# The Interaction of Morphological Cues in Bilingual Sentence Processing: An Eye-Tracking Study

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## 1. Introduction

There are systematic crosslinguistic differences in mapping the thematic role (such as the **agent** of the action and the **theme** of the action) in sentences with transitive verbs (e.g., *The rabbit ate the cabbage*). Language-specific differences in assigning thematic roles that influence processing are related to the cue availability (how frequent does a speaker encounter that particular cue in the input?), the reliability of the cue (does the cue always signal the same relation?), cue cost (how difficult is that cue?), and cue conflict resolution (which cue can or cannot be overridden?) within the *Unified Competition Model* (e.g., MacWhinney, 2008, 2012). This model accounts for different processing strategies regarding order of arguments and morphological case marking in different languages in monolinguals. However, processing strategies differ depending on the cue strength in a specific language that determines the speed of processing: strong cues lead to faster responses and competing cues lead to slower ones because they require conflict resolution.

For example, in languages that do not use morphological case (e.g., English), monolingual speakers rely on word order as the most reliable cue so that noun-verb-noun strings are strongly biased towards an SVO interpretation. In the sentence *The eraser push the dogs,* the cues of animacy and subject-verb agreement favor *the dogs* as agent while the preverbal position favors *the eraser* as agent (MacWhinney, 2012). In languages with rich nominal morphology such as Russian, case marking is the most reliable cue in thematic-role assignment while word order is subordinate (e.g., Kempe & MacWhinney, 1996).

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With respect to children, there is no agreement to what extent they adhere to adult-like processing strategies. On the one hand, some studies show that monolingual children are adult-like in their processing strategies. For Russian monolinguals, previous off-line studies demonstrated that children follow the case morphology when processing OVS sentences (e.g., Janssen, 2016; Janssen & Meir, 2019; Sauermann & Gagarina, 2018). On the other hand, other studies show that children often rely on 'incorrect' cues. German-speaking children rely less on case marking and require additional cues to correctly comprehend sentences with the non-canonical word order (Dittmar, Abbot-Smith, Lieven, & Tomasello, 2008). Similarly, Hebrew offline studies show that word order is the strongest cue (Frankel, Amir, Frenkel, & Arbel, 1980); children gradually learn to refrain from relying solely on word order and start paying attention to other linguistic information (e.g., the direct object marker *et,* gender and number agreement agreement).

Recent on-line studies using the Visual World eye-tracking Paradigm (hereafter VWP; see Kamide, Altmann, & Haywood, 2003; Sekerina, 2014, for more details) allow us to assess processing strategies and investigate how cues are integrated through the course of the utterance. They demonstrate anticipatory morphosyntactic processing, i.e., case morphology is predicted and integrated as the utterance unfolds. Özge, Küntay, & Snedeker (2019) reported that Turkish-speaking adults and 4-year-old children used the case cue in verb-medial and verb-final sentences to predict the upcoming noun although children were slower in integrating case cues. Similar sensitivity to the case cues with slowdown is reported for German-speaking children for on-line comprehension of object *wh*-questions (Schouwenaars, Hendriks, & Ruigendijk, 2018).

For bilingual speakers, the *Unified Competition Model* (MacWhinney, 2008, 2012) posits that cues from the two languages of a bilingual speaker interact. In comprehension, at the initial stages of acquisition, L2 learners heavily rely on their L1 cue strength hierarchy. They might transfer it onto L2, or might merge L1 and L2 cue hierarchies. Transfer of cues from L1 to L2 can decrease with growing L2 competence leading to cue preference patterns similar to monolinguals.

In the current study, we investigated predictive on-line processing in bilingual children whose two languages, i.e., HL-Russian and SL-Hebrew, differ in morphological cue weight. Russian provides multiple case cues (e.g., double case marking on nouns and adjectives simultaneously allowing for considerable flexibility in word order). Hebrew has a relatively impoverished case morphology: it uses the ACC case marking *et* only with definite nouns, which makes case morphology less reliable (Frankel & Arbel, 1981; Sokolov, 1988).

