Stamp, R., Novogrodsky, R. & Shaban-Rabah, S. (Accepted for publication). Argument omissions by deaf students in three language modalities. *First language*.

Argument omissions by deaf students in three languages and three modalities

While it is common for deaf children to be bilingual in a spoken and signed language, studies often attribute any delays in language acquisition to language deprivation, rather than as a result of cross-linguistic interaction. This study compares the production of simple sentences in three languages (Palestinian Arabic, Modern Standard Arabic, and Israeli Sign Language) and three language modalities (spoken, written and signed) by deaf and hearing students in an Arabic-speaking community. Thirty-eight school-age Palestinian Arabic-speaking students participated in a sentence elicitation task in which they retold the events portrayed in video clips. Hearing students (n=19) produced the sentences in spoken Palestinian Arabic and in written Modern Standard Arabic. Deaf students (n=19) produced the sentences in these two language varieties and additionally in Israeli Sign Language. Omissions of arguments and verbs were compared across the two groups and three languages. Results showed that deaf students omitted more arguments and verbs compared with their hearing peers who scored at close to ceiling. Deaf students produced more omissions for direct-objects and more omissions in ISL. The findings can be interpreted in two possible ways: atypical effects resulting from inconsistent language input and cross-linguistic transfer known to arise in multilingual children.

Keywords: deaf, sign language, language deprivation, cross-linguistic transfer, argument structure, argument omission.

Running header: Argument omissions by deaf students

Introduction

Deaf children often present delayed spoken and written language abilities compared to hearing children (e.g., Friedmann, et al., 2008, Tomblin, et al., 2005). However, it has been shown that when deaf children grow up in a bimodal-bilingual environment with exposure to both signed and spoken language, their rate of language acquisition is comparable to their hearing peers (Davidson, et al., 2014; Hall, et al., 2019; Rinaldi & Caselli, 2014). Yet, when spoken and signed languages interact in bilingual settings, this results in contact-induced phenomena such as transfer of spoken language elements into sign language (Quinto-Pozos & Adam, 2015 for an overview) or vice versa (Koulidobrova, 2016).

The current study provides insights into language contact between Israeli Sign Language (ISL) in the signed modality, Palestinian Arabic (PA) in speech and Modern Standard Arabic (MSA) in writing. Specifically, we explore argument and verb omissions in these languages by groups of deaf and hearing school-age students.

Language deprivation

Deaf children sometimes experience language deprivation (Hall, 2017). Note that the term language deprivation here does not relate to environmental neglect, that is, language deprivation that is caused by lack of childcare or absence of a nurturing and loving environment. Deaf children in these studies are raised by caring families and in most cases, hearing impairment identification and intervention starts at an early age (including in Israel, the site of the current study, see Novogrodsky, et al., 2018). Moreover, parents seek support to enhance language and communication at an early age (Keen, 2007; Napoli, et al., 2015). For deaf children, language deprivation reflects

lack of exposure to a consistent language input (Meir, 2014; Novogrodsky, et al., 2017). Deaf children receive limited spoken language input compared to hearing children and this limitation is even more apparent for incidental language input (Novogrodsky, et al., 2018, Tomblin, et al., 2005). For children who use sign language, as is the case for the students in this current study, language input is often inconsistent because for most of them, sign language input differs between home and school; they do not receive explicit sign language instruction and teachers are not necessarily proficient users of sign language (Meir, 2014; Hou, et al., 2019). In many cases, teachers use a combination of signed and spoken language (such as signed English or signed Arabic). Furthermore, those from non-signing families receive a reduced exposure in terms of incidental sign language input. This leads to unique and difficult conditions for language acquisition (Meir, 2014).

Language interaction

Deaf children who use sign language become bilingual during the school-age years when they learn to read and write the spoken language in the surrounding community. The common term used for this phenomenon in the literature is bimodal-bilingualism. Some use this term in a broad way (Lillo-Martin et al., 2014) and some in a more restricted way (Novogrodsky & Meir, 2020b). In the current study, we follow the broader definition of bimodal-bilingual. According to Lillo-Martin and colleagues (2014), in the broad sense, bimodal-bilinguals can be hearing or deaf, with varying abilities in spoken, written and signed languages. In contrast, Davidson et al. (2014) focused on bilingual-bimodal deaf children who sign (American Sign Language, ASL) and speak (English), before acquiring written language at school. They showed that deaf children with cochlear implants, who are exposed to both language

modalities from an early age, scored similarly to their hearing counterparts on spoken language measures. The control group included bimodal-bilingual hearing children with deaf parents who use ASL and English as their native languages. The results suggest that sign language might mitigate negative effects of early auditory deprivation for spoken language (Davidson, et al., 2014). In another study, the mixed language input of four deaf mothers and the mixed output of their three deaf and three hearing children were explored (Van den Bogaerde & Baker, 2005). The deaf mothers used code-blending (mixing between Dutch and Sign Language of the Netherlands) in their communication with their children. However, while the deaf children (up to 3 years) showed minimal code-blends in their productions, the hearing children showed code-blends similar to their mother's. The authors attributed the gap between the two groups in terms of degree of access to spoken Dutch, which was reduced for the deaf group. This study highlighted the effects of exposure and language interaction on early stages of bimodal-bilingual acquisition.

Deaf children with functioning hearing[1], which allows them to perceive and produce spoken language, and who are exposed to both spoken and sign language, become bimodal-bilingual (to varying degrees). Language skills of bilingual children who are exposed to two spoken languages are usually distributed unequally across the two languages and even within the same language that the child speaks (e.g., comprehension versus production, vocabulary versus syntax, see Kohnert, 2010). Similarly, the language of bimodal-bilingual children varies across the two languages and it might show differences in language dominance as the child's languages develop. This bimodal-bilingual continuum is related to factors such as age of hearing

[1] Functioning hearing refers to the child's ability to perceive spoken language. It is measured directly by speech perception tests (e.g., Crosson & Geers, 2001), indirectly by questionnaires (e.g., Novogrodsky, et al., 2018) and it has a positive correlation with spoken language measures; children with better hearing function/speech perception score higher on spoken language tests.

loss identification (and in some cases, the age of hearing loss), the severity of hearing loss, the age of exposure to the respective languages, the hearing status of the parents and schooling policy (Plaza-Pust & Morales-López, 2008).

For bimodal-bilinguals (both deaf and hearing), some linguistic properties are transferred from one language into the other, and this process is known as cross-linguistic transfer. These effects have been recorded in a number of language pairs (ASL-English, Italian Sign Language-Italian, British Sign Language-English and Sign Language of the Netherlands-Dutch, for an overview see Koulidobrova, 2016). For example, Koulidobrova (2016) tracked the language acquisition of two bimodal-bilingual hearing children who grew up exposed to ASL and English. She focussed on instances of subject and object omissions, which in ASL is more freely possible than in English (Lillo-Martin, 1986) and found evidence of cross-linguistic effects. The bimodal-bilingual children omitted more arguments than English speakers and these omissions were consistent with their ASL, which allows null arguments (Koulidobrova, 2016). Likewise, Pe'er-Strugo (2020) tested bimodal-bilingual school-age deaf students in ISL and Hebrew. They showed omissions of function words in Hebrew, as these are not a common feature in ISL. Plaza-Pust and Morales-López (2008) suggested that for deaf children, contact phenomena between signed and spoken languages range from a switch to another language, integration of loan vocabulary and language change on the diachronic level (which is beyond the scope of the current study). For example, bimodal-bilingual signers of Chinese and Chinese Sign language combine elements of Chinese Sign language and mouthing from spoken Chinese, together with elements of written Chinese by tracing the strokes of characters in the air or on the palm of the hand. Therefore, language contact phenomena are a "natural" outcome of language contact and bilingualism.

In addition to being bimodal-bilingual, students in the current study use two distinct varieties of Arabic. Arabic is a typical case of diglossia, in which the spoken and written languages are linguistically related, yet different at all linguistic levels: phonology, morpho-syntax, lexical-semantic and pragmatics (Khamis-Dakwar, et al., 2012; Saiegh-Haddad & Spolsky, 2014). The spoken language (in our case PA) is the first language acquired by hearing children and is used in regular day-to-day interactions. While the written language, MSA, is formally taught in school, hearing children are also exposed to it in specific contexts such as books and religious sermons. Therefore, there is interaction between PA and MSA in acquisition and with age, children develop the ability to distinguish between these two distinct language varieties (e.g., Ravid, et al., 2014). In the case of deaf children though, MSA is used mostly in reading and writing, because spoken MSA (e.g., radio, television) is not fully accessible to them in the auditory modality.

Few studies have tested the interaction between PA and MSA in terms of syntactic acquisition, which is the domain explored in the current study (e.g., Ravid, et al., 2014; Khamis-Dakwar, et al., 2012). Khamis-Dakwar et al. (2012) examined the acquisition of ten syntactic structures among 120 children from first to fifth graders. Six structures represent a mismatch between PA and MSA (subject–verb agreement, negation, yes/no questions, dual number marking, relative pronouns and passive) and four structures are similar across the two language varieties (plural, adjective definiteness agreement, construct phrases[2] and wh-questions). All structures are taught explicitly as part of the MSA curriculum between Grades 1 and 4 (except for passive structure which is not addressed in the curriculum), and children are

[2] Construct phrases involve the connection of two or more nouns, such as possession (The rabbit's food). In both MSA and PA construct phrases must have an indefinite nominal first and definite in the second noun (e.g., 'food (indefinite) the (definite)-rabbit').

exposed to them incidentally through the MSA curriculum and outside of school. The findings showed that in a judgment task, children performed better on structures that were similar across the two language varieties. Furthermore, children performed better on structures that are acquired early (e.g., plural marking and word-order agreement), and poorly on structures that are acquired late cross-linguistically (e.g., passive structures and relative pronouns).

The current study examined the omissions of arguments and verbs in simple sentence production. Following Khamis-Dakwar et al. (2012) and Saiegh-Haddad and Spolsky (2014), we examined both PA and MSA. The next section explains the notion of argument structure and its acquisition.

Acquisition of argument structure by hearing children

Verbs play a central role in language acquisition in signed and spoken languages. They link meaning and sentence structure, and it is the argument structure of verbs, which represents this link. Argument structure includes the subject of the verb and its complements and the rules about the constituents that must be present in the sentence (Botwinik-Rotem & Friedmann, 2009; Pinker, 1989). Arguments can be obligatory in some languages and optional in others. Furthermore, the number and types of complements are determined by the verb's meaning and by the syntactic requirements of the language. For example, verbs can have no complements, or multiple complements (e.g., "I run", "I eat an apple" and "I give an apple to dad") and these can have different thematic roles such as agent ("The bear climbed the tree") and theme ("The bear fell") (Botwinik-Rotem & Friedmann, 2009). In addition, verbs allow different options as internal arguments (e.g., a noun-phrase, or both a noun-phrase and a clausal complement). These different options affect the processing of verbs in

typical and atypical language acquisition (Botwinik-Rotem & Friedmann, 2009; Thordardottir & Weismer, 2002).

The acquisition of argument structure in spoken languages starts at preschool and extends into adolescence (Berman, 1986; Gentner, 1978; Naigles, et al., 1992). In typical acquisition, the first true verbs appear during the period of 'single word utterance', around 16 months, after the child has acquired numerous nouns (Gentner, 1978). Based on observational and experimental data from children aged 2;6–5;6 years, Berman (1986) suggested that children reach near-mastery of the concepts of causativity and the distinction between transitivity and intransitivity of verbs (e.g., *push* vs. *run*) at pre-school-age. Development continues into school-age and until adulthood (Naigles, et al., 1992) and is affected by different variables including verb-specific frequency (Abbot-Smith & Tomasello, 2010). In the next section, we discuss the acquisition of argument structure by deaf children.

The acquisition of argument structure by deaf children

As aforementioned, some deaf children show delays in their language proficiency, compared with hearing children with typical language development (Boons, et al., 2013; Friedmann & Haddad-Hanna, 2014). With regards to PA, which is explored in the current study, school-age deaf children have been shown to score significantly lower than hearing children in a variety of syntactic tasks (e.g., Friedmann & Haddad-Hanna, 2014; Kawar, et al., 2019; Novogrodsky, et al. accepted). These findings might suggest that deaf children face difficulties in acquisition at the sentence level. However, to the best of our knowledge, no study has explored omissions of arguments in simple sentence production in deaf children from Arabic-speaking communities.

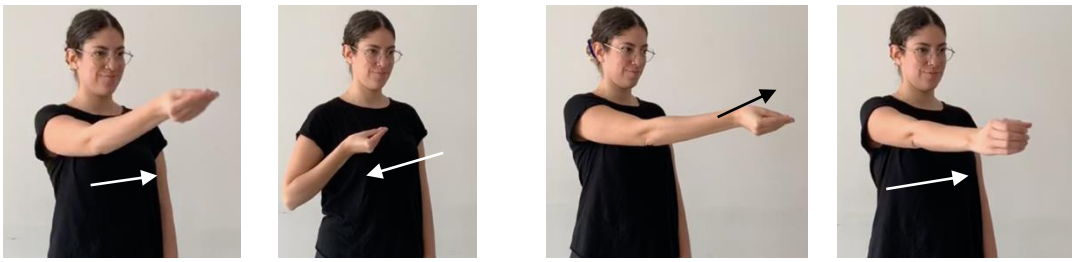
Since the current study is interested in argument structure of deaf signing students, we take a moment to briefly consider how sign languages represent arguments in sentences and how omissions might arise. It is claimed that there are no dedicated morphemes to distinguish arguments (e.g., subject versus object) from each other in sign languages (Cormier, 2012). Some sign languages, however, do have special signs, such as object pronouns, whose sole purpose is to signify the object in the utterance (Meir, 2003 for ISL; Börstell, 2019 for Swedish Sign Language). For those sign languages that lack overt marking, word order is an important strategy for expressing grammatical relations (Cormier, 2012), but word order itself is also affected by properties of the arguments (e.g., animacy) (Meir, et al., 2017).

Similar to spoken languages, argument structure of sign languages is also largely based on verb semantics. In a corpus-based study of 25 verb meanings in Russian Sign Language, Kimmelman (2019) confirms that some verbs are more 'transitivity prominent' than others because of their semantics, as shown in spoken languages (Haspelmath, 2015). For example, verbs which almost always require a direct-object in terms of their semantics (e.g., 'see') are transitive, while those that do not are intransitive (e.g., 'laugh') (Oomen & Kimmelman, 2019). This was further corroborated by Börstell and colleagues (2019) in four other sign languages: Sign language of the Netherlands, German Sign Language, Finnish Sign Language and Swedish Sign Language, although notably considerable variation between individual languages was evident. In addition to the transitivity distinction (intransitive versus transitive), in sign languages, most verbs fall into one of three inflectional classes subject to their argument structure (Rathmann & Mathur, 2003). These include: (1) verbs that take two animate arguments as part of their argument structure, (2) verbs of motion and location, and (3) the rest of the verbs, which take one animate argument

along with other inanimate arguments. The first class of verbs, also known as agreeing[3] verbs according to Padden's morphological criteria (1988), show agreement for person and number. For agreeing verbs, the movement of a sign such as GIVE can move from one location to another to agree with the subject and/or object (See Figure 1). In the second class of verbs, also known as spatial verbs, the movement of the sign agrees with locations (Meir, 2002). Finally, the last class of verbs, plain verbs, do not show any agreement (e.g., EAT, WANT[4]). More specifically in ISL, the same three verb classes have been documented and discussed in depth by Meir (1998, 1999).

In some sign languages, arguments may be omitted, for example, (1) when produced with agreeing verbs (Lillo-Martin, 1986), (2) with body-anchored verbs (Oomen & Kimmelman, 2019), or (3) or when indicating agent defocusing (Nordlund, 2019). Studies suggest that the presence of verb agreement can result in the omission of subjects and objects (Lillo-Martin, 1986 in ASL), although the nature of this omission is debatable (Koulidobrova, 2017). Meir and colleagues (2007) describe the notion of 'body as subject' verbs in which for plain verbs, a signer's body represents one of the arguments, the subject, and therefore subject omission is acceptable or rather represented by the body. Similarly, Hou and Meier (2018) found that the center of the chest is the default first person object marker in ASL, with the exception of only a few signs. Verb agreement is reported to be acquired by the age of 3-4 years (Morgan, et al., 2006 for BSL; Meier, 1987; Supalla, 1982 for ASL) or even earlier (Quadros & Lillo-Martin, 2007).

[3] Some linguists argue against the term 'agreement' and use 'indicating' instead (Liddell, 2003). For the sake of consistency and ease, we use the term agreeing here.
[4] Citation signs for EAT and WANT in ISL can be viewed at the following site: http://isl-lex.co.il



(a) (b) (c) (d)

Figure 1. The ISL sign GIVE agrees with person in (a) I-GIVE-YOU, (b) YOU-GIVE-ME and (c) SHE-GIVES-HIM, and (4) I-GIVE-YOU (something cylindrically-shaped) produced with a handling classifier.

Some verbs may be modified to incorporate features of arguments by using classifier handshapes (Emmorey, 2003). Classifier handshapes depict whole or part entities or the handling and size and shape of objects (Johnston & Schembri, 2007). In fact, Meir (1999) describes verb classifiers in ISL as instances of noun incorporation. For example, the handshape of the verb GIVE can be modified to indicate the object, a bottle, by using a handling handshape (as shown in Figure 1d). Note, the handling classifier does not replace the lexical sign for BOTTLE as the classifier alone can be confused with any cylindrical-shaped object. That said, in a relatively new sign language in Turkey (Ergin, et al., 2018), adult signers produced object omissions and in these cases, signers incorporated object handshapes into the verb (e.g., in the sentence WOMAN BALL-ROLL (i.e., ‘woman rolls the ball’, the sign for ‘roll’ was produced with a handling classifier to represent the object ‘ball’). Similar to spoken languages, these findings suggest that sign languages can omit arguments but that this is dependent on the syntactic structures and verb characteristics of each specific language.

The present study

The deaf students investigated as part of the current study are an interesting case of multilingualism. They are not only bimodal-bilingual, in PA and ISL, but they can be better described as trilingual, they also use written MSA, a distinct language variety as aforementioned. We explored simple sentence production of school-age deaf students in three modalities: in speech and writing in two distinct language varieties of Arabic (PA and MSA), and in a third language, ISL. These productions were compared with the productions of the same sentences by hearing students (with the exception of ISL). Specifically, we explored argument omissions and verb omissions, which gave us insight into the acquisition of argument structure in each language and language interaction of the three languages. .

Following previous studies exploring omissions in atypical populations (e.g., Novogrodsky et al., 2018; Thordardottir & Weismer, 2002), we treated omissions as an indication of lack of proficiency of verb argument structure. We predicted that deaf students would show more argument omissions compared with hearing students due to lack of exposure to a fluent language model. We discuss the findings in light of two possible interpretations: language deprivation and cross-linguistic transfer.

Method.

Participants. Thirty-eight students were recruited from the North of Israel; they all used the same PA dialect from the Nazareth area. Students were recruited through personal connections and parents provided signed informed consent for all participation.

Deaf students. Nineteen bimodal-bilingual school-age deaf students (11 boys, 8 girls), aged 11:08–21:00 participated in this study. They all attend special classes for deaf

students, use ISL and PA for daily communication and MSA mainly for writing in school-related activities. All students are severely or profoundly deaf and they use bilateral hearing devices: hearing aids, cochlear implants, or a combination of the two (see Table 1 for students' characteristics). Typically, students who attend special classes with sign language as the language of instruction do not have sufficient hearing function (meaning their hearing abilities with the hearing device) to rely on spoken language alone in a learning environment. However, as part of the intervention program, students received the best amplification for their hearing impairment. All students are able to perceive speech and they communicate in spoken language on a daily basis with good speech intelligibility, allowing them to fulfill the current study's task. With regards to sign language, while all students were exposed to ISL at school (the school follows a bilingual program of ISL and PA as the languages of instruction, for an overview of bilingual programs see Plaza-Pust & Morales-López, 2008), 13 came from families with deaf relatives, 11 of these from families with first-degree deaf relatives (see details in Table 1). Six came from families with no deaf relatives. Though we did not measure sign language exposure directly we took the presence of close deaf relatives as a proxy for sign language exposure in the home environment. This was based on the sociolinguistic characteristics of PA-speaking families in Israel, in which in most cases, extended families live in close proximity, within the same village, town, or neighbourhood. ISL was not assessed for this study since no standardised ISL language tests exist for this age range.

Table 1. Information about the deaf group (*n* = 19)

Stamp, R., Novogrodsky, R. & Shaban-Rabah, S. (Accepted for publication). Argument omissions by deaf students in three language modalities. *First language*.

Age (years: months)	**Gender F/M**	**Hearing-Loss**	**Hearing device for each ear***	**Deaf relatives**
11:08	M	Profound	CI+CI	None
12:04	M	Severe	HA+HA	Parents & brothers
12:04	M	Severe	HA+HA	Second-degree relatives
13:03	M	Severe	HA+HA	Second-degree relatives
13:04	M	Profound	CI+CI	None
13:10	M	Profound	CI+CI	Brother
13:10	M	Severe	HA+HA	None
14:04	F	Profound	CI+CI	Father and sister
15:04	M	Severe	CI+CI	Brother
15:06	F	Severe	HA+HA	None
16:03	M	Severe	HA+HA	Brother
18:09	M	Profound	CI+CI	Brother
19:03	F	Severe	HA+HA	Brother
19:09	F	Severe-Profound	CI+HA	Father and brother
20:00	F	Profound	CI+HA	Sister
20:00	F	Profound	CI+HA	Sister
20:03	M	Profound	CI+CI	None
20:04	F	Severe	HA+HA	Brother
21:00	M	Severe	HA+HA	None

*CI=Cochlear-Implant; HA=Hearing Aid.

Hearing students. Nineteen students (8 boys, 11 girls), aged 8–14 participated in this study. They all had typical hearing, based on parental reports. The group was divided into two age groups (ages 8–10, 12–13), with the aim of comparing the omissions of deaf children to the omissions of younger hearing children, as is common in the field of atypical acquisition (e.g., Novogrodsky & Kreiser, 2015). However, as shown in our results, the performance of both age groups was near ceiling with no significant difference between them, and therefore the two groups were combined into one control group.

In both groups, students had no additional cognitive or neurologic disorders based on reports from their parents and teachers. The Ethics Committee at the University of Haifa approved this study.

Materials. The research stimuli included 24 short video clips in which one event occurs (see Appendix A for a full list of the described events). All target responses could be described in a simple sentence. The target sentences included 8 with two arguments and 16 with three arguments. The sentences were controlled for animacy; of the sentences with two arguments (8 sentences), 4 included animate objects (Table 2a) and 4 included inanimate objects (Table 2b), and of the sentences with three arguments (16 sentences), 8 sentences included one animate object and one inanimate object (Table 2c) and 8 included two inanimate objects (Table 2d).

In order to check the obligatoriness of arguments, we consulted three hearing PA-speaking individuals and three deaf native ISL individuals. All six individuals completed the same task and two acceptable omissions were found, one object omission in PA and MSA, and one indirect-object omission in ISL. All stimuli sentences required the presence of at least one subject, verb, direct-object and in 16 of

the 24 sentences, also an indirect-object, with only two exceptions. First, in the sentence 'the man washes *the dishes*', the direct-object 'the dishes' can be optionally omitted in PA and MSA. For this sentence, the direct-object 'dishes' is inferred from the choice of the verb, which is specific to the act of washing dishes. Secondly, in the sentence 'the boy puts the sock *on his head*', the verb 'to put' and the indirect-object 'his head' can be incorporated into a single sign (e.g., in ISL "BOY SOCK PUT-ON-HEAD"); that is, signers modify the location of the verb, producing it at the head location. Oomen (2017), in her work on psych-verbs such as LOVE or THINK in Russian Sign Language, formalizes the body of the signer as part of a locative adjunct, attached to the verb phrase. Although the sign PUT in ISL is not body-anchored, the position of the verb 'on the head' is interpretable from the spatial modification of the verb. For a syntactic analysis of similar examples, see Oomen and Kimmelman (2019). These two examples were not counted as omissions in this study. We return to these examples in the Discussion with regard to understanding more closely the contribution of cross-linguistic transfer.

Table 2: Examples of target sentences in each language

Event shown in the clip	Arguments	Animacy	PA	MSA	ISL
(a) A boy combs a girl's hair	Two	Animate	The-boy combs the-girl	Combs the-boy the-girl	BOY COMB GIRL HAIR
(b) A girl tears the paper	Two	Inanimate	The-girl tears paper	Tears the-girl paper	GIRL PAPER TEAR
(c) A woman	Three	Inanimate	The-girl gives a	Gives the-girl a	WOMAN GIVE

gives a shirt to the man		& animate	shirt to-the-man	shirt to-the-man	SHIRT MAN
(d) A boy puts a ball in the closet	Three	Two inanimate	The-boy puts the-ball in-the-closet	Puts the-boy the-ball in-the-closet	BOY BALL CLOSET PUT

Procedure. After students watched a video clip, they describe what they saw. The same video clips were shown in all conditions. The order of clips was initially randomized and then the same order was maintained across participants and tasks. Students were tested in spoken PA, written MSA, and signed ISL. Instructions were given in PA for all three tasks. Students responded appropriately to each condition suggesting that they understood the task. The signed and spoken tasks were filmed and for the MSA task, the responses were written in a notebook. Deaf students were tested in two separate meetings, in the first meeting they were tested in ISL and in the second one in PA and MSA; hearing students were tested in one meeting in both PA and MSA. The aim of this procedure was to avoid the task effect of Arabic (MSA and PA) on the signed modality since the aim of the study is to explore the interaction between languages and not the effect of one task on another. In both groups, half of the students started with PA followed by MSA and half were tested in the opposite order.

Coding schema. An omission was defined as the absence of an argument, which would otherwise be present in the production of the same sentence stimuli by adult users of the language. In order to determine this, we ran the same task with adult PA-speakers and adult ISL native signers, as described above. Based on the responses,

argument omissions (see examples below a, b, c) and verb (d) omissions were counted. For all responses, the third author of the paper who is a native PA speaker coded the PA and MSA productions. This was cross-checked by a research assistant, also a PA speaker from the Nazareth area. Any discrepancies were discussed, and in all cases, errors were immediately rectified. ISL productions were coded by the first author, a linguist who researches ISL. This coding was confirmed by three deaf native ISL signers (one of them is bimodal-bilingual in Arabic and ISL and the other two are bimodal-bilingual in Hebrew and ISL).

Examples of omissions:

(a) Subject omission (in ISL): "WATER BOTTLE BOY GIVE" (Target: "*GIRL* WATER BOTTLE BOY GIVE")

(b) Direct-object omission (in PA): "the-girl puts on the-father" (Target: "the-girl puts *stickers* on the-father").

(c) Indirect-object omission (in ISL): "BOY APPLE PUT" (Target: "BOY APPLE PUT *BOX"*)

(d) Verb omission (in MSA): "the-girl table shoe" (Target: "*put* the-girl a shoe under the-table").

Results

Omissions for the two groups in the three languages are shown in Table 3 below. While hearing students scored at near-ceiling with a total of only 33 omissions (~1%), deaf students produced 335 omissions (~7%). Note that, 13 hearing students produced at least one omission and all deaf students produced omissions.

Table 3. Raw number of omissions (percentage of omissions to one decimal place)

Hearing status	Language	Subject	Verb	Direct-object	Indirect-object	Total
Hearing	PA	12/456 (2.6%)	0/456 (0%)	4/437 (0.9%)	9/304 (3%)	25/1653 (1.5%)
	MSA	1/456 (0.2%)	0/456 (0%)	2/437 (0.5%)	5/304 (1.6%)	8/1653 (0.5%)
	Total	13/912 (1.4%)	0/912 (0%)	6/874 (0.7%)	14/608 (2.3%)	33/3306 (1%)
Deaf	PA	2/456 (0.4%)	30/456 (6.6%)	44/437 (10.1%)	20/304 (6.6%)	96/1653 (5.8%)
	MSA	1/456 (0.2%)	46/456 (10%)	24/437 (5.5%)	30/304 (9.9%)	101/1653 (6.1%)
	ISL	2/456 (0.4%)	9/456 (2%)	83/456 (18.2%)	44/285 (15.4%)	138/1653 (8.3%)
	Total	5/1368 (0.4%)	85/1368 (6.2%)	151/1330 (11.4%)	94/893 (10.5%)	335/4959 (6.7%)

To investigate the effects of sentence constituents (subject, verb, direct-object, indirect-object), language (PA, MSA, ISL), hearing status (deaf, hearing), age (as a continuous variable), and sign language exposure (deaf relatives, no deaf relatives) on omissions, we carried out several multivariate statistical analyses of the data using Rbrul. Of the 8265 tokens analysed, 368 were omissions. We ran the data in three separate analyses: 1) combined data, 2) hearing students only, and 3) deaf students only. The dependent variable was binary: the presence or absence of omissions. In addition, we included participant and stimuli item as random effects. The inclusion of

these two variables enabled us to account simultaneously for participant-specific and stimuli-specific variability and allowed for generalizations beyond our sample of students and our set of stimuli sentences. Table 3 presents the results, including the log-odds, number of tokens analysed, percentage of omissions and the centred factor weight (with omission as the application value). Results with a positive log-odd and a factor weight over 0.5 indicate that this factor results in an increased likelihood that omissions will be present (highlighted in bold in Tables 4, 5 and 6) while a negative log-odd and a factor weight below 0.5 indicate decreased likelihood that omissions will be present in this dataset.

In the first analysis (shown in Table 4), we found significant main effects of sentence constituents ($p<.001$), hearing status ($p<.001$) and language ($p=.002$). The findings showed that students were more likely to omit direct-objects (e.g., “The girl puts on the father” in PA, for the target sentence: “The girl puts *stickers* on the father”), indirect-objects (e.g., “BOY APPLE PUT” in ISL, for the target sentence: “BOY APPLE PUT BOX”, "The boy puts the apple *in the box*”) and verbs (e.g., "The girl a-picture on the-wall" in MSA, for the target sentence: "The girl *hangs* a picture on the wall"). Moreover, deaf students were more likely to omit sentence constituents compared to hearing students and the highest number of omissions were in ISL. Age was not significant in this analysis.

Table 4. Significant results of the mixed-effects logistic regression (dependent variable: omission; independent variables: sentence constituents, hearing status, language, age (continuous)).

Independent factors		Tokens	Percentage	Log odds	Factor weight
Sentence constituents	**Direct-object**	**2204**	**7.1**	**0.823**	**.695**
	Indirect-object	**1501**	**7.2**	**0.662**	**.662**
	Verb	**2280**	**3.7**	0.073	**.518**
	Subject	2280	0.8	-1.568	.172
Hearing status	**Deaf**	**4959**	**6.8**	**1.005**	**.732**
	Hearing	3306	1	-1.005	.268
Language	**ISL**	**1653**	**8.3**	**0.261**	**.565**
	PA	3306	3.7	-0.071	.482
	MSA	3306	3.3	-0.190	.453

For hearing students (3306 tokens), three fixed effects were included in the model: sentence constituents (subject, verb, direct-object, and indirect-object), language (PA, MSA) and age (as a continuous variable). There were two significant main effects (see Table 5): sentence constituents ($p<.001$) and language ($p=.001$). The findings showed that students were more likely to omit indirect-objects, subjects and direct-objects, and least likely to omit verbs. Omissions were also most likely in PA and age was not found to be a significant predictor of omissions.

Table 5. Significant results of the mixed-effects logistic regression for the hearing group (dependent variable: omission; independent variables: sentence constituents, language, age (continuous)).

Independent factors		Tokens	Percentage	Log odds	Factor weight
Sentence constituents	**Indirect-object**	**608**	**2.3**	**4.833**	**.992**
	Subject	**912**	**1.4**	**4.339**	**.987**
	Direct-object	**874**	**0.7**	**3.582**	**.973**
	Verb	912	0	-12.754	<.001
Language	**PA**	**1653**	**1.5**	**0.599**	**.645**
	MSA	1653	0.5	-0.599	.355

For our deaf group (4959 tokens), four fixed effects were included into the model: sentence constituents (subject, verb, direct-object and indirect-object), language (PA, MSA and ISL), sign language exposure (deaf relatives, no deaf relatives) and age (as a continuous variable). Two significant main effects were found: sentence constituents ($p<.001$) and language ($p<.001$), as shown in Table 4. The findings showed that deaf students were more likely to omit direct-objects, indirect-objects, and verbs, and least likely to omit subjects. Omissions were most likely in ISL. Sign language exposure was not significant, although those individuals with deaf relatives (n=13) produced a lower average omission rate of 6.8% (st.dev=5.4) than those from hearing families (n=6), with an average omission rate of 8.5% (st.dev=4.2). While there is a decrease in the total omissions with age, age was not found to be significant.

Table 6. Significant results of the mixed-effects logistic regression for the deaf group (dependent variable: omission, independent variables: sentence constituents, language, age (continuous)).

Independent factors		Tokens	Percentage	Log odds	Factor weight
Sentence constituents	**Direct-object**	**1330**	**11.1**	**1.167**	**.763**
	Indirect-object	**893**	**10.5**	**0.892**	**.709**
	Verb	**1368**	**6.5**	**0.45**	**.611**
	Subject	1368	0.4	-2.509	.075
Language	**ISL**	**1653**	**8.3**	**0.262**	**.565**
	PA	1653	6.1	-0.101	.475
	MSA	1653	5.8	-0.161	.46

Cross-linguistic transfer

To investigate cross-linguistic transfer as a possible effect on omission rates, we analyzed deaf students' data in more detail. In particular, here we focus on the two exceptions in which the omission of a sentence constituent was acceptable in one language and not in the students' other language. We discuss two examples. First, in PA and MSA, in the sentence 'the-man washes the-dishes', it is acceptable to omit the direct-object 'the-dishes', because the verb 'washing' is specific only to the action of washing dishes. However, in ISL the verb WASH is a more generic verb and therefore the argument 'dishes' seems to be required. Second, in ISL, in the sentence describing the event 'the boy puts the sock on his head', it is acceptance to omit the indirect-object 'on head' by modifying the verb location. However, this is not

acceptable in PA and MSA. In addition, we explored the relationship between the use of handling classifiers and omissions. We examined specifically whether the acceptance of an omission in one language was transferred to the students' other language and resulted in non-acceptable omissions.

ISL into Arabic

For the target sentence 'the boy puts the sock on his head', incorporation of the verb and indirect-object 'on head' was common in ISL with 7 of the 19 deaf students (37%) producing it as "BOY SOCK PUT-ON-THE-HEAD", in which the verb location was modified. Because the argument 'on head' is not produced as a separate sign in ISL, we looked at whether this had an influence on the production of the same argument in the other two languages. In the PA condition, we found that three students (16%) omitted the indirect-object 'on head' (e.g., "boy put socks"). Similarly, in the MSA condition, we found that three students (16%) omitted the indirect-object 'on head' (e.g., "the-boy put socks"). Though these numbers are small, when we compared this to another sentence in which all arguments appear to be obligatory in ISL, such as 'a girl puts the shoes under the table', we found only a single omission in MSA and no omissions in PA, suggesting that the omission of 'on head' is in fact a result of cross-linguistic transference.

Furthermore, of all sentences in ISL that included a direct-object omission, 81% of the verbs were produced with a handling classifier, which in part represents the object. When exploring related cross-linguistic transfer in Arabic for these parallel sentences, we found that for those sentences with object omission in ISL, there was also direct-object omission in 13% of PA sentences and 11% of MSA sentences.

Arabic into ISL

We found acceptable omissions of the direct-object by three students in the PA condition (16%) (e.g., "the-guy is washing") and four students (21%) in the MSA condition (e.g., "the-father is washing"). To explore transfer from Arabic into ISL, we looked at this special instance and checked whether the direct-object was also omitted in the ISL condition, in which the object must be signed explicitly (confirmed by our three deaf consultants, see Methods section). Ten of 19 students (53%) omitted the direct-object ‘dishes’ in ISL (e.g., FATHER WASH), suggesting that cross-linguistic transfer might be taking place. When we compared this to another sentence in which all arguments appear to be obligatory in ISL, such as ‘a girl tears the paper’ as the target sentence, we found no omissions in MSA and PA.

To summarise, school-age deaf students showed more omissions compared with hearing students, who scored at ceiling. Some of these omissions may be attributed to cross-linguistic transfer, in which grammatically acceptable omissions are transferred from one language to another. We discuss this further in the next section.

Discussion

In the current study, we investigated the production of simple sentences by school-age deaf and hearing students in PA, MSA and ISL. Hearing students scored at ceiling on a task, which involved simple sentence production in PA and MSA. In contrast, deaf students showed higher omissions on the same task, and additionally in their ISL production.

Our discussion focuses on two possible interpretations, each addressed below: language deprivation and cross-linguistic transfer. On the one hand, deaf students in

the current study may have experienced language deprivation due to limited access to spoken language and inconsistent sign language input. On the other hand, these students are bimodal-bilingual and therefore acquisition might be influenced by cross-linguistic transfer.

Language deprivation

Language deprivation might in part explain the poor performance of deaf students compared to hearing students. Meir (2014) discussed the case of deaf students from PA-speaking homes and suggested that they present a complex situation of language inconsistency. According to Meir, due to the different spoken dialects and the different signed variations (e.g., ISL, signed Arabic), children are exposed to inconsistent linguistic input in each language (spoken and signed). This inconsistency is present in the structure of the languages and in their setting. For example, a deaf child can hear different dialects of PA from different teachers in the school setting and different signed varieties at home and at school. Note that our argument here is not that there is exposure to many different languages (which is the case for many typical multilinguals), but that there is lack of access to consistent language input.

While hearing students scored at ceiling on the task in both PA and MSA, deaf students omitted a high number of arguments and verbs in the sentences they produced, most notably for direct-objects. We suggest that the inconsistent language input they experience has a direct impact on their acquisition of the full linguistic rules of argument structure in the languages they use. In particular, the results showed a higher omission of arguments and verbs in the ISL condition. Notably, ISL is not taught as a language, only used as a language of instruction and this too, might contribute towards our findings.

Another finding supporting the idea of language deprivation is the different types of omissions. Within the small numbers of omissions in the group of hearing students (1% omissions), they did not omit verbs and they only omitted 6 direct-objects in both PA and MSA (see Table 3). In contrast, most omissions in PA by deaf students were direct-objects, which are obligatory for transitive verbs, as shown by the production of our hearing students. Furthermore, in some instances, deaf students omitted the verb of the sentence, which is arguably the core constituent of any sentence.

Finally, the effect of language exposure at home was tested in the current study by exploring language background: students with exposure to signing at home and those without. Our results show fewer omissions in ISL for signers with exposure to signing at home, although this was not statistically significant. This finding falls in line with studies showing that deaf children exposed to signing from the earliest stage of language acquisition outperform those who are delayed in their sign language exposure (Henner, et al., 2018; Mayberry & Lock, 2003; Novogrodsky, et al., 2017).

Cross-linguistic transfer

Our second explanation which might account for the high number of omissions in our deaf group is the effects of cross-linguistic transfer (Cummins, 1979; Kawar, et al., 2019; Quinto-Pozos & Adam, 2015). Transfer of knowledge from ISL to Arabic and from Arabic to ISL might explain the omissions observed. Our first example involves cross-linguistic transfer from ISL to PA and MSA by incorporating the location of the argument (e.g., head) into the verb (e.g., ‘to put’) in ISL. We suggest that this acceptable omission in ISL (which was not counted as an omission) might account for some of the object omissions found by deaf students in their PA and MSA

productions. Our second example shows cross-linguistic transfer in the opposite direction, from Arabic to ISL. In Arabic, the verb 'to wash (dishes)' allows an optional direct-object omission since the verb is specific to the act of washing dishes in both language varieties. When students showed examples of direct-object omissions in PA and MSA, they also showed direct-object omissions in ISL, in which the object is obligatory. This finding is in line with evidence of interaction between Hebrew and ISL in school-age deaf bimodal-bilingual students (Pe'er-Strugo, 2020).

Some of the verbs in our dataset accept semantically locative arguments such as "in the closet"/ "under the table" and these arguments can be treated as goals (Thordardottir & Weismer, 2002) from a semantic point of view and as obliques[5] from a syntactic point of view. It is possible that obliques are less obligatory than other indirect-objects in ISL, despite the fact that locative arguments were never omitted by our adult ISL signers. As explained by Börstell et al. (2019), distinguishing between oblique arguments and oblique adjuncts is particularly difficult in sign languages and from a semantic perspective, location descriptions are not normally considered arguments, except in cases when they accompany location verbs such as 'put'. In Börstell et al.'s (2019) study, they found that locative argument-taking verbs showed more variation in terms of transitivity prominence ranking of verb meanings in the five sign languages they investigated. If we err on the side of caution, we can treat our 44 omissions of locative arguments as acceptable in ISL. In doing so, we strengthen our argument for cross-linguistic effects as we can also attribute a further 68 omissions observed in PA and MSA by our deaf students as potential transfer from ISL. This, of course, warrants further investigation.

[5] Note that syntacticians have argued that some obliques (indirect-objects) are arguments, while others are adjuncts (Przepiórkowski & Patejuk, 2018).

Importantly, the most frequent omissions in ISL and PA by our deaf students were direct-objects, to which we turn next.

Interestingly, we found that when deaf signers omitted an object in ISL they produced the verb with a handling classifier, which in part represents the direct-object. This finding falls in line with Ergin et al.'s study (2018) in which they found that direct-object omissions were accompanied by the use of a classifier handshape in the verb. Furthermore, for those sentences with object omission in ISL, omissions of the direct-object were also found in PA and MSA sentences. Comparing the omissions of different constituents in ISL supports this explanation. In ISL, our deaf signers had only 9 omissions of verbs in comparison with 83 omissions of direct-objects and 46 omissions of indirect-objects. This finding suggests that they had the knowledge that verbs might be carrying information about the objects[6].

Not all language transfer may result from absence of a feature in one language (in which the absence is accepted) causing absence of the same feature in the other language (in which the feature is obligatory). Deaf students in our study omitted a high number of verbs in both the MSA (10%) and PA (7%), and yet few omissions were seen in ISL (2%). Take the example, ‘a boy puts the apple in the box’, some deaf students produced ‘boy apple basket’ in PA, omitting the verb ‘put’. We assume that deaf students interpret the verb classifier in ISL as one constituent and in this case, the salient feature, which the students overtly produce in PA and MSA is the handshape classifier representing an ‘apple’. This follows Meir’s claim (1999) that verb classifiers are examples of noun incorporation, which narrow the scope of their host verbal root. In this example, the verb PUT or MOVE-TO-PLACE (in terms of its more abstract movement predicate meaning) represents the noun through its

[6] We thank an anonymous reviewer for this interpretation of the results.

handshape morpheme. In another example, 'a girl puts the shoes under the table', many deaf students omitted the verb 'put' in PA and MSA and instead produced 'girl table shoe under'. We suggest that deaf students interpret the spatial verb 'put' and the preposition 'under' in ISL which are expressed as a single constituent through the use of space and they explicitly mention only 'under' in PA and MSA. In sum, deaf students in these two cases might experience cross-linguistic transfer effects from ISL into Arabic, which are less obvious at first analysis. We suggest that the effect of verb classifiers on the number of omissions warrants further investigation.

Note that deaf students in this study are more accurately described as trilingual, acquiring ISL, PA and MSA, which are all distinct language varieties. This linguistic condition makes them notably different from the hearing group, who are exposed to only two language varieties. However, studies thus far show no disadvantage in language acquisition for trilinguals compared to bilinguals (Hirosh & Degani, 2018). The trilingual condition awaits further investigation in which trilingual deaf children, like those in the current study, are compared with trilingual hearing children, fluent in PA, MSA and ISL. Furthermore, future studies should include a direct measure of language exposure as potentially the deaf group may spend more time with ISL and PA compared to MSA, which differs from the hearing group. This difference might affect trajectories of development. Professionals who work with deaf bimodal-bilingual children should be aware of cross-linguistic transfer across modalities. **In assessment**, when testing bimodal-bilingual children, productions should be checked for cross-linguistic transfer, which is a frequent phenomenon in bilingual and bimodal-bilingual children (for an overview see Novogrodsky & Meir, 2020b), and only if no cross-linguistic transfer effects are found, can it be identified as an atypical production. With regards to **intervention**, the higher number of omissions

by deaf students in the current study suggests that intervention should include explicit teaching of argument structure rules of each of the languages used.

In this study, the elicitation material was not designed with the aim of exploring cross-linguistic transfer specifically. Therefore, no contrastive conditions between the languages were included. Thus, the fact that we found evidence of cross-linguistic transfer means that the effects might be more evident in a custom-designed task with the aim of investigating cross-linguistic transfer. Questions about directionality and size of these cross-linguistic transfer effects await future studies.

To conclude, the current study explored a special situation in which deaf students from Arabic-speaking communities produced simple sentences in PA, MSA and ISL. We found that deaf students produced significantly more omissions compared to hearing students. We suggest that exposure to limited and inconsistent language input as well as cross-linguistic transfer can explain these omissions, highlighting the importance of early and consistent language intervention and awareness of cross-linguistic transfer for professionals.

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Appendix A: Descriptions of the video stimuli (total of 24 videos)

Three arguments	Two arguments
A boy puts a sock on his head	A boy combs the girl's hair
A man shows a picture to the girl	A girl feeds the man
A boy puts the ball in the locker	A man washes the dishes
A man throws the ball to the girl	A boy rides the girl
A girl gives a bottle of water to the man	A girl tears the paper
A girl hangs a picture on the wall	A girl pulls the man
A boy puts the book into his bag	A man puts on the jacket
A boy puts the hat on the girl	A girl drinks the milk
A girl puts the shoes under the table	
A girl takes the book from the boy	
A girl takes the shirt from the bag	
A boy throws the box to the girl	
A girl gives a shirt to the man	
A boy puts an apple in the box	
A girl puts stickers on a man's face	
A girl puts the book on the table	

Stamp, R., Novogrodsky, R. & Shaban-Rabah, S. (Accepted for publication). Argument omissions by deaf students in three language modalities. *First language*.

Appendix B: An example response by a deaf native adult ISL signer (arguments are marked with underline)

Event shown in the clip	ISL gloss	Translation	Arguments
A boy combs the girl's hair	GIRL SIT HAIR IX BOY BRUSH	There's a girl sitting with long hair. A boy is behind her brushing her hair	Two
A girl feeds the man	FATHER SIT NEXT-TO GIRL CL:FEED-WITH-SPOON FATHER IX FATHER EAT	There is a father sitting. A girl sitting next to him feeds him	Two
A boy puts a sock on his head	BOY SOCK CA:(holds) TRY CL:PUT-ON-HEAD IMPOSSIBLE	A boy tries to put a sock on his head but fails	Three*
A man shows a picture to the girl	TWO PEOPLE STAND BOY IX GIRL IX PICTURE SHOW GIRL LOOK	A man and woman are standing next to each other. The man shows a picture to the woman. The woman looks at it	Three
A man washes the plate	KITCHEN SINK MAN STAND DISH WATER CL:WATER-RUN WASH WATER CL:WATER-RUN	In the kitchen, next to the sink, there is a man standing with a plate. He's washing the dishes	Two
A boy puts a ball in the locker	CUPBOARD BOY STAND CUPBOARD BALL RETURN CL:PUT-BALL CLOSE	There's a cupboard and a boy is standing. He returns a ball to the cupboard	Three
A man throws a ball to the girl	FATHER GIRL STAND FATHER IX BALL THROW CL:PATH-OF-BALL GIRL CATCH	There's a father and a girl. The father throws a ball to the girl	Three
A girl gives a man a bottle of water	TWO PEOPLE STAND MAN GIRL IX GIRL IX BOTTLE WATER CL:GIVE-BOTTLE MAN CL:TAKE-BOTTLE	There's a man and a girl standing. The girl gives a bottle of water to the man	Three
A boy rides a girl	TWO CHILDREN GIRL CA:(crawl) BOY IX RIDE BOY RIDE CA:(crawl)	There are two children. A girl is crawling and a boy is riding on her back	Two
A girl tears the paper	GIRL PAPER CL:TEAR	A girl tears a paper	Two
A girl hangs a picture on the wall	GIRL PICTURE CL:PICTURE CA:(hold) SHOW CA:(hold) CL:HANG WALL CL:HANG	A girl is holding a picture and she hangs it on the wall	Three
A boy puts a book in a bag	MAN BOOK CA:(reads, closes and puts book in bag) BAG INSIDE CA:(lifts bag)	The man is reading a book, he closes it and puts it in his bag	Three
A boy puts a hat on a girl	TWO CHILDREN BOY IX GIRL IX IX HAT PINK CA:(puts hat on girl) GIRL CL:HAT-ON-HEAD LAUGH	There're two children. A boy puts a pink hat on the girl's head and they laugh	Three
A girl pulls a man's arm	FATHER GIRL FATHER CA:(arm pulls) GIRL CA:(pulls	A father is being pulled by a girl	Two

	arm) FATHER CA:(arm pulls)		
A girl puts shoes under the table	GIRL SHOES CA:(holds & puts on floor) TABLE UNDER CA:(puts shoes under the table)	A girl has a pair of shoes and she puts them under the table	Three
A girl takes a book from a boy	BOY STAND BOOK CA:(reads) NEXT-TO GIRL RUN BOOK TAKE RUN-WAY	There's a boy standing with a book, reading and a girl comes running over and takes the book and runs away	Three
A man puts-on a jacket	MAN STAND COAT BLACK PUT-ON	A man stands and puts-on a black coat	Two
A girl takes a shirt from a bag	GIRL BAG OPEN GIRL CA:(takes something out and holds it to her body) TOP BLACK LONG-SLEEVE CA:(holds it to her body) SEE CHECK	There's a girl and an open bag. The girl takes a black long-sleeved top from the bag and holds it against her body to check it	Three
A boy throws a box to the girl	BOY IX GIRL IX BOY IX BOX CL:HEART-SHAPED THROW GIRL CATCH	There's a boy and a girl. The boy throws a heart-shaped box to the girl, who catches it	Three
A girl drinks milk	GIRL PRETEND LIKE CAT GIRL SIT CA:(crouches) BOWL MILK GIRL LICK DRINK MILK LIKE CAT	A girl is pretending to be a cat. She crouches down and drinks milk from a bowl like a cat	Two
A girl gives a shirt to the man	TWO PEOPLE MAN STAND GIRL STAND GIRL IX TOP GREEN CL:GIVE-TOP GIVE BOY CL:TAKE-TOP	There are two people, a man and a woman standing. The woman gives a green top to the man	Three
A boy puts an apple in a box	SEE SOFA CL:(rectangular) BOY SIT APPLE CA:(holds the apple and puts it down) BOX BASKET CA:(puts apple in the basket)	I see a rectangular sofa. There is a boy sitting on it. He has an apple and he puts it on a basket next to him	Three
A girl puts stickers on the man's face	MAN SIT IX GIRL STICKER CA:(puts stickers on man) MAN CL:STICKER-ON-FACE STICKER CA:(puts on face) MAN CL:STICKER-ON-FACE	There is a sitting man. A girl puts stickers on his face, repeatedly	Three
A girl puts the book on a table	GIRL BOOK CA:(hold) TABLE CA:(puts book on the table) TABLE IX	A girl puts a book on the table	Three

*Number of arguments refers to the example given in the column 'Event shown in the clip' and in most examples is similar in ISL (with the exception of "A boy puts a sock on his head", which has only two arguments).