

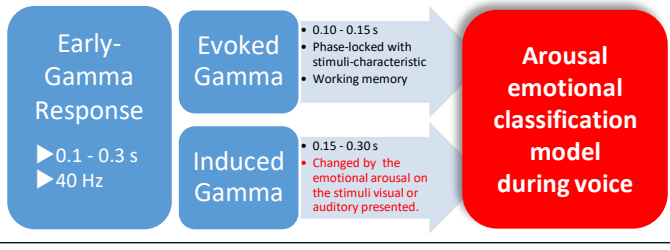
EEG-based emotion recognition from during paying attention to prosodic information

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Background



Materials and Methods

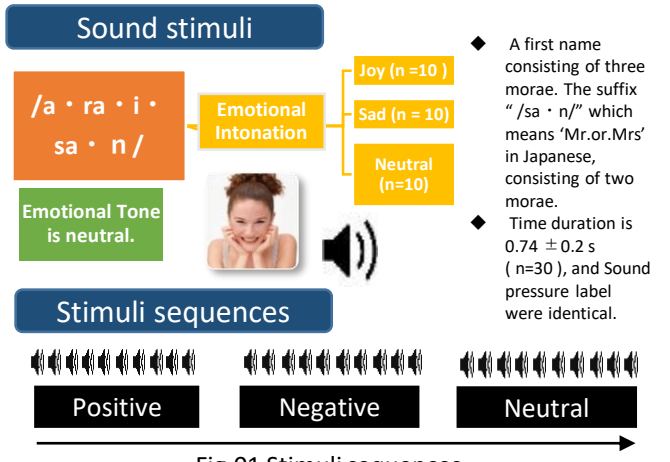


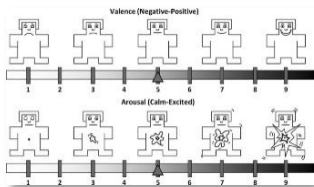
Fig.01 Stimuli sequences

- ◆ ISI(inter stimulus interval) is 10s.
- ◆ 10 sounds for Each emotion block which is sad. Joy and neutral emotional sound.

EEG data acquisition

- ◆ Subjects; n = 4 (age; mean = 24.7) One subject was excluded for remarkable noise.
- ◆ EEG; Brain Vision acticap,32CH (Re-referenced on Fcz)
- ◆ Sampling: 1000Hz, hpf-0.01Hz lpf-60Hz, Artifact rejection with ICA

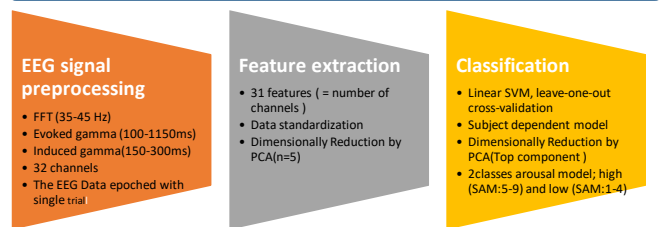
Subjective evaluation of emotional arousal



- ◆ Subjective evaluation was done after the experiment by Self-Assessment Manikin (SAM).
- ◆ This values were used for the class label of the classification model whether it is high(5-9) or low arousal(1-4).

Fig.02 Self-Assessment Manikin (SAM)

Classification procedure with Machine learning



Result

Classification Accuracy of γ (35-45Hz) amplitude

Evoked Gamma			Induced Gamma		
	Accuracy	Chance Rate		Accuracy	Chance Rate
S1	0.82	0.76	S1	0.85	0.76
S2	0.70	0.50	S2	0.73	0.50
S3	0.70	0.66	S3	0.76	0.66

*Evoked gamma: 0.10-0.15 s, Induced gamma:0.15-0.30 s
*Top of PCA's components(n = 5) were selected for classification model.
*Classes labels were two which were divided into high (SAM value :5-9) and low (SAM value:1-4) arousal.
*Number of Low and High values; All = 30;S1(high:17;low:13)-S2(high:20;low:10)-S3(high:15;low:15)

Confusion Matrices

Sub01 Evoked			Sub01 Induced		
True label	High	Low	True label	High	Low
	High	16		1	High
Low	4	7	Low	2	9
	High	Low		High	Low
Predicted label			Predicted label		

Sub02 Evoked			Sub02 Induced		
True label	High	Low	True label	High	Low
	High	13		2	High
Low	7	8	Low	6	9
	High	Low		High	Low
Predicted label			Predicted label		

Sub03 Evoked			Sub03 Induced		
True label	High	Low	True label	High	Low
	High	18		2	High
Low	7	3	Low	5	5
	High	Low		High	Low
Predicted label			Predicted label		

Discussion and Conclusion

- ◆ Accuracy of all subjects have exceeded the chance level.
- ◆ All subjects has no abnormality of accuracy from Confusion Matrices.
- ◆ All of the subjects had a higher accuracy to amplitude of induce gamma than evoked gamma. Whether or not it reflects cognitive function requires more scrutiny by increasing the number of subjects.
- ◆ It will be useful for developing communication support tools and devices that real-time detect his/her changes in physiological state emotions through the voice.

References

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Name of first author:
Haruko Yagura
I have no COI with regard to the presentation.