Interpreting indexicals under Role Shift in Sign Language of the Netherlands: experimental insights

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Role Shift is a common reporting construction found in sign languages, in which the signer can adopt the perspective of another person using a dedicated set of non-manual markers to 'flag' what is reported. When used in Role Shift, first (IX_1) and second (IX_2) personal pronouns can shfit their usual reference to denote reported authors or addressees, respectively. Starting from the observation that in various sign languages, indexicals do not behave uniformly under Role Shift, we designed an experiment aiming at testing the interpretation of IX_1 and IX_2 under Role Shift in Sign Language of the Netherlands (*Nederlandse Gebarentaal*, NGT). Our results show an important interpretive difference between first and second person indexicals that cannot readily be accounted for by prominent accounts of Role Shift literature. Building on Khristoforova (2023)'s account of person features in sign languages, we provide evidence that the observed difference comes from the interplay between the inherent ambiguity of the first person form IX_1 and local exhaustification of person features (Sauerland and Bobaljik, 2022) prior to insertion of a context-shifting operator, allowing for some instances of IX_1 to remain unshifted even in the scope of Role Shift non-manual markers. In addition to accounting for the NGT data, our analysis also develop a full-fledged account of the morpho-semantics of pronouns in sign languages that fit within a broader typology of person features beyond the visual modality.

Keywords: Sign language, indexicals, pronouns, Role Shift, indexical shift, attitude reports, person features

1 Introduction

Within sign language linguistics, both sign language pronouns and Role Shift constructions have been a matter of active research over the past decade. In this paper, we aim at contributing to both threads by providing new experimental data from Sign Language of the Netherlands (*Nederlandse Gebarentaal*, NGT) involving the interpretation of the first and second person indexical pronouns IX_1 and IX_2 in attitude Role Shift constructions, or RS for short.[1] In RS, a signer uses a set of non-manual markers (RS-NMMs) such as body and eye gaze orientation to reproduce (parts of) a previous utterance, 'embodying' the reported signer and adopting her perspective throughout the report. This is exemplified in Figure 1 for American Sign Language (ASL), where the signer leans her body to the side, tilts her head, and shifts her eye gaze to the opposite direction, exemplifying three RS-NMMs (body lean, head tilt, and eye gaze shift) realized simultaneously with the reported material. Such RS-NMMs have been observed for most sign languages investigated so far (Lillo-Martin, 2012).[2]

Role Shift constructions are of special interest in the study of indexicality and pronominal forms in general, since, under RS, the first person IX_1 (which is realized through pointing to the chest of the signer; see Figure 2) and the second person IX_2 (realized through pointing towards the addressee) may undergo a change in reference, from the actual signer and its addressee to the signer or addressee of the reporting event, respectively. As a consequence, the sign YOU in Figure 1 (IX_2 in our notation) is shifted towards the reported addressee.

This behavior in attitudinal constructions bears striking similarities with that of indexicals in spoken languages such as Amharic (Schlenker, 2003) or Zazaki (Anand and Nevins, 2004), in which first and second person indexicals (as well as location and temporal indexicals for a smaller set of languages) can be used in attitude report con-

[1] Another type of Role Shift, *action Role Shift*, which does not involve content reporting but description of an event from some shifted perspective, has also been studied in the literature (Schlenker 2017a, 2017b; Kawasaki 2024). Although the two phenomena largely overlap, they exhibit noticeable differences as well. In what follows, we will only be concerned with attitude Role Shift, and use the cover term 'Role Shift' to refer to this variant exclusively.

[2] Here is a list of glossing conventions for sign languages used in this paper:

- IX_1, IX_2: first and second person indexicals;
- IX_a: third person pronoun associated with locus *a*, the region in the signing space where the associated discourse referent has been located;
- $\overline{\text{——}}^{\text{rs}}$: a Role Shift construction. The horizontal line indicates the scope of the role-shift non-manual markers;
- ——^{t}: a topicalized constituent;
- $^{\text{eg-r/l, h-r/l, b-r/l}}$: precise marking of non-manual markers (eye gaze shift, head tilt, body lean) and their direction (right/left); specified where possible.

Figure 1: Role Shift Non-Manual Markers (RS-NMMs): eye gaze shift, body lean and head tilt in ASL (Lillo-Martin, 2012, 369).

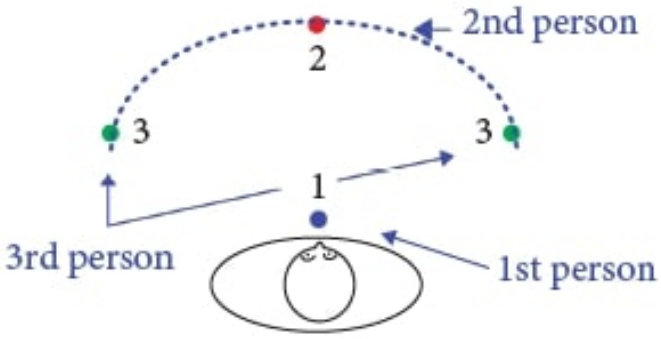


Figure 2: Location of pronouns in the signing space (from Herrmann and Steinbach 2012, 207).

structions to refer to participants of the reported event. This is illustrated in (1) for the Semitic language Amharic, and in (2) for the Iranian language Zazaki:

(1) jon jəgna nə-ññ yɨ-l-all
John hero COP-1SG.S 3SG.M.S-say-AUX.3SG.M.S
'John$_i$ says that he$_i$ is a hero'
[Amharic, Schlenker 1999: (12)]

(2) Hɛsen-i mɨ-ra va kɛ ɛz dɛwletia
Hesen-OBL 1SG-OBL say COMP 1SG.NOM rich.be.PRS
'Hesen$_i$ tells me$_s$ that he$_{i/s}$ is rich.'
[Zazaki, Anand and Nevins 2004: (4)]

In (1), the first person marker *ññ* does not refer to the utterance speaker, but to the reported speaker, *John*. Something similar occurs in (2), where the nominative first person *ɛz* embedded under *va* '*say*' can either refer to *Hesen* or the utterance speaker. A popular line of inquiry (see Anand 2006; Deal 2020) assumes that shifting in those languages is the result of embedding under a context-shifting operator introduced by the attitude verb in the embedded clause, which modify the context parameters indexicals obtain their reference from (Kaplan, 1989). Given that Role Shift constructions seem to induce a similar interpretive effect on indexicals, it has been proposed that RS-NMMs are the overt realization of such an operator in sign languages (Quer 2005; Schlenker 2017a, 2017b; Kawasaki 2024 i.a.).

However, cross-linguistic studies have since challenged this assumption in various ways. As first noted by Quer (2005) for Catalan Sign Language (LSC), some indexicals fail to shift even when they are under the scope of RS-NMMs. An example is (3), where the location indexical HERE retains its indexical meaning:

(3) $\overline{\text{IX}_a\ \text{MADRID}_m\ \text{MOMENT}}^{t}\ \text{JOAN}_i\ \overline{\text{THINK IX}_{1i}\ \text{STUDY FINISH HERE}_b}^{\text{RS}_i}$
'When he was in Madrid, Joan thought he would finish his study here (in Barcelona).'
[Quer 2005: (6)]

In the above example, the first person indexical IX_1 is shifted towards JOAN, the reported speaker, while the locative indexical HERE denotes the actual place of utterance, Barcelona. Similar data were found in Russian Sign Language (RSL) for the indexical HERE (Kimmelman and Khristoforova, 2018), and in German Sign Language (*Deutsche Gebärdensprache*, DGS) for the indexicals HERE and TODAY (Hübl, 2013). Regarding indexical pronouns, Hübl et al. (2019) reported cases such as (4) in DGS, in which the second person IX_2 is unshifted in spite of being in the scope of RS-NMMs:

(4) a. *Felicia says:*
IX$_1$ DREAM ANNA IX$_3$ LOTTO WIN
'I have dreamed that Anna won the lottery.'

b. *Tim reports to Anna:*
FELICIA $_3$INFORM$_1$ $\overline{\text{IX}_1 \text{ DREAM IX}_2 \text{ LOTTO WIN}}^{\text{rs}}$
'Felicia$_i$ told me$_T$, she$_i$ dreamed that you$_A$ won the lottery.'
[Hübl et al. 2019: (28)]

It therefore seems that (at least in those languages), some indexicals can still be interpreted as unshifted (i.e., retain their indexical value), in spite of being in the scope of RS-NMMs.

Taking this observation as a starting point, the present study aims at providing further data on the interpretation of indexicals under Role Shift from yet another sign language, Sign Language of the Netherlands (*Nederlandse Gebarentaal*, NGT). Restricting our attention to pronouns, we designed an experiment in order to test whether the indexicals IX$_1$ and IX$_2$ systematically shift their reference under the scope of RS-NMMs in NGT. Our results reveal an unexpected asymmetry between first and second person forms: while IX$_2$ systematically shifts under RS-NMMs, this is crucially not the case for IX$_1$, which displays an interpretive ambiguity: some signers shift it across the board regardless of RS-NMMs being present or not, while others never do, even in presence of RS-NMMs.

