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Null Arguments in Bimodal Bilingualism: Code-blending (and the Lack of) Effects in American Sign Language

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1. Introduction

The literature on bilingual language acquisition explores a number of questions, among which are a) how autonomous are bilinguals' two languages? b) how exactly do the two separate grammars interact?, and c) in what ways do the languages influence one another during development?. As we search for answers to the questions above in an attempt to elucidate a theory of language interaction effects (during and outside of development), various phenomena and language pairs have been examined. This paper examines such effects in children acquiring a spoken and a sign language simultaneously. The status of this population is unique: while sign languages are now commonly assumed to be natural languages and, as such, have been shown to be acquired on par with spoken languages, modality-related differences remain. For instance, bilinguals acquiring two spoken (or sign) languages simultaneously are always bound by only one set of usable articulators (i.e. one mouth or one set of hands); in contrast, individuals acquiring a spoken and a sign language concurrently, can produce language in two modalities, using use both sets of articulators (i.e. mouth and hands) simultaneously. This characteristic of the sign-speech bilinguals has resulted in the term '*bi*modal' (as opposed to '*uni*modal') and has been argued as offering a unique insight into the linguistic mind of a bilingual – one that is not hampered by the forced language choice. Here, we examine linguistic development of balanced bimodal bilinguals. This description applies to two types of population: hearing children of Deaf adults and deaf individuals with cochlear implants receiving natural input in both sign and spoken

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languages. We focus on one type of bimodal bilingual population – young hearing children of Deaf adults, a.k.a. kodas.[1]

Linguistic patterns of kodas have been examined by various researchers over the past three decades (Todd 1971, Schiff & Ventry 1976, Sachs et al. 1981, Schiff-Myers 1988, Johnson et al. 1992, Messing 1999, Pizer, 2008; Kovelman et al. 2009, Jarque 2010). Studies concur that this population can be characterized on par with unimodal bilinguals: for instance, children exhibit parallel lexical growth in sign and spoken modalities, produce "translation equivalents," and are sensitive to the language of the interlocutor (cf. Petito & Holowka 2002, Petitto & Kovelman 2003, Brackenbury et al. 2006). As in unimodal bilingualism, linguistic patterns of bimodal children are affected by the nature of the input (Capirci et al. 2002, van den Bogaerde & Baker 2005). Further, researchers both spoken and sign languages of kodas often show what may be described as instances of 'incorporation of grammatical properties' from the other language.[2]

Although in many respects bimodal bilinguals behave on par with their unimodal counterparts, certain differences remain. For instance, unlike unimodal bilinguals, bimodal bilinguals exhibit strong preference for code-blending (>90%) over code-switching (<10%) (Petitto et al. 2001). What is more, in both spontaneous production and experimental settings, language interaction effects have been observed in domains not immediately predicted by the standard models of cross-linguistic influence (e.g. Hulk and Müller, 2000): wh-questions, articles, focus constructions, i.a. (Lillo-Martin et al. 2009, et seq.). In this paper, we focus on one such domain by examining kodas' sign and spoken languages.

2. Previous research: 'Influence' of null-argument language onto the non-null argument language

2.1. Unimodal English bilinguals

One linguistic domain where bimodal bilinguals behave differently is argument omission: in comparison with both monolingual and bilinguals controls, ASL-English kodas omit subjects to a higher degree, for longer, and in different contexts.

English falls into the class of languages typically forcing arguments to be overt, although in some cases, what argument omission appears possible.

(1) a. __ Don't think {I/*__} can make it tonight. (adpt. Weir, 2009)
b. Let's go out. Mary is buying __ today.

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[1] Following Lillo-Martin et al. (2009), i.a., we refer to young hearing children of Deaf adults as '*k*odas'; this differentiates children from the adults – *c*odas.

[2] These cross-language interaction effects have been recorded for at least five language pairs: ASL-English (cf. Todd 2009; Lillo-Martin et al. 2010), Libras-Brazilian Portuguese (Lillo-Martin et al. 2010, et seq.), LIS-Italian (Donati & Branchini 2009), the NGT-Dutch (van den Bogaerde & Baker 2005) and BSL-English (Morgan 2000).

c. She is reading ___ .
d. Have you heard ___?

