"So this memory is quite negative" – Interrelations between Sentiment and Intensification in Schizophrenia-Bipolar Spectrum Disorders

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Goal and topic of the present research work

- Analysis of the interrelations of sentiment and intensification
- Hungarian spontaneous speech
- Patients suffering from schizophrenia (SZ), schizoaffective (SAD) and bipolar disorders (BD)

Structure of the presentation

- Short description of the disorders in question
- Discussion of the motivation of the current analysis
- Corpus and methods
- Basic data of the analysis
- Results and discussion

Schizophrenia-bipolar spectrum disorders

- **Schizophrenia** (henceforth SZ): characterized by symptoms of delusions, hallucinations, disorganized speech or behavior, and impaired cognitive ability
- **Schizoaffective disorder** (henceforth SAD): mixed psychotic (hallucinations or delusions) and affective symptoms (mood episodes) → intermediate position between BD and SZ in the schizophrenia-bipolar spectrum
- **Bipolar disorder** (BD): characterized by episodes of mania, hypomania, and alternating or intertwining episodes of depression, possibly psychosis
- Common feature of the three disorders: cognitive deficits, impaired executive function → impaired verbal function

In our current study

- We analyze the interrelations of linguistic **intensification** and the **sentiment** content in speech texts produced by SZ, SAD and BD patients
- Why analyze these features?
  - Sentiment analysis: **emotion perception and expression** show deficit, e.g., in SZ; there is an interrelation between specific neurocognitive deficits and **emotion regulation** in BD
  - Linguistic intensification: the use of intensifiers is closely related to **emotion regulation**; linguistic markers of speaker **subjectivity**; primary function: signifying the speaker's point of view and attitude
- Material and method in brief:
  - HuMenDisCo corpus (Szabó et al. 2023); written texts
  - In our previous study Szabó et al. (2023): *collocational sentiment*: sentiment value of the immediate right collocator of the intensifiers
  - Here: *contextual sentiment*: the sentiments of the whole clauses the given intensifiers occurred in; manual annotation
  - Comparative analyses (sentiment types and sub-corpora)

Novelty and research questions

- Novelty:
  - we examine the outcomes of the **manual and the automatic sentiment analysis** in a comparative way
  - we examine them in relation to linguistic **intensification**
- Main research questions:
  - Is there any systematic interrelation between intensifiers and sentiments?
  - Is there any systematic difference among sub-corpora?
  - And between collocational and contextual sentiments? And in their interrelation to linguistic intensification?

Corpus and method I.

- Recordings:
  - Prevention of Mental Illnesses Interdisciplinary Research Group (University of Szeged, Hungary) led by István Szendi
  - 90 subjects, 526 separate transcripts were made of texts produced by SZ, SAD, BD and the control group (henceforth: HC) (For more details see Szabó et al. 2023a, 2023b). Basic data:

	SZ	**SAD**	**BD**	**Control**	**All**
Participants	31	16	16	27	90
Texts	183	91	94	158	526
Age; M(SD)	38.00(9.78)	40.09(9.77)	49.42(8.49)	36.28(10.03)	39.89(10.55)
Education; M(SD)	14.26(2.86)	14.91(2.96)	16.34(4.05)	14.67(2.99)	14.87(3.18)

Corpus and method II.

- **Intensifier extraction** was carried out prior to the current analysis (Szabó et al. 2023); amount of data was automatically reduced, relying on the POS-tags (adjective, adverb or verb) of the collocators
- Here: **manual annotation** of the clauses (containing an intensifier): negative, positive or neutral (contextual sentiment)
- Inter-annotator agreement rate: 98%

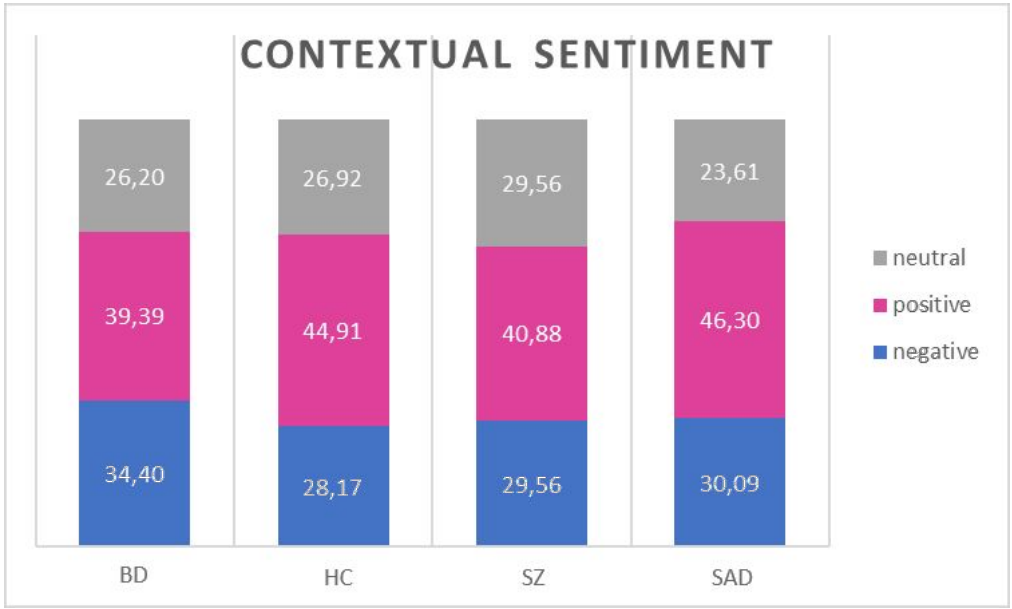
Basic results

- Number and frequency distribution of intensifiers: **BD** uses **intensifiers** with a higher frequency than HC; SAD and SZ groups with a lower frequency; SAD speakers use the least
- **3 most frequent intensifiers** are exactly the **same** in each sub-corpora (*nagyon, elég, annyira*)
- Overall sentiment:

GROUP	pos%	neg%	neut%
SZ	6.63	2.72	90.65
SAD	5.55	2.63	91.81
BD	6.43	2.95	90.61
ALLPAT	6.29	2.79	90.90
HC	5.99	2.44	91.57

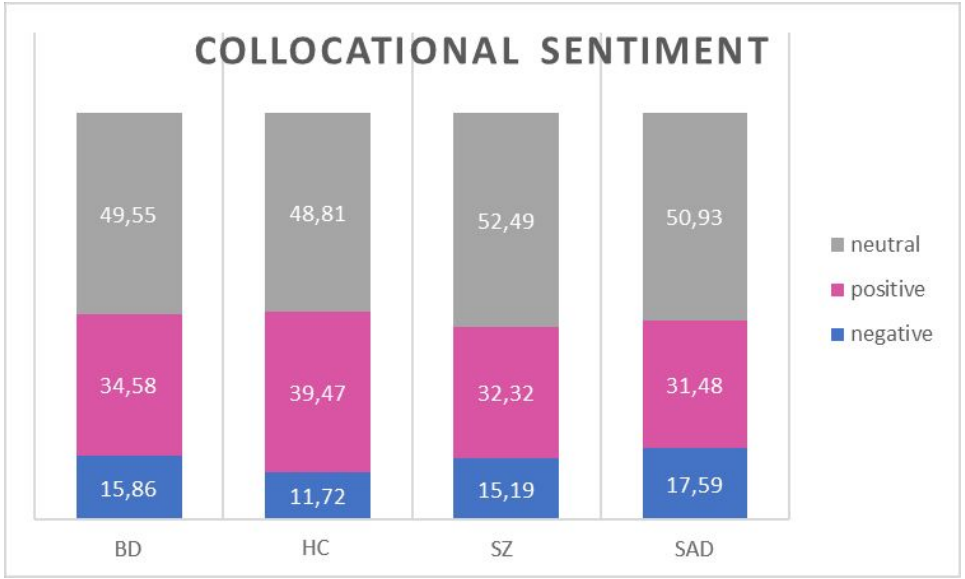
Results on contextual sentiment

- Utterances containing an **intensifier** are **positive** in most cases in each and every speaker group
- The highest number of **positive sentiment: SAD**
- Most **balanced: BD**-group



Results on collocational sentiment (Szabó et al. 2023)

- **HC**: the **most positive** and the **least negative** words with an **intensifier**
- The most striking difference between contextual and collocational sentiments: SAD used **intensifiers in positive utterance** with the highest frequency, however, they used the **least positive intensified words**
- Most of the **collocators** appeared to be **neutral**, but, based on the manual analysis, most of the **utterances** have **positive or negative** sentiment
- Interesting fact: despite the fact that **SAD** used the **most neutral words** in their entire corpus, they **intensify negative words** with the highest frequency



Discussion I.

- Intensifiers in general:
  - **BD** utilized the **most intensifiers**; more than the HC
  - **Patients** tend to use slightly **fewer intensifiers** than the HC, but SZ and SAD notably lag behind HC
- As for the specific intensifiers each group uses:
  - **BD** and **HC**: more **varied** + **negative emotive** words

BD

HC

Discussion II.

- Contextual sentiments:
  - The highest number of **positive sentiment** in the **SAD**-corpus → exceeds that of the HC group
  - **SAD** patients use **intensification** in relation to **sentiment contents**; to express some evaluation; they tend to do so in a **positive context**

- Contextual vs. collocational sentiment:
  - **Differ** notably
  - Most of the **collocators** appeared to be **neutral**
  - But: most of the **utterances** have **positive** or **negative** sentiment value
  - The most striking difference: **SAD** are inclined to use **intensifiers** in **positive** expressions, but the **intensifiers** they use tend to modify **negative words**
  - The importance of **manual sentiment analysis**

Discussion III.

- Contextual sentiment vs. overall sentiment:
  - The only patient group that uses **fewer positive sentiment words** than the controls are **SAD** patients; “the most neutral”

- Collocational sentiment vs. overall sentiment:
  - **SAD**: even though they most frequently use **intensifiers** in a **positive context** and use the most **intensifiers with negative words**, they exhibit the **lowest overall sentiment words** usage

Conclusion

- Analysis of the interrelations of **sentiment** and **intensification**
- In Hungarian spontaneous speech
- Patients suffering from **schizophrenia** (SZ), **schizoaffective** (SAD) and **bipolar disorders** (BD)
- **Sentiment analysis** related to intensifiers (**contextual** and **collocational** sentiments) can provide new, nuanced insights
- It can be used in automatic **classification** among these speaker groups via machine learning methods (additional important data for the analysis, beyond general sentiment analysis results)

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