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A Sociolinguistic View on Variable Subjects in Italian Sign Language (LIS)

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Abstract This study examines variable subject expression in Italian Sign Language (LIS) through a quantitative analysis of data from the LIS Corpus. The results indicate that both linguistic and social factors shape the distribution of subject omission. Null subjects occur more frequently with agreeing verbs, while geographical origin and education further modulate this pattern. Discourse and clause-mate coreference also condition subject omission, interacting significantly with clause type.

Keywords Italian Sign Language. Sociolinguistic variation. Corpus study. Variable subject. Null subjects.

Summary 1 Introduction. – 2 Variable Subjects in Human Language. – 3 Methodology. – 4 Results. – 5 Discussion. – 6 Conclusions.

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1 Introduction

The syntax of sign languages is often described as quite flexible, especially with respect to word order (a.o. Quer et al. 2017).[1] While there could be an easily identifiable canonical word order like SVO or SOV, additional word orders are frequently attested within a sign language, sometimes co-occurring with special non-manual markers (NMMs) indicating syntactic movement (see Branchini, Geraci 2011 for Italian Sign Language – LIS). This high degree of variability is found in other syntactic domains as well. For instance, in wh-questions, wh-phrases may appear in situ, in clause-final position, or be split between the wh-sign and its restriction within the same language (see Cecchetto et al. 2009 for LIS).

Interestingly, one domain in which the grammar of sign languages appears to be uniform is subject expression. To our knowledge, in non-out-of-the-blue contexts, subjects may remain unexpressed in all sign languages studied to date (Jaber et al. 2022). This uniformity can be attributed to several factors that, independently or in combination, license subject omission and, more generally, argument omission. These factors include the use of space to mark argument relations in directional predicates (see Costello 2015 for Spanish Sign Language – LSE), the use of NMMs to retrieve a previously introduced subject (e.g. head tilt in American Sign Language – ASL; Neidle et al. 2000), the use of the body as a subject marker (see Meir et al. 2007 for Israeli Sign Language – ISL), as well as action and attitude role shift. Crucially, although subject omission is quite widespread across sign languages, the conditions under which it applies are far from uniform. Previous studies clearly show that this phenomenon is governed by a variety of linguistic and social factors, as we discuss in Section 2.

In this paper, we present a corpus-based study conducted on LIS, describing the variability found in subject expression and discussing the factors that condition it. We investigate the role of linguistic factors such as verb type, grammatical person, role shift, and subordination, as well as sociolinguistic factors, including gender, age, education, and exposure to LIS.

1 Authors' contribution: GC conceived the study and designed the annotation protocol. All authors annotated the LIS corpus data and jointly discussed ambiguous cases. GC conducted the statistical analysis, and all authors contributed to the interpretation and discussion of the results. GC is responsible for Sections 1, 2 (excluding 2.2), and 5. LM is responsible for Sections 2.2, 3, 4, and 6. All authors revised the paper and accepted the present version.

2 Variable Subjects in Human Language

Research on spoken languages has largely treated subject omission as a purely grammatical phenomenon since early studies (a.o. Perlmutter 1971; Rizzi 1986; Jaeggli, Safir 1989).

From a typological perspective, a basic classification distinguishes languages that do not allow subject omission (e.g. English and French), from languages that allow it (e.g. Italian and Chinese). However, the latter group is far from homogeneous. Biberauer et al. (2010) and D'Alessandro (2015) propose a feature-based classification that distinguishes topic-drop from pro-drop languages (e.g. Chinese vs. Italian) and, within the latter group, complete from partial pro-drop languages (e.g. Italian vs. Finnish). In partial pro-drop languages, subject omission is conditioned by specific linguistic features such as grammatical person (omission allowed only for 1st and 2nd person, but disallowed for 3rd person), control in subordinate clauses (omission allowed in finite complements when the subject is controlled by the main clause), and genericity (generic subjects are allowed to be null). Cardinaletti's (1997, 2018) seminal work on the structural position of subjects provides a key theoretical framework for explaining why subject omission is systematically available in some languages but not in others.

