

# Opinion Changes on Debatable Arguments Involve Executive Process, but Opinion Amplification does not

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## Introduction

The biased assimilation theory posits that acceptance of the reasons refuting our prior belief requires conscious scrutiny, while that of supporting reasons does not, leading to polarization. (Lord, et al, 1979)

### The objective of this study:

To elucidate the difference of the neural mechanism between

- opinion changes affected by opposing reasons
- belief polarization affected by supporting reasons

## Methods

### Participants

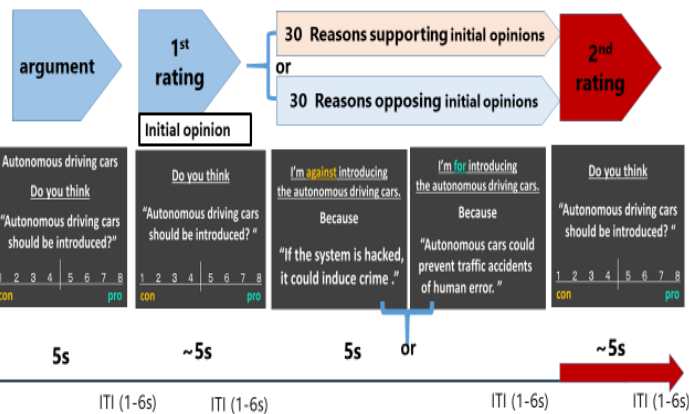
21 healthy right-handed, undergraduates & graduate students of Tohoku university, age:20-26 (mean(SD)=21.43(1.43), 15 males & 6 females, approved by IRB of Tohoku University School of Medicine (2014-1-259)

### Stimuli

- 60 debatable arguments
- Reasons for pro & con opinions for each argument (used as reasons supporting or opposing initial opinions, depending on their **initial opinions**)

### Tasks & Procedure

1. Arguments are presented
2. Participants rate their opinion on 1-8 Likert scale (con 1-4 5-8 pro)=**initial opinions**
3. Reasons supporting (30) or opposing (30) their initial opinions are presented from others.
4. Participants rate their opinions again.



Neural activity during the 2nd rating was compared between the trials where the opinion was updated from the 1st to the 2nd rating and those unchanged.

**fMRI data acquisition:** 3-T Phillips Achieva scanner EPI: 64 × 64 matrix; TR=2000ms, TE=30ms, flip angle=85

**fMRI data analysis:** SPM 12

-uncorrected  $p < 0.001$  at voxel-by-voxel analysis, FWE corrected at  $p < 0.05$  at the cluster level for multiple comparisons

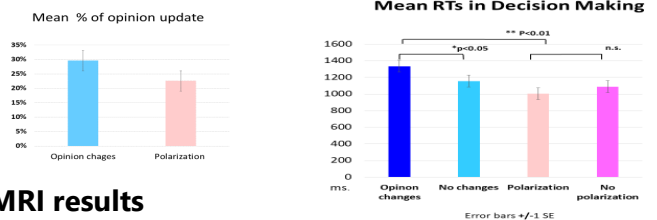
-contrast:

1. **[Opinion changes > No changes]** affected by opposing reasons
2. **[Polarization > No polarization]** affected by supporting reasons

## Results & Discussion

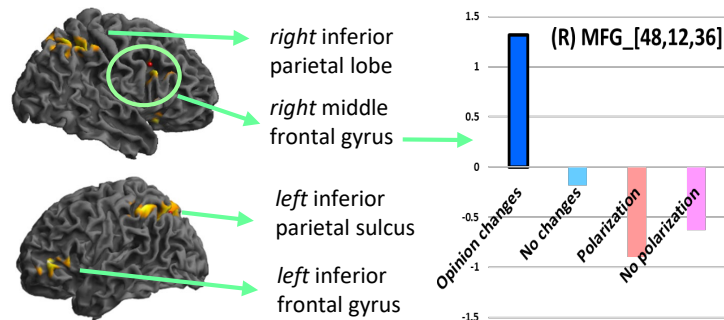
### Behavioral results

1. Mean % of converted rating value of opinion changes and polarization **[Rating 2- Rating1]**
2. Mean reaction times(RTs) in decision making of opinion update. 2-way repeated measure ANOVA.



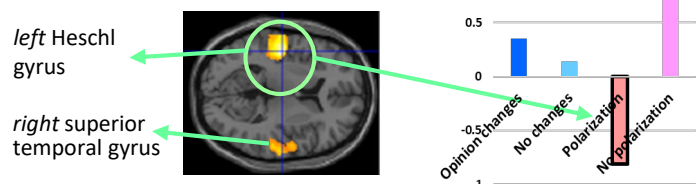
### fMRI results

#### <Opinion changes by opposing reasons> [Opinion changes > No changes]



The bilateral fronto-parietal network (the *r*IPL, the *l*PS, the *r*MFG, and the *l*IFG) and the *b* putamen were activated. No deactivation was seen.

#### <Polarization by supporting reasons> [Polarization > No polarization]



No significant activation was observed, but deactivation was seen in the *l*Heschl gyrus & the *r*STG.

The involvement of the executive function was observed only during the opinion changes, but not during the polarization. Together with significantly slower RTs in opinion changes compared to that of polarization, we presumed that opinion changes might be related with systematic data-driven process of deductive reasoning and bias inhibition, while polarization might be involved in the heuristic concept-driven process by biased assimilation.

### Conclusion

Executive functions of fronto-parietal network and putamen might be the neural correlate of opinion changes affected by opposing reasons, while this is not involved in belief polarization by supporting reasons.

### Reference

Lord,C.G., Ross,L., & Lepper,M.R., 1979. Biased Assimilation and Attitude Polarization: The effects of Prior Theories on Subsequently Considered Evidence. *J Pers Soc Psychol* 37, 2098-2109