The rest of this article is structured as follows: §2 provides some background on Role Shift in sign languages, and introduces further one analysis of the phenomenon, the context-shift analysis. §3 introduces the experiment we ran on NGT and its results; in §4, we propose a formal analysis of the results, which grounds the observed semantic asymmetry between IX$_1$ and IX$_2$ in the morphosemantic makeup of their respective person features. Building on a proposal by Khristoforova (2023) for the person system of Russian Sign Language, we propose that IX$_1$ forms are structurally ambiguous, being either spelled out as featureless pronominal elements or as realizations of a vacuous feature PERSON, which is semantically interpreted as an elsewhere form (Alexiadou et al., 2024). This structural difference turns out to have non-trivial consequences when considering the competition mechanism regulating the distribution of these forms with respect to their intended referent; following Sauerland and Bobaljik (2022), we assume that this competition is realized at the featural level directly, through application of a predicate-level exhaustification operator EXH (Mayr 2015; Ahn et al. 2020), which regulates pronominal reference by systematically negating stronger alternatives. The effects of exhaustification depending on the featural makeup of the first person has direct consequences for its interpretation in Role Shift structures, since, as we show, application of the context-shifting operator can in some cases be vacuous. Last, in §5, we present a competing analysis of Role Shift, the partial quotation analysis (Maier

2018; Maier and Steinbach 2022) and argue that it cannot derive the observed results. §6 concludes.

2 Role Shift as context-shift

In this section, our goal is to provide some theoretical background on existing analyses of sign language Role Shift (RS), and particularly the context-shifting analysis, which makes an important prediction about the interaction between indexical expressions and Role Shift non-manual markers (RS-NMMs) that our experiment aims to test.

While there generally is agreement about the existence of Role Shift in the sign language literature as a reporting construction, its theoretical status has been actively debated. A prominent line of analysis (Lillo-Martin 1995, Quer 2005, Schlenker 2017a, 2017b, Kawasaki 2024 i.a.) considers RS structures as syntactically and semantically embedded constructions introduced by a (potentially silent) reporting verb; on this view, the behavior of indexical expressions under RS illustrated in Figure 1 is an instance of indexical shift as it is observed in spoken languages. Another stream of research considers instead sentences under Role Shift to be unembedded, more akin to direct discourse/quotation in spoken languages (Lee et al. 1997; Davidson 2015; Maier 2018).[3] According to this view, the meaning of indexicals in RS is not the result of context-shift but rather, an instance of partial quotation. In what follows, we focus on the context-shift analysis since, as the rest of this section argues, it makes testable predictions about the interpretation of indexicals in RS, precisely those our experiment reported in §3 aimed to assess. An alternative (although ultimately unsatisfactory) analysis of our data in terms of partial quotation is considered in §5.

According to the context-shifting operator theory (Quer 2005; Schlenker 2017a, 2017b), the behavior of indexical expressions under Role Shift is similar to that observed in structures such as (1) and (2), motivating a unified account of both phenomena. A widespread generalization about indexical shift is that, in a given intensional domain, indexicals must *shift together*, i.e. inherit their value from one context only. In order to capture this, Anand (2006) proposes a generalization, *shift together*, which captures the observed pattern. The generalization is restated by Deal (2020) as follows:[4]

(5) **Shift Together** [Deal 2020: 42]
If one indexical of class ψ picks up reference from context c, then all indexicals of

[3] As argued by Davidson (2015), the available cross-linguistic evidence regarding the syntactic status of Role Shift is, at the moment, inconclusive. See, however, Kawasaki 2024 for recent arguments for embedded Role Shift structures in Japanese Sign Language.

[4] The reason we use Deal's formulation is because it relativizes shift together to *classes* of indexical expressions; this will prove important for our analysis in §4.

class ψ within the same minimal attitude complement must also pick up reference from context c.

The *Shift Together* constraint aims at explaining data like (2) and (6), where multiple indexicals seem to retrieve their value from one single shifted context:

(6) vizeri Rojda Bill-ra va kɛ ɛz to-ra miradisa
yesterday Rojda Bill-to say.PST COMP 1SG 2SG-to angry.be.PRS
✓ 'Yesterday Rojda$_i$ said to Bill$_j$ that he$_i$ is angry at him$_j$.'
✓ 'Yesterday Rojda$_i$ said to Bill$_j$ that I am angry at you.'
✗ 'Yesterday Rojda$_i$ said to Bill$_j$ that I am angry at him$_j$.'
✗ 'Yesterday Rojda$_i$ said to Bill$_j$ that he$_i$ is angry at you.'
[Zazaki, Anand and Nevins 2004: (13)]

The sentence in (6) is only two-ways ambiguous, relatively to the context in which it is interpreted: if it is the reported context, the two indexicals *ɛz* and *to* will refer to the reported speakers and addressee (Rojda and John), respectively, while if it is the utterance context, they will refer to the speaker and addressee of that context. Crucially, mixed or 'cross-contextual' readings are excluded: indexicals have to shift together. In order to capture this, Anand and Nevins (2004) suggested that the shifting of indexicals may be induced by the presence of a 'monstrous' operator 👻 in the embedded clause.[5] The semantics of this operator is straightforward: it rewrites the Kaplanian context coordinates of a contex-sensitive expression α - a tuple of parameters consisting of an author (or speaker) s, an addressee ad, a world w, a time t and a location l - with the values of the *index*, or circumstances of evaluation, consisting of a similar set of coordinates (c.p. Zimmermann 1991, Von Stechow and Zimmermann 2005):

(7) $[\![👻 \alpha]\!]^{g,c,i} = [\![\alpha]\!]^{g,i,i}$

Depending on the language, the operator is generally taken to be introduced by attitude verbs such as *say*, which then allows the first (and second) person in embedded clauses to refer to the reported speaker and addressee, respectively:

(8) $[\![$ Rojda said to Bill that 👻 I am angry at you $]\!]^{g,c,i} = 1$ iff $\forall i'$ compatible with what Rojda said in i, then the speaker in i' is angry at the addressee in i'.

Once 👻 is inserted, all indexicals within its scope will thus inherit the value of the embedded context; this captures the shift-together effect in (5) above.

[5] Anand and Nevins (2004) and Anand (2006) write $OP_\forall$ for the context-shifting operator; the 👻-notation is from Sudo (2012).

Turning now to the interpretation of indexicals under Role Shift, Quer (2005) and Schlenker (2017a, 2017b) have proposed that RS-NMMs are an overt spell-out of a version of Anand and Nevins's (2004) context-shifting operator RS-OP, for which the following semantics can be provided:

(9) a. $[\![\text{RS-OP } \phi]\!]^{g,c,i} = [\![\overline{\phi}^{\text{RS}_i}]\!]^{g,c,i} = [\![\phi]\!]^{g,i,i}$

b. $[\![\text{JOHN}_j \text{ SAY } \overline{\text{IX}_j \text{ WILL LEAVE}}^{\text{RS}_i}]\!]^{g,c,i} = 1$ iff
$\forall i'$ compatible with what John said in i, $[\![\overline{\text{IX}_1 \text{ WILL LEAVE}}^{\text{RS}_i}]\!]^{g,c,i'} = 1$ iff
$\forall i'$ compatible with what John said in i, $[\![\text{IX}_1 \text{ WILL LEAVE}]\!]^{g,i',i'} = 1$ iff
$\forall i'$ compatible with what John said in i, $[\![\text{WILL LEAVE}]\!]^{g,i',i'}([\![\text{IX}_1]\!])^{g,i',i'} = 1$ iff
$\forall i'$ compatible with what John said in i, *auth*(i') will leave in i'

In words, the construction JOHN SAY $\overline{\text{IX}_1 \text{ WILL LEAVE}}^{\text{RS}_i}$ will be true if and only if John is the author/signer of the reported context *i'* and said that he will leave in *i'*. RS-OP thus achieves the same result as its spoken language counterpart, context-shifting, through the use of dedicated non-manuals markers: it is just another example of the visual modality providing a direct window into the formal apparatus of the language faculty, as emphasized by Schlenker (2018).[6] This particular analysis of Role Shift assumes a version of what we call the *Overt Operator Hypothesis*, or OOH:

(10) **Overt operator hypothesis (OOH)**
In sign languages, Role Shift non-manual markers are the overt spellout of a context-shifting operator 👻.

