

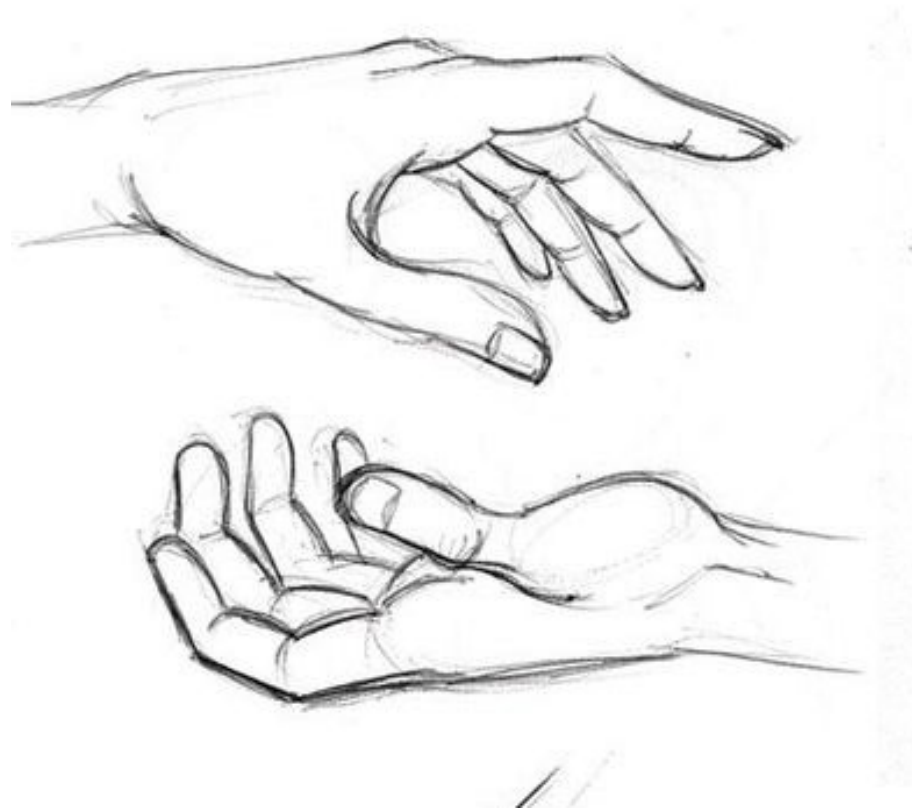


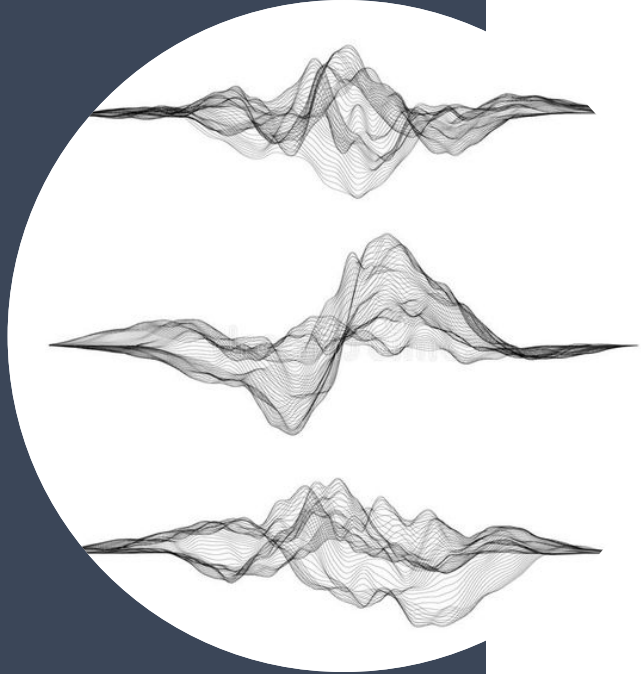
A TOOL FOR DETERMINING DISTANCES AND OVERLAPS BETWEEN MULTIMODAL ANNOTATIONS

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AGENDA

- Problem
- Multimodal Annotation Tool
- Case study





PROBLEM



Multimodality is the interface of many areas and, therefore, different theoretical backgrounds. This entails multiple ways to collect, store, process, and analyze the data.

As a result, a striking problem is **comparability**

PROBLEM: MULTIPLE ANNOTATION SCHEMES

GESTURE

Gesture units, phrases, phases, strokes

Neuroges (Lausberg, 2019)

LASG (Bressemer, Ladewig & Müller, 2013)

M3D (Rohrer et al., 2022)

...

SPEECH

Intonational phrases (Pierrehumbert, 1986)

Prosodic phrase (as per Kendon, 1972)

Terminated unit (Cresti, 2000)

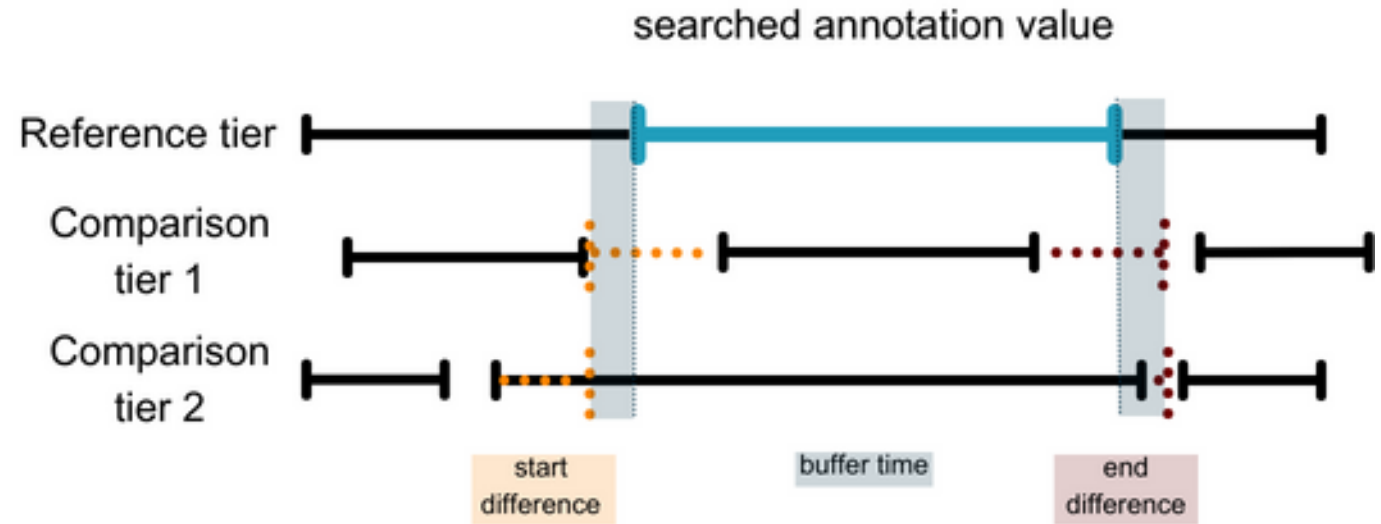
...

cf. (Izre'el et al., 2020)

MULTIMODAL ANNOTATION TOOL

INPUT

1. Define tiers:
 - Reference tier;
 - Comparison tier(s);
2. Define searched annotation value
3. Define mode of comparison
4. Define buffer time (optional)



MULTIMODAL ANNOTATION TOOL

	18.000	00:00:50.000	00:00:52.000	00:00:54.000	00:00:56.000	00:												
	<é> //	então / tipo assim / se você tem um avião lá / ai &d [1] eu defini a geometria / ai eu comecei a fazer &a [1] cálculo estru	ral / e o cálculo estrutural já depende da															
	<é>	então	tipo a	se você tem um avião lá	ai &d	eu defini a geometria	ai eu comecei &a [1] cálculo estrutu	e o cálculo estrutural já depende	depende de									
[101]	COM	AUX	AUX	COB	SCA	COB	SCA	COB	CMM	CMM								
			105			106												
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[12]			preparation	strok	retraction		preparati	stroke	prepa	stroke	retrac	pre	strok	ret	preparati	stroke	retractio	
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MULTIMODAL ANNOTATION TOOL

USAGE

; Configuration file for the multimodal annotation distance tool.

[MAIN_SETTINGS]

; Path of the directory containing the .eaf files to analyze.

DIR_PATH = /hgest/files2022

; Path to the multimodal-annotation-distance.py configuration file

SAVE_PATH = PS C:\Users\ name \OneDrive\Documentos\GitHub
> python mult

; Name of the multimodal-annotation-distance.py configuration file

RESULTS_FILE = InfoStructure_PAR_start_ms,InfoStructure_PAR_end_ms,InfoStructure_PAR_duration,Buffer_ms

;RESULTS_FILE = path, Tier, Value, Begin_ms, End_ms, Duration, Overlap_time, Overlap_ratio, Diff_start, Diff_end

; Reference tier at 7660,8010,350,0,GE-Phrase,203,7612,9471,1859,350,1.0,48,-1461

REFERENCE_TIER = I 7660,8010,350,0,GE-Phase,preparation,7612,8445,833,350,1.0,48,-435

; Value in the reference tier 12059,14017,1958,0,GE-Phrase,205,13467,16449,2982,550,0.281,-1408,-2432

SEARCH_VALUE = PAR 12059,14017,1958,0,GE-Phase,preparation,13467,14334,867,550,0.281,-1408,-317

; Mode of operation 23185,24876,1691,0,GE-Phrase,209,23217,24642,1425,1425,0.843,-32,234

MODE = span 23185,24876,1691,0,GE-Phrase,210,24642,25844,1202,234,0.138,-1457,-968

; MODE = point_comparison 23185,24876,1691,0,GE-Phase,preparation,23217,23638,421,421,0.249,-32,1238

; Buffer time in milliseconds 23185,24876,1691,0,GE-Phase,stroke,23638,24372,734,734,0.434,-453,504

BUFFER = 0 23185,24876,1691,0,GE-Phase,retraction,24372,24642,270,270,0.16,-1187,234

; Tiers to compare against the reference tier.

; Enter the comparison tiers separated by commas (e.g.: tier1,tier2)

COMPARISON_TIERS = GE-Phrase,GE-Phase



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MULTIMODAL ANNOTATION TOOL

OUTPUT

1. **ReferenceTier_value_start_ms**: onset of the searched annotation value on the reference tier in milliseconds;
2. **ReferenceTier_value_end_ms**: offset of the searched annotation value on the reference tier in milliseconds;
3. **ReferenceTier_value_duration**: duration of the searched annotation value on the reference tier in milliseconds. It is calculated as follows:
$$\text{ref_tier_duration} = (\text{ref_tier_end} + \text{buffer}) - (\text{ref_tier_start} - \text{buffer})$$
4. **Buffer_ms**: assigned buffer time;
5. **Tier**: compared tier, ordered first by relation to reference tier then by time;
6. **Value**: annotation values for each unit in the compared tiers;
7. **Begin_ms**: onset of the compared tier for each annotation value (listed in item 6);
8. **End_ms**: offset of the compared tier for each annotation value (listed in item 6);

MULTIMODAL ANNOTATION TOOL

OUTPUT

9. **Duration:** duration of the compared tier for each annotation value (listed in item 6). It is obtained as follows:

```
comparison_tier_duration = comparison_tier_end - comparison_tier_start
```

10. **Overlap_time:** provides the time in milliseconds for all cases in which there is an overlap between the reference tier and the compared tier and is calculated as follows:

```
overlap = min((ref_tier_end + buffer) / comparison_tier_end) - max((ref_tier_start - buffer), comparison_tier_start)
```

11. **Overlap_ratio:** provides the proportion of the overlap time (rounded to three decimal places) in relation to the length of the reference value and is obtained as follows:

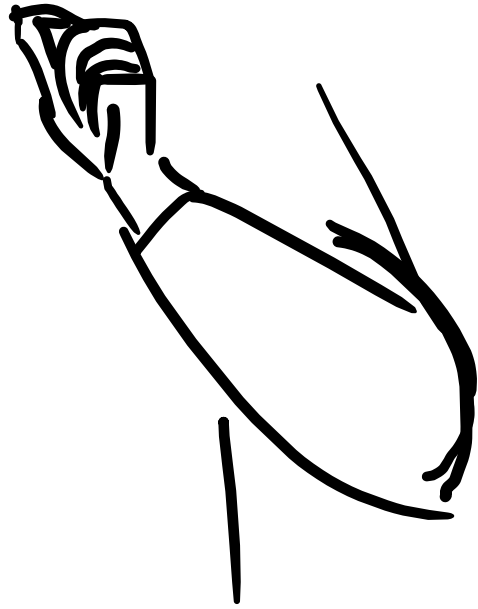
```
overlap_ratio = overlap_time / ref_tier_duration
```

12. **Diff_start:** provides the starting time of the comparison tier in relation to the start of the reference value as follows:

```
diff_start = (ref_tier_start - buffer) - comparison_tier_start
```

13. **Diff_end:** provides the ending time of the comparison tier in relation to the end of the reference value as follows:

```
diff_end = (ref_tier_end + buffer) - comparison_tier_end
```



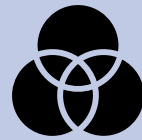
CASE STUDY



BGEST CORPUS

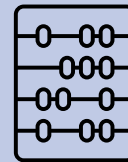
The BGEST corpus comprises Brazilian Portuguese spontaneous speech, 450 strokes and 3984 words.

