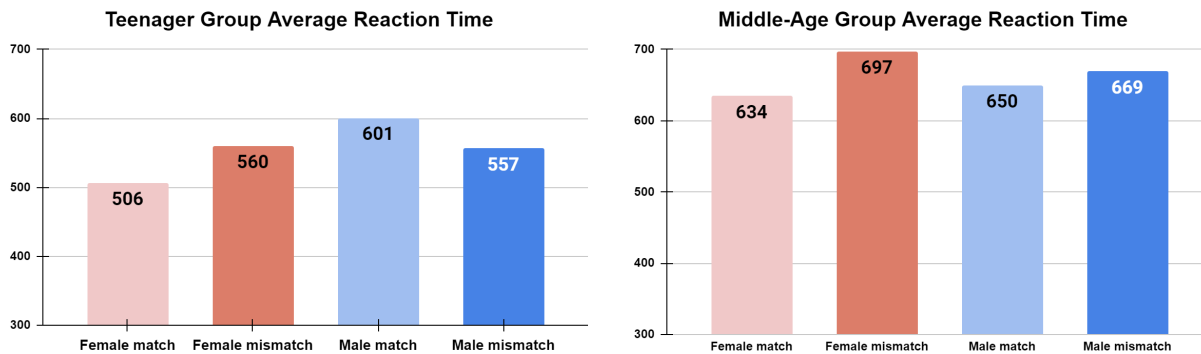


Norming Study Rating Results As the bar graph shows the result of the rating average of the stereotypical degree, the rating result is not higher than four as predicted, and we can observe a distinctive phenomenon: the degree of gender stereotypes observed by teenagers and

middle-aged people is more likely the same. Comparing the gender difference from the existing 80-word range, female words are more gender stereotyped, and there are more female-coded words due to the long-term sociolinguistic phenomenon of using male terms as the unmarked, default forms. For example, the male-related pronoun "他" (*he*) in Mandarin is also more frequently used as the neutral form of pronoun in general.

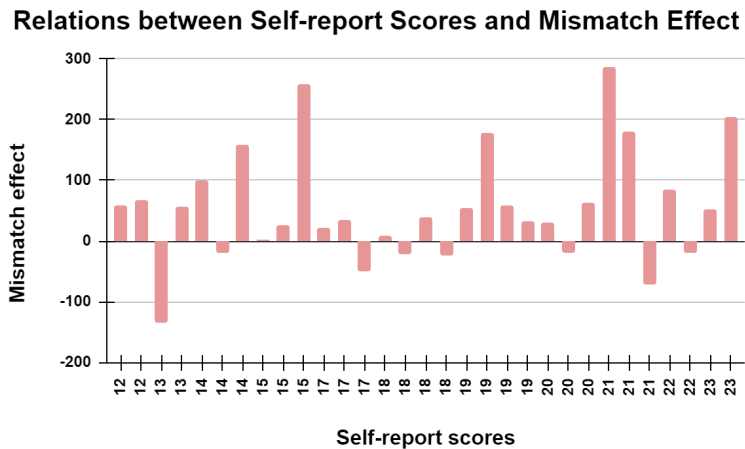


Accuracy Rate The two charts above show the correct answer rates of teenage group and middle-aged group, respectively. We can see that the accuracy rates of middle-aged group are much lower than the results of the teenage group. However, in common, more errors occurred when encountering words of gender mismatch for both sides.



Reaction Time Analysis The reaction time of the two groups both showed a significant increase when the prime associated with an underlying female stereotype mismatched the target. As we observed in the norming study, male-coded primes do not influence participants' responses as much as female ones do. The results in male-coded primes did not appear as we hypothesized in

the teenage group. However, stereotypical effects did emerge in the middle-aged group, even though it was not as solid as the female-coded primes. In addition, the participants in the middle-aged group tend to have a longer reaction time on average; this can be related to the reaction ability of older participants.



Self-Report Data Analysis The X-axis is the score of the self-report form (the sum of all questions, one question has one conversion) from small to large, and the Y-axis is the difference average of mismatch minus match regardless of male or female. If there are positive correlations between the two, then the mismatch effect should also show a trend from small to large. However, regarding this chart, there is no obvious correlation between the two as expected. There are participants who have high self-assessment but also have an extremely high stereotypical effect. On the other hand, some participants rate themselves as having high scores and indeed are very unbiased.

Conclusion

This study aims to investigate how gender stereotypes impact lexical priming activation in different age groups in Taiwan. We followed previous research and hypothesized that stereotypical activation would occur when the prime's gender stereotype does not match the target. By assigning the participants a decision task, the reaction time and accuracy are detected associating with the prime-target pair in different conditions. Additionally, the participants were

asked to fill out a self-report form in order to state the correlation between self-awareness and actual behavioral performance. The results suggested that female-coded prime words show a stronger influence on participants' average reaction time compared to the male-coded primes in both age groups. However, the primes did not perform as well as predicted in the norming phase. In the future, we want to explore the different effects of the selected primes with significant rating results between age groups and conduct a larger norming study. In conclusion, even though the social atmosphere changes, our results show that the effects of gender stereotypes still exist among different age groups, and the semantic activation in gender stereotypes may not be reduced in a short time.

References

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Appendices

- PsychoPy
 - Code for online platform
- Google Form & Sheet (<https://forms.gle/DJb9Fy9oFpuAUVtU8>)
 - Data Collect Organization
- Pavlova
 - Send online to accept responses