The OOH is appealing as an analytical move, for at least two reasons. Conceptually, it brings sign languages closer to spoken languages, assuming that the two differ only in modality, but not in the core grammatical and semantic mechanisms at their disposal. The other reason is empirical: an analysis positing a context-shifting operator such as (9a) is able to straightforwardly derive the *shift together* constraint, which covers the reported observation that indexicals within the same intensional domain tend to access the same context parameter. We therefore expect, for any class of indexical expression (pronouns, adverbs) over which RS-NMMs take scope, to be interpreted with respect

[6] Although Schlenker (2017a) does not specifically discuss non-manual markers, it is clear that he takes them as the overt realization of RS-OP / 👻: he writes (p. 4) that Role Shift "[...] *in all cases involves at least body shift and eye gaze shift* (and possibly other non-manuals as well)" (emphasis in the original). Here and throughout the paper, we will continue to use the 👻 notation for the context-shifting operator in order to highlight this similarity.

to the shifted coordinates introduced by the spatial locations introduced by these RS-NMMs. However, as evidenced by the examples (3) and (4), it appears that at least in languages LSC and DGS, the predictions made by the OOH are not borne out, since one finds in these languages *un*shifted indexicals directly in the scope of RS-NMMs.

In the next section, we report on an experiment designed to test the OOH on pronominal indexicals in Dutch Sign Language (NGT). More precisely, the experiment was designed in order to assess the following:

- Is there a systematic correlation between absence/presence of RS-NMMs and un/shifted readings of indexicals?
  ➥ Data from RSL, LSC and DGS suggests that it might not be the case.
- Do pronominal indexicals behave uniformly to this respect?
  ➥ Data from DGS (Hübl et al., 2019) suggests that IX_1 and IX_2 might behave differently.

3 Experiment

In order to test the predictions of the OOH, we designed an experiment to investigate whether RS-NMMs were required for indexical pronouns to receive a shifted interpretation, with NGT as our target language. Raw data, .Rmd files and experimental protocol can be found on the OSF platform of our study.

The experiment was carried out in two phases differing in the targeted conditions. Each phase employed two methods: (i) felicity judgment task and (ii) identification task. Phase I involved 13 native deaf NGT signers (26 - 58 y.o; 5 males) coming from central and southern regions of the Netherlands (Amsterdam, Utrecht, Voorburg, Zoetermeer). Ten participants out of the same group also participated in Phase II.

3.1 Procedure

Eleven participants took part in the experiment on-site, while the other two participated online via Zoom.Both on-site ad online participants completed the experiment by filling in an online questionnaire a website, specifically created using jsPsych library (De Leeuw, 2015).

First, participants received information on data sharing and general instructions, which were provided in NGT via a video recorded by a native NGT research assistant. Then, the participants get acquainted with four main characters featured in the experimental materials – T., M., C., and J. In an introductory video, character T. narrates that the four characters are friends who attended a party together the day before. Subsequently, more specific instructions were given. The participants were informed

that they would soon receive multiple pairs of stimuli. In each pair, the first stimulus featured a video of signing in NGT presented for a felicity judgment (see the description of the stimuli in section 3.2.1 for details), followed by a second stimulus presenting the same video for an identification task (see section 3.2.2 for details). The participants were additionally informed that could watch any videos as many times as they desired. However, once proceeded to the next stimulus, the system would prevented the participants from returning to change their answers.[7]

The instructions were followed by a training phase that involved the interpretation of locative pointing (in contrast with the pronominal pointing in the main body of the experiment) to ensure participants understood the instructions. The correct response to the stimuli in the training phase served as an exclusion criterion, and all participants successfully completed the training, demonstrating their understanding of the instructions.

During the main experimental phase, participants were presented with randomized target stimuli interspersed with control baseline stimuli. An incorrect response to a control baseline stimulus would lead to the exclusion of the respective participants. Such behavior, however, was not observed.

3.2 Stimuli

All stimuli were recorded by two pairs of deaf native NGT research assistants (representing T. and M.), while a hearing NGT second language learner assumed the role of the addressee (representing C. and J.). Depending on the testing condition (explained in detail below), the stimulus includes either a video featuring both the context sentence (T. signs a simple sentence to C., as in (11a)) and a video with the target sentence (M. reports to J. what T. signed to C., as in (11b)), or solely the target sentence without context.[8]

(11) a. IX$_1$ LOVE CYCLING — T to C
'I love cycling.'

b. YESTERDAY T. C. MEET. T. RS-NMM: SAY IX$_1$ LOVE CYCLING — M to J
'Yesterday, T. and C. met. T. said I love cycling.' *video*

As mentioned above, for each stimulus in the experiment, two tasks were presented consecutively: the felicity judgment task followed by the identification task.

[7] This was, in fact, a technical limitation of the jsPsych 7.3.0 version (specifically, of the *survey-html-form* plugin) employed in the experimental setup, rather then a deliberate methodological decision on our behalf.

[8] For each stimulus, we provide a link to the video example. Note, however, that the text contained on the respective web-pages is in Dutch as it is in the original experiment.

3.2.1 Felicity judgments

For this task, in conditions without a context sentence, participants assessed the acceptability of the target sentence using a 5-point Likert scale. A score of "1" indicated that the sentence was entirely unacceptable, whereas a score of "5" indicated that the participant would sign the sentence exactly as presented in the video.

When a context video was included, participants were asked to evaluate whether the target sentence accurately conveyed the content of the context sentence. This evaluation was likewise performed using the 5-point scale.

3.2.2 Identification task

After completing the felicity judgment task, the same stimulus was immediately presented for the identification task. Participants retained access to both the context video (if present) and the target video. In addition, a .gif file depicting the pronoun used in the target stimulus was provided, as illustrated by the website screenshot in Figure 3. The task required participants to select the appropriate referent for the pronoun from a list of characters — T., C., M., and J. — by clicking on the corresponding sign name .gif. An additional option labeled 'None of the above' ('Geen daarvan' in Dutch) was available if none of the characters could serve as a referent for the pronoun. Participants could also select multiple characters if they judged the reference of the pronoun to be ambiguous. The order of presentation of the .gifs in the character list was randomized for each stimulus.

3.3 Testing conditions

The experiment comprised three groups of conditions: (i) those targeting the interpretation of indexical pronouns (IX_1, IX_2, or both within a single sentence); (ii) those examining the effect of the presence of RS-NMMs; and (iii) those examining the effect of context. To comprehensively explore potential interactions, all possible combinations of the values of these three conditions were included, resulting in a *Latin cube* design.

3.3.1 Condition I: person value

This condition aims to investigate the impact of the person features of the indexical pronouns on whether or not they get interpreted within local context of the speech report. The condition is examined both independently and in interaction with Conditions II and III. For each value, three lexically distinct but grammatically analogous items were included. The values include:

- a single indexical pronoun IX_1 appearing in the subject position within the report (as in (11)); its reference is potentially ambiguous, referring either to the actual

Figure 3: The screenshot of the interpretation task. The text at the center of the image can be translated from Dutch as 'You can mark more than one option if you find it necessary.'

signer M. or the reported signer T.

- a single indexical pronoun IX_2 appearing in the subject position within the report (as in (12)); its reference is potentially ambiguous, referring either to the actual addressee J. or the reported addressee C.
- two indexical pronouns appearing in the report: IX_1 in the subject position (referring to either T. or M.) and IX_2 in the object position (referring to either C. or J.), as in (13).[9]

(12) a. IX_2 SIGN VERY.WELL — T to C
'You sign very well!'

b. YESTERDAY T. C. MEET. T. SAY IX_2 SIGN VERY.WELL — M to J
'Yesterday, T. and C. met. T. said You sign very well!' *video*

[9] Another condition was post-factum informally explored: IX_1 and IX_2 in subject and object positions, but with the original quote (context) containing the sign name of the actual addressee, J. instead of IX_2.

(13) a. IX$_1$ MISS IX$_2$ T to C
'I miss you.'

b. YESTERDAY T. C. MEET. T. SAY IX$_1$ MISS IX$_2$ M to J
'Yesterday, T. and C. met. T. said I miss you.' *video*

3.3.2 Condition II: RS-NMMs

This condition explores the impact of RS-NMMs. In half of the stimuli (examples (11)-(14)), no RS-NMMs were present, that being the signer's body, eye gaze, and head neutrally oriented toward the actual addressee. The remaining half of the stimuli featured RS-NMMs.[10] In these cases (as in (14), the counterpart of (11)), the signer's head, body, and eye gaze were directed away from the actual addressee. As mentioned previously, Condition II was tested for all values of Condition I.

(14) a. IX$_1$ LOVE CYCLING T to C
'I love cycling.'

b. YESTERDAY T. C. MEET. $\overline{\text{T. SAY IX}_1\text{ LOVE CYCLING}}^{\text{RS}}$ M to J
'Yesterday T. and C. met. T. said I love cycling.' *videos*

3.3.3 Condition III: context effect

Condition III explores whether presence or absence of context had an impact on the results. Each combination of values from Conditions I and II was presented twice: once with the original quote recorded from T. and C. preceding the target report, and once without the quote. Unlike the previous conditions, this condition was not randomized. Consequently, participants first viewed all stimuli without the quote and then, in the second part of the experiment, viewed all stimuli with the quote.