### 1.1. ACC case marking and word order in Russian

Russian realizes case features morphologically. There are six main cases in Russian in singular and plural: nominative NOM, genitive GEN, accusative ACC, dative DAT, instrumental INSTR and prepositional PREP. All Russian nouns, adjectives, numerals, and demonstratives must carry a case morpheme (Timberlake, 2004). The current study employed animate and inanimate nouns of all three genders: feminine ending in *–a/ja* (e.g., *lisa* 'fox', *kapusta 'cabbage'*), masculine zero ending following the consonant (e.g., *zajchik* 'bunny', *mjod* 'honey'), and neuter (only inanimate, *morozhenoe* 'ice-cream').

**Table 1: The Russian case inflections (NOM–ACC) for animate and inanimate nouns of three genders**

| | Feminine | Masculine and Neuter |
|---|---|---|
| Animate | *lis**a** – lis**u***<br>'fox.NOM – fox.ACC' | *zajchik – zajchik**a***<br>'bunny.NOM – bunny.ACC' |
| Inanimate | *kapust**a** – kapust**u***<br>'cabbage.NOM – cabbage.ACC' | *jajco – jaico*<br>'egg.NOM = ACC' |

In a simple transitive sentence, Russian permits all six basic word orders: SVO, SOV, VSO, VOS, OVS, and OSV (e.g., Bailyn, 2012). SVO is the default form and statistically the most frequent (SVO 79%; OVS 11%; OSV 4%; VOS 2%; VSO 1%; SOV 1%, Bivon, 1971). Typically, Russian subjects are marked with the NOM case, whereas direct objects are marked with the ACC case (Shvedova et al., 1980). According to Kempe and MacWhinney (1996), case is the strongest cue in the context of transitive sentences in Russian. The overwhelming majority of Russian transitive sentences with two nouns (95%) contain animate nouns (reversible), making the case inflection a valid cue.

On-line and off-line studies show that Russian monolingual adults and children are sensitive to case cues. Janssen and Meir (2019) conducted an off-line study that investigated children`s sensitivity to the ACC case cue in reversible sentences. When word order and case cues competed (e.g., OVS sentences), monolingual children correctly comprehended OVS sentences by prioritizing case over word order. In contrast to monolingual children, bilingual Russian-Hebrew and Russian-Dutch children showed diminished sensitivity to case cues in reversible sentences (Janssen & Meir, 2019). In the VWP experiment, Sekerina and Mitrofanova (2017) found that monolingual children successfully used the ACC case cue to anticipate the sentential subject once they heard the first noun phrase in OVS, reflecting children's case sensitivity.

### 1.2. ACC case marking and word order in Hebrew

Although Hebrew does not use case inflections on nouns, the ACC case is marked by the particle *et* before definite nouns (Berman, 1978), as illustrated in (1a-b) for different contexts. For indefinite nouns, modern Hebrew has a strict SVO word order; however, OVS (see (2a)) and OSV word orders are possible with definite subjects and objects (Ravid, 1977), but they are secondary.

(1) a. **SVO - Indefinite Context:**
*ha- pil* *ro'e* *dov.*
DEF.elephant sees.M.SG.3P bear
'The elephant sees a bear.'

b. **SVO - Definite Context:**
*ha- pil* *ro'e* ***et*** *ha-dov.*
DEF.elephant sees.M.SG.3P ACC DEF-bear
'The elephant sees the bear.'

(2) a. **OVS - Definite Context:**
***et*** *ha-dov* *ro'e* *ha-pil*
ACC DEF-bear sees.M.SG.3P DEF- elephant
'The elephant sees a bear.'

Previous studies demonstrate that in production, monolingual Hebrew-speaking children do not omit the ACC case marker *et* in front of definite nouns (Berman & Slobin, 1985). For example, using a sentence repetition task, Friedmann and Reznick (2017) reported that out of 360 produced SVO and VSO sentences, there were no omissions of the ACC marker in front of definite nouns.

Using off-line comprehension tasks, Frankel and colleagues (1980) demonstrated that the Hebrew ACC marker *et* is a reliable marker, yet younger children do not always regard it as a valid cue and follow the word-order strategy (Frankel & Arbel, 1981; Sokolov, 1988). Biran and Ruigendijk (2015) assessed sensitivity to case cues in 3;5-6-year-old monolingual Hebrew-speaking children using two tasks: a forced-choice sentence comprehension task and a sentence repetition task. The results of the sentence repetition task showed that that 5-6-year-old children produced SVO, OSV and OVS sentences correctly (mean accuracy above 80%). For the forced-choice sentence comprehension task, their comprehension of SVO sentences was close to ceiling, but comprehension of OVS and OSV sentences was lower.