Segmentation and annotation based on L-Act Theory.



OVERLAP RATIO

The amount of overlap is crucial to determine if two tiers, i.e. two instances, are related or not.

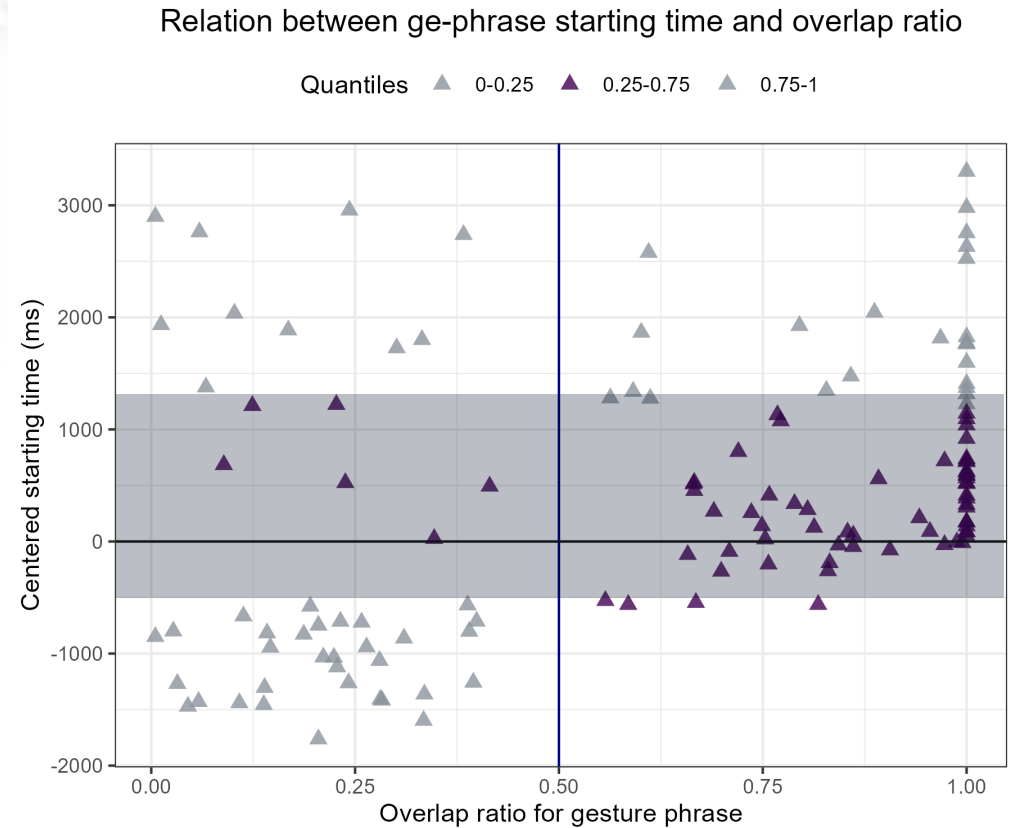
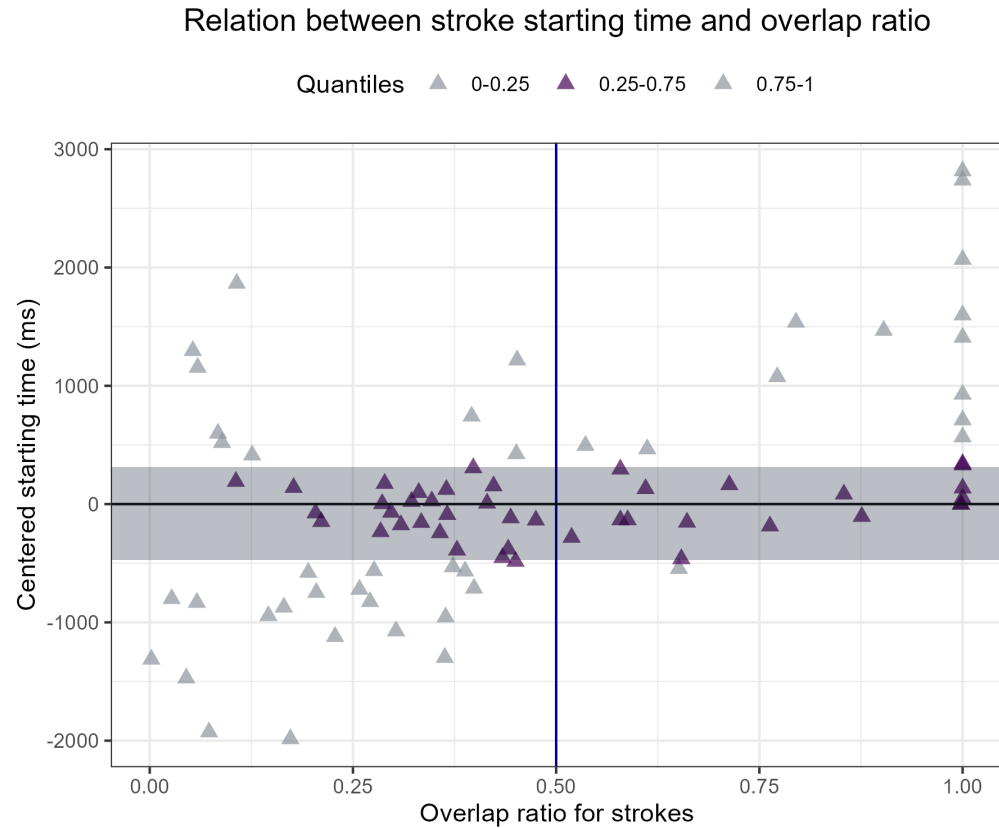