3.4 Results

Before proceeding to the description of the results, it is important to highlight the unexpectedly high degree of variation across participants observed in the data. This variation allows for the identification of consistent behavioral patterns within three distinct participant groups (Group 1: 6 participants; Group 2: 3 participants; Group 3: 4 participants).

[10] It is important to note that the deaf research assistant portraying signer M. was instructed to perform RS-NMMs naturally, as they would in an actual conversation. The scope of RS-NMMs was determined by the deaf research assistants according to their own intuition, which resulted in RS-NMMs scoping over the quote but also over the sign SAY. This aligns with our observation in the corpus, where RS-NMMs, if present, also start on the speech predicate and scope over the entire construction.

In the following sections, the results are presented separately for each of these groups. It should be emphasized that the grouping is based on a post-hoc examination of the data (rather than on a formal cluster analysis) and serves exclusively illustrative purposes. The variation also did not correlate with any sociolinguistic data (e.g., region of the signing, age, etc.), although, given the small size of the sample and its unbalanced nature, no sociolinguistic research could be done on the present data anyway. We therefore refrain from making any claims regarding microvariation in NGT.

We begin by discussing the results obtained from the stimuli involving a sole IX_1 pronoun in subject position, as illustrated in (15).

(15) a. IX_1 LOVE CYCLING — T to C
'I love cycling.'

b. YESTERDAY T. C. MEET. T. $\overset{\text{RS-NMM}}{\overline{\text{SAY IX}_1\text{ LOVE CYCLING}}}$ — M to J
'Yesterday, T. and C. met. T. said I love cycling.' *video*

All stimuli containing only IX_1, both with and without RS-NMMs, were deemed acceptable. The identification task results for IX_1 are graphically depicted in Figure 4, averaging across Groups 1-3.[11] The various colors illustrate the proportions of shifted, non-shifted, and ambiguous interpretations of the first-person indexical. These interpretations are linked to the reported signer T. (light green), the actual signer M. (dark green), or an ambiguity between the two (violet), respectively. Columns within each Group represent different values of the RS-NMM condition.

The results shown in Figure 4 indicate that the interpretation of IX_1 was unaffected by RS-NMMs for all participants. However, notable differences emerged in how participants interpret IX_1. Specifically, participants in Groups 1 and 2 consistently interpreted IX_1 as shifted, referring to the reported signer T. In contrast, participants in Group 3 interpreted IX_1 as non-shifted (referring to the actual signer M.) or as ambiguous between the two interpretations, as evidenced by their selection of both options.

Felicity scores, as shown in Figure 5, further underscore these group distinctions. While RS-NMMs, again, did not impact felicity scores for all participants, Group 3 signers assessed stimuli as infelicitous when the context stimulus (original quote) was present. Recall that the original quote invariably implied a shifted interpretation of IX_1 (T. consistently refers to themselves), which aligns with the interpretation of signers in Groups 1 and 2. These participants consistently interpret IX_1 as shifted, even in the absence of context and therefore the semantics of the context matches their expectations. However, signers in Group 3 interpret IX_1 as non-shifted, hence conflicting with what context sentence suggests leading to low felicity scores for the respective stimuli.[12]

[11] Results for individual participants can be found on OSF platform

[12] The statistical significance of the felicity score differences was not explored in the present study.

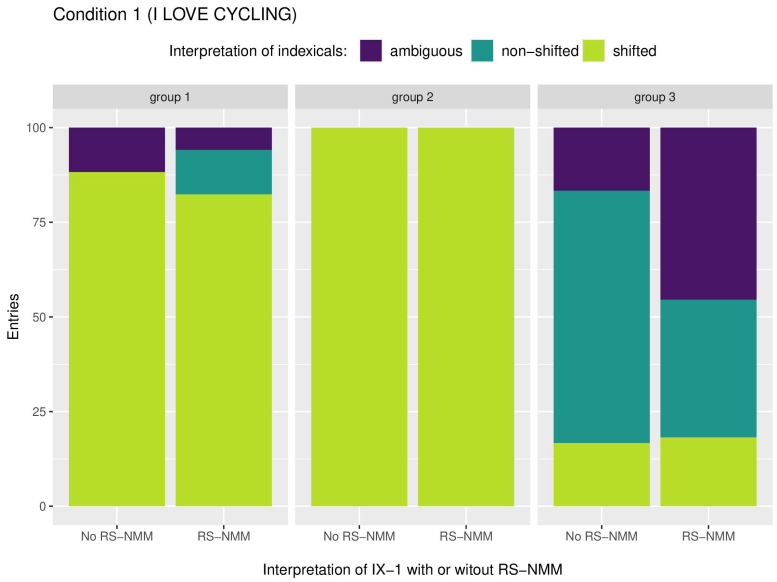


Figure 4: Interpretation task results for stimuli involving IX_1 grouped by different patterns of interpretation (Groups) and different values of the RS-NMM condition

We now turn to the interpretation of the constructions with a single IX_2, which presents a markedly different pattern. We examine the proportions of shifted interpretations (referring to the reported addressee C.), non-shifted interpretations (referring to the actual addressee J.), and ambiguous interpretations of IX_2, as illustrated in Figure 6.

In line with the behavior of IX_1 illustrated in Figure 4, Figure 6 demonstrates variation in the interpretation of the pronoun, where two groups align in their choice of interpretation while one group diverges. This time, however, it is Groups 1 and 3 that exhibit a similar response pattern, rather than Groups 1 and 2 as observed previously. Moreover, in this case, RS-NMMs play a significant role in how the pronoun is interpreted in the majority of instances. Specifically, while Group 2 consistently adhered to a shifted interpretation of indexicals irrespective of RS-NMMs, Groups 1 and 3 were sensitive to their presence. When RS-NMMs were present, participants in these groups tended to choose a shifted interpretation for IX_2; in the absence of RS-NMMs, they leaned toward either non-shifted or ambiguous interpretation.[13]

In summary, while RS-NMMs did not influence the interpretation of IX_1– despite variation in interpretation across groups – the presence of RS-NMMs did affect the interpretation of IX_2, enforcing a shifted reading for two out of the three groups of signers. The felicity scores assigned to stimuli involving IX_2 mirror this pattern. As illustrated

[13] Note, however, that Groups 1 and 3 do diverge in the proportions of ambiguous vs. non-shifted responses (with Group 1 favoring the latter and Group 3 the former), as well as in whether they allow a shifted interpretation of IX_2 without RS-NMMs (Group 1 does, while Group 3 does not). What is crucial here, however, is the principled sensitivity to RS-NMMs, which participants in Group 2 lack.

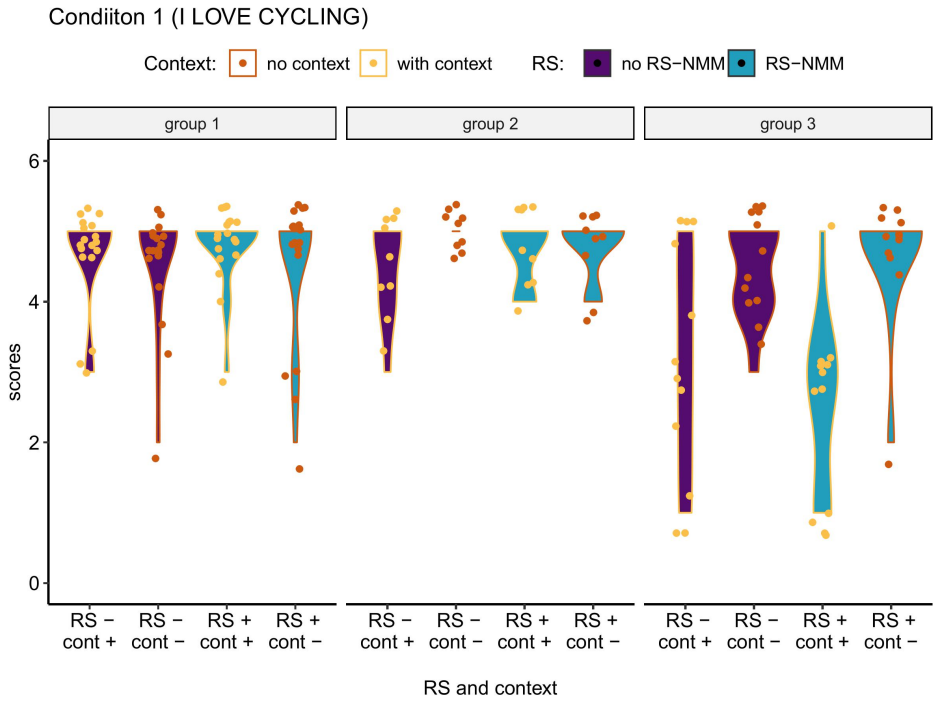


Figure 5: Felicity judgment results for the stimuli involving IX_1 grouped by different patterns of interpretation (Groups) (different windows) and different values of the RS-NMM and context conditions (different filling an contour colors, respectively).

in Figure 7, signers from Groups 1 and 3 assign low felicity scores to stimuli with IX_2 when RS-NMMs are absent but context is present, a combination that promotes a shifted interpretation. In such cases, participants in Groups 1 and 3 encounter conflicting cues, resulting in lower felicity ratings.