Since early studies, the influence of sociolinguistic factors on subject expression has been often relegated to explaining differences across registers, styles, and genres. In variationist sociolinguistics, however, variable subject expression is analyzed as the outcome of both linguistic and social constraints. The following sections offer an overview of major sociolinguistic studies on this phenomenon in spoken and sign languages. Rather than explaining why null subjects exist, these studies examine how they are used. As will be shown, both linguistic and social factors play a crucial role in shaping patterns of subject omission, which reflect preferences rather than categorical contrasts.

2.1 Variation in Spoken Languages

The majority of prior sociolinguistic studies on this topic has focused on spoken languages. A substantial body of variationist research has investigated subject drop in languages with rich inflectional morphology such as Spanish (Cameron 1992; Travis 2007; Flores-Ferrán 2010) and Portuguese (Paredes Silva 1993; Smith 2013). This phenomenon has also been investigated on some non-inflectional languages, including Mandarin Chinese (Jia, Bayley 2002) and Bislama (Meyerhoff 2000). An illustrative example of subject drop is provided in (1).

(1) ø Du mei du Kewen?
ø read NEG read text
'Did you read the text or not?' (Mandarin - Jia, Bayley 2002, 108)

Overall, previous variationist studies have shown that the choice between overt and null subjects is constrained by a range of both linguistic and social factors. Linguistic factors typically include coreference with the subject of the preceding clause (switch in reference favors overt subject expression, e.g. Cameron 1992), and person/number of the subject (singular subjects are more likely to be expressed overtly than plural ones, e.g. Jia, Bayley 2002). Additional factors such as verb type, sentence type, and discourse context have also been shown to play a role (Travis 2007; Flores-Ferrán 2010). Social factors can also condition subject expression. General patterns indicate that null subjects are more frequently used in informal conversation (e.g. Haegeman, Weir 2025) and by speakers with lower levels of education and socioeconomic status (e.g. Beaman 2025), while the effects of age and gender vary across languages.

2.2 Variation in Sign Languages

Subject omission has been investigated for various sign languages within formal approaches (see Lillo-Martin 1986; Bahan et al. 2000; Koulidobrova 2017 for ASL; Bos 1993 for Sign Language of the Netherlands – NGT; Glück, Pfau 1998 for German Sign Language – DGS; and Jaber et al. 2022 for French Sign Language – LSF). A variationist sociolinguistic approach to subject omission has only recently become possible, thanks to the availability of large, annotated sign language corpora (a.o. Wulf et al. 2002; McKee et al. 2011).

The first sociolinguistic study on subject omission in a sign language is Wulf et al. (2002). Analyzing 19 narratives from a large ASL corpus and focusing on animate referents associated with plain verbs, the authors found that only 35% of subjects in plain verb clauses were overtly expressed, as illustrated in (2).

(2) ø HAVE TWO STUDENT…
'I have two students…' (ASL – adapted from Wulf et al. 2002, 64)

Their statistical analysis revealed that subject expression in ASL is significantly influenced by several factors, including English influence, clause-mate coreference, person and number, action and attitude role shift, gender, and age. Overt subjects are favored in English-influenced structures and with first-person singular

pronouns, whereas null subjects are favored with role shift and third-person singular pronouns. With respect to social predictors, men and signers aged 15-54 showed a stronger preference for null subjects.

McKee et al. (2011), conducted two parallel corpus-based studies on Australian Sign Language (Auslan) and New Zealand Sign Language (NZSL) using comparable quantitative methods. In the Auslan study, based on 977 clauses from spontaneous personal narratives, the authors found that 63% of clauses contained a null subject, as illustrated in (3).

(3) Ø NEED Ø $_{1}$GIVE$_{3}$
'I need to give it to him.' (Auslan – McKee et al. 2011, 390)

The analysis showed that subject expression in Auslan is significantly constrained by linguistic factors such as clause-mate coreference (coreference with the subject of the preceding clause favors the use of null subjects), person and number (first-person singular pronominal subjects are most likely to be expressed, whereas third-person singular and plural pronouns are more likely to be null), English influence (the presence of fingerspelling, English mouthings without an accompanying sign, and syntactic influence from English favor overt subjects), verb type (spatial verbs favor null subjects, whereas agreement and plain verbs favor overt subjects), and action role shift (which favors null subjects).

In the NZSL study, the authors examined a larger dataset of 2,145 clauses from conversations and interviews and found that 55% of the clauses contained a null subject, as illustrated in (4).

(4) Ø GO WORK
'I went to work.' (NZSL – adapted from McKee et al. 2011, 391)

The analysis showed that subject expression is significantly influenced by both linguistic predictors (coreference, verb type, action role shift, and discourse genre) and social predictors (age and ethnicity). In particular, null subjects were more frequent in coreferent clauses, with spatial verbs and action role shift, and in conversational discourse. They were also used significantly more often by signers aged 40-64 and by Pākehā signers than by Māori signers.

Overall, sociolinguistic studies of subject expression in sign languages show substantial heterogeneity, particularly with respect to corpus size, genre, and methodological approaches.

3 Methodology

To investigate subject expression in LIS, we analyzed data from the largest available LIS corpus (Geraci et al. 2011; Cardinaletti et al. 2011), whose structure is comparable to that of corpora used in previous sociolinguistic studies of other sign languages (Section 2.2). The LIS corpus includes data from 163 participants, balanced with respect to social factors such as age, gender, geographic origin, and parental hearing status, who were involved in four linguistic tasks (Cardinaletti et al. 2011). For the present study, we focused on spontaneous narratives, as this task provides access to subject expression in naturalistic discourse.

Data were annotated by the authors using ELAN (Crasborn, Sloetjes 2008). Inter-annotator consistency was ensured through a shared annotation template and collective discussion of dubious cases. The annotation focused on the narrative productions of all the signers of the corpus, coming from ten Italian cities (Turin, Milan, Brescia, Bologna, Florence, Rome, Salerno, Trani, Lamezia, and Ragusa). For each signer, at least 15 consecutive predicates were annotated (tot. 2,654 tokens). As shown in Figure 1, signs were segmented and glossed according to standard conventions. Clauses were segmented mainly on the basis of prosodic cues typically associated with clause boundaries, such as pauses, eye blinks, and head nods.

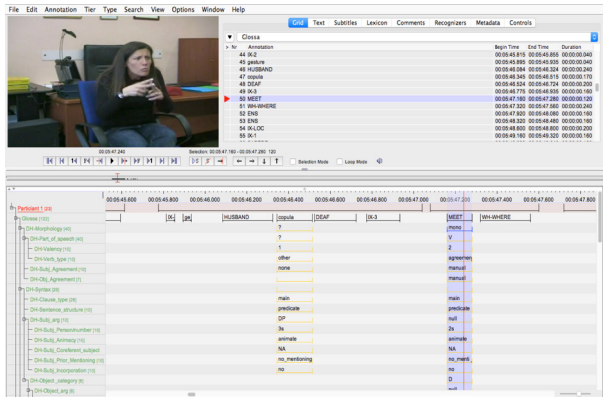


Figure 1 ELAN screenshot

Annotation tiers were used to enter values for the dependent variable (subject expression) and the linguistic independent variables. Subject expression was coded using the following categories: null subjects and overtly realized subjects, including pronouns, DPs, and CPs. As for the linguistic independent variables, the annotation addressed properties of the subject (Animacy, Clause-mate coreference,

Discourse coreference, Number, Person, Subject incorporation), properties of the predicate (Verb type, Agreement, Semantic type, Sign Category, Valency), and clausal properties (Role shift and Clause type). In line with previous studies, Verb type (agreeing vs. non agreeing verbs) is predicted to be a significant variable, as spatial agreement encode referential information morphologically, potentially facilitating subject omission.

Once the annotation in ELAN was completed, linguistic data were extracted from the software, were combined with the participants' social information, and organized into a dataset. The social independent variables were collected during the LIS Corpus project through a metadata questionnaire administered to all participants. They included Age and Age group, Gender, Geographical origin, Residential status, Education, Occupation, as well as Deaf-culture predictors such as the hearing status of the Family and Register.

To better capture distributional patterns in the statistical analysis, levels displaying comparable behavior were collapsed for some variables.

4 Results

This section first outlines the general distribution of the dependent variable and then examines the role of linguistic and social factors as potential predictors.

In the annotated corpus, subject variables are distributed as shown in Figure 2. The most frequent option is null subjects (1,404 - 53%). These are followed by subjects overtly realized as personal pronouns (802 - 30%) and DPs (428 - 16%). Sentential subjects (CPs) are relatively infrequent (20 - 1%).

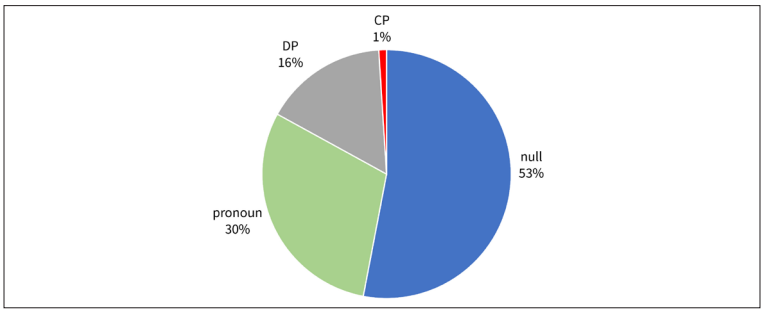


Figure 2 General distribution of subject variables in the corpus

For statistical purposes, pronouns, DPs, and CPs were collapsed into a single category of overt subjects. The resulting binomial variable

shows a balanced distribution, with 1,404 null subjects (53%) and 1,250 overt subjects (47%).

The data were analyzed using mixed-effects logistic regression (Baayen et al. 2008), with Participant and (Predicate) Item included as random effects and the linguistic and social factors described in Section 3 as potential predictors. A step-up and step-down model selection procedure converged on the same final model, which included one linguistic fixed effect (Verb type) and two social effects (Education and Geographical origin). In addition, a significant three-way interaction emerged among Clause type, Clause-mate coreference, and Discourse coreference. The parameters estimated by the final model are reported in Table 3, with overt subject set as the reference level of the dependent variable. Following a 2-SD criterion, five outliers were excluded.

Table 3 Mixed-effect analysis. Parameters estimated by the final model and their statistical significance analysis. Model's goodness of fit values: AIC 3229.4, BIC 3335.1 and logLik -1596.7

Fixed factor	Estimate	Std. Error	Z value	Pr(>|z|)
Intercept	-1.1904	0.1594	-7.466	8.24e-14 ***
Verb type:directional	0.6234	0.1128	5.529	3.23e-08 ***
Geog. origin:noTurin	0.4336	0.1543	2.809	0.004965 **
Geog. origin:Turin	-0.2409	0.2266	-1.063	0.287739
Education:low	0.2995	0.1269	2.361	0.018211 *
Clause type:adjunct	0.7681	0.2263	3.394	0.000689 ***
Clause type:other	0.8987	0.1959	4.587	4.49e-06 ***
Clause-mate coref.:antecedent	-0.1754	0.4210	-417	0.676958
Discourse coref.:antecedent	0.5086	0.1336	3.807	0.000141 ***
Clause type:adjunct * Clause-mate coref.:antecedent	1.1927	0.5503	2.167	0.030208 *
Clause type:other * Clause-mate coref.:antecedent	1.4936	0.4881	3.060	0.002213 **
Clause type:adjunct * Discourse coref.:antecedent	-0.2554	0.3255	-785	0.432722
Clause type:other * Discourse coref.:antecedent	-0.1616	0.3063	-527	0.597853
Clause-mate coref.:antecedent* Discourse coref.:antecedent	0.4322	0.5043	857	0.391435
Clause type:adjunct * Clause-mate coref.:antecedent * Discourse coref.:antecedent	-1.3797	0.6890	-2.002	0.045247 *
Clause type:other * Clause-mate coref.:antecedent * Discourse coref.:antecedent	-1.1207	0.6161	-1.819	0.068935.

Further details on the statistically significant effects of the linguistic and social predictors, as well as on the three-way interaction, are provided in the next sections.

4.1 Linguistic Predictor

The Verb type factor indicates whether the predicate can display overt agreement with its argument(s) or not. The analysis indicates that null subjects are more likely with agreeing verbs than with non-agreeing verbs, as illustrated in Figure 3.

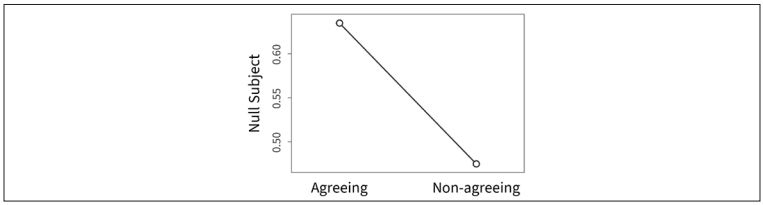


Figure 3 Probability of null subjects by Verb type

This pattern is illustrated by the examples in (5).

(5) a. ø $_3$TEACH$_1$ PROGRAM HEARING EXACTLY
'(They) taught me exactly the hearing program…'
b. IX$_1$ THINK HOUSE IX
'I think about the house.'

In LIS, TEACH is an agreeing verb, as subject–object agreement is expressed through the directionality of the verb's movement. In (5a), the hands move from the locus of the third-person subject toward that of the object (the signer), and the verb co-occurs with a null subject. By contrast, THINK is a non-agreeing verb, as it lacks spatial agreement. In (5b), it is preceded by the overt first-person pronoun, IX$_1$.

4.2 Social Predictors

The statistical analysis revealed that the distribution of LIS null subjects is influenced by two social factors: Geographical origin and Education. The geographical predictor was recoded into three groups: i) Turin, ii) Rome and Trani, and iii) the remaining seven

cities.[2] The probability for null subjects to occur across these groups is illustrated in Figure 4. The analysis indicates that null subjects are more likely in Rome and Trani, whereas overt subjects are marginally more frequent in Turin.

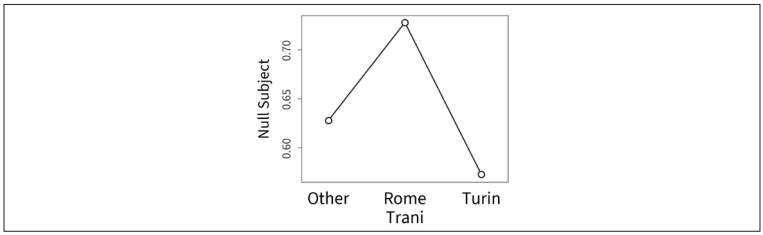


Figure 4 Probability of null subjects by Geographical origin

In the Education factor, signers with primary or middle school education were grouped as lower-educated, while those who completed high school or university were classified as higher-educated. The analysis shows that null subjects tend to be more frequent among lower-educated signers than with higher-educated signers, as illustrated in Figure 5.

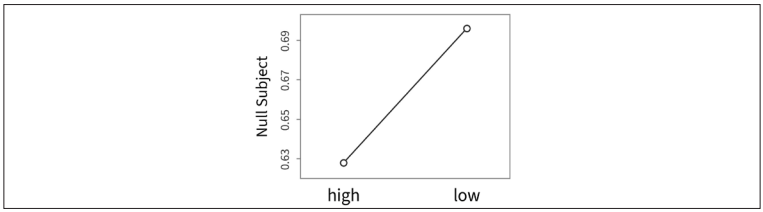


Figure 5 Probability of null subjects by Education

4.3 Three-Way Interaction

A significant three-way interaction emerged among Clause type, Clause-mate coreference, and Discourse coreference. For clarity, we briefly describe these factors. Clause type is a three-level factor, including main clauses, adjunct clauses, and coordinate together with

2 This predictor appears to be a partial post-hoc artifact and improves model fit. We are not aware of historical reasons to group Rome and Trani. Notably, LIS in Turin is lexically distinct from other varieties (Geraci, Battaglia 2011), and signers from Rome show a stronger preference for SVO order (Branchini, Geraci 2011).

completive clauses.[3] Clause-mate coreference is a two level-factor, indicating the presence or absence of a clause-mate antecedent, serving as an approximation of syntactic dependencies such as binding, coordination, raising, and control. Discourse coreference is also binary and indicates whether the subject under analysis was mentioned in the two preceding clauses: this factor has been used in previous research to capture topic-drop effects in sign languages.

Each graph in Figure 6 corresponds to a clause type. Clause-mate coreference is shown on the horizontal axis (absence on the left, presence on the right), while Discourse coreference is encoded by color (red = presence of a discourse antecedent; blue = absence of a discourse antecedent).

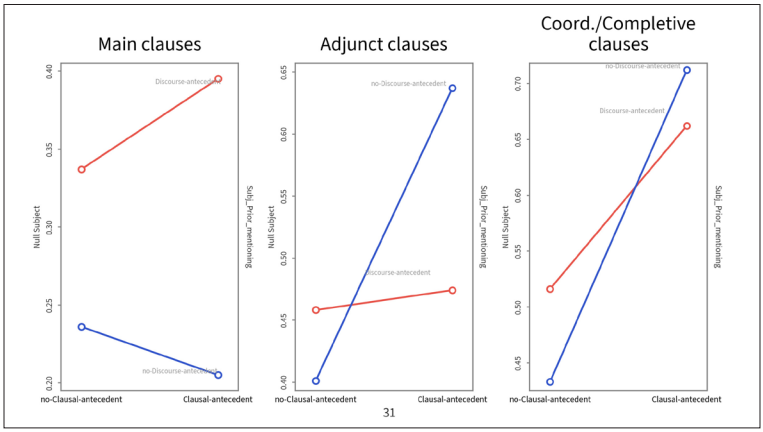


Figure 6 Probability of null subjects by the interaction among Clause type, Clause-mate coreference, and Discourse coreference

In the first graph (main clauses), Clause-mate coreference shows virtually no effect, as the two points on the left are approximately at the same height as the two points on the right. By contrast, Discourse coreference has a clear effect: the red line is consistently higher than the blue one, indicating that topicality strongly conditions subject omission in main clauses, while syntactic antecedents play little or no role. The third graph (coordinated and completive clauses) shows the opposite pattern. Here, Clause-mate coreference plays a decisive role: null subjects are more likely when a co-referential DP is present within the clause. Discourse coreference, by contrast, has no apparent effect, as indicated by the almost overlapping lines.

3 Coordinate and completive clauses are grouped together, as they show a similar distribution.

The second graph (adjunct clauses) reveals a mixed pattern. Clause-mate coreference has a clear effect, but only when the subordinate subject is not discourse-topical, as shown by the blue point on the right. Discourse coreference, in turn, shows little to no effect on subject realization, as reflected in the flat and relatively low red line.

5 Discussion

Subject expression, whether overt or covert, has been investigated in corpus studies of other sign languages (Section 2.2). Adopting this methodological tradition, the present study examines variation in subject expression in LIS using comparable texts and predictors. Table 4 summarizes the significant predictors identified in previous studies and compares them with the findings for LIS.

Table 4 Significant predictors in previous sign language corpus studies compared with the present study

Language	Distribution of null vs. overt subjects	Significant predictors
ASL	65% of plain verbs clauses have null subjects	English influence, Coreference, Person/Number, Role shift, Gender, Age
Auslan	63% of clauses have null subjects	Coreference, Person/Number, English influence, Verb type, Role shift
NZSL	55% of clauses have null subjects	Coreference, Age, Ethnicity, Text type, Verb type, Role shift
LIS	53% of clauses have null subjects	Verb type, Education, Geographical origin, Clause type*Clause-mate coreference*Discourse coreference

A first observation is that LIS and NZSL show a very similar distribution of null and overt subjects, with the two options occurring at comparable rates. Auslan, by contrast, exhibits a higher proportion of null subjects. The ASL data are not directly comparable, as they concern only plain verbs; nevertheless, the fact that 65% of the plain verbs occur with null subjects is quite remarkable, given that null subjects with plain verbs are not spatially licensed and require additional NMMs (Neidle et al. 2000). In LIS, by contrast, only 41.6% of plain verbs occur with null subjects (compared to 58.4% with agreeing verbs), highlighting a substantial difference between ASL and both LIS and NZSL that calls for further research.

A second observation concerns the effect of discourse on null subject expression, a finding that is not particularly surprising. As in spoken languages, discourse antecedents license both pronouns and null subjects, and out-of-the-blue null subjects are pragmatically disfavored even in languages with radical pro-drop. Interestingly, this

effect does not operate as an independent factor; rather, it interacts with other grammatical properties, such as clause type (main vs. embedded) and the presence of a clause-internal antecedent.[4]

A third observation concerns the effect of Verb type, which mirrors findings from Auslan and NZSL.[5] Overall, null subjects occur less frequently with non-agreeing verbs than with agreeing verbs. This robust cross-linguistic pattern raises three points of discussion. First, it supports approaches that identify φ-features as the licensing mechanism for subject omission in pro-drop languages (a.o. Biberauer et al. 2010, D'Alessandro 2015), providing independent quantitative evidence from sign languages. Second, it offers a way to interpret this effect in terms of partial pro-drop, as also discussed in Jaber et al. (2022), since the functional equivalent of rich agreement in sign languages is found only with agreeing verbs, while non-agreeing verbs lack overt φ-feature exponents. Third, and crucially, the absence of agreement does not result in the absence or extremely low rates of null subjects with non-directional predicates. Instead, null subjects remain widely attested in these contexts. Following Jaber et al. (2022), this pattern can be explained by assuming that φ-features in non-directional predicates are highly underspecified, yielding a system that resembles topic-drop. On this view, sign languages such as ASL, Auslan, NZSL, and LIS instantiate a mixed system combining properties of both pro-drop and topic-drop languages (see Lillo-Martin 1986; Zwitserlood, van Gijn 2006). This pattern is particularly interesting, as it suggests that LIS behaves more like consistent pro-drop languages such as Spanish and Italian, whereas ASL, Auslan, and NZSL pattern more closely with Finnish. As in other sign languages, however, the effect is not categorical but probabilistic.

With respect to Role shift, no effect was found for LIS. Given that the narratives analyzed in this study strongly favor the use of role shift, the absence of an effect in this discourse type suggests that it is unlikely to emerge in other domains.

Moreover, this study is the first to introduce the syntactic predictors Clause type and Clause-mate coreference. We argue that these variables more accurately capture what has been described as role shift effects in other languages. Indeed, role shift is often introduced by a main predicate (typically a verb of saying) and occurs within an embedded sentential complement. Crucially, the embedded subject must have a clause-mate antecedent to be taken over by the signer. This configuration is consistent with the syntactic conditions captured in the observed three-way interaction.

4 We verified that the factors included in the analysis are not collinear.

5 Considering that 65% of plain verbs in ASL are subjectless, we expect the effect of Verb type less relevant in this language.

An anonymous reviewer suggested that contact with spoken Italian might emerge as an additional predictor. While spoken-language influence has been considered in other sign language studies (e.g. Wulf et al. 2002; McKee et al. 2011), its annotation involves a high degree of subjectivity. Although contact effects are possible and deserve further investigation, ideally through a parallel study of Italian, we leave this issue for future research.

Finally, a brief note on the sociolinguistic factors. Geographical variation in LIS is well known, particularly at the lexical level (Geraci et al. 2011). This study identified three areas: Turin, on the one hand, and Rome and Trani, on the other, which show distinct patterns of subject expression compared to the remaining cities. Whether this syntactic difference correlates with other structural properties remains a topic for future research. As for Education, the analysis indicates that higher-educated signers show a lower rate of subject omission. In line with findings from spoken languages, this pattern may reflect greater sensitivity to potential ambiguity and a corresponding tendency to favor overt subjects to avoid misunderstanding. While this interpretation remains tentative, it highlights Education as a factor that may shape metalinguistic awareness and communicative strategies.

6 Conclusions

This study examined subject expression in LIS through a quantitative analysis of the LIS corpus, an invaluable resource developed with the contribution of Anna Cardinaletti within the PRIN 2007 project "Dimensions of Variation in Italian Sign Language". The results show that both linguistic and social factors shape the distribution of subjects in LIS. While many sign languages display effects of both pro-drop and topic-drop, LIS reveals a complementary distribution of these mechanisms across clause types, and the effect of role shift is now better qualified as part of syntactically-driven null subjects.

Acknowledgments

We are deeply indebted to Anna Cardinaletti, whose work has given a significant impetus to scientific research on LIS and has played a crucial role in promoting its recognition within academia.

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