

# Anxiety and Stuttering:

## Differences in speech between face-to-face and telephone communication

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**Purpose:** To verify whether anticipatory anxiety strengthens stuttering, stuttering frequency (SF), disfluency frequency (DF), state anxiety (STAI) and electro-dermal activity (EDA) were analyzed under face-to-face and telephone tasks with 16 adults who stutter (AWS) and 15 adults who don't stutter (ANS).

**Method:** Two communication tasks were performed following the time table shown in Fig 1. Various parameters relating EDA and STAI were measured as shown in Fig.2.

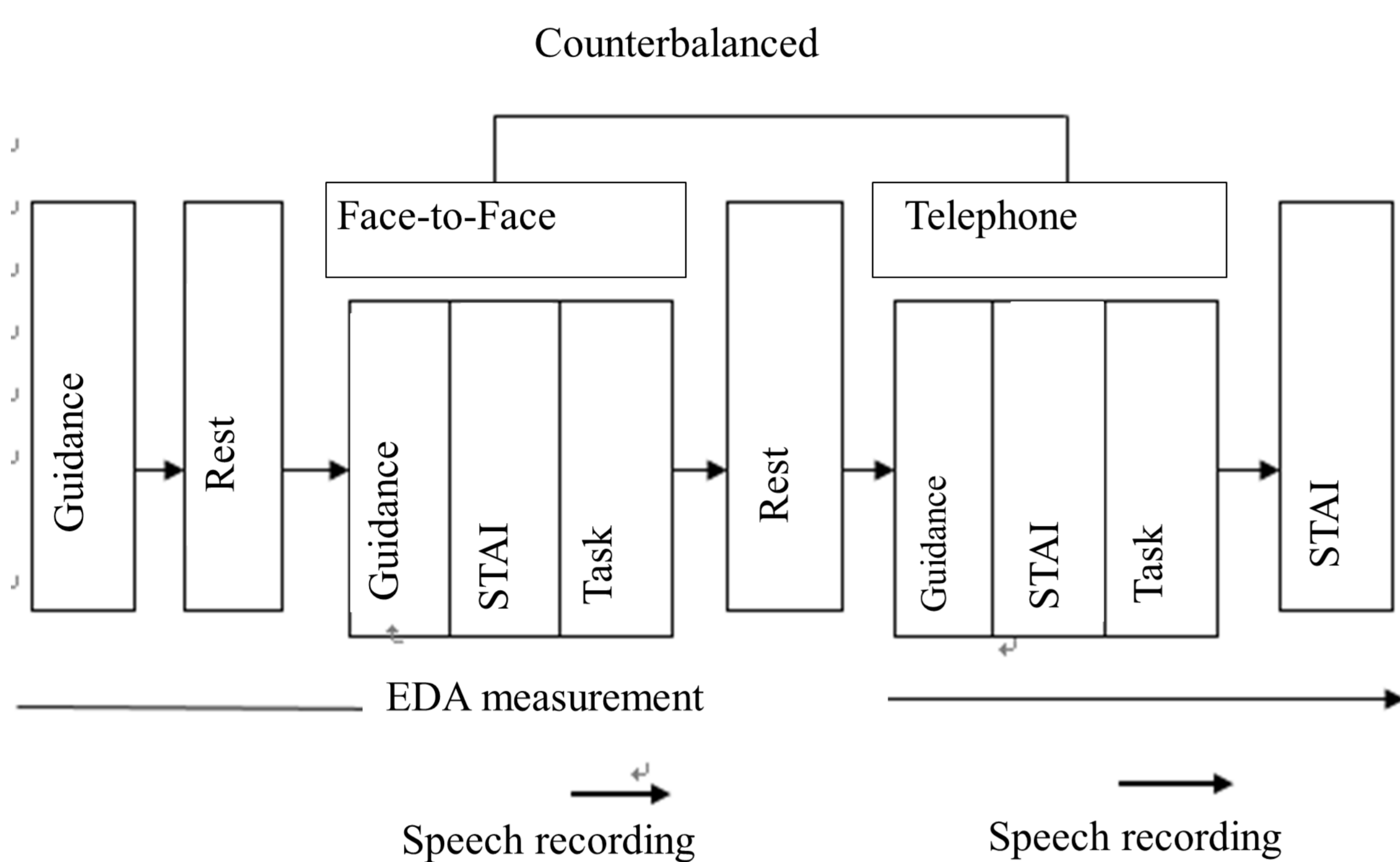


Fig. 1. Time table of Experiment: Each subject explained characteristics of a geometric pattern to a conversation partner so that the partner could draw it as precisely as possible in a face-to-face (F2F) and telephone (Tel) conversation tasks.