Distinct sensitivity to context and RS-NMMs between the interpretations of IX_1 and IX_2 among the majority of participants (i.e., with an exception of Group 2) straightforwardly predicts that the results of the signers in Groups 1 and 3 would violate the *shift together* constraint mentioned previously when both IX_1 and IX_2 occur within the same sentence. This prediction is borne out by the data, as illustrated in Figure 8.

Importantly, Figure 9 demonstrates that, even within a single clause, the distinct interpretations of IX_1 and IX_2 remain intact, replicating the patterns observed for these pronouns in isolation. Figure 8 further illustrates how this divergence across participant groups gives rise to instances of mixed indexicality, where one indexical is interpreted in the global context and the other within the local context of the report.

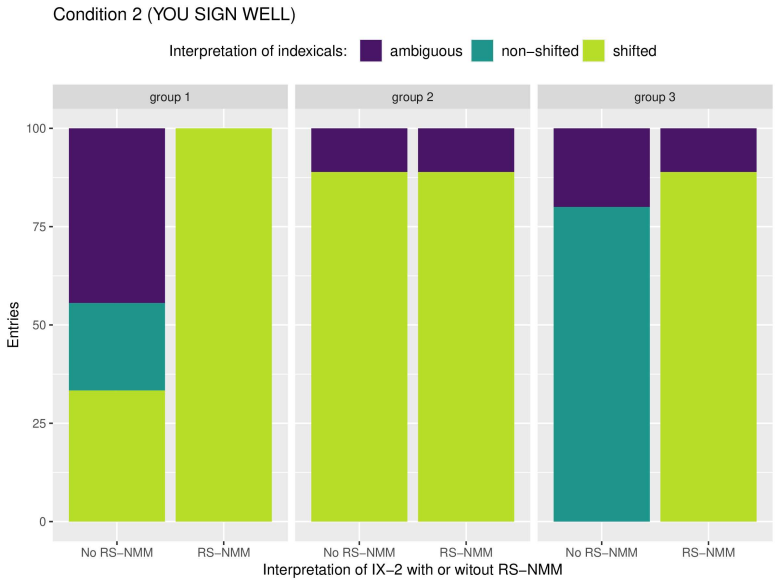


Figure 6: Interpretation task results for the stimuli involving IX_2 grouped by different patterns of interpretation (Groups) and different values of the RS-NMM condition

3.5 Discussion

To summarize, we see that while IX_2 seems well-behaved in being consistently shifted under RS-NMMs, as the context-shift analysis and the OOH outlined in §2 predicts, IX_1 seems to respond very differently: being consistently shifted even in the absence of RS-NMMs by some signers (Group 1) or, on the contrary, being systematically denied shifting even in the presence of RS-NMMs (Group 3). The fact that these interpretive tendencies are observed even when both indexicals appear within the same clause illustrates what seems to be an inherent discrepancy in lexical specifications of IX_1 vs IX_2, and not a consequence of some other factor of the Role Shift phenomenon. The unforeseen immunity of IX_1 to RS-NMMs asks for an explanation of the interpretive logic behind IX_1 for Groups 1 and 3.

In the remainder of this paper, we will provide such an explanation that builds on Khristoforova (2023)'s theory of person features in sign languages, augmented with a competition-based account of features that has been proposed to account for various person restrictions in spoken languages (Sauerland and Bobaljik, 2022).

4 Analysis

Our analysis has two goals. In addition to accounting for the data presented in §3, it also aims at recasting the discussion about sign language pronouns within the broader,

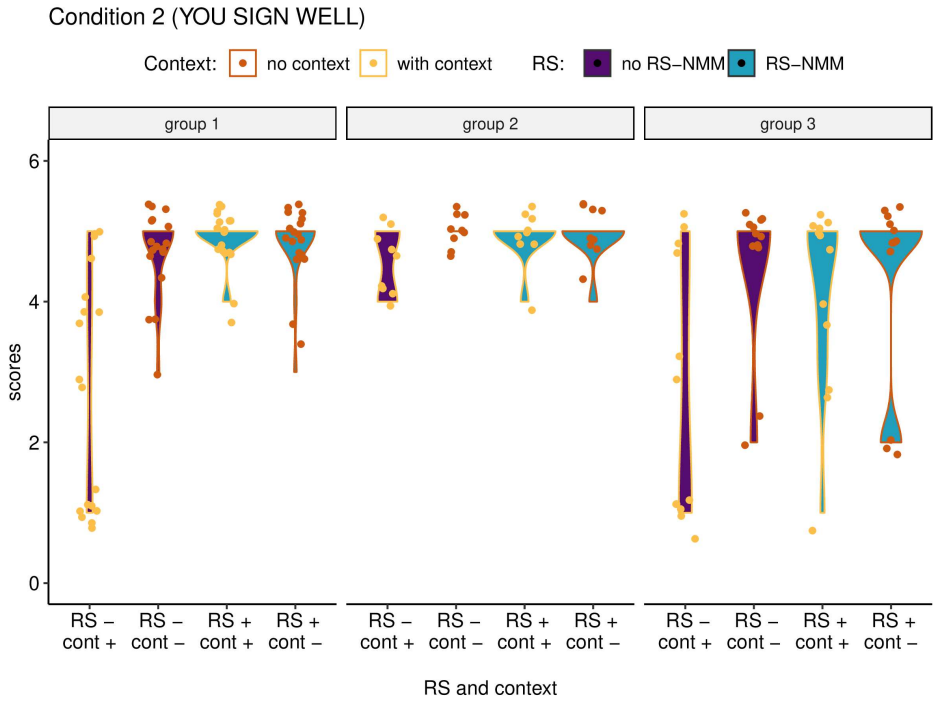


Figure 7: Felicity judgment results for the stimuli involving IX_2 grouped by different patterns of interpretation (Groups) (different windows) and different values of the RS-NMM and context conditions (different filling an contour colors, respectively).

cross-modal and typologically-informed discussion concerning the morphosemantics of person features. We first outline our main assumptions regarding person as a grammatical category (§4.1), assumptions which we then use to motivate our own proposal regarding sign language pronouns (§4.2) before proposing an analysis of the NGT data (§4.3).

4.1 Person features: generalities

Following Zwicky (1977), Noyer (1992), Harley and Ritter (2002), Harbour (2007, 2016) and many others, we take person features in (16) to be universally active across languages (where 1, 2, 3 stand for the respective persons):

(16) a. 1: [AUTHOR]

b. 2: [PART(ICIPANT)]

c. 3: [PERSON]

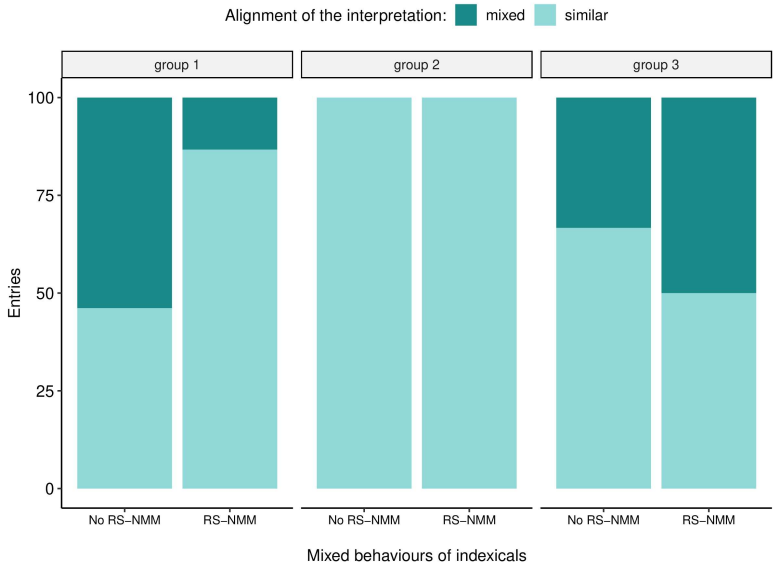


Figure 8: Proportions of mixed indexicality (one indexical in the report is shifted, one is not).

