



# Electrophysiological Evidence of Gender Difference in Subliminal Processing of Fearful Faces



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## Background

There are more women who suffer from anxiety disorders and major depressive disorders than men [1-2]. Previous studies have suggested gender differences in emotion processing [3]. The purpose of the current study is to investigate the gender difference in processing emotional stimuli presented with or without awareness using electroencephalography (EEG) signals.

## Research Question

- Do women show different ERP responses to consciously presented threat-related stimuli compared to men?
- Do women show different ERP responses to subliminally presented threat-related stimuli?

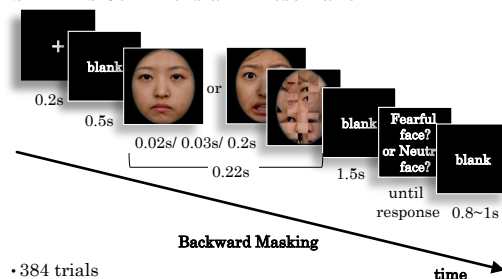
## Participants

	Men(±SEM)	Women(±SEM)
N=	21	20
Age	28.90(±1.41)	29.65(±1.754)
Education	13.62(±.38)	13.90(±.369)

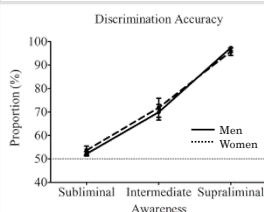
## Demography

	Men (±SEM)	Women (±SEM)
BDI II	4.95(±.877)	6.5(±.731)
BAI	3(±.694)	5.25(±.767)
STAI-trait	41.48(±1.194)	44.95(±1.085)
PANAS +	20.57(±1.055)	20.7(±1.334)
PANAS -	21.86(±1.094)	22.65(±1.136)

## Stimulus Conditions and Presentation



- 384 trials
- 6 conditions : 2 emotions (fearful vs. neutral) x 3 awareness (subliminal, intermediate, supraliminal)
- 64 trials for each condition
- Stimuli : Korean Facial Expressions of Emotion (KOFEE)



Behavioural responses showed no significant differences in discrimination accuracy between men and women for all awareness conditions.

## Procedure

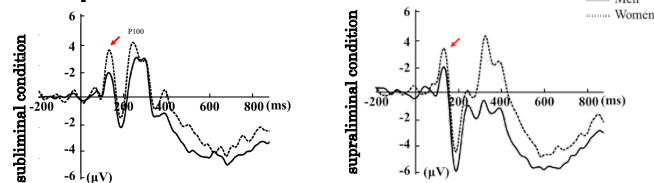


- BDI-II
- BAI
- STAI-trait
- PANAS
- Autonomic Balance Report
- Neuroscan SynAmps 4.3 - 62 Ag/Ag-cl electrodes
- Sampling Rate: 1000Hz
- Band pass filtering: 0.1-100Hz
- Filter: 0.1-30Hz
- Epoch: -200~ +900ms
- P100, N170, P300, EPN, LPP

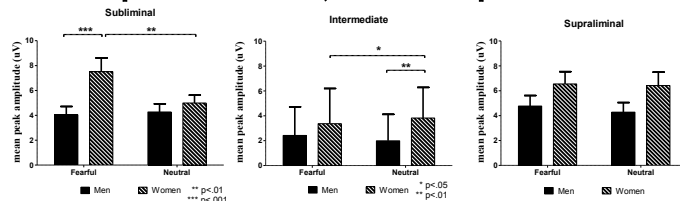
## Result

Within-group factor : emotion (fearful, neutral), awareness (subliminal, intermediate, supraliminal), hemisphere (left, middle, right)  
Between-group factor : Gender (men, women)  
Covariant : BAI, STAI-trait

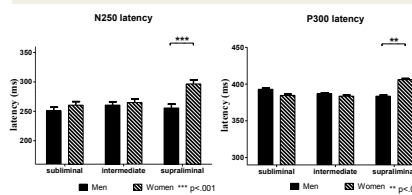
### P100 amplitude for Fearful Faces at O1



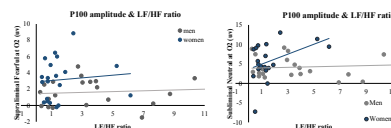
### P100 amplitude at O1 for subliminal, intermediate and supraliminal conditions



- There was a significant interaction between awareness x emotion x gender for P100.  $F(2,24)=4.53, p<0.05$ .
- Only to subliminal fearful face, P100 peak was for Women than Men at both O1 and O2.
- For women only, P100 peak was greater to subliminal fearful faces than subliminal neutral face for both O1 and O2.



- There was a significant interaction between awareness x gender for N250 latency [ $F(2,74)=11.43, p<.001$ ] and P300 latency [ $F(2,74)=3.393, p<.05$ ].
- N250 latency (left) and P300 latency (right) was longer for women than men in supraliminal condition



- Women showed greater P100 peak to supraliminal fearful at O2 with greater LF/HP ratio (left).
- Women showed greater P100 peak to subliminal neutral at O2 with greater LF/HP ratio (right).

## Conclusion

1. Women and Men show differential neural response to subliminal emotional stimuli from the early processing stages.
2. Women showed enhanced subliminal processing of fearful faces compared to men as demonstrated by larger P100 amplitude
3. It indicates that early and subliminal visual processing of emotion may be different between women and men, and women may be more sensitive to fearful faces when they are subliminally processed.

## Reference

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- [3] Ekehammar, B., et al. (2003). Personality and Individual Differences, 34(8), 1509-1523.

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