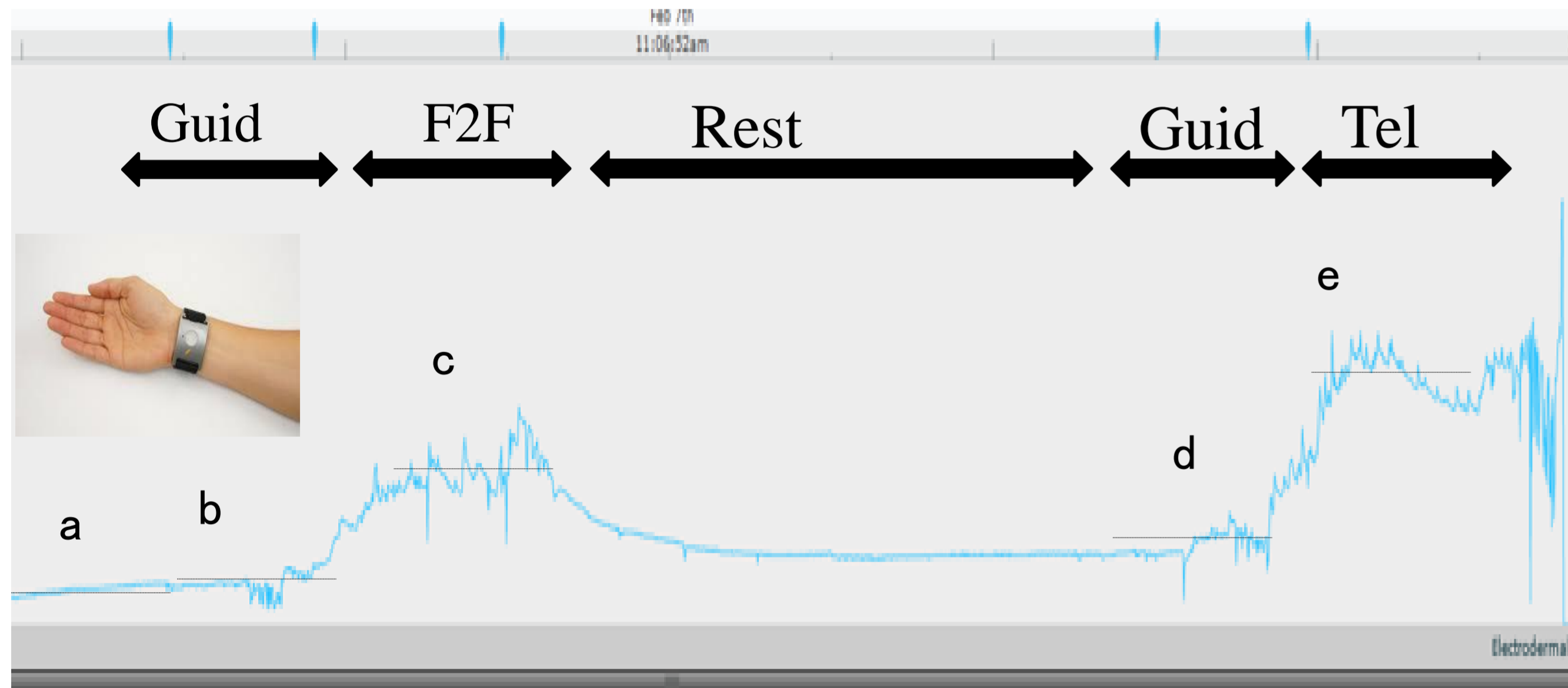


Fig. 2. EDA measured during the whole experiment: Situation dependent variations in EDA were recorded as mean EDA during each moment: a: initial rest, b: pre-F2F Guidance, c: F2F task, d: pre-Tel Guidance, e: Tel task. STAI was measured just before and just after the tasks.

**Result 1:** Stuttering frequency (SF) and disfluency frequency (DF) as well as EDA significantly increased during the Tel task than the F2F task for AWS as shown in Fig. 3, 4, and 5. STAI increased before the Tel task for AWS as shown in Fig. 6.

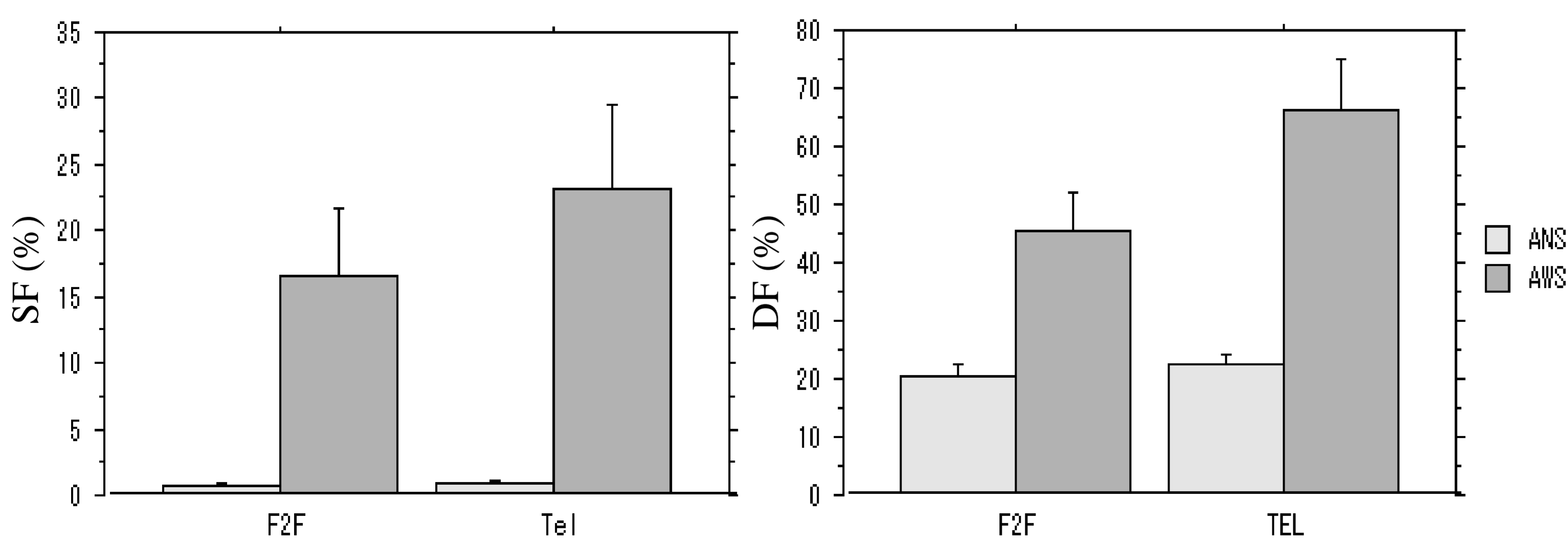


Fig. 3. Stuttering Frequency

Fig. 4. Disfluency Frequency

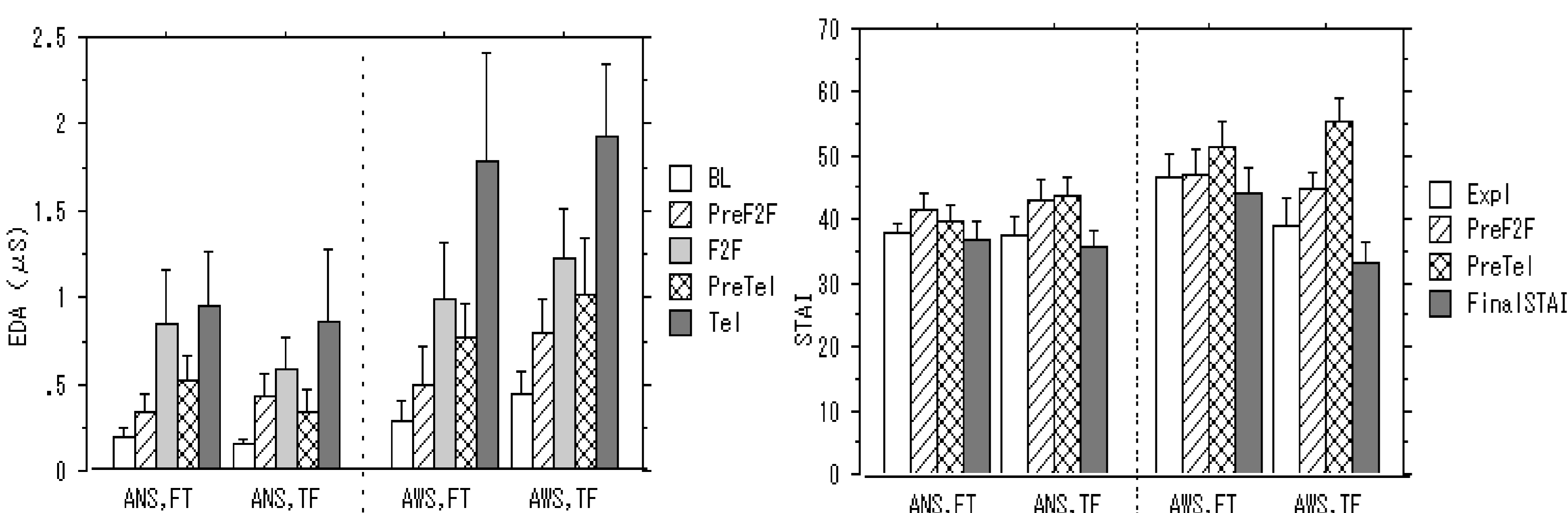


Fig. 5. mean EDA

Fig. 6. STAI.

**Result 2:** Two principal components, F1 and F2, with the largest factor loadings are shown in Table 1.

- F1 indicates that SF co-varies with increases in EDA and STAI during the Tel task compared to the F2F task. This is suggested because F1 have positive loadings for parameters relating with SF, DF, EDA and STAI.
- F2 indicates that EDA contains a principal component which correlates with a SF decrease, not with a SF increase. This is suggested because F2 have negative loadings for parameters relating with SF and DF, but positive loadings for EDA parameters.