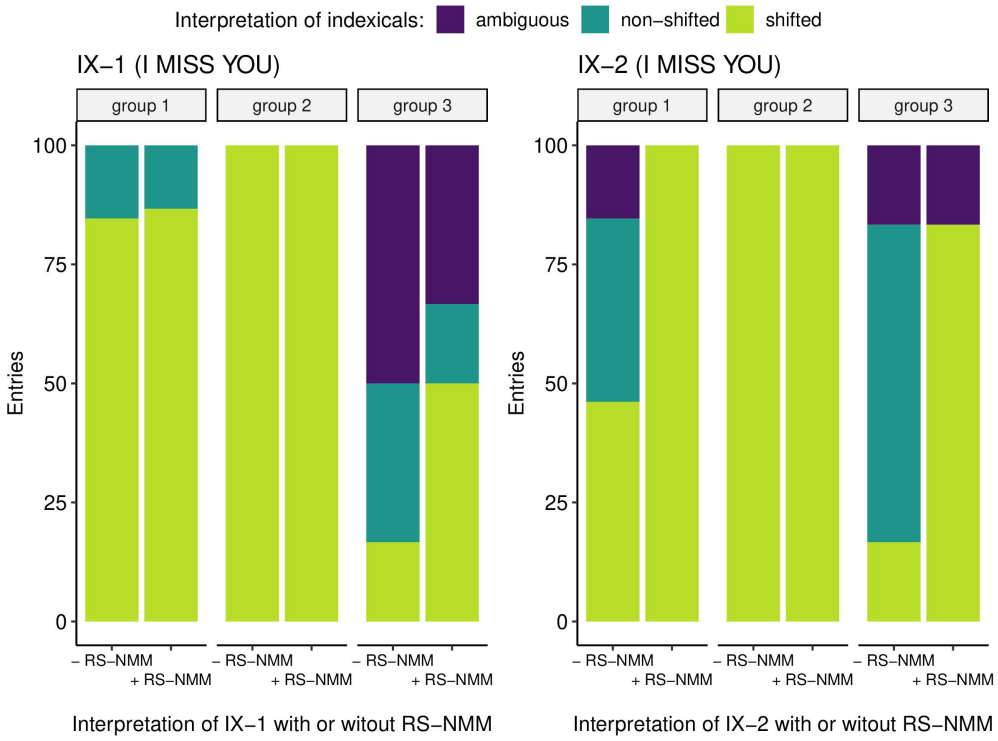


Figure 9: The results of the interpretation task for IX_1 + IX_2

While the use of AUTHOR and PART is fairly standard in the literature, there has been some debate in the literature about whether or not the third person is featurally specified (Nevins 2007, 2011; Harbour 2016; Ackema and Neeleman 2018; Grishin 2023, Alexiadou et al. 2024) or is a featurally empty/unmarked form (Benveniste 1966; Harley and Ritter 2002; Bejar and Rezac 2003; Adger and Harbour 2007; Kratzer 2009). For reasons that we motivate below (§4.2.2), we opt for the former.

The features in (16) are given the denotations in (18):[14]

(18) a. $[\![\text{AUTHOR}]\!]^{g,c,i} = \lambda x.s(c) \sqsubseteq x$

b. $[\![\text{PART}]\!]^{g,c,i} = \lambda x.s(c) \sqsubseteq x \vee a(c) \sqsubseteq x$

c. $[\![\text{PERSON}]\!]^{g,c,i} = \lambda x.x$

The feature AUTHOR takes a pronoun (i.e., an individual variable x) as its argument and returns the set of individuals that minimally contain the speaker/signer.[15] PART returns the set of individuals minimally containing discourse participants; last, PERSON is defined as the identity function, having no semantic effect. Taking, as it is standard (e.g., Heim and Kratzer 1998) pronouns to be functions from indices on variables to individuals, we assume that a language using the person inventory above disposes of the following pronominal paradigm:

(19) a. $[\![\text{I}_n]\!]^{g,c,i} = \begin{cases} g(n) \text{ if } s(c) \sqsubseteq g(n) \\ \text{undefined otherwise} \end{cases}$

b. $[\![\text{you}_n]\!]^{g,c,i} = \begin{cases} g(n) \text{ if } s(c) \sqsubseteq g(n) \vee a(c) \sqsubseteq g(n) \\ \text{undefined otherwise} \end{cases}$

c. $[\![\text{he/she/it}_n]\!]^{g,c,i} = g(n)$

[14] Following i.a. Harbour (2016), we treat features as predicates. It is, however, possible to treat them as presuppositions instead, i.e. partial functions of type $\langle e, e \rangle$ that restrict the domain of interpretation of the expression they are associated with (Cooper 1983; Heim 2008; Sauerland 2008; Stokke 2010; Charnavel 2019, a.o.). While ultimately our analysis does not require us to take a stance on this issue, we note that a recent implementation by Sauerland and Bobaljik (2022) could, in principle, dissolve the conundrum, allowing features to be 'presuppositionalized' via the insertion of a δ-operator (Beaver 1992; Beaver and Krahmer 2001), which takes a property P and returns *True* if that property is defined, (17):

(17) $[\![\delta]\!] = \lambda P.\lambda x : P(x) = \begin{cases} 1 \text{ iff } P \text{ is defined} \\ 0 \text{ otherwise} \end{cases}$

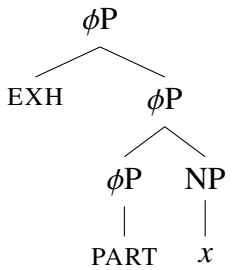
[15] The inclusion symbol $\sqsubseteq$ is motivated by the analysis of plural pronouns and inclusive number (Sauerland and Bobaljik, 2022), which do not concern us directly here. We keep it for consistency.

Note that the entries in (19) by themselves do not predict the standard distribution of pronouns, as observed in most languages, since according to these entries, nothing prevents a third person form to refer to discourse participants, or a second person form to refer to the speaker, contrary to fact. In order to prevent such uses, we assume (following Sauerland and Bobaljik 2022) a mechanism of strengthening via application of predicate-level exhaustification operator EXH (Mayr 2015; Ahn et al. 2020). This operator takes a predicate P and creates a new predicate with a strengthened meaning, negating logically non-weaker alternatives Q contained in the set of alternatives Alt - that is, negating all the alternatives except those that are entailed by P itself:

(20) $[\![\text{EXH}_{Alt}]\!]^w = \lambda P_{\langle e,t\rangle}.\lambda x_e.P(x)(w) \wedge \forall Q \in Alt[\neg Q(x)(w) \vee \forall x.(P(x) \rightarrow Q(x))]$

When applied to a given feature F, EXH negates all the alternatives that are not entailed by F, yielding an strenghtened meaning for F - that is, the conjunction of $F \wedge \neg F'$, for every non-weaker alternative F' in Alt. Consider as an example the application of EXH to the feature PART. At the syntactic level, EXH attaches locally to the feature it applies to (following Sauerland (2008), we assume that features are inserted on their own head at the DP-level):

(21)



The operator will effectively block reference to the author through strengthening, by negating the alternative AUTHOR, which is stronger, yielding reference to the second person (a discourse participant that is not the author), as desired.

(22) $\text{EXH}_{\text{AUTHOR}}(\text{PART})(x) = 1$ iff $a(c) \sqsubseteq x$

Following Katzir (2007), Fox and Katzir (2011) and much subsequent literature, we define alternatives structurally, and take the alternative set Alt of a given structure ϕ to be this set consisting of alternatives ψ that are strictly at-most-as-complex as ϕ, adhering the following algorithm:

(23) **Structural complexity (Katzir, 2007):**
Let ϕ, ψ be parse trees. ψ can be said to be at-most-as-complex as ϕ (noted $\psi \preceq \phi$) if we can transform ϕ into ψ by

a. deleting constituents of ϕ,

b. contracting (i.e., merging and identifying nodes) constituents of ϕ,

c. replacing constituents of ϕ with constituents of the same category from the Substitution Source of the language.

Crucially, any structure ψ that would not be at-most-as-complex as ϕ according to this definition could not be contained in *Alt* and therefore, would be excluded from exhaustification.

4.2 Person features in sign languages

In §1, we introduced the pronominal system of sign languages. As with Role Shift, no theoretical consensus about pronouns or person features has been achieved for sign languages. While some scholars maintain a standard tripartite system in the analysis of sign language pronouns (Berenz 1996, 2002, Alibasic and Wilbur 2006, Meurant 2008, Veiga Busto 2022 i.a.), others - starting with Meier (1990) - argue that sign languages use a bipartite system, only distinguishing first person from non-first person (Engberg-Pedersen 1993; McBurney 2002; Cormier 2008; Lillo-Martin and Meier 2011). While it is impossible for us to engage in this foundational debate, we will simply assume in what follows a tripartite system for NGT, following what has been proposed for the pronominal systems of Brazilian Sign Language (*Língua Brasileira de Sinais*, Libras; Berenz 1996, 2002), Catalan Sign Language (*Llengua de signes catalana*, LSC; Veiga Busto 2022), Croatian Sign Language (*Hrvatski znakovni jezik*, HZJ; Alibasic and Wilbur 2006) and Belgian French Sign Language (*Langue des signes de Belgique francophone*, LSFB; Meurant 2008). It is important to note, however, that all the above accounts are descriptive, and do not engage in providing an uniform morphosemantics for person features that would align with spoken language typologies. In what follows, we attempt at developing such an account.

