RESEARCH

Elicited Subject-Verb Agreement in German Early L2 Children with Developmental Language Disorders

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The present study investigates whether subject-verb agreement (SVA) serves as a clinical indicator for developmental language disorders (DLD) in early second language learning (eL2) children. Using a LITMUS-tool (language impairment testing in multilingual settings) described by de Jong (2015) for eliciting SVA contexts, 22 German eL2 children aged six to eight years with and without DLD are tested for their ability to mark SVA in first-, second- and third-person singular forms of transitive verbs. Results show significant differences between eL2 children with and without DLD. Other factors shaping the eL2 acquisition process, namely age of onset, length of exposure, first language and the amount of second-language German input at home, do not appear to have a significant influence on the total SVA marking. However, some of the children with DLD in this age bracket have already mastered the German SVA paradigm. It is thus concluded that SVA is a reliable indicator of DLD in most cases. However, due to its diagnostic accuracy of 82% it should not be used as a screening on its own but must always be accompanied by the investigation of later acquisition phenomena in order to avoid underdiagnoses.

1. Introduction

Research on clinical indicators of bilingual children with developmental language disorders (DLD) is growing because speech and language pathologists and paediatricians struggle with diagnostics in this population (Armon-Lotem et al., 2015; Ehlert, 2016). However, compared to the knowledge about clinical indicators in monolingual DLD, much less is known about this issue in bilingual children (Paradis & Govindarajan, 2018). In monolingual and bilingual acquisition, DLD go along with protracted language development and unexplained language problems (Bishop, 2017). On the other hand, research on early second language acquisition (eL2[1]) provides increasing evidence for persistent problematic domains within the language system to be acquired (Paradis, 2019). It is thus not straightforward to disentangle the influence of DLD and of bilingual exposure, as both can lead to delays in language acquisition. Considering the reported high rates of misdiagnosis with DLD in eL2 children (Grimm & Schulz, 2014a), it is all the more important to develop well-designed tasks and to collect normative data in order to be able to differentiate between the effects of DLD and those of bilingualism (Armon-Lotem, 2018).

The present study seeks to contribute to the debate about indicators of DLD in eL2 German by testing subject-verb

agreement (SVA) as an early acquisition phenomenon within children of advanced age (six to eight years). By piloting an elicitation task (de Jong, 2015) for German, it investigates the primary research question of whether SVA is a suitable clinical indicator of DLD in German as an eL2 at the age of around seven. Additionally, influences from factors other than the DLD that could be the cause of delay are investigated. This is in order because a wide range of individual variation in monolingual and bilingual children's acquisition rates is reported in the literature (Nicoladis & Genesee, 1997; Paradis, 2011). The sources of these individual differences need to be taken into account when seeking to avoid misinterpretations of results obtained in research on bilingual DLD. Particularly when eL2 children are concerned, many additional influencing factors need to be considered: Social background and input factors have been shown to influence these children's language acquisition, demonstrating that lower socioeconomic status (SES) and less quality and quantity of input lead to lower second-language (L2) proficiency (Armon-Lotem et al., 2011; Paradis, 2019; Rothweiler & Ruberg, 2011; Unsworth et al., 2014). Furthermore, the age of onset (AoO) and the length of exposure (LoE) to the L2 should also be considered (Paradis, 2019; Tuller, 2015; Unsworth et al., 2014), as an earlier AoO and a higher LoE have shown to be advantageous for L2 acquisition outcome (Armon-Lotem et al., 2011; Meir et al., 2017). Another influencing factor discussed in the literature is cross-linguistic influence (or transfer) from the children's

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first language (L1; Gutiérrez-Clellen et al., 2008; Schaeffer et al., 2017). It has also been reported that influence from the L1 can lead to delayed acquisition of some particular linguistic phenomena such as case marking (Scherger, 2016) but also to accelerated acquisition of other phenomena such as the use of definite articles (Müller et al., 2011). The nature of SVA and verbal inflection differ across languages. Inflectional languages mark SVA in a way similar to German (e.g., English, Spanish, Kurdish). Isolated languages, such as Thai, have no verbal inflection. In Germany, there is a wide range of heritage languages with different SVA systems. It is supposed that some of the SVA systems in the children's various L1s influence the acquisition of the German SVA systems and others do not (for L1 Russian and L1 Arabic, see Tracy & Thoma, 2009).

2. Subject–verb agreement in German and its acquisition

SVA is defined as "the marking of verbs for grammatical features of the subject of a sentence" (de Jong, 2015, p. 25). In German, grammatical features that are marked this way are the person and number features. Compared to English where only the third-person singular is morphologically marked (-s), German has a richer verbal inflection morphology. When compared to null subject languages (e.g., Turkish or Italian), the German verbal inflection paradigm is not rich enough to enable speakers of German to constantly omit subjects. See **Table 1** for a contrastive overview of verbal inflection paradigms. As can be seen, German has four inflectional forms (-e, -st, -t, -en). However, the first-person marking (-e) is often omitted in colloquial speech. Utterances like *ich spiel-Ø* ('I play') are therefore considered target-like in oral production but not in the written modality.

