

Eye-movements reveal sensitivity to habitual vs episodic contexts in the processing of verbal aspect in Russian

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Russian grammaticalizes the distinction between imperfective (IMP) and perfective (PF) aspect with every verb belonging to one of these categories. When verbs refer to individual events (episodic context) both PF and IMP verbs are possible (ex. 1), with previous research demonstrating strong preference for ongoing event representations (=activity portion of the event) when processing IMP verbs and overwhelming preference for completed events (=resulting states) for PF verbs [1,2]. In certain contexts, however, the aspectual distinction is neutralized, and only IMP forms are acceptable [3-5]. One such example are habitual contexts where the verb describes a repeated action (ex. 2). In this case, PF verbs are ungrammatical, and the IMP verb can refer to a repetition of either incomplete or completed events.

In this study, we investigated whether changes in the immediate context (episodic vs habitual) affect how Russian speakers process IMP forms. We conducted a web-based VW eye-tracking study using WebGazer [6]. 36 adult native speakers (m.a.=33.4) viewed pairs of images (Fig.1) representing either an ongoing (OE) or completed (CE) phase of the same event. While looking at the pictures, participants heard sentences involving either an episodic adverbial (*yesterday*) paired with a PF or IMP verb, or a habitual adverbial (*every day*) paired with an IMP verb (ex. 3-5). The participants were asked to select the picture that best matched the sentence. We expected participants to show strong preference for OE events in the episodic IMP condition and for CE events in the episodic PF condition. Furthermore, if speakers are sensitive to the distinction between episodic and habitual adverbials, we expected a decreased preference for OE events in the habitual IMP condition.

In offline responses, participants showed an equally strong preference for the OE picture in both episodic and habitual IMP conditions (Tab.1). However, eye movements revealed contrasting processing patterns between all three conditions (Fig.2). In episodic IMP and PF conditions, participants showed early preference for OE and CE pictures, respectively. In contrast, in the habitual IMP condition, participants looked equally often at OE and CE pictures until the end of the audio stimulus, and only then displayed a preference for the OE picture. Analysis revealed significantly more looks to the OE picture in the episodic IMP condition compared to the habitual IMP condition from verb offset to sentence offset ($t=-3.2$, $p=0.001$). These findings indicate that Russian speakers are sensitive to context manipulation during the processing of grammatical aspect. Interestingly, this sensitivity was only reflected in online eye-movement data but not in the offline responses.

References

- [1] Minor, S., Mitrofanova, N., Guajardo, G., Vos, M., & Ramchand, G. (2023). Aspect processing across languages: A visual world eye-tracking study. *Frontiers in Language Sciences*, 1, 1052205.
- [2] Minor, S., Mitrofanova, N., & Ramchand, G. (2022). Fine-grained time course of verb aspect processing. *Plos one*, 17(2), e0264132.
- [3] Bondarko, A. V. (1971). *Vid i vremja russkogo glagola (značenie i upotreblenie)*. Moskva
- [4] Janda, L. A., Endresen, A., & Reynolds, R. J. (2019). Aspectual opposition and rivalry in Russian are not discrete: new evidence from experimental data. *Russian Linguistics*, 43(3), 249-271.
- [5] Forsyth, J. (1970). *A grammar of aspect: Usage and meaning in the Russian verb*. Cambridge University Press.
- [6] Papoutsaki A, Sangkloy P, Laskey J, Daskalova N, Huang J, & Hays J. (2016). WebGazer: Scalable webcam eye tracking using user interactions. *Proceedings of the 25th International Joint Conference on Artificial Intelligence (IJCAI)*, 3839–3845.

Figures and Tables

Figure 1: Visual stimulus example.

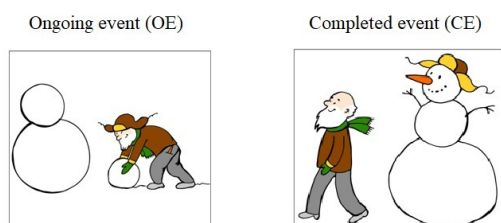
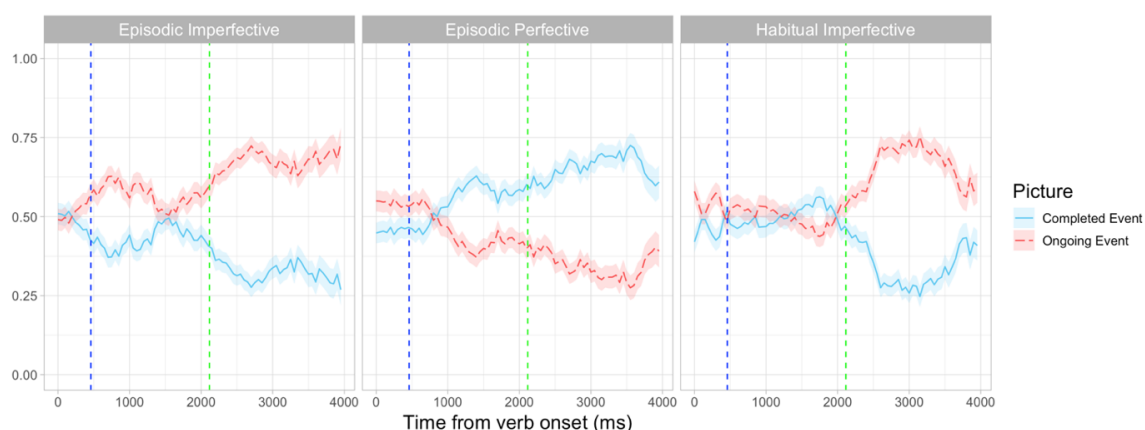


Table 1: Proportion of OE and CE offline responses (clicking to the best fitting picture task).

	Episodic Imperfective	Episodic Perfective	Habitual Imperfective
OE (%)	95.38	6.97	94.12
CE (%)	4.62	93.03	5.88

Figure 2: Proportions of fixations to the Completed event (CE) and Ongoing event (OE) pictures in the Episodic Imperfective, Episodic Perfective and Habitual Imperfective conditions starting from the verb. Dashed vertical lines mark the average verb offsets (blue) and sentence offsets (green).



Optional Supplemental Information

In episodic past contexts both imperfective and perfective verbs are allowed (1).

- (1) Maša risova-la / na-risova-la kot-a
Masha draw.IPFV-PST.F.SG PFV-draw-PST.F.SG cat-ACC
na kanikul-ax.
on holidays-LOC.PL

‘Masha was drawing / drew a cat on holidays.’

In habitual contexts, perfective verbs are unacceptable (2).

- (2) Maša risova-la (*na-risova-la) kot-a
Masha draw.IPFV-PST.F.SG PFV-draw-PST.F.SG cat-ACC
každyj den' na kanikul-ax.
every day on holidays-LOC.PL

‘Masha drew a cat every day on holidays.’

An example of the experimental block (3 – 5).

- (3) EPISODIC PERFECTIVE

Včera utr-om deduška **s-lep-il**
yesterday morning-INS grandfather PFV-sculpt-PST.M.SG
bol's-ogo snegovik-a vozle dom-a.
big-ACC.M.SG snowman-ACC.M.SG near house-GEN

‘Yesterday morning, the grandfather built a big snowman near the house’.

- (4) EPISODIC IMPERFECTIVE

Včera utr-om deduška **lep-il**
yesterday morning-INS grandfather sculpt.IPFV-PST.M.SG
bol's-ogo snegovik-a vozle dom-a.
big-ACC.M.SG snowman-ACC.M.SG near house-GEN

‘Yesterday morning, the grandfather was building a big snowman near the house’.

- (5) HABITUAL IMPERFECTIVE

Každ-oe zim-n-ee utro deduška
every-NOM.N.SG winter-ADJ-NOM.N.SG morning grandfather
lep-il bol's-ogo snegovik-a vozle dom-a.
sculpt.IPFV-PST.M.SG big-ACC.M.SG snowman-ACC.M.SG near house-GEN

‘Every winter morning, the grandfather built a big snowman near the house’.