4.2.1 The case for negative features

At this point of the analysis, we need to introduce *negative features* in the spirit of Khristoforova (2023), in which our analysis is grounded. While exploring the interaction between agreement and control clauses in Russian Sign Language (RSL), Khristoforova (2023) observes that, contrary to what happens in simple clauses (24a), agreement in control constructions (24b) in RSL can be specified for first person, instead of matching the person feature of the controller (third person):

(24) a. *TEACHER IX_{3a} $_1$HELP$_{3b}$ BOY IX_{3b}
'The teacher helps the boy.'

b. BOY IX_{3a} $_1$HELP$_{3b}$ IX_{3b} FRIEND
'The boy wants to help a friend.'

[Khristoforova 2023, (15), (16b), (10b)]

Khristoforova (2023) argues that first-person agreement in clause like (24b) is, in fact, an instance of default agreement (for a full syntactic analysis, see Khristoforova 2023, §5.2 sqq.). In order to account for the fact that the default (unmarked) form corresponds to the first person, and not third, as standardly assumed for spoken languages (§4.1), Khristoforova (2023) suggests that the person inventory of RSL might consist of an 'inverted hierarchy', in which second and third person forms are specified with negative AUTHOR and PART features, respectively; the first person, bearing only a PERSON feature, is interpreted as the elsewhere form. This yields the following feature inventory for RSL:[16]

(25) **Person inventory of RSL** [adapted from Khristoforova 2023, (24)]

a. 1: [PERSON]

b. 2: [-AUTHOR]

c. 3: [-PART]

Note that the system in (25) is fully conservative with respect to the ontology of features adopted in (16) above: the person inventory of RSL consists in various combinations of two primitive binary features, AUTHOR and PARTICIPANT, albeit distributed in a different order.[17] Their semantics is equally straightforward: assuming that a negative feature

[16] In her analysis, Khristoforova (2023) adopts a feature geometry approach (cf. Harley and Ritter 2002) in order to ensure that more specified features are contained within less specified ones, which is crucial to explain their distribution. However, as argued in length by Harbour (2011a, 2016), geometries become unnecessary if the asymmetry of the features is derived from their semantics directly, as in the present proposal. We therefore can adopt the inventory in (25) for consistency of exposition without losing Khristoforova's central insight.

[17] In fact, this hierarchy seems to be the privative counterpart of that oposed by Nevins (2007), which assumes a binary feature system:

(26) **Binary person feature system** [Adapted from Nevins 2007, (44)]

a. 1: [+AUTHOR, +PART]

b. 2: [-AUTHOR, +PART]

c. 3: [-AUTHOR, -PART]

The hierarchy proposed in (25) is privative, but uses inherently negative features. It remains to be seen whether the two are equivalent, something we have to leave for future research. There are, however,

is semantically interpreted as the negation of the feature denotation (Harbour 2011b, 2013), we arrive at the following (as before, PERSON denotes the identity function over individuals and remains unchanged):

(27) a. $[\![\text{PERSON}]\!]^{g,c} = \lambda x.x$

b. $[\![\text{-AUTHOR}]\!]^{g,c} = \lambda x.s(c) \not\sqsubseteq x.x$

c. $[\![\text{-PART}]\!]^{g,c} = \lambda x.s(c) \not\sqsubseteq x \wedge a(c) \not\sqsubseteq x.x$[18]

These (alongside the appropriate syntactic agreement mechanism) derives the observed agreement patterns discussed in Khristoforova (2023) for RSL: assuming that first person is the elsewhere form, the probe failing to agree with the controller will exhibit default marking, which would surface as first person, as observed. Although Khristoforova (2023) does not discuss pronominal elements and repercussions of her analysis anywhere outside of the morphosyntax of verbal agreement, her analysis would organically derive the following entries for pronouns in a language such as RSL:[19]

(28) a. $[\![\text{IX}_{1n}]\!]^{g,c,i} = g(n)$

b. $[\![\text{IX}_{2n}]\!]^{g,c,i} = \begin{cases} g(n) \text{ iff } s(c) \not\sqsubseteq g(n)] \\ \text{undefined otherwise} \end{cases}$

c. $[\![\text{IX}_{n}]\!]^{g,c,i} = \begin{cases} g(n) \text{ iff } [s(c) \not\sqsubseteq g(n) \wedge a(c) \not\sqsubseteq g(n)] \\ \text{undefined otherwise} \end{cases}$

In what follows, we will adopt Khristoforova's theory and assume that NGT exhibits a similar configuration in its person system: second person IX_2 is featurally specified to refer to entities that are non-authors, and the first person pronoun IX_1 can either be i) specified with a PERSON feature, or ii) vacuous (a claim based on recent work by Alexiadou et al. (2024) that we motivate in the next subsection). This will allow us to explain the apparently erratic behavior of both forms under Role Shift, as described in §3.

4.2.2 The inherent ambiguity of the first person

Hierarchies such as the one adopted in (25) have been the subject of active debate in the literature (starting with Benveniste 1966) regarding whether or not the elsewhere

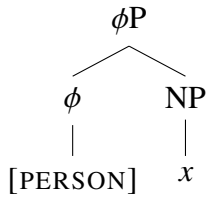
reasons to think that privativity is to be dispreffered on an empirical basis, as forcefully emphasized by Harbour (2013).

[18] By De Morgan's law: $p \vee q \equiv \neg[\neg p \wedge \neg q]$, therefore $\neg[p \vee q] \equiv \neg p \wedge \neg q$.

[19] Note that the entry for the third person form IX_n covers only the pronominal use of the pointing gesture without its locus component (i.e. this entry is different from that of IX_{loc}); we assume, following Ahn (2019) and Ahn et al. (2020), that *loci* have a semantic import on their own, perhaps as modifiers.

form (the third person for most spoken languages, or the first person in our case) is featurally specified with a vacuous or negative feature (Nevins 2007, 2011; Harbour 2011a; Harbour 2016; Ackema and Neeleman 2018; Grishin 2023, Alexiadou et al. 2024) or featurally empty/unmarked (Benveniste 1966; Harley and Ritter 2002; Bejar and Rezac 2003; Adger and Harbour 2007; Kratzer 2009). Based on the optional realization of determiners in generic statements in both Romance and Germanic languages, Alexiadou et al. (2024) provide evidence that third person pronominal elements could optionally realize a PERSON feature depending on their syntactic environment – something that has independently been argued for other morphosyntactic features such as number in a wide variety of languages (Harbour 2014; Martí 2020; Bylinina and Podobryaev 2020; Scontras 2022 i.a.). We argue that this is exactly what occurs in the pronominal system of NGT. Specifically, NGT has access to two first-person forms: a PERSON-specified form and a featureless form, corresponding to the two clusters of data discussed in §3. Following Alexiadou et al. (2024), we assume that NGT can spell out two distinct structures for the first-person pronoun IX_1: one that realizes the PERSON feature, (29), and one that does not, (30). Assuming that ϕ-features are hosted in their own projection, ϕP (Sauerland, 2003), these structures yield the parallel, semantically equivalent hierarchies in (31) and (32), respectively:

(29)



(30)

(31) a. 1: [PERSON]
b. 2: [- AUTHOR]
c. 3: [- PART]

(32) a. 1: [ ]
b. 2: [- AUTHOR]
c. 3: [- PART]

For ease of exposition, we will refer to these two possible realizations of IX_1 as IX_1^{π} for (29) and $\text{IX}_1^{\emptyset}$ for (30). Note that this structural difference does not affect the reference of IX_1 in any way: the feature PERSON being an identity function, its application on the variable contained within the pronoun is vacuous. However, the structural difference between the two forms will prove crucial upon application of the exhaustification operator, as we will now see.

At this point however, the proposed lexical entries for the pronouns in (28) are too weak: both IX_1^{π} and $\text{IX}_1^{\emptyset}$ are not restricted to the signer and can potentially denote any referent, just as the features of IX_2 are compatible with entities that do not include the speaker; only IX (with or without *locus*) is semantically specified enough to be

restricted to entities that do not include a speech act participant. Applying the exhaustification operator EXH introduced above ensures that the pronouns map to the correct entities whenever used. However, while exhaustification strengthens the meaning of IX^{π}_{1} to author-denoting variables only by excluding its as-most-as-complex alternatives IX_2 and IX (33), it is crucially not the case in (34) for $\text{IX}^{\emptyset}_{1}$; both IX_2 and IX being more complex, EXH cannot take them as alternatives and therefore its effects are vacuous.