In German, SVA comes with another particularity: In German matrix clauses, inflected verbs are obligatory in verb second (V2) position (Haider, 1997). Typically developed (TD) monolingual children acquire SVA in German early, including both acquisition tasks – verb placement in V2 and verb inflection in agreement with the subject in number and person features. After an initial phase of use of infinitive verbs in the utterance-final position, the first verbal inflection forms that TD monolinguals produce are third-person singular (-t). It takes them only until about age 2;6 (two years and six months) to 3;6 to master the paradigm (Clahsen, 1988; Schulz & Grimm, 2018). The second-person singular (*du spiel-st*, 'you play') is most difficult to

acquire (Clahsen, 1988; Clahsen et al., 1996, Kauschke, 2012). Debates about a possible correlation between the acquisition of verb inflection and the placement of the verb still exist in the research literature (Clahsen, 1986; Kauschke, 2012; Weissenborn, 2000). However, most studies report a strong temporal relation between the acquisition of V2 placement and verb inflection, signifying that both phenomena are jointly acquired around the same age (Clahsen, 1988; Clahsen et al., 1996; Schulz & Schwarze, 2017).

Moreover, SVA and verb inflection in eL2 are reported to be acquired with ease by eL2 TD children (Grimm & Schulz, 2014b; Lemmer, 2018; Rothweiler, et al., 2017; Schulz & Schwarze, 2017) and are considered to be early acquisition phenomena (Grimm & Schulz, 2016; Schulz & Grimm, 2018) like in monolingual acquisition. eL2 children follow the same acquisition path as monolingual children, producing the same types of error patterns. The only difference is the age of mastery (Schulz & Grimm, 2018; Tracy & Thoma, 2009). Between six and 18 months of exposure, eL2 TD children should have mastered SVA in German (Schulz & Schwarze, 2017; Schulz et al., 2017; Schwarze et al., 2015; Tracy & Thoma, 2009).

For children with DLD, however, SVA seems to remain challenging for a prolonged period of time (Lemmer, 2018; Rothweiler et al., 2012, 2017; Schulz & Schwarze, 2017; Schulz et al., 2017) and is therefore considered a clinical indicator of monolingual and bilingual DLD in German (see extended optional infinitive stage, Rice & Wexler, 1996, for English, and Lemmer, 2018, and Rice et al., 1997, for German). DLD children display prolonged infinitival verb placement in utterance-final position (*du laufen*, 'you_INF run', Clahsen & Hansen, 1997, p. 151). When acquiring inflection, agreement errors (as in younger TD children) such as substitutions (e.g., *du macht das kaputt*, 'you destroy_3rd prs sg that', Lemmer, 2018, p. 68; *dann macht ich diese*, 'then I make_3rd prs sg these', Rothweiler et al., 2012, p. 47) or omissions of inflectional morphemes (=bare stems: *Peter tanz*, 'Peter dance', Clahsen & Hansen, 1997, p. 151) may occur. Evidence for SVA disentangling between DLD and TD mostly stems from longitudinal studies relying on spontaneous speech data (Rothweiler et al., 2012). Studies using the elicitation technique for SVA are scarce (Schulz & Schwarze, 2017). This is perhaps because the first- and second-person contexts are complicated to elicit since they are not depictable. Furthermore, longitudinal studies

Table 1: Contrastive overview of verbal inflection paradigms of English, German, Turkish, and Italian.

Inflected form	English (*to play*)	German (spiel-en)	Turkish (oynamak)	Italian (giocare)
1st person singular	*I play*	**ich spiel-e**	*(ben) oynayorum*	*(io) gioco*
2nd person singular	*you play*	**du spiel-st**	*(sen) oynayorsum*	*(tu) giochi*
3rd person singular	*he/she/it plays*	**er/sie/es spiel-t**	*(o) oynayor*	*(lui/lei) gioca*
1st person plural	*we play*	**wir spiel-en**	*(bis) oynayoruz*	*(noi) giochiamo*
2nd person plural	*you play*	**ihr spiel-t**	*(sis) oynayorsunuz*	*(voi) giocate*
3rd person plural	*they play*	**sie spiel-en**	*(onlar) oynayorlar*	*(loro) giocano*

often cumulate large age ranges within their samples. Generalized statements pertaining to SVA being a clinical indicator/marker for DLD are based on small groups of children with DLD, with ages ranging around four to 10 years (Rothweiler, 2012, 2017; Schulz & Schwarze, 2017). However, Tsimpli (2014), Grimm and Schulz (2016), and Schulz and Grimm (2018) recommend considering the timing in monolingual acquisition of the respective linguistic phenomenon under investigation, i.e., the age of acquisition of this domain in monolingual typical development should be considered. Early acquisition phenomena might be more appropriate for children with low LoE (e.g., SVA, see Rice et al., 2007; Rothweiler et al., 2012, 2017; Schulz & Schwarze, 2017; Schulz et al., 2017). Late acquisition phenomena might be more appropriate to use in assessment of children with higher LoE (e.g., case marking, see Ruigendijk, 2015, Scherger, 2018, 2019; Lemmer, 2018). Furthermore, due to the timing in acquisition, one linguistic phenomenon that helps disentangle DLD from bilingualism by one particular age might not necessarily be useful for diagnosing children of other ages (see Scherger, 2018, 2019). Therefore, whether or not a respective phenomenon – related to AoO and LoE – can disentangle DLD from bilingualism should be confirmed by studies that concentrate on smaller age ranges. Schulz et al. (2017) suggested considering an eL2 child as "at-risk for DLD" if difficulties with SVA persist after 18 months of exposure. The present study contributes to providing a response to the question of up until which age it is useful to implement SVA in the diagnostic process of eL2 children.

3. Research questions and hypotheses

The primary research question for the present study is whether SVA as an early acquisition phenomenon is a suitable clinical indicator of DLD in eL2 German acquisition around age seven (six to eight). A second research question concerns the factors other than the language disorder that influence children's performance in marking SVA. AoO, LoE, amount of input in L2 German at home and the nature of the L1 (inflectional or isolating language) are of special interest here. A third research question regards the elicitation material that was developed for cross-linguistic application and used in the present study: Is the language impairment testing in multilingual settings (LITMUS) tool for SVA (de Jong, 2015) applicable to German eL2 children by age seven?

Based on the aforementioned state of the research, the following hypotheses were deduced:

· Hypothesis 1: SVA is a suitable clinical indicator of DLD in eL2 German around age seven;
· Hypothesis 2: Besides the language impairment, AoO, LoE, amount of input in L2 German at home and the nature of the L1 are factors that significantly influence the SVA performance of eL2 German speaking children;
· Hypothesis 3: The LITMUS tool for SVA (de Jong, 2015) is applicable to eL2 German-speaking children around age seven.

4. LITMUS tools

In order to collect norms for bilingual children, new tools were developed in the international Bi-SLI[2] project according to linguistic principles that allow cross-linguistic application (see amongst others, Armon-Lotem et al., 2015). These elicitation materials are called LITMUS tools (re: language impairment testing in multilingual settings). The LITMUS principles outlined in de Jong (2015) for SVA and the Questionnaire for Parents of Bilingual Children (PABIQ; Tuller, 2015), described below in Section 5.1, are of specific interest in the present study. To the best of my knowledge (and personal communication with Jan de Jong), the current elicitation task has never been used systematically with eL2 TD and eL2 DLD German children.

Eliciting SVA is often done by supplying sentences for the child to complete. An example from the Test for Early Grammatical Impairment (Rice & Wexler, 2001; see also de Jong, 2015) is provided in (1).

(1)   Here is a singer. Tell me what a singer does.

However, in German, this kind of elicitation has an obvious drawback: German allows for answering with an infinitive, as shown in (2).

(2)   Hier ist ein Sänger. Sag mir, was
       ein Sänger macht.   –   singen
       Here is a singer. Tell me what a
       singer does.   –   to sing-INF
       'Here is a singer. Tell me what a
       singer does.   –   he sings'

Another problem with stimuli similar to (1) is the impossibility of eliciting first- and second-person forms. A good way to avoid these elicitation problems is to proceed with eliciting full sentences from the child.

Moreover, an issue that was considered in the elicitation task design described by de Jong (2015) was the verb position in the elicited utterances. Some forms (such as first- and third-person plurals in German) are identical to the infinitive (see 3a). In German matrix clauses, inflected verbs are obligatory in V2 position (Haider, 1997). As illustrated in Section 2, the acquisition path of verbal inflection in TD German is as follows: German children start their verb productions by producing infinitives in utterance-final positions before being able to raise finite verbs to V2. With intransitive verbs in simple structures (like 3b), it is impossible to distinguish between V2 and utterance-final positions, unless, for example, an adverb is added (see 3c).

(3)   a.   Paul und Luisa schlafen.
            Paul and Luisa sleep-3rdPERS PL.
            'Paul and Luisa are sleeping'
      b.   Paul schläft.
            Paul sleep-3rdPERS SG.
            'Paul sleeps'
      c.   Paul schläft always.
            Paul sleep-3rdPERS SG always-ADV
            'Paul sleeps always'

However, sentences containing adverbs (3c) cannot be illustrated for elicitation purposes. In order to avoid this confusion, only transitive verbs with singular subjects are included in the elicitation task where the obligatory object clarifies the verb position (see example (4)).

(4) Paul isst a pizza.
    Paul eat-3rdPERS SG a pizza.
    'Paul is eating a pizza'

Bearing these issues in mind, 30 test items and four practice items were devised (see **Table 3** in Section 5.2. below).

5. Methodology
5.1. Participants
In order to select participants, the Parents of Bilingual Children Questionnaire, PABIQ (Tuller 2015) was applied to gather information about the child's language background that enable us to better understand the child's eL2 language performance. The questionnaire collects general information about the date of birth, languages spoken by the child, the child's early language history, the child's current skills in both languages, languages used at home, information on SES and language-related difficulties (e.g., with reading and spelling).

In the present study, information on the L1, AoO, LoE, SES (operationalised as parents' years of education) and amount of input in German L2 at home are considered key factors influencing eL2 acquisition. Since not all the parents were willing to offer information about their education, SES had to be excluded from the variables investigated here. In this study, we used statements from the parents to gauge the amount of use of the child's L2 German at home spoken with the mother, the father, other adults who regularly take care of the child (grandparents, babysitter, etc.), and siblings. Parents were asked to rate the children's use of German in the following categories when speaking to them: 0 = never, 1 = rarely, 2 = sometimes, 3 = mostly, 4 = very often/always. Additionally, parents self-reported their proficiency in German.[3] In the current study, a ratio for the amount of overall German input at home was calculated by adding the mother's input score, the father's input score, and the siblings' input and dividing it by three (e.g., mother's input in German: 2 = sometimes, father's input in German: 2 = sometimes, brother's input in German: 4 = always; total score for amount of German input at home: (2 + 2 + 4)/3 = 2.7).

From the results of the PABIQ, 22 children were investigated for their mastery of the SVA paradigm for this study. **Table 2** presents the sample and demonstrates that the two groups do not differ with respect to age, AoO, LoE and amount of L2 input at home.

One of the participants (a girl with DLD) had to be excluded from the sample because of severe disorders in language comprehension. She did not understand the test instructions for switching the perspective in the picture description task (see Section 5.2).

L1s in the eL2 TD group included Arabic ($n = 2$), Kurdish ($n = 1$), Polish ($n = 1$), Russian ($n = 1$), Thai ($n = 1$), Turkish ($n = 2$), Urdu ($n = 1$). The eL2 DLD group included Arabic ($n = 1$), English ($n = 1$), Kurdish ($n = 2$), Polish ($n = 3$), Russian ($n = 3$), Spanish ($n = 1$) and Swahili ($n = 1$).

The following criteria were used for pre-classifying a child as having a language disorder:

a) receiving speech and language therapy
b) scoring below a T-value of 40 in at least two sub-tests of the LiSeDaZ (Linguistische Sprachstanserhebung – Deutsch als Zweitsprache; Schulz & Tracy, 2011) which is an assessment tool in German that is normed for bilingual children with respect to their LoE
c) showing normal non-verbal intelligence, measured by the CPM (Coloured Progressive Matrices, Bulheller & Häcker, 2002)
d) no hearing impairments
e) parental concern (PABIQ, Tuller, 2015).

There was one case of suspected overdiagnosis according to these criteria: A participant was receiving treatment, although he scored within the normal range in all of the LiSeDaZ-scales and showed normal IQ. There were no parental concerns regarding the child's early language history. Nevertheless, he attended a school for children with speech defects.[4] For the purpose of this study, he was reclassified as TD.

5.2. Procedure
The SVA task is a picture-description task. For eliciting first- and second-person forms, the child needs to take the role of the child in the picture (the individual wearing the heart insignia in **Figure 1**). Furthermore, the child needs to pretend that the adult person in the picture is the experimenter (the individual wearing the star insignia

Table 2: Overview of participants.

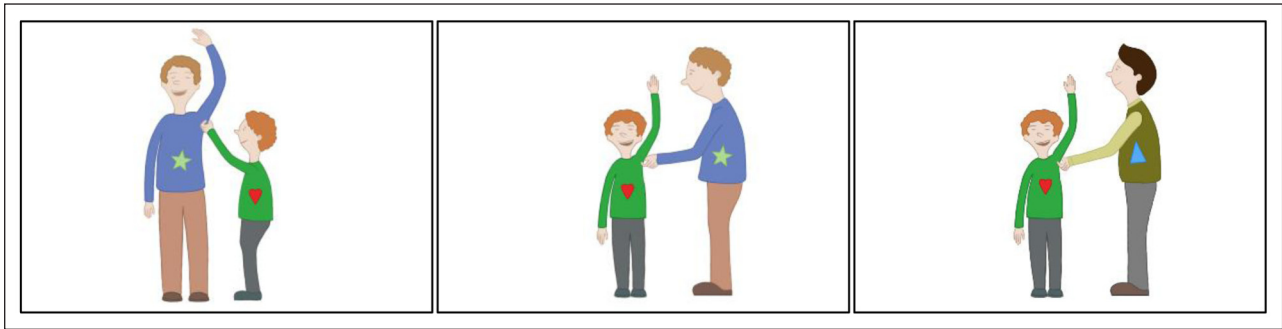| TD/DLD status	N	Sex	Age in months (*SD*)	Age range in months (in years)	AoO in months (*SD*)	AoO range in months (in years)	LoE in months (*SD*)	Amount of L2 input at home
eL2 TD	9	f = 3	95.8 (8.1)	83–106 (6;11–8;9)	35.8 (6.51)	26–51 (2;2–4;3)	60.4 (11.2)	2.63 (.57)
eL2 DLD	13	f = 5	90.2 (7.9)	75–99 (6;3–8;3)	37.5 (9.8)	24–59 (2;0–4;11)	52.9 (7.5)	2.29 (1.00)
Mann-Whitney-U	–	–	$U = 34.5$ $p > .05$	–	$U = 49.5$ $p > .05$	–	$U = 37$ $p > .05$	$U = 38$ $p > .05$

Figure 1: Examples of items no. 25, 27 and 29 (see Table 3: 'I tickle you', 'you tickle me', 'he tickles me') from the SVA tool (de Jong, 2015).

in **Figure 1**). A third person in the pictures has a third insignia (the triangle). The experimenter starts by saying, "Let's pretend you are the child with the heart and I am the man with the star. So, the book is about us. Let's see what we are doing. In this picture, I wash you, and in this picture, you wash me." (see instructions given in de Jong, 2015, p. 31). For this study, the SVA task was conducted as suggested by de Jong (2015). After a warm-up with four practice items, 30 items were elicited (see **Table 3**).

However, after the initial sessions, it was found that the accompanying "game about putting together a book with pictures" (see de Jong, 2015, p. 30) was not necessary for most of the six- to eight-year-old children. Playing the proposed game protracted the task because they had to wait for the experimenter to find the matching picture. Most children were not interested in repairing a book and only wanted to describe the pictures. Therefore, the SVA task was conducted without the game.

5.3. Analysis

As a first step in the analysis, a score for overall correct SVA was calculated (in percentage from a total of 30 items). An utterance was considered to be correct when the verb was placed in V2 position and the verbal inflection agreed in person and number with the subject. The second step included the calculation of scores for each grammatical person (first-, second- and third-person singular). For first-person inflection, markings with *-e* as well as markings with *-Ø* (null marking) were considered correct since these forms are usually used in oral language. For second-person inflection, markings with *-st* and markings with *-s* were considered correct, because it was not easy to determine whether children produced a *-t* after the *-s* in every case. A second reason was the phonological complexity of *-st*. It can be assumed that phonologically impaired children have more difficulties with articulating *-st* than TD children because of their reported problems with consonant clusters (Fox & Dodd, 2001; Fox-Boyer, 2016; Kauschke, 2012). The present study aims to analyse syntactic agreement principles and not phonological complexity. Therefore, *-s* was considered correct as well (e.g., *du kitzels mich* instead of *du kitzelst mich*, 'you tickle me'). For each grammatical person and for the total SVA scores, Mann-Whitney-U-tests were applied to test the equality of group medians between TD-group and DLD-group. For the statistical

Table 3: Target utterances for the SVA task (de Jong, 2015).

	German	English translation
practice items	*ich wasch(e) dich*	'I wash you'
	du wäschst mich	'you wash me'
	er wäscht dich	'he washes you'
	er wäscht sie	'he washes her'
1	*ich schieb(e) dich*	'I push you'
2	*ich schieb(e) ihn*	'I push him'
3	*du schiebst mich*	'you push me'
4	*du schiebst ihn*	'you push him'
5	*er schiebt mich*	'he pushes me'
6	*er schiebt dich*	'he pushes you'
7	*ich zieh(e) dich*	'I pull you'
8	*ich zieh(e) ihn*	'I pull him'
9	*du ziehst mich*	'you pull me'
10	*du ziehst ihn*	'you pull him'
11	*er zieht mich*	'he pulls me'
12	*er zieht dich*	'he pulls you'
13	*ich umarm(e) dich*	'I hug you'
14	*ich umarm(e) ihn*	'I hug him'
15	*du umarmst mich*	'you hug me'
16	*du umarmst ihn*	'you hug him'
17	*er umarmt mich*	'he hugs me'
18	*er umarmt dich*	'he hugs you'
19	*ich kneif(e) dich*	'I pinch you'
20	*ich kneif(e) ihn*	'I pinch him'
21	*du kneifst mich*	'you pinch me'
22	*du kneifst ihn*	'you pinch him'
23	*er kneift mich*	'he pinches me'
24	*er kneift dich*	'he pinches you'
25	*ich kitzel(e) dich*	'I tickle you'
26	*ich kitzel(e) ihn*	'I tickle him'
27	*du kitzelst mich*	'you tickle me'
28	*du kitzelst ihn*	'you tickle him'
29	*er kitzelt mich*	'he tickles me'
30	*er kitzelt dich*	'he tickles you'

analyses, the free software R was used (www.r-project.org; for a guide to doing statistics using R, see Larson-Hall, 2016).

Next, correlations and multiple linear regressions were run with SVA total as the response variable and DLD, LoE (in months), AoO (in months), amount of input in L2 German at home (0–4 points, where 0 = never and 4 = always) and L1 (0 = isolating language, 1 = inflectional language) as explanatory factors. In order to avoid AoO and LoE multicollinearity, both factors were run in separate models, leading to more interpretable models (Dormann et al., 2013).

6. Results

As **Figure 2** shows, eL2 TD children performed at ceiling with an accuracy rate greater than 90% with SVA markings in all grammatical persons. eL2 children with DLD, however, showed difficulties with marking SVA (SVA total, Mann-Whitney-U: $U = 11$, $p < .001$), most of all in second-person contexts (first-person: Mann-Whitney-U: $U = 36$, $p > .05$; second-person: Mann-Whitney-U: $U = 6.5$, $p < .001$; third-person: Mann-Whitney-U: $U = 37$, $p > .05$).

Error patterns showed inflection omissions like in the examples in (5) or substitutions of first- or third-person inflections for second-person inflections (see examples in (6)).

(5) a. du kneif mich
You pinch-Ø me-ACC
'You pinch me'
(DyMBiDLD0618, male, age: 8;3, AoO: 3;3, LoE: 60 months)

  b. du kitzel ihn
You tickle-Ø him-ACC
'You tickle him'
(DyMBiDLD0618, male, age: 8;3, AoO: 3;3, LoE: 60 months)

(6) a. du schiebe mir
You push-1st person me-DAT
'You push me'
(IaMBiDLD0518, male, age: 7;0, AoO: 2;0, LoE: 60 months)

  b. du zieht den mann
You pull-3rd person the man-ACC
'You pull him'
(SaMBiDLD0518, male, 6;3, AoO: 2;6, LoE: 45 months)

In most cases (99.5%), eL2 TD and eL2 DLD children place the verb correctly in V2 position. Three children (all eL2 DLD) showed utterance-final verbs to a small extent (see examples in (7)).

(7) a. der mann mich umarmt
The man me hug-3rdPERS SG
'The man hugs me'
(SaMBiDLD0518, male, age: 6;3, AoO: 2;6, LoE: 45 months)

  b. der mann dich umarmt
The man you hug-3rdPERS SG
'The man hugs you'
(SaMBiDLD0518, male, age: 6;3, AoO: 2;6, LoE: 45 months)

  c. ich mann drücken
I man push-INF
'I push the man'
(LiFBiDLD1118, female, age: 7;10, AoO: 3;1, LoE: 57 months)

  d. ich du armen
I you hug-INF
'I hug you'
(IaMBiDLD, male, age: 7;0, AoO: 2;0; LoE: 60 months)

Since all these children use V2-placement in all other utterances, these instances of utterance-final verb placement are negligible.

While TD children perform at ceiling with almost no exception, there appears to be considerable variation among the children with DLD, as can be seen by comparing the percentages shown in **Figure 3**.

In order to calculate the diagnostic accuracy of the SVA tool for this sample, sensitivity and specificity scores were calculated. According to Conti-Ramsden (2003), sensitivity refers to the percentage of children with DLD who are accurately identified as "impaired." Specificity refers to the
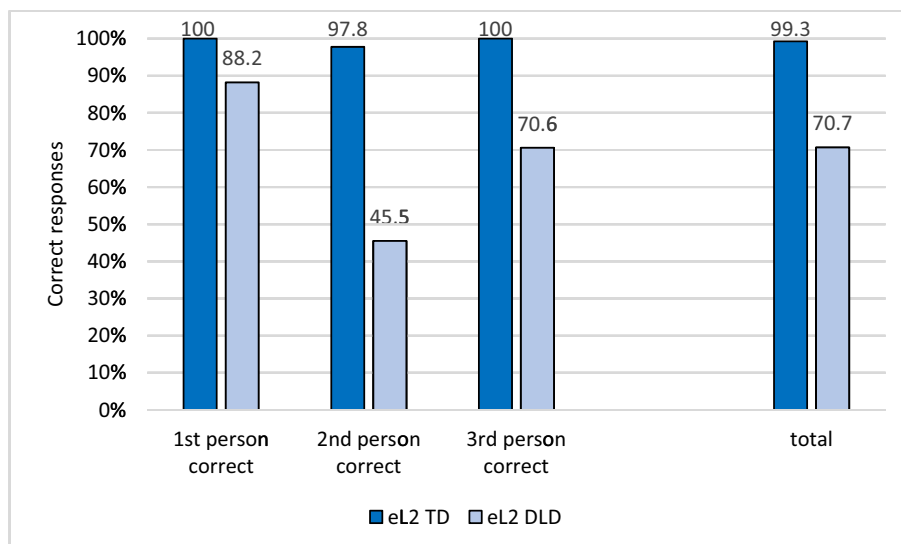

Figure 2: Mean target-like markings in 1st, 2nd, 3rd person and in total in eL2 TD and in eL2 DLD children.

percentage of TD children who are accurately identified as "not impaired". Nine out of nine TD children scored above 90%. Specificity is therefore 100%. Four out of 12 DLD children scored below 90%. Sensitivity is therefore 66.7%. Overall diagnostic accuracy is 81.8% (four out of 22).

In order to get an idea about the source of the variation in eL2 DLD participants and to see whether DLD is the most influential factor in SVA outcomes, a mixed-effects regression was conducted. **Table 4** shows the correlation matrix in the first model where DLD (TD = 0, DLD = 1), AoO (in months), L1 (0 = isolating language, 1 = inflectional language) and the amount of L2 input at home were entered as explanatory factors. The response variable is SVA. **Table 4** shows the correlations (*r*-values) between these variables.

Besides the strong and significant correlation between DLD and SVA total ($p < .01$), AoO and LoE, as expected in this sample, are also strongly correlated ($p < .01$). Given this significant correlation, we followed Yow and Li's (2015) procedure of creating separate regression models. Four of the five explanatory variables were thus simultaneously entered into each model. One model contained DLD, AoO, L1 and amount of L2 input (model 1) and the other model consisted of DLD, LoE, L1 and amount of L2 input (model 2).

Model (1) was significant. The four variables (DLD, AoO, L1 and amount of L2 input at home) explained 43% of the variance ($p < .05$, $R^2 = 0.43$, $R^2_{adjusted} = .28$). However, only DLD contributed significantly to the total SVA variance ($\beta = -0.29$, $t = -3.33$, $p < .01$). Neither AoO ($\beta = -0.00$, $t = -0.18$, $p > .05$) nor L1 ($\beta = -0.04$, $t = -0.32$, $p > .05$) nor the amount of L2 input at home ($\beta = -0.06$, $t = -1.10$, $p > .05$) contributed significantly. Using the relaimpo package (Grömping, 2006) in R, we could evaluate and compare the relative importance of terms in a regression within the explained 43% of the variance. DLD was the most important influence factor. It explained 14% of the total SVA variance.

Model (2) was significant as well. The four variables (DLD, LoE, L1 and amount of L2 input at home) explained 45% of the variance ($p < .05$, $R^2 = .45$, $R^2_{adjusted} = .31$). Again, only DLD as a variable contributed significantly to the total SVA variance ($\beta = -0.26$, $t = -2.84$, $p < .05$). Neither LoE ($\beta = 0.00$, $t = 0.77$, $p > .05$) nor L1 ($\beta = -0.03$, $t = -0.28$, $p > .05$) nor the amount of L2 input at home ($\beta = -0.07$, $t = -1.31$, $p > .05$) contributed significantly. Again, DLD was the most important influence factor. It explained 10% of the total SVA variance.
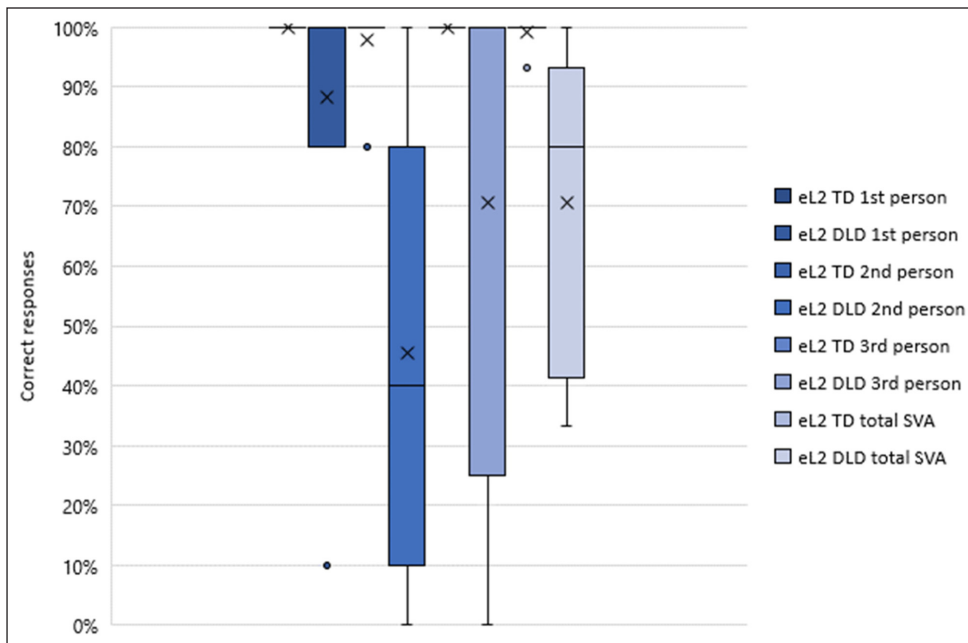

Figure 3: Target-like SVA markings in eL2 TD and eL2 DLD children.

Table 4: Correlation matrix for explanatory variables.

Variables	SVA	DLD	AoO	LoE	L1	Home L2 input
SVA	1.0	**−0.59****	−0.05	0.34	−0.15	−0.11
DLD	**−0.59****	1.0	0.14	−0.43	−0.03	−0.23
AoO	−0.06	0.14	1.0	**−0.59****	0.19	−0.24
LoE	0.34	−0.43	**−0.59****	1.0	−0.05	0.29
L1	−0.15	−0.03	0.19	−0.05	1.0	0.37
Home L2 input	−0.11	−0.24	−0.33	0.29	0.37	1.0

Note: Double asterisks mark significance ($p < .01$).

7. Discussion

This study's main aim was to evaluate the early acquisition phenomenon of SVA as a clinical indicator of DLD in children around age seven acquiring eL2 German, using a screening tool described by de Jong (2015). Besides the DLD, the influencing factors AoO, LoE, amount of input in L2 German at home and the nature of the L1 were also investigated. For this purpose, nine eL2 TD children and 13 eL2 children with a diagnosed DLD were screened using the LITMUS tool for SVA (de Jong, 2015).

Hypothesis 1 predicted SVA to be a suitable clinical indicator of DLD in eL2 German acquisition by age seven. The results confirm this hypothesis and are in line with prior findings (Lemmer, 2018; Rothweiler et al., 2012; Schulz et al., 2017; Schwarze et al., 2015). The group medians of the TD children and the children with DLD are significantly different from each other, showing better results among the TD children. Only one TD child produced two utterances in the second-person singular that were not target-like; example (8) shows that the verbal inflection was omitted and a bare stem was produced instead.

(8) a. du kneif mich
     you pinch-Ø me-ACC
     'you pinch me'
     (SaFBiTD0618, female, age: 7;1, AoO: 3;0, LoE: 53 months)
   b. du kneif der
     'you pinch-Ø he-NOM'
     'you pinch him'
     (SaFBiTD0618, female, age: 7;1, AoO: 3;0, LoE: 53 months)

It is interesting to mention that the L1 of this participant was Thai, the only isolated L1 included in the eL2 TD sample. In other words, the only TD child showing at least some difficulties with SVA has an L1 background without verbal inflection. This is an important observation in terms of cross-linguistic influence and the nature of the L1 but cannot be generalised on the basis of this sample.[5] All of the other 268 elicited utterances in the TD group were target-like. On the other hand, four of the children with DLD have already mastered the SVA paradigm, performing correctly for over 90% of the items, i.e., these four children would have been underdiagnosed using this tool. Therefore, the diagnostic accuracy in this sample of 22 children is at 81.8%. This is in line with results obtained by Blom et al. (2013) on Dutch bilingual children with DLD. While SVA shows a clear DLD effect, the diagnostic accuracy is limited to some extent.

The linear regression models confirmed the significance of the factor DLD on the SVA performance when compared to the factors AoO, LoE, amount of input in L2 German at home and the nature of the L1. DLD was the only factor that contributed significantly to the SVA outcome in the investigated sample. Hypothesis 2, therefore, is not confirmed for the children investigated in the current study. None of the other factors had a significant impact on the SVA performance. The combination of all of these factors, however, explained 43% of the variance. One could argue that the missing correlation between age factors (like AoO and LoE) and SVA in the whole sample is due to the ceiling effects found in the eL2 TD group. It is most likely that there have been effects of AoO and LoE before the mastery of SVA. These effects are not visible (any more) in the present sample because of the ceiling effects. Moreover, within the eL2 DLD group of children, there were no correlations between SVA total and AoO or LoE (SVA-LoE: r = .18, p > .05; SVA-AoO: r = .06, p > .05). This result was similar to Chondrogianni and Marinis's (2011) findings, which found the amount of language input at home to be unrelated to children's language performance, particularly because of the mother's low L2 proficiency. The current study's results, on the other hand, contradict previous findings about the importance of AoO and LoE and eL2 children's input at home (cf. Hopp, 2011; Unsworth et al., 2014). This is probably due to timing in acquisition of SVA being an early acquisition phenomenon and due to the advanced age and LoE of the eL2 TD children in this study. The absence of significant impacts in the regression models in this sample does not mean that AoO and LoE are not important factors (for earlier stages of acquisition). However, the disorder is the more decisive factor that influences SVA performance irrespective of LoE or AoO. This finding is important since SVA is easily acquired by eL2 TD children after a short LoE of about 18 months (Schulz et al., 2017). In this study, bilingual children with DLD show difficulties in this domain even after 60 months of exposure. This corresponds to Lemmer (2018), who found that eL2 children with DLD showed prolonged difficulties with SVA as well. This demonstrates a delay in these eL2 DLD children's ability to mark SVA. However, it can be argued that the eL2 DLD children investigated in the present investigation have already overcome the extended optional infinitive stage (Rice et al., 1997) since only two utterances out of the 359 in this group of children had infinitives in utterance-final position. Instead, I want to argue for a visible progress in these children's SVA production patterns compared to the extended optional infinitive stage: There are negligible instances of utterance-final position infinitives in contrast to a vast majority of V2 utterances, which means that these children have mastered one of the two developmental steps of SVA (i.e., verb placement). What remains difficult at this age and LoE is the agreement with the subject in person and number (see examples in 6). This result is partially in line with Lemmer (2018) who found that eL2 DLD children at the age of 8 (LoE of 59 months) still produce utterance-final infinitives but the majority of their errors were bare stems in V2 position that are not assumed to be infinite (*die schieß-Ø fußball*, 'she kick-Ø football', Lemmer 2018, p. 80).

Finally, the third hypothesis stated that the LITMUS tool for SVA (de Jong, 2015) is applicable to eL2 German speaking children around the age of seven. The current study offers support for this hypothesis. The screening tool is applicable to this age. Children were motivated to participate. As described in Section 5.2, children aged 6–8 do not need the game around repairing a picture book but seek to move on faster. The task worked well when this

was adapted to their age. However, a few issues occurred during the tool's adaption to German. First, using the verb *ziehen* 'to pull' following the verb *schieben* 'to push' created a semantic confusion to many of the participants, resulting in perseverations on *schieben* instead of *ziehen*, particularly among children with DLD. This can be solved easily by changing the procedure's order. Second, the verb *umarmen* 'to hug' is morphologically complex in German and easily confused with a particle verb in German (like *auffallen* 'to strike' *or zurückgeben* 'to give back'). As seen in the L2 literature, particle verbs in German are difficult to acquire (Ziegler & Thurner, 2015). Some of the investigated children therefore omitted the prefix *um-*, producing utterances as in example (7d, see Section 6) and examples in (9).

(9) a. du   armest   der
        you hug-2ndPERS SG he-NOM
        'you hug him'
        (AdMBiDLD1118, male, age: 8;1, AoO: 4;10, LoE: 39 months)
    b. er   armet   mich
        he   hug-3rdPERS SG   me-ACC
        'he hugs me'
        (AdMBiDLD1118, male, age: 8;1, AoO: 4;10, LoE: 39 months)

In target-like German, the example in (9a) should be *du umarmst ihn* and the example in (9b) should be *er umarmt mich*. The omission of the prefix *um-* had no influence on the inflection suffix, but it confused many of the children as it seemed to be a new lexical item to them. To solve this issue, the item could be translated by *drücken*, which has roughly the same meaning but is not morphologically complex in German. Third, the verb *kneifen* 'to pinch' in German has a phonologically complex onset *kn-* containing two consonants. Some children with DLD had difficulties in articulating this. The second-person singular form (*du kneifst*, 'you pinch') contains consonant clusters at the word-initial and word-final position. This led to some pronunciation problems that could be avoided by using another verb.

Additionally, the cognitive complexity of the task in terms of switching the perspective when describing the picture could be problematic. In the current sample, one child had comprehension problems and could not complete the task. Therefore, the tool is only applicable to DLD children whose language comprehension is relatively unaffected by the disorder.

8. Conclusion

In a nutshell, this study shows that the investigated LITMUS tool for SVA (de Jong, 2015) is applicable to German. It is promising and can be used as a time economic screening that evaluates the ability of German children around age seven to mark SVA. However, in order to be usable in practice with German children, it needs some adaptations (see Section 7), particularly in the lexical choices within the verbal material. Additionally, since this tool requires abilities in switching the perspectives, it is not usable with children whose language comprehension abilities are severely impaired.

To conclude, besides the evidence for SVA being a clinical indicator for monolingual children, the results of the present study suggest evidence for SVA being a clinical indicator for DLD in the bilingual population as well with a diagnostic accuracy of 81.8%.

Notes

[1] In the present paper, eL2 refers to children acquiring German as a L2 after they have been exposed to another language for at least two years after birth; therefore, the age of onset of the children included in this study was above two years. In line with Schulz and Grimm (2018), these children are not considered simultaneous acquirers since they should have developed substantial grammatical and lexical knowledge after two years of exposure to their L1. The age threshold for still being classified as early L2 is discussed controversially in the literature (see amongst others Meisel, 2009; Tracy & Thoma, 2009). It should be highlighted here that the inclusion criterion for this study was up to the age of five as AoO (in line with Tracy & Thoma, 2009).

[2] In the Bi-SLI project (during COST Action IS0804), the term SLI (specific language impairment) is used. For a discussion on terminology for SLI/DLD, see Bishop (2017).

[3] In the present sample, self-reported German proficiencies of the parents could not be evaluated because of the low number of responses to this category in the questionnaire (nine out of 22 parents provided details on their own language proficiency). Therefore, only the amount of L2 use at home is considered for further calculations. In the responses obtained, the mothers' mean German proficiency in the TD group was slightly higher than in the DLD group, but the difference was not significant (Mann-Whitney-U: $U = 2$, $p > .05$).

[4] The present study is part of a bigger research project in which further language-internal and language-external data were collected. Besides the SVA task, the boy that seemed to be overdiagnosed with DLD scored similarly to the eL2 TD children in case marking and non-word-repetition and showed a comparable forward and backward digit span, i.e., the correct recall of increasingly longer sequences of numerical digits in normal or reverse order.

[5] With respect to the typology of L1 being an influencing factor, the statistical analyses have to be interpreted with caution since a majority of the children's L1s were inflectional languages. In order to investigate the role of L1 further, another sample composition is desirable. Due to practical reasons, this was not possible in the present study.

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