Table 1. Two principal components extracted.

Parameters	Principal Component	
	F1	F2
SF F2F	<b>0.77</b>	<b>-0.45</b>
SF Tel	<b>0.82</b>	<b>-0.48</b>
SF Tel-F2F	<b>0.74</b>	<b>-0.43</b>
DF F2F	<b>0.73</b>	<b>-0.42</b>
DF Tel	<b>0.69</b>	<b>-0.54</b>
DF Tel-F2F	0.37	<b>-0.45</b>
EDA Init	0.41	<b>0.64</b>
EDA PreF2F	0.40	<b>0.70</b>
EDA F2F	0.34	<b>0.81</b>
EDA PreTel	0.46	<b>0.81</b>
EDA Tel	<b>0.72</b>	<b>0.58</b>
EDA Tel-PreTel	<b>0.67</b>	0.25
EDA F2F-PreF2F	0.17	<b>0.68</b>
EDA TEL - F2F	<b>0.66</b>	0.12
EDA preTEL - PreF2F	0.28	<b>0.52</b>
STAI PreTel	<b>0.70</b>	-0.06
STAI Tel-F2F	<b>0.71</b>	-0.27

**Result 3:** The generalized linear model shown in Fig. 7 indicates that AWS with stronger state anxiety during the Tel task compared to the F2F task has higher stuttering frequency during the Telephone task compared to the F2F task. This suggests that anticipatory anxiety, which increases in a task-dependent manner, strengthens stuttering.

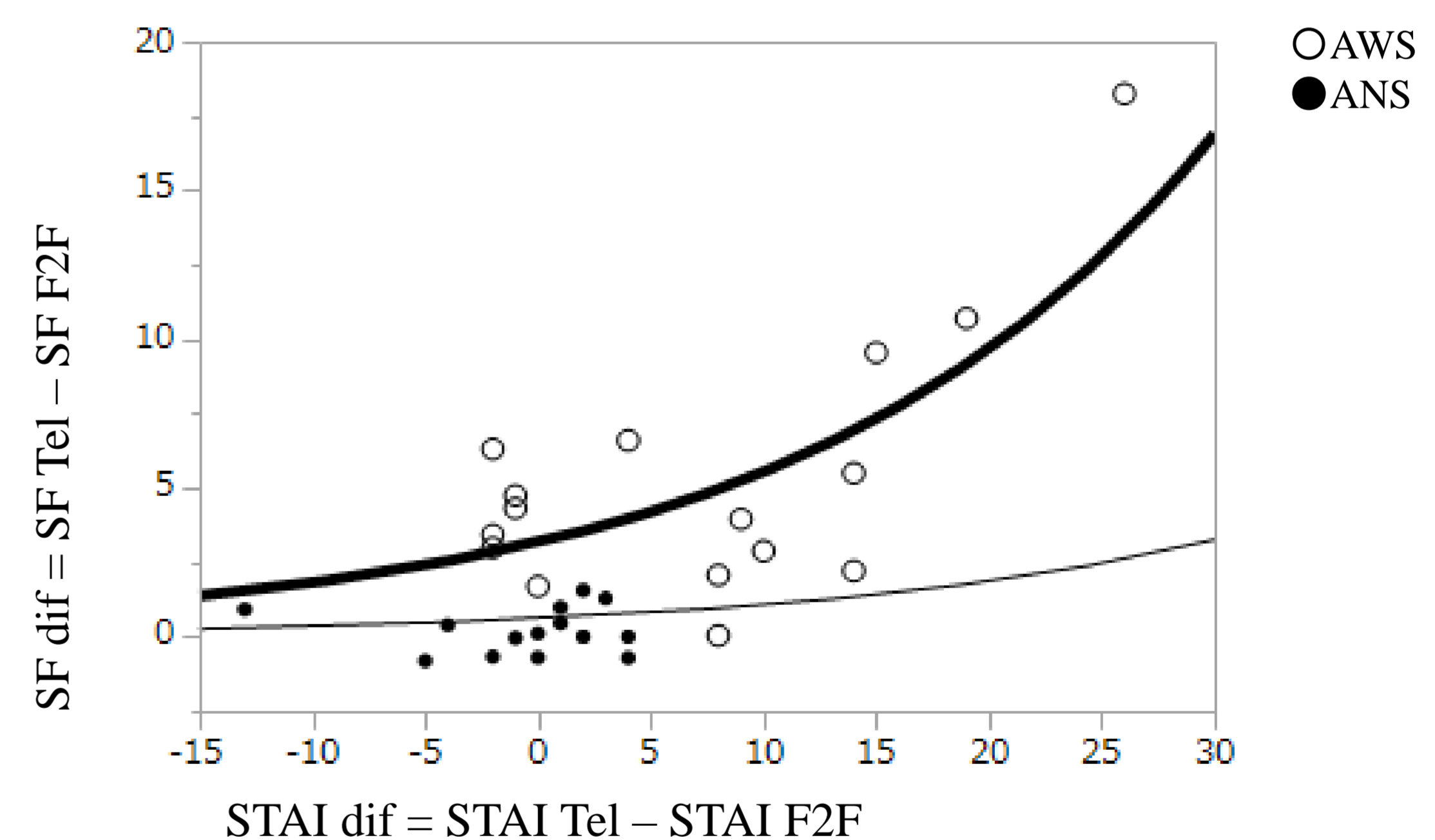


Fig. 7. The generalized linear model to predict the relation between SF Tel-F2F versus STAI Tel-F2F. Here, SF Tel-F2F shows increase in Stuttering Frequency, and STAI Tel-F2F shows increase in STAI in the Tel task compared to the F2F task

### Conclusions:

EDA consists of two different components: one reflecting the state anxiety which increases SF, the other reflecting the physiological activity which decreases SF. This may explain why there are many conflicting reports on the relationships between autonomic arousal measured by EDA, anxiety, and SF.

These findings suggest that

- 1) anticipatory anxiety, which increases in a task-dependent manner, strengthens stuttering.
- 2) Reduction of the state anxiety may have some positive effects on stuttering symptoms.

### Acknowledgments

The authors appreciate all the participants who made this study possible.

This study was approved by Research Ethics Committee of Pref. Univ. Hiroshima, and was supported by JSPS Grants.