(33) a. $\text{EXH}_{\{\text{-AUTHOR, -PART}\}}(\text{PERSON})(x) = 1$ iff $s(c) \sqsubseteq x$

b. $[\![\text{EXH } (\text{IX}^{\pi}_{1n})]\!]^{g,c} = \begin{cases} g(n) \text{ iff } s(c) \sqsubseteq g(n) \\ \text{undefined otherwise} \end{cases}$

(34) a. $\text{EXH}_{\{\ \}}([\ ])(x) = 1$

b. $[\![\text{EXH } (\text{IX}^{\emptyset}_{1n})]\!]^{g,c} = g(n)$

(35) a. $\text{EXH}_{\{\text{-PART}\}}(\text{-AUTHOR})(x) = 1$ iff $a(c) \sqsubseteq x$

b. $[\![\text{EXH } (\text{IX}_{2n})]\!]^{g,c} = \begin{cases} g(n) \text{ iff } a(c) \sqsubseteq g(n) \\ \text{undefined otherwise} \end{cases}$

(36) a. $\text{EXH}_{\{\ \}}(\text{-PART})(x) = 1$ iff $[s(c) \not\sqsubseteq x \wedge a(c) \not\sqsubseteq x]$

b. $[\![\text{EXH } (\text{IX}_{n})]\!]^{g,c} = \begin{cases} g(n) \text{ iff } [s(c) \not\sqsubseteq g(n) \wedge a(c) \not\sqsubseteq g(n)] \\ \text{undefined otherwise} \end{cases}$

Per the definition in (20) and the complexity filter in (23), the EXH operator can only apply to alternatives that are not entailed by its prejacent; since the features in (25) asymmetrically entail each other, the correct referential restrictions are derived: IX_2 can only refer to addressees (since EXH excludes the feature -PART), while IX is restricted to non-participants semantically (and upon which EXH is vacuous, -AUTHOR being entailed by -PART and therefore being excluded from the alternative set). Importantly, still per (23), exhaustification of IX_1 can only take place if it is endowed with a PERSON feature, rendering it at-most-as-complex as its second IX_2 and third IX person counterparts; in other words, exhaustification is effective only on IX^{π}_{1}, while it is vacuous on $\text{IX}^{\emptyset}_{1}$.

To summarize, the overall picture we are left with is one in which, contrary to IX_2, the first person indexical IX_1 is interpreted differently depending on whether it is specified with a PERSON feature (IX^{π}_{1}) or not ($\text{IX}^{\emptyset}_{1}$). If yes, exhaustification takes place, and strengthens its meaning to yield the entry in (33) above. $\text{IX}^{\emptyset}_{1}$, on the other hand, eschews competition and is interpreted as an unrestricted variable.

4.3 Person features under Role Shift in NGT

Turning now to the results of our experiment outlined in §3, we are able to provide an explanation about the seemingly erratic behavior of the first person indexical IX_1 under Role Shift.

As mentioned in §2, following context-shifting accounts of Role Shift (Quer 2005; Schlenker 2017a, 2017b; Kawasaki 2024 i.a.), we assume that shifting under Role Shift in NGT comes about via the insertion of a context-shifting operator 👻 at the CP level, when the matrix clause features an attitude verb. As layered out in (9a) repeated here, the sign language version of this operator licenses role-shift via use of RS-NMMs:

(9a) $[\![👻\ \phi]\!]^{g,c,i} = [\![\overset{\text{RS}_i}{\overline{\phi}}\ ]\!]^{g,c,i} = [\![\phi]\!]^{g,i,i}$

Being a context shifter, if 👻 were inserted above a pronoun which featural makeup makes no reference to person at all, its effects would be vacuous. This, we argue, is the cause between the two different readings of IX_1 under Role Shift: the reason why IX_2, but not IX_1, consistently shifts under Role Shift is because the context-shifting operator 👻 applies to different structures. In case of IX_1^{π} (i.e. when the first person contains a PERSON feature), exhaustification has been applied to ensure that the referent of IX_1^{π} denotes the actual signer; subsequent insertion of 👻 shifts the context coordinate the strengthened PERSON feature maps to to the signer of their reported context, $s(i)$. On the other hand, recall that the interpretation of $\text{IX}_1^{\emptyset}$, being featurally void, does not refer to any contextual coordinate in the parameters of the interpretation function; it has not been strengthened by EXH to refer to signers only. As a consequence, application of 👻 is vacuous, and allows $\text{IX}_1^{\emptyset}$ to return actual as well as reported signers.

Let us now apply the present analysis to the three variants of responses we found in the experimental data as described in section §3.4 and summarized in Table 1.

	IX_1		IX_2	
	-RS-NMM	+RS-NMM	-RS-NMM	+RS-NMM
Group 1	shifted		non-shifted/ambiguous	shifted
Group 2	shifted			
Group 3	non-shifted/ambiguous		non-shifted/ambiguous	shifted

Table 1: Summary of experiment results

4.3.1 Group 1: exhaustification occurs before RS-OP insertion

Participants of Group 1 systematically shifted all indexicals under Role Shift. We assume that this group both interprets and produces a version of the PERSON-specified IX^{π}_{1} and therefore competes with IX_2 and IX. Strengthening via application of EXH therefore takes place, yielding the meaning in (33). In a subsequent step, 👻 is inserted, effectively shifting the context parameter for all persons:[20]

(37) a. $[\![[\text{👻}\ldots[\text{EXH}[\text{IX}^{\pi}_{1_n}]]]]\!]^{g,i,i} = \begin{cases} g(n) \text{ iff } s(i) \sqsubseteq g(n) \\ \text{undefined otherwise} \end{cases}$

b. $[\![[\text{👻}\ldots[\text{EXH}[\text{IX}_{2_n}]]]]\!]^{g,i,i} = \begin{cases} g(n) \text{ iff } a(i) \sqsubseteq g(n) \\ \text{undefined otherwise} \end{cases}$

c. $[\![[\text{👻}\ldots[\text{EXH}[\text{IX}_{n}]]]]\!]^{g,i,i} = \begin{cases} g(n) \text{ iff } [s(i) \not\sqsubseteq g(n) \wedge a(i) \not\sqsubseteq g(n)] \\ \text{undefined otherwise} \end{cases}$

As a result, IX^{π}_{1} effectively gets shifted alongside IX_2, yielding systematic reference to the reported signer.

4.3.2 Group 3: both exhaustification and context-shift vacuous

Participants of Group 3 exhibit the opposite pattern and consistently assign IX_1 a non-shifted, indexical interpretation. This, we argue, is due to the fact that participants of this group actually interpret IX_1 as $\text{IX}^{\emptyset}_{1}$, which does not get strengthened by EXH and remains fully ambiguous in reference. Consequently, 👻, as a context-shift operator, has vacuous effects on person-underspecified elements. However, 👻 effectively shifts the context parameters of IX_2 as desired, because the featural makeup of the latter makes reference to context participants through the -AUTHOR feature:

(38) a. $[\![[\text{👻}\ldots[\text{EXH}[\text{IX}^{\emptyset}_{1_n}]]]]\!]^{g,i,i} = g(n)$

b. $[\![[\text{👻}\ldots[\text{EXH}[\text{IX}_{2_n}]]]]\!]^{g,i,i} = \begin{cases} g(n) \text{ iff } a(i) \sqsubseteq g(n) \\ \text{undefined otherwise} \end{cases}$

c. $[\![[\text{👻}\ldots[\text{EXH}[\text{IX}_{n}]]]]\!]^{g,i,i} = \begin{cases} g(n) \text{ iff } [s(i) \not\sqsubseteq g(n) \wedge a(i) \not\sqsubseteq g(n)] \\ \text{undefined otherwise} \end{cases}$

This correctly predicts that, in the absence of exhaustification, the reference of $\text{IX}^{\emptyset}_{1}$ will remain compatible with the actual signer, while enforcing reference to the reported sign act for second person forms, thus deriving the observed results for Group 3.

[20] Following the literature, we assume that the domain of application of 👻 is the CP for both spoken and signed languages (Deal 2020; Kawasaki 2024). Thus the notation in (37) and (38) should not be taken as reflecting the actual syntactic position of 👻 directly above the DP.

4.3.3 Group 2: RS-NMMs as uninterpreted cues?

Results of Group 2 are harder to account for using the present analysis, mostly because the participants seemed to consistently ignore the very presence of RS-NMMs during interpretation. This result, however, tends to be less surprising upon a closer inspection of the role of non-manual markers in general in sign language grammar, which tend to be non-univocal (Sandler 1999; Dachkovsky and Sandler 2009; Herrmann and Steinbach 2011; Wilbur 2021 i.a.). While the issue of which components of the grammar NMMs rely on is a very complex one (see the discussion in Wilbur (2021)), one could tentatively suