Intercomprehension of Slavic Functional Multiwords: Translation Experiment Results

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1. Motivation

🤔 Can Russian speakers infer the meaning of functional multiwords in other Slavic languages?
🤔 Which cross-lingual conditions favour intercomprehension?

2. Research Goal

Assess the intelligibility of MSUs in Czech, Polish, Bulgarian, Belarusian, Ukrainian for Russian speakers **and reveal conditions** facilitating comprehension between Slavic languages.

4. Textual Data Sources

1. Stimuli and Russian 'gold' translations:
   - parallel subcorpora of Russian and Czech NC
2. Literal translations:
   - GPT-4 prompted for isolated MSUs (22 July 2024) + random manual check

5. Example CS→RU (id: CS_30)

MSU	nejen že [**not only**]
CsNC	**Nejen že** nemohl vstát, ale připadalo mu, že nesmí ani otevřít oči. – **Не то что** встать, ему казалось, что он не может открыть глаз.
gold	не то что
lit.	не только это
users	nan: 11, неужели: 5, недели ты: 1, не ел же: 1, не один же: 1, не только это: 1, нежный: 1, неужели ж: 1, нужен ли: 1, он же: 1

6. Annotated Translation Solutions

Types of linguistic behaviour and weights:

- correct (7)
- fluent-literal (6)
- paraphrase (5)
- awkward-literal (4)
- fantasy (2)
- noise (0)
- empty (0)

comprehension

Slavist annotators

MSU Intelligibility score: a sum of weighted solution probabilities across all responses.

7. Intercomprehension Predictors

1. Transformer-based features: surprisal and cosine similarity for MSUs and contexts (`ruRoBERTa-large` [3])
2. Formal distances (stimulus-to-gold, gold-to-lit): Phonologically Weighted Levenshtein Distance (PWLD), phonological similarity between phonemic sequences [1, 2].
3. Automatic translation quality: `COMET` scores for gold and literal [4]

Total: 14 predictors

Another measure of task difficulty: MSU translation entropy, Shanon's formula (p_i=probability of $i_{\overline{n}}$th unique response):

$$H = -\sum_{i=1} p_i \log_2(p_i) \qquad (1)$$

3. Online Experiment: Free Translation Task

- **Stimuli:** up to 60 sentences with MSUs from a multilingual glossary (balanced for PoS: adverbials, conjunctions, parenthesis, particles, prepositions)
- **Participants:** 126 users, no formal knowledge of the source language.
- **Dynamic time limit**
- **Total responses:** 6,579 (users/task: >20, unique responses/task: 2–27)

MultiLingID-Portal: `https://intercomprehension.coli.uni-saarland.de/en/`

8. Overview of experimental data

Fig.1 Solutions and average PWLD by SL

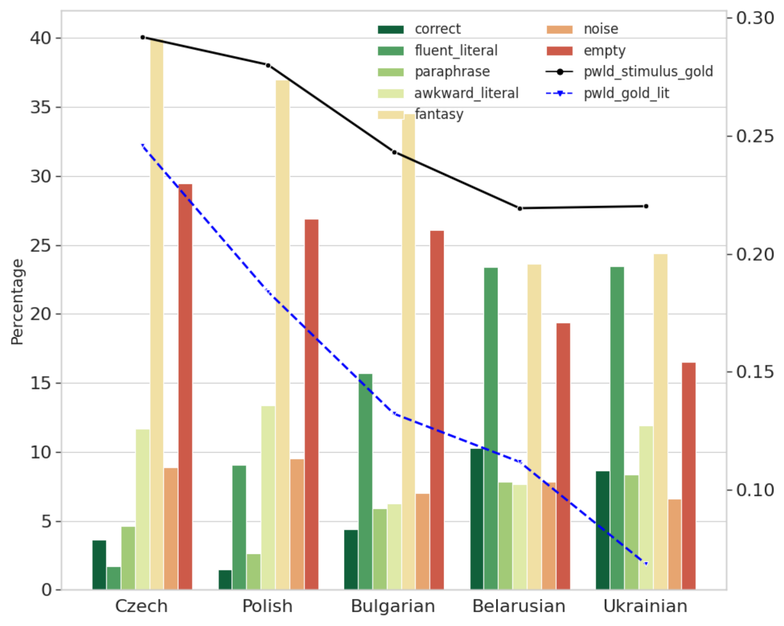


Fig.2 Literality options: 1/3 most similar MSU

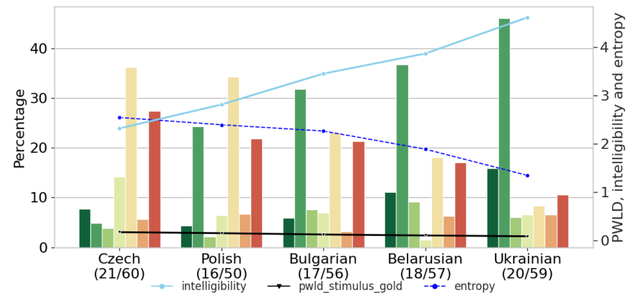
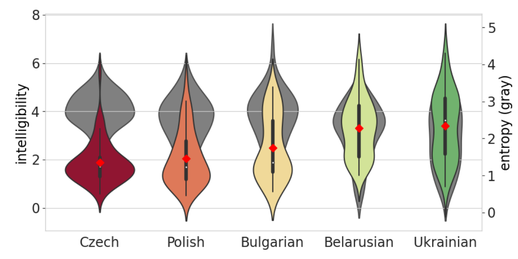


Fig.3 Distibution of intelligibility scores by SL



9. Regression Trends

		intelligibility		entropy	
	n	Pearson	RMSE	Pearson	RMSE
CS	60	0.21±.43	0.83	0.23±.36	0.53
PL	50	0.23±.50	1.05	0.19±.55	0.61
BG	56	0.50±.35	1.05	0.32±.38	0.70
BE	57	0.34±.53	1.05	0.36±.51	0.62
UK	59	0.62±.31	1.15	0.65±.37	0.61

SVR results on 5 top predictors for each SL.
Best: PWLD, context surprisal & similarity.

10. Observations

- Participants' performance aligns with expectations: Tasks in East-Slavic SLs are easier than tasks with West-Slavic MSUs.
- SVR-captured trends are similar for intelligibility and entropy.
- Intelligibility score helps avoid the ambiguity of MSU translation entropy.
- Unique feature patterns for each SL: e.g. UK: low PWLD=low entropy=high intelligibility.

Key Findings: Intercomprehension Factors

1. Ability to recognise similarities: low PWLD ≠ high intelligibility (Fig.2).
2. Scope of the similarities as basis for literality: same PWLD, different success rate (Fig2).
3. Context sentence difficulty (surprisal) and similarity to gold translation (cosine or TQE scores),
4. Non-linear relations between MSU entropy and intelligibility scores (Fig.3-4).
5. The association strength and predictive power of the model varies across SLs.

Fig.4 MSU entropy vs Intelligiability

Acknowledgments & References

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