To the best of our knowledge, no previous studies tested case sensitivity using on-line tasks in Hebrew monolinguals or in bilingual children speaking Hebrew as their SL.

## 2. The current study

Russian-Hebrew bilingualism offers a new opportunity to test production and on-line processing in bilinguals whose both language mark the ACC case quite differently. The current study investigated production and on-line comprehension of ACC case morphology in both languages of bilinguals and compared them to monolingual controls.

Starting with ACC case production and based on the previous literature, we hypothesized that bilingual children will be less accurate in both languages. With respect to on-line processing in bilinguals, we expect the case cue to be stronger than the word-order cue for monolingual Russian-speaking children (see Sekerina & Mitrofanova, 2017). For monolingual Hebrew-speaking children, the current study is the first one to investigate interaction between case and word-order cues in real-time.

Our null hypothesis ($H_0$) is that bilinguals will show native-like processing strategies, i.e., bilinguals will not differ from their monolingual peers. Alternatively, according to the *Unified Competition Model* (MacWhinney, 2008, 2012), cues in the two languages of bilinguals will interact. Two scenarios are possible: ($H_1$) bilinguals will show poorer sensitivity to the ACC case in Russian as the SL-Hebrew Case cue is weighed lower that word order and it will affect HL-Russian cue weight. ($H_2$) Bilinguals will show enhanced sensitivity to ACC case in SL-Hebrew as the HL-Russian cue weight is stronger than the wordorder cue and it will affect SL-Hebrew cue weight.

## 3. Method

### 3.1. Participants

Three groups of children took part in the two experiments: bilingual Russian-Hebrew-speaking children (*N*=25), and Russian- (*N*=62) and Hebrew-speaking monolingual controls (*N*=10). Bilingual Russian-Hebrew and monolingual Hebrew-speaking children were recruited in Israel. The data for monolingual Russian-speaking controls came from two previous studies that used the same tasks as in the current study: production data (Janssen & Meir, 2019) and eye-tracking data (Sekerina & Mitrofanova, 2017).

**Table 2: Background information for the participants**

| | **Russian-Hebrew bilinguals** | **Hebrew monolingual controls** | **Russian monolingual controls** |
|---|---|---|---|
| | Present Study | | (Sekerina & Mitrofanova, 2017) |
| *N* | 25 | 10 | 62 |
| $M_{Age}$ (Range) | 5;5 (4-8) | 6;0 (4-7) | 4;1 (3-6) |
| $M_{AoO}$ (Range) | 1;4 (0-4) | n/a | n/a |

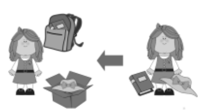
Note: AoO - Age of Onset of bilingualism; n/a - not-applicable as AoO among monolinguals is equal to chronological age

Table 2 presents background information for the participants. The bilingual Russian-Hebrew-speaking participants were acquiring Russian as their HL and Hebrew as SL. The bilinguals were exposed to Russian from birth, while the AoO to SL-Hebrew varied (*M* = 1;4; range 0-4). Based on the parental questionnaire (a short version of BIPAQ, Abutbul-Oz et al., 2012), the input available to the bilinguals from the mothers was mixed: 44% of the children were exposed exclusively to Russian; 48% dual Russian-Hebrew; 4% exclusively in Hebrew, and 4% Russian and other. The paternal input also varied: 24% of the sample were exposed exclusively to Russian; 40% dual Russian-Hebrew, 32% exclusively in Hebrew, and 4% Russian and other.

As a group, the bilinguals were balanced as there were no significant differences between proficiency in Russian and Hebrew in parental ratings (1-4 scale) — for HL-Russian: $M = 3.44$, $SD = .65$; for SL-Hebrew: $M = 3.37$, $SD = .65$, the paired-sample $t$-test ($t(23) = .20$, $p = .84$).

### 3.2. Procedure and materials

**ACC case production in Russian and Hebrew.** Elicitation production task in Russian (Janssen & Meir, 2019) evaluated the accuracy of the ACC case production in Russian. The child was asked to describe what she sees on the card by saying *Ja viẓu* ______ 'I see (target noun)'. If the child failed to respond to the sentence with *Ja viẓu* ______ 'I see ____', she was reminded to start the sentence with *ja viẓu* 'I see'. This was done for each target noun to ensure that the syntactic environment for the ACC case was produced. In this study, we compare the production accuracy of animate nouns which use a dedicated ACC case inflection (e.g., *slon* 'elephant.NOM'–*slon-**a*** '**elephant.ACC' as compared to inanimate nouns whose ACC and NOM forms are homophonous (e.g., *mjod* 'honey.NOM = ACC').

| (3) | **Prompt** | **Target answer** | **Picture** |
|---|---|---|---|
| a. | *ma romi ciyera?*<br>What did Romi draw? | *koxav.*<br>star.INDEF |  |
| | *ma yesh le- romi?*<br>What does Romi have? | *kova ve sefer.*<br>hat.INDEF and book.INDEF |  |
| b. | *ma romi asta?*<br><br>What did Romi do? | *hi sama **et ha**-kova ba-kuvsa **et ha**-sefer ba-yalkut .*<br>She put ACC DEF-hat into the box and ACC DEF-book into the backpack |  |

Elicitation production task in Hebrew (Meir & Novogrodsky, in preparation) evaluated the accuracy of production of the ACC marker *et* in Hebrew. The task elicits noun phrases in definite and indefinite contexts in subject and object positions. For the purposes of the current study, only stimuli targeting noun phrases in the object position were analyzed (see (3)). The task is adapted from Schaeffer (2018) and Armon-Lotem and Avram (2005). Child`s responses were coded as correct if the target response was produced: no ACC and no definiteness in indefinite contexts (3a), and *et* particle with definiteness marker in definite contexts (3b). The response was noted as erroneous if the child produced indefinite noun phrases in definite contests. It should be noted that in Hebrew, the ACC marker *et* and the definite marker *ha-* are often contracted to *"eta'* in oral speech; this response was marked as correct.

**ACC case comprehension: Eye-tracking experiments in Russian and in Hebrew.** We conducted two Visual World eye-tracking experiments in which Word Order (OVS vs. SVO) (4a-b) and Task (3-REF vs. 2-PIC) were manipulated (Fig. 1) in a 2 x 2 design, with 6 items per condition. In the 3-REF task (as in Özge et al., 2019), children listened to the spoken sentence (4a-b) while looking at the individual pictures of the three referents. Immediately after that, they were presented with a single picture depicting the event (the left or the right from the 2-PIC task, Fig. 1) and had to perform a sentence-picture matching task. In the 2-PIC task, children saw two events side-by-side and had to perform a picture selection task. Each of the tasks was crossed with both Word Orders. Both factors were manipulated within-participants; in particular, each child performed both tasks presented in two blocks (3-REF, 2-PIC) counterbalanced across the participants. Bilinguals were tested twice, once in each of their languages.

**Preamble**
Ѐto kapusta, zajčik, lisa.
Ze kruv, arnav, šual.
'This is cabbage, bunny, fox.'

**3-REF Task** **2-PIC Task**

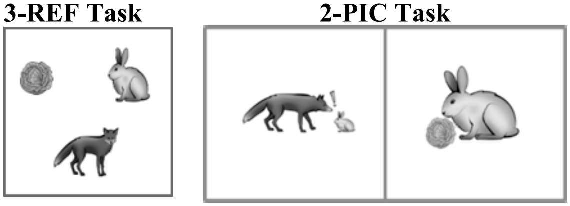


**Figure 1: Task manipulation: 3-REF vs. 2-PIC.**

(4) a. Russian stimuli

| **ROI:** | **Adjective** | **NP1** | **Adverb** | **Verb** | **NP2** |
|---|---|---|---|---|---|
| **SVO:** | Ser**yj** | zajčik | sejčas | s'jest | kapust**u.** |
| | Grey-NOM | bunny-NOM | now | will-eat | cabbage-ACC |
| | 'The grey bunny now will eat cabbage.' | | | | |
| **OVS:** | Ser**ogo** | zajčik**a** | sejčas | s'jest | lis**a.** |
| | Grey-ACC | bunny-ACC | now | will-eat | fox-NOM. |
| | 'The grey bunny, the fox now will eat.' | | | | |

b. Hebrew stimuli

| **ROI:** | **NP1** | **Adjective** | **Verb** | **Adverb** | **NP2** |
|---|---|---|---|---|---|
| **SVO:** | ha-arnav | ha-afor | yoxal | axšav | **et** ha-kruv. |
| | DEF-bunny | DEF-grey | will-eat | now | *ACC-DEF-cabbage* |
| **OVS:** | ***et** ha-arnav* | *ha-afor* | *yoxal* | *axšav* | *ha-šual.* |
| | ACC-DEF-bunny | DEF-grey | will-eat | now | DEF-fox |

For the analysis, each sentence was divided into Regions of Interest (ROI): Adjective, first Noun (NP1), Adverb, Verb, and the second Noun (NP2). Each ROI started at the onset of the relevant word and ended at the onset of the next word, and was split into 100-ms segments. Following Özge et al. (2019), ***agent preference*** measure was used as a dependent variable in our analysis. Agent preference was calculated as the number of samples (for a given trial and a ROI) in which the participant looked at the plausible agent minus plausible patient (i.e., the looks to the cabbage subtracted from the looks to the fox) in the 3-REF task and in the 2-PIC task (in both word orders). Note that in the 2-PIC task, the pictures depicted two events: one with Patient interpretation (rabbit-fox picture) which was the correct picture in the OVS condition, and one with Agent interpretation (rabbit-cabbage picture) which was the correct picture in the SVO condition. If participants are able to use the case marker to predict the upcoming referent, then we should see greater agent preference (looks to the fox) during the predictive ROIs between the two nouns in the OVS sentences, i.e., NP1, Adv, and V (in Russian), and Adj, V, Adv (in Hebrew), as compared to SVO sentences (more looks to the Patient, cabbage).

The eye-tracking data were analyzed separately for each language and for each task (3-REF vs. 2-PIC) using mixed-effects modeling with the agent preference score as the dependent variable**,** Word Order (SVO vs. OVS) and ROI (adjective, NP1, adverb, verb, NP2) as independent variables; items and participants were entered as random effects.

## 4. Results

### 4.1. ACC case production in Russian and Hebrew

Russian monolingual controls (see Janssen & Meir, 2019) showed a ceiling effect on the ACC case production in OVS sentences for when ACC ≠ NOM, i.e., the condition requiring the use of a dedicated ACC morpheme ($M = .96$, $SD = .06$), and also for the ACC = NOM condition, i.e., the condition including nouns which NOM and the ACC forms are homophonous ($M = .90$; $SD = .09$). Similarly, the current study showed that Hebrew-speaking monolingual controls were at ceiling on the ACC case production in both conditions, definite and indefinite ($M = 1.00$). Thus, the production of the ACC case is target-like in monolingual controls.

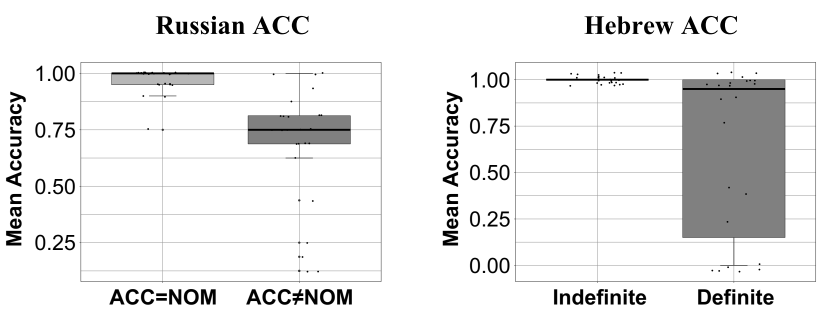



**Figure 2: ACC case production of in bilinguals (ceiling effect in monolingual controls).**

The bilinguals were less accurate on the dedicated ACC case production in both languages (Fig. 2). In Russian, they were at ceiling on the homophonous ACC = NOM nouns forms ($M$ = .97; $SD$ = .01), yet were significantly less accurate on the ACC case condition which requires the dedicated ACC case suffix ($M$ = .69; $SD$ = .26), and this difference was significant ($t(24) = 5.82$, $p < .001$). Similarly, in Hebrew, bilinguals were at ceiling on unmarked indefinite forms ($M$ = 1.00), yet they were less accurate on the definite NPs which require the use of *et* particle and definite marker *ha-* ($M$ = .65, $SD$ = .44); this difference was significant ($t(24) = 3.89$, $p = .001$).

### 4.2. ACC case comprehension: Eye-tracking experiments in Russian and Hebrew

**ACC case comprehension in Russian.** Monolingual Russian-speaking children showed immediate sensitivity to the ACC case cue, i.e., already on the first NP and in both tasks (3-REF vs. 2-PIC) (see Sekerina & Mitrofanova, 2017).

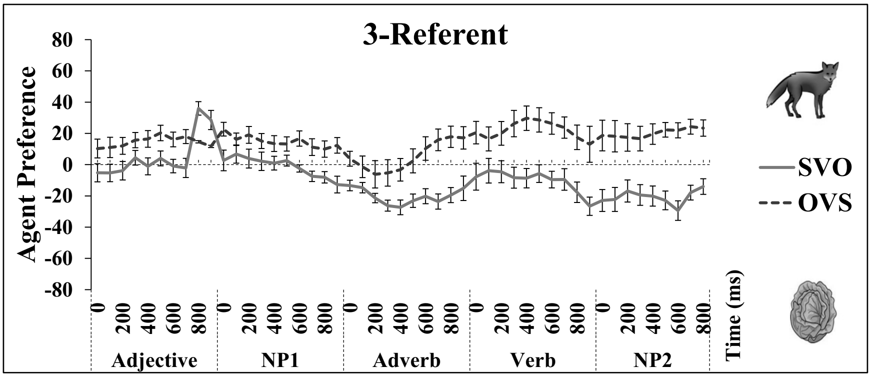



**Figure 3: Bilingual children, Russian, 3-REF task: Agent preference (proportions of looks to the fox – proportions of looks to the cabbage). Error bars indicate the standard error of the mean.**

Bilingual children's eye movements in Russian are presented in Figures 3-4. The agent preference score varied across the sentence depending on Word Order and ROI. This was confirmed by the mixed-effects modeling and the pair-wise comparisons with an adjusted alpha-level for each ROI (see Table 3). Nonetheless, bilingual children performing the experiment in their heritage Russian, showed sensitivity to ACC case cue similarly to monolingual (Sekerina & Mitrofanova, 2017), yet the integration of the ACC case cue was delayed.

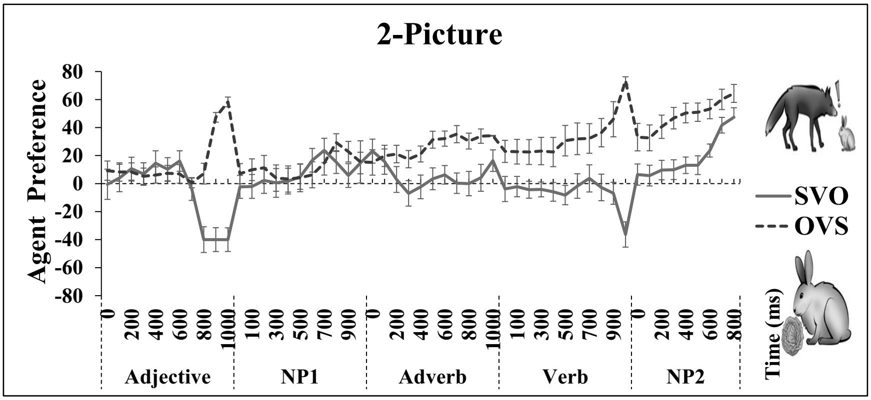



**Figure 4: Bilingual children, Russian, 2-PIC task: Agent preference (proportion of looks to the agent – proportion of looks to the patient). Error bars indicate the standard error of the mean.**

**Table 3: Model summaries for the bilingual children in Russian**

| | 3-REF | 2-PIC |
|---|---|---|
| **Word Order** | ***F* = 30.41, *p* < .001** | ***F* = 9.03, *p* = .01** |
| **ROI** | ***F* = 2.57, p = .04** | *F* = 1.25, *p* = .29 |
| **Word order x ROI** | *F* = 1.71, *p* = .14 | *F* = 1.53, *p* = .19 |
| **Pair-wise comparison for each ROI:** | ADJ: *p* = .12<br>NP1: *p* = .10<br>**ADVERB: *p* = .01**<br>**VERB: *p* < .001**<br>**NP2: *p* < .001** | ADJ: *p* = .66<br>NP1: *p* = .99<br>ADVERB: *p* = .08;<br>**VERB: *p* = .01**<br>**NP2: *p* = .02** |

*Note.* Shaded cells are significant effects.

**ACC case comprehension in Hebrew.** Monolingual Hebrew-speaking children did not show sensitivity to ACC *et* particle, in contrast to ACC case production, on which they were at ceiling.

The most exciting finding was that bilingual Russian-Hebrew-speaking children were sensitive to the ACC *et* particle in Hebrew, despite their low accuracy on production and in contrast to the lack thereof in monolingual Hebrew children. Bilingual children`s preference for the agent changed in the course of the utterance, with the agent preference appearing at the Adverb region in both tasks (see Fig. 5-6). This was also confirmed using a mixed-effects modeling and pair-wise comparisons with an adjusted alpha-level for each ROI (see Table 4).

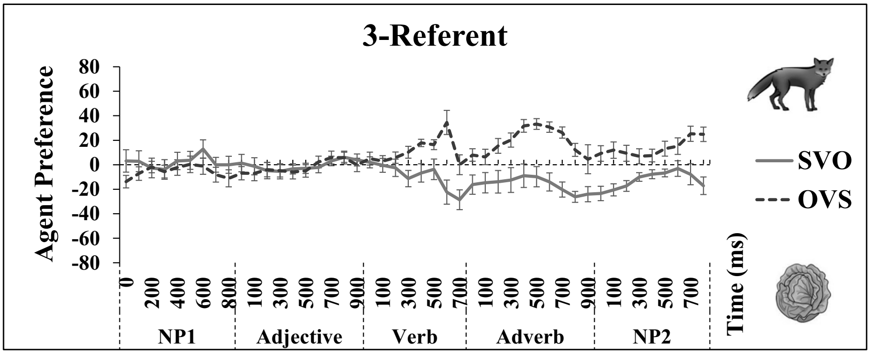



**Figure 5: Bilingual children, Hebrew, 3-REF task: Agent preference (proportions of looks to the fox – proportions of looks to the cabbage). Error bars indicate the standard error of the mean.**

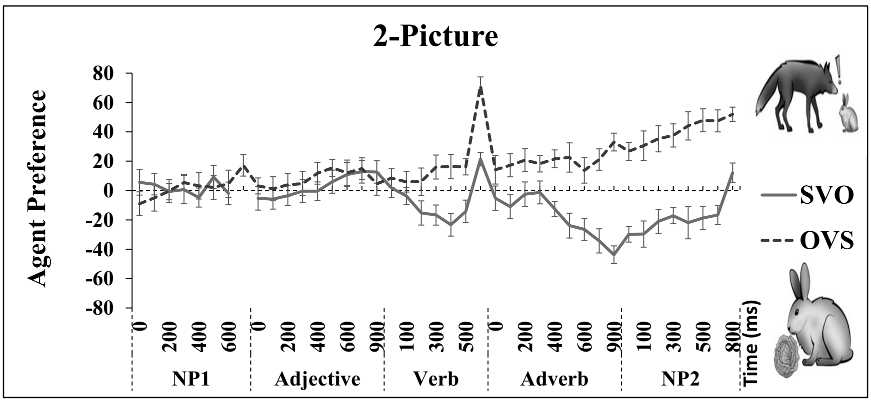



**Figure 6: Bilingual children, Hebrew, 2-PIC task: Agent preference (proportion of looks to the agent – proportion of looks to the patient). Error bars indicate the standard error of the mean.**

**Table 4: Model summaries for the bilingual children in Hebrew**

| | **3-REF** | **2-PIC** |
|---|---|---|
| **Word Order** | ***F* = 6.17, *p* = .01** | ***F* = 10.90, *p* = .01** |
| **ROI** | *F* = .27, *p* = .89 | *F* = .17, *p* = .95 |
| **Word order x ROI** | ***F* = 3.71, *p* = .01** | ***F* = 3.60, *p* = .01** |
| **Pair-wise comparison for each ROI:** | NP1: *p* = .66<br>ADJ: *p* = .92<br>VERB: *p = .21;*<br>**ADVERB: *p* < .01**<br>**NP2: *p* = .01** | NP1: *p* = .87<br>ADJ: *p* = .83<br>VERB: *p* = .14<br>**ADVERB: p = .02**<br>**NP2:** p < .001 |

*Note.* Shaded cells are significant effects.

## 5. Discussion

The current study investigated the ACC case production and on-line comprehension in Russian-Hebrew-speaking bilinguals who acquire Russian as their Heritage Language and Hebrew as their Societal Language, and their performance was compared to Russian- and Hebrew-speaking monolingual controls. Such design allowed us to evaluate interaction of case cues as both languages use the ACC case, yet they vary with respect to the ACC case cue strength. In Russian, case morphology is ubiquitous: every Russian noun is marked morphologically for case which is critical for interpretation of word order. Case thus is the strongest cue for theta-roles assignment for children and adults (Janssen, 2016; Janssen & Meir, 2019; Kempe & MacWhinney, 1996; Sauermann & Gagarina, 2018). In Hebrew, the ACC case morphology is more limited: the ACC particle *et* is used only with definite nouns. For Hebrew-speaking monolingual adults, the ACC particle *et* is a reliable marker, yet for children, it is less so (Frankel & Arbel, 1981; Sokolov, 1988).

Based on these differences between Russian and Hebrew case morphology, we hypothesized reliable anticipation of argument structure in Russian, but not in Hebrew. Our predictions were born out for monolingual Russian controls who were at ceiling in ACC case production (see Janssen & Meir, 2019) and on-line comprehension (Sekerina & Mitrofanova, 2017). Case sensitivity was immediate: as soon as they heard the ACC case on the first NP in OVS, they reliably switched the gaze to the Agent well before it appeared in speech. In contrast, Hebrew-speaking monolinguals tested in this study, did not show case sensitivity despite performing at ceiling on the ACC case production.

Turning to Russian-Hebrew bilinguals who were the focus of the current study, our results confirmed non-target like production in both languages. They were less accurate in using the dedicated case marking in Russian (e.g., nouns requiring a dedicated case suffix *kukl-u* 'doll.ACC' vs. *kukl-a* 'doll.NOM') and in Hebrew (e.g., *et ha-buba* 'ACC DEF-doll). However, bilinguals were at ceiling in the unmarked condition (e.g., *stol* 'table.NOM = ACC'). Similarly, they were at ceiling on the unmarked indefinite conditions in Hebrew.

The on-line eye-tracking data revealed an important difference for Russian-Hebrew-speaking bilinguals as compared to monolingual controls. Starting with Russian, bilinguals used case morphology to predict the upcoming noun, similarly to monolingual controls, yet they were slower in integrating the case cue. While monolingual controls are reported to show case sensitivity as early as on the first NP, bilinguals integrate the case morphology later. In Hebrew, the bilinguals differed from their monolingual peers. While Hebrew monolinguals showed no incremental case cue processing in the current study, bilinguals showed an advantage by integrating case cues prior to the second NP in the sentence. Bilinguals revealed an agent anticipation in OVS sentence at the Adverb ROI in SL-Hebrew. Thus, case cues in the two languages of bilinguals can interact. The advantage of the bilinguals in their SL-Hebrew over their monolingual peers is language-pair specific: it is the result of cue weight interactions in Russian and

Hebrew. Weaker cues in one language, i.e., Hebrew, are reinforced by stronger cues in the other language, i.e., Russian.

This study is not without limitations. First, it is not clear when monolingual Hebrew-speaking controls start using case morphology incrementally. Future studies need to investigate in more detail case processing in Hebrew-speaking monolingual children of different ages comparing 4-5-, 7-8-, and 10-11-year-olds) . Furthermore, case processing in bilinguals and the interaction of the cues should be evaluated relative to children`s language dominance. This will enable us to assess whether cue interaction and cue weight in a given language of bilinguals are modulated by their language proficiency/dominance. The children in our sample were balanced bilinguals, yet more information is needed on unbalanced bilinguals. For example, we might assume that in unbalanced bilinguals, i.e., those children who are dominant in SL-Hebrew, the transfer of processing strategies will be from the dominant SL-Hebrew onto their weaker HL-Russian.

To conclude, our study confirms the predictions of the *Unified Competition* Model using on-line methodology not only for monolingual, but also for the first time for bilingual children. In monolinguals, predictive interpretation of a morphosyntactic cue is related to its weight, while in bilinguals, cues in the two languages interact. Despite lower ACC case accuracy in production in both languages, in comprehension, bilingual children can use the ACC case predictively. Bilingual predictive on-line processing can be boosted by an interaction between processing strategies in the two languages of bilinguals as weaker cues in one language are reinforced by stronger cues in the other language.

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