ALIGNMENT

How displaced two tiers are from one to another in milliseconds.

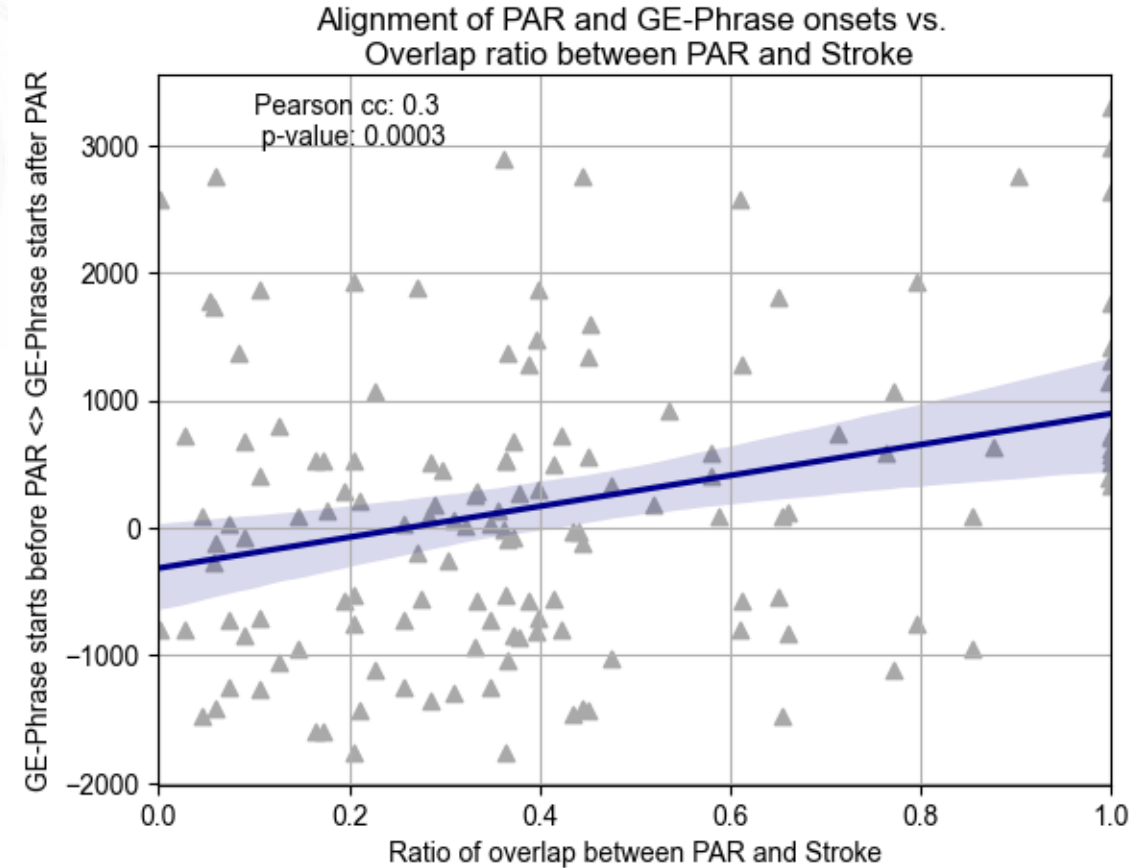
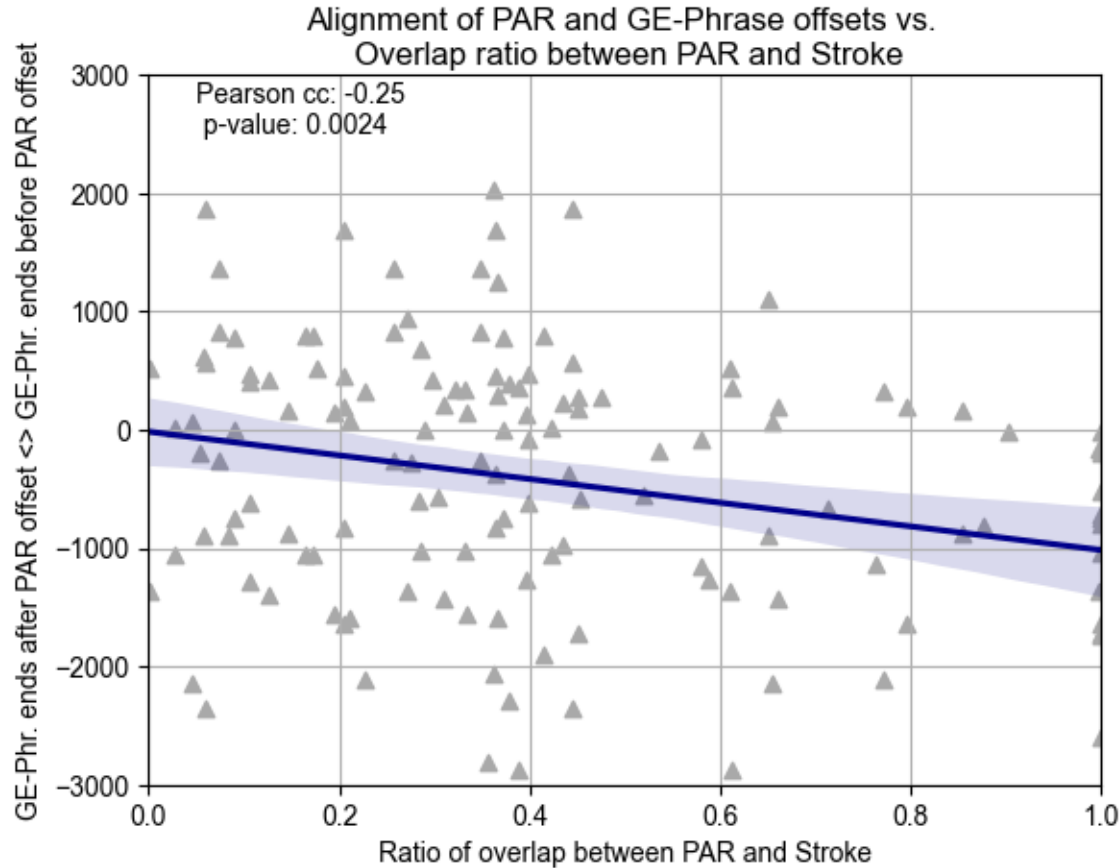
OVERLAP RATIO

We analyzed the synchronicity of PAR (in the reference tier) with gesture phrases (in comparison tier 1) and strokes (comparison tier 2) spans (mode of comparison)



ALIGNMENT

We analyzed the synchronicity of PAR (in the reference tier) with gesture phrases (in comparison tier 1) and strokes (comparison tier 2) spans (mode of comparison)



THANK YOU

GRAZIE

OBRIGADO

GRACIAS



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