

Simultaneous Imaging of Neural Activations of Women and Men in Real-time Conversation using fNIRS

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QUESTION

Do men and women think and communicate in fundamentally different ways? If so, do men and women recruit similar or different neural mechanisms when in conversation?

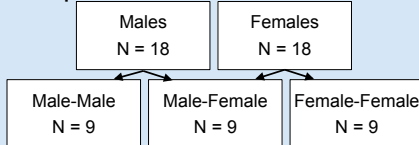
Here we examine the neural activations of same-gender and mixed-gender pairs as they interact to see whether there are similarities or differences between men and women depending on same or mixed-gender pairing

HYPOTHESES

- H1 Men and women communicate in *different* ways and recruit different neural mechanisms *independent* of same or mixed-gender pairing¹
- H2 Men and women communicate in *similar* ways and recruit the same neural mechanisms *independent* of same or mixed-gender pairing^{2,3}
- H3 Men and women communicate in *similar* ways and recruit the same neural mechanisms *dependent* on same or mixed-gender pairing⁴

METHOD

Participants



Task

Participants worked together to place an out-of-sequence cartoon in order by recalling the details of the cartoon (Story Recall), placing events in order (Event Ordering) and reconstructing the complete story (Story Construction)



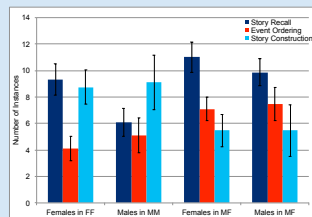
Participants simultaneously underwent functional Near Infrared Spectroscopy (fNIRS) neuroimaging^{5,6}

BEHAVIORAL RESULTS

No overall behavioral differences between men and women

Significant interaction between participant gender and partner gender

Similar behavioral patterns observed in same-gender and mixed-gender pairs



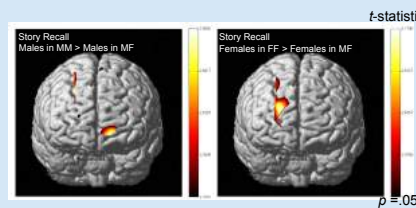
NEUROIMAGING RESULTS

No overall differences between men and women in neural activation

Gender differences were dependent on the gender of the partner

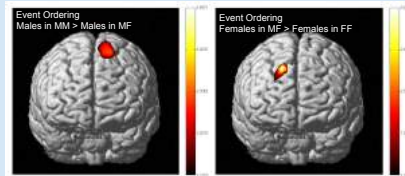
Story Recall

Same-gender pairs show more robust recruitment of the RLPFC



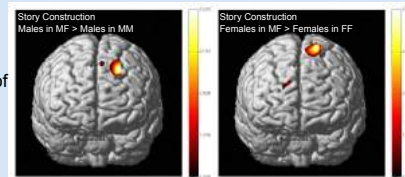
Event Ordering

Both males and females showed robust DLPFC recruitment



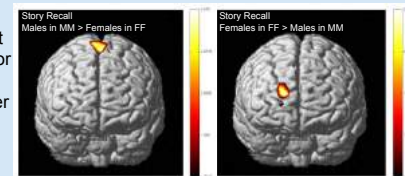
Story Construction

Mixed-gender pairs show more robust recruitment of the DLPFC



Neural differences between Female-Female and Male-Male pairs

Males in same-gender pairs showed more robust recruitment of the posterior DLPFC and SMA relative to females in same-gender pairs who showed more robust recruitment of the left anterior DLPFC



CONCLUSION

No overall behavioral or neural differences were found between men and women as they conversed to construct a story

Different neural activation patterns were observed between same-gender and mixed-gender pairs

Supports H3: Men and women recruit similar neural mechanisms while interacting depending on same or mixed-gender pairing

Significant neural activation differences were observed in the Dorsolateral Prefrontal Cortex (DLPFC; BA 8/9) and Rostrolateral Prefrontal Cortex (RLPFC; BA 10), possibly due to the working memory and information integration demands of the task⁷

Men and women might adjust their behavior according to the gender, and/or conversation style, of their partner⁴ which may account for the different neural activation patterns of mixed-gender and same-gender pairs

Contextual variables have a major impact on men and women's neural activation during conversation

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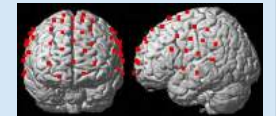
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What is fNIRS? ^{5,6}

Measures oxygenated, deoxygenated blood, and BOLD Advance - Tolerates movement, participants are seated Good spatial (~4 cm) & temporal (10 Hz) resolution



Hitachi ETG 4000 46 Channel



Frontal Placement Lateral Placement

Society for Neuroscience 2011