These null arguments (NAs), however, are allowed only under restricted syntactic, pragmatic and semantic conditions (cf. Sigurðsson 2011, AnderBois 2011). Yet, young monolingual English-speaking children omit arguments. The study of such omission boasts a long history and has served as vehicle for a variety of proposals for the general view of early grammar. For instance, subject omission/suppliance rates have been used as evidence regarding (i) processing difficulties in linguistic performance, (ii) metrical effects in child language, (iii) parameter triggering mechanisms, (iv) maturational accounts of acquisition of syntax; (v) the role of information structure, and others. Whatever the ultimate explanation, the last 20-30 years of inquiry (see Hyams 2011 for an extensive overview) have yielded a few observable generalizations: in spontaneous production, monolingual English children exit the stage in which they incorrectly omit arguments (primarily subjects) by the age of 3 and MLU_w>3, more or less concurrently with having demonstrated the knowledge of morpho-syntax in terms of, e.g., tense/agreement.[3] Moreover, both before and at this age, subjects are omitted at the left edge and never in finite embedded clauses (see (1a)); objects are always 3rd person singular.

Precisely because much monolingual data are now available, it has been tempting to draw a comparison between monolinguals and bilinguals in order to flesh out processes characteristic of and unique to bilingualism. Serratrice et al. (2004) examine the rates of argument omission in the two languages of a balanced Italian-English bilingual Carlo (age 1;10-4;06) and illustrate that he converges on the target English grammar in terms of subject and object suppliance even before monolingual controls do. The authors sort the child's data into stages of linguistic development: Stages 1-4 (MLU_w 1.1–4.8). Their findings demonstrate that although in Carlo's other language (Italian) subjects tend to remain null, Carlo begins supplying them in English very early. At the stage of development typically associated with the knowledge of the relevant aspects of English morpho-syntax (age ~3;00, MLU_w>3), both Carlo and monolingual English comparisons have mastered the language's requirement for the overt (i) subject of the clause, and (ii) object/complement if one is required in the adult grammar. Additionally, Serratrice et al. report that the rare cases of null arguments in Carlo's English are not qualitatively different either. In other words, in his English, Carlo performs in line with monolinguals.

The findings have been supported by studies of various language combinations, at least one of which is a NA language: Spanish-English, Italian-Dutch, French-English, Hebrew-English, German-Italian, French-Italian, German-French, Italian-French, Japanese-English, Japanese-French, Chinese-

[3] Although they often omit ~50% of required subjects and around 5% of objects when younger, at this stage of development, the rate of subject omission tends to hover well below 10%; the rate of object omission is typically recorded to be below 1% and non-existent after the age of 3. This contrasts with the parallel data from languages like Italian and Chinese, where children's NA rates mirror those of adults — typically above 50%.

English, Turkish-English, Inuktitut-English.[4] Although varying in methodology, with respect to subject omission, the studies demonstrate no visible effect on the bilingual child's non-NA language. On the other hand, many of the aforementioned studies, Serratrice et al. included, record oversuppliance of overt arguments in the bilingual's NA language. Crucially, similar results have been reported irrespective of the syntax of relevant argument (cf. Roberts & Holmberg 2010). To summarize: unimodal bilingual studies in general, and the study of an Italian-English bilingual in particular, have illustrated that children acquiring a NA and a non-NA language simultaneously show no delay in 'exiting the NA stage' in their non-NA language while performing somewhat non-target in their NA languages. This has been shown in both spontaneous production and experimentally (see Sorace 2011 for an overview).

2.2 Bimodal English bilinguals

Unlike English, ASL allows (and sometimes prefers) any nominal argument to remain silent (Lillo-Martin 1991; Bahan et al. 2000; Koulidobrova 2012):

(2) a. A: Have you seen my candy?
B: YES, __ EAT-UP __
'Yes, (I) ate (it).' (Lillo-Martin 1991)
b. ARTHUR WORRY __ WILL FALL[5]
'Arthur is worried that (he) will fall.'

Children learning ASL as a native language acquire this property early (Lillo-Martin, 1991) and proceed in their acquisition of related phenomena on par with other children acquiring typologically similar languages (Quadros & Lillo-Martin 2007). Judging from the previous studies, the 'transfer' of NA (or the property from which it results) is unexpected – at least in the direction of English. Yet, this prediction is not borne out: adopting the methodology from Serratrice et al. (2004), Koulidobrova (2012) shows that TOM and LEX – balanced ASL-English bilingual kodas (presented below as means) – omit both arguments (see (3)-(4) for subjects) at the age, to the degree, and in contexts different from monolingual and bilingual comparisons.

(3) Koulidobrova (2012): English-target sessions
a. CHI: Mister Conductor said __ won't crashed# he said (LEX 4;05)
b. CHI: Can __ give me this? (TOM 4;06)

[4] Juan-Garau & Pérez-Vidál (2000), Pinto (2006), Hacohen & Schaeffer (2007), Schmitz et al. (2012), Mishina-Mori (2007), Blais et al. (2010), Huang (1999), Haznedar (2010), Zwanziger et al. (2004), respectively.
[5] Conventionally, ASL glosses are written in all caps.

(4) Koulidobrova (2012): English-target sessions

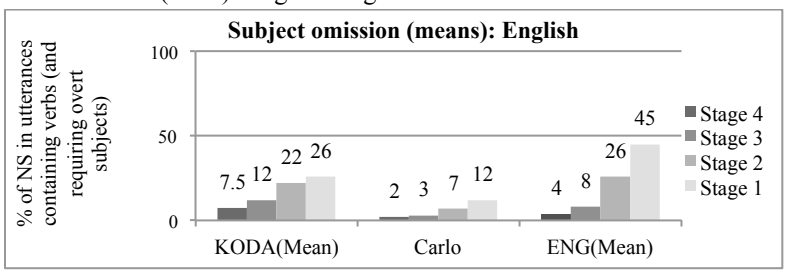


Figure 1. Rates of subject omission in non-NA language: ASL-English bilinguals vis-à-vis English monolinguals and Carlo

These findings have been corroborated experimentally. In Koulidobrova (2013), ASL-English bilingual kodas (age 6;02-7;05) were presented with a truth-value judgment task aimed at establishing whether the children would allow embedded subjects (as in (3a)) to remain null. They do: the rejection rate of non-target English utterances such as the one produced by Cat in (5) was only ~80%.

(5) Context: two toys are performing the same action.
Exp: Cyclop and Mr. Incredible are getting ready for a race […].
Cat: 'Mr. Incredible hopes ___ might win'
Exp: Did that cat say it right?
CHI: Yes
Exp: Who is Mr. Incredible thinking about? Who might win?
CHI: I think himself. (KIM 6;02, Koulidobrova 2013)

The following conclusion emerges: unlike unimodal bilinguals, kodas present language interaction effects in argument omission – their NA-language (ASL) 'influences' their non-NA language (English).

3. Study: 'Influence' of non-null argument language onto the null argument language

In this study, we examine the effects on the other language as well as the contribution of the language context. Guided by the research on similar language combinations (see section 2.1), we predicted that the rate of overt argument suppliance in the NS-language of ASL-English bilinguals would be higher than what is observed in monolingual production; the difference in rate would be explained by the presence of inappropriately overt arguments. In other words, we expected ASL-English bilinguals to perform in ASL like Carlo in Italian.

Previous studies have shown that young monolingual signers omit subjects and objects in their ASL. For instance, Quadros et al. (2001) demonstrate that between the ages of 1;08-2;10 (approximately corresponding to Stages 2-3

above[6]), Deaf signers omit over 75% of subjects in their ASL. These numbers are compatible with the adult data: Wulf et al. (2002) show that adult signers supply 35-40% of overt subjects, omitting the rest. However, as the children grow older (3:06-5:09, Lillo-Martin, 1991) and begin to exhibit understanding of spatial agreement, their rates of argument omission drop.[7] Since the exact numbers are unavailable in the literature, only a rough comparison can be made here: e.g. if kodas omit subjects around 70% or so, their behavior is more or less adult-like; if less – it is consistent with the monolingual child data. In other words, at the moment, literature offers an opportunity at only a rough comparison between bilingual and monolingual ASL users and, therefore, the question regarding English influence on ASL not easily answerable. What can be compared, however, is the rate of argument omission in each of the languages within that language-target sessions. Additionally, since bimodal bilinguals tend to use both languages consistently (see section 1), we examined each of the languages independently in order to compare the rates of subject omission per language based on the target language of the session – i.e. the language of context.

3.1 Subjects and methodology

In this study, we examine spontaneous production of TOM (3;00-4;06) and LEX (3;11-5;04) during ASL-target sessions. Both children have at least one Deaf parent and a number of hearing family members. Each of the children has been attending an English-based preschool from an early age. Filming takes place either at the child's home, daycare, or at Gallaudet University. The subjects are filmed biweekly in sessions between 35-68 min. During the sessions, children interact with Deaf parents or familiar Deaf researchers. In one of the sessions per child, another hearing ASL-English bilingual is present: a younger koda (TOM session) and an adult coda camera person (LEX session).

Data were transcribed and analyzed using ELAN (http://www.lat-mpi.eu/tools/elan/). Throughout the sessions, children use both languages consistently (see section 1); thus, both languages were coded. A total of 2956 utterances (1190_{ASL}, $1766_{English}$) were examined. All non-linguistic utterances (i.e. vocalizations, *xxx, yyy*), repetitions and direct imitations, as well as unambiguous gestures, were excluded from the analysis. The remaining utterances were coded based on the existence of verbs requiring arguments.[8]

[6] Since the MLU information is unavailable, placing the subjects of the Lillo-Martin et al. study along the linguistic continuum as employed here (i.e. Stages 1-4) serves as a rough approximation only.

[7] At this stage, suppliance of overt arguments is often non-target.

[8] Only utterances containing verbs were included; this artificially reduced the number of potential cases in ASL – a language without an overt copula.

(6) **Table 1. Data: ASL-target sessions (6 total: 3 TOM, 3 LEX)**

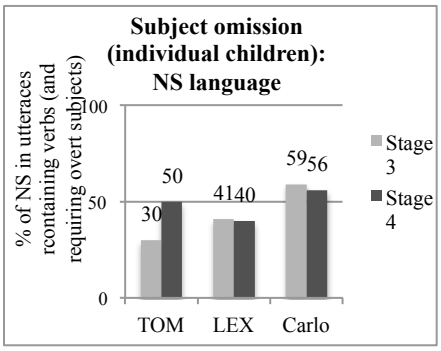
Language	Subject	N of linguistic utterances for analysis	N of utterances with verbs (requiring subjects)
ASL	TOM	310	50
	LEX	536	122
English	TOM	619	204
	LEX	629	248

Independent tiers were created for null arguments; the sentence was coded as "1" if the subject was omitted. All utterances subject to analysis were coded according to their compatibility with the adult language in a given context. Mirroring the previous study, and following the methodology in Serratrice et al. (2004), data were sorted into stages of linguistic development: Stage 3 (MLU_w 3.0-4.0), and Stage 4 ($MLU_w > 4.0$).[9] The rates of subject omission in koda ASL were compared to the rates of subject omission a) in Carlo's Italian, b) in koda English during ASL-and English-target sessions.

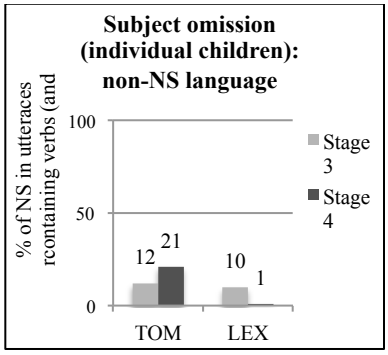
3.2 Findings

As (7)-(9) demonstrate, during ASL-target sessions, TOM and LEX use both languages consistently and omit subjects in each. The rate of omission in the kodas' NS-language (ASL) is lower than that of Carlo's (Italian).[10]

(7) Rates of subject omission: ASL-target sessions



a. **Figure 2. ASL and Italian**



b. **Figure 3. English**

(8) ASL-target sessions:

a. CHI: BECAUSE __ WANT IX (toy) (LEX 4;05)
'Because (I[=?you]) want that'

b. CHI: I am going outside now (TOM 4;06)

[9] MLU_{ASL} does not tend to increase with language development, making it difficult to use as a predictor (Berk & Lillo-Martin 2012); we rely on $MLU_{English}$ (Brown 1973).

[10] Serratrice et al. (2004) do not report the amount of Italian during English sessions.

OUTSIDE __ GO OUTSIDE NOW

c. CHI: I never fall when I climb
g(no)[+] __ CLIMB IX(self) NEVER FALL __ CLIMB

(9) ASL-target sessions:

a. CHI: __ think come back here you tires. (LEX 4;05)

b. CHI: __ isn't broken
BREAK

c. CHI: So ___ could see you (TOM 4;06)

The rates of subject omission in English during ASL- vs. English-target sessions (Koulidobrova 2012) were then compared and are plotted in (10).

(10) Rates of subject omission: ASL- vs. English target sessions

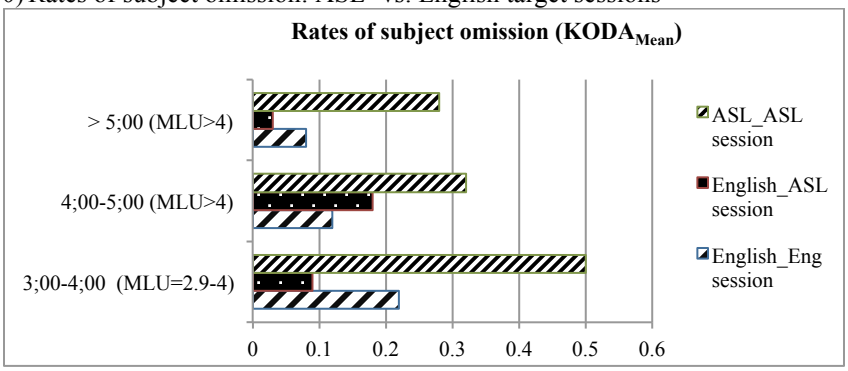


Figure 4. ASL- vs. English-target session

3.3. Analysis and discussion

The first observation to be made about the data reported above is this: kodas omit subjects in ASL, and they do so less than Carlo in his Italian. Their rates of subject omission do not mirror the monolingual adult performance; however, it is possible that they behave in a manner typical for monolingual children: previous studies have shown that monolingual signers omit ~75% subjects in a spontaneous production but fewer at the age 3;06-5;09 – the stage of development examined here. At these ages, kodas subject omission in the study is 30-50% – clearly less than adults. Yet, while the rates of argument omission in both languages drop with age,[11] all but two of the overt subjects in ASL were considered appropriate by an adult Deaf consultant.[12] Thus, whereas the answer to the question whether kodas behave like monolingual children at these stages must wait until the comparable data from monolinguals are available, we can tentatively conclude that they behave differently from various unimodal

[11] Although note the temporary rise at ages 4-5 in English during the ASL-target sessions.
[12] In the two remaining cases, the overt subject was 1st person pronoun.

bilinguals, who have consistently been shown to supply pragmatically inappropriate from the adult language point of view subjects.

The data above invite another conclusion: it is not the case that TOM and LEX adopt the ASL-style subject omission strategy into their English, simply because the input is ambiguous and the relevant parametric decisions have not yet been made (cf. Hulk & Müller, 2000): the children omit arguments to varying degrees in each of the languages per language context (see (10)). Furthermore, during the ASL-target sessions, TOM and LEX use both ASL and English, but they do so differently as well: the rates of argument omission in ASL are always higher than in English. At each stage, the difference between the rates of subject omission in ASL vs. English is significant: z- = 7.2, $p_{two\text{-}tailed}$ < .0002 at Stage 3 and z- = 5.76; $p_{two\text{-}tailed}$ < .0002 at Stage 4. No modality (unimodal/bimodal) or person ($1^{st}/2^{nd}/3^{rd}$) trends surfaced during the analysis.

Finally, while English is used during ASL-target sessions, the rates of subject omission during ASL- vs. English-target sessions also differ. At Stage 3, the difference is not significant (z- = .0706; $p_{two\text{-}tailed}$ < .474); however, at Stage 4, it is (z- =1.838; $p_{two\text{-}tailed}$ < .068). The possibility remains that the spoken language surfacing during the ASL sessions is simply 'voiced ASL'; yet, this explanation does not suffice: spoken utterances contain articles as well as English-specific verbal morphology (as in (9b)), both of which ASL lacks.

To summarize then: kodas in this study use their two languages consistently and omit subjects in both, but they do so to different degrees. The children seem to be developing an awareness that ASL-like structures in their English are 'more appropriate' during the ASL- vs. English-target sessions. Whatever influence then one of their languages exerts on the other, it seems to be mediated by the target language context.

A finding of this sort has been recorded in the literature: with respect to non-target subject suppliance in Italian, Italian-English bilinguals perform differently in the UK vs. Italy (Sorace et al. 2011). In other words, for whatever reason, the language of the community matters. Along this line of argumentation, we might expect kodas in this study to oversupply overt arguments in their ASL: by the age of 4, TOM and LEX are fully immersed in the hearing community and use primarily English in school, with neighbors, and hearing family members. Yet, kodas' subject omission in ASL is judged target-like (except 2 instances). Nor do the rates of argument omission in the children's English mirror to those in the language around them (see (11) – 1 session per caretaker – vis-à-vis (10)).

(11) **Table 2. Parental input: English (Koulidobrova & Guerrerra, in prep.)**

CHI	Caregiver	N of linguistic utterances	N of utterances with verbs	NS
TOM	Mother (Deaf)	161	49	18 (.37)
	Father (Deaf)	38	13	9 (.69)
LEX	Mother (Deaf)	1	0	0
	Father (hearing)	813	435	3 (.006)

In other words, we need a different explanation – namely, a model that will accommodate the presence of ASL-like phenomena in English, English-like phenomena in ASL, sensitivity to the language of the context, and last (but not least) the fact that ASL-English bilinguals thus far constitute the only population exhibiting language interaction effects in argument omission from NA- to the non-NA language – i.e. they are unique among bilinguals. The latter two characteristics suggest involvement of code-switching—the domain in which bimodal bilinguals are clearly different.

Incidentally, Lillo-Martin et al. (2009) have argued that language interaction effects in bilingual production result from language synthesis, which, in turn, based on a Minimalist model of code-switching (MacSwan 2000). Concretely, subject omission in ASL-English bilingual production results from the presence of an $T°_{ASL}$ in the structure (Koulidobrova 2012). The aforementioned approach results in the following scenario: while the utterance *appears* language uniform, it actually is not, since the structure contains items from another language as well – i.e. the relevant language interaction effects are accounted for. The model thus implies that language interaction effects are a natural outcome of bilingualism and may be accompanied by the various code-switching related phenomena. For instance, given that in language synthesis children tend to exhibit language-context sensitivity (Cantone 2007, i.a.), different rates of subject omission are expected depending on the target language of the session. This prediction is confirmed: kodas' English betrays presence of ASL more during the ASL-target sessions. Additionally, since bilingual children tend replicate the rates of language synthesis in the input (van Bogaerde & Baker 2005, i.a.), we might expect kodas 'growing out' of the language interaction effects sooner if they are raised with the input (in each of the languages) that involves less language synthesis. Note, the aforementioned suggestion reigns across the entire language sample and is not construction-specific (cf. Paradis & Navarro 2003, i.a).

4. Conclusion

The study reported above demonstrated that ASL-English bilinguals exhibit language interaction effects in the domain of argument omission. No notable effects of English 'influence' have been observed on ASL; ASL appears to affect English irrespective of target language context. Nevertheless, children appear sensitive to the language context: rates of subject omission in English differ, nor do they mirror the rates of subject omission in ASL.

Bilingual children face a constant challenge: how to keep languages separate, which, in terms of the language synthesis model means how to pick out the lexical item from target lexicon (Cantone & Müller 2005). Since both syntax and phonology constrain code-switching possibilities (MacSwan 2000), individuals with access to more than one set of articulators may be expected to behave differently from their unimodal count. In preceding sections, we alluded to a particular characteristic of bimodal bilinguals – an ability to use to languages simultaneously. With other researchers (e.g. Emmorey et al. 2008), we interpret this ability as resulting from the lack of necessary inhibition of one

of their languages – i.e. the forced language choice. Elsewhere, we have argued that the additional, from the point of view of unimodal bilingualism, language interaction effects in the languages of bimodal bilinguals are, in fact, a consequence of this ability (Lillo-Martin et al. 2009 i.a.). Many more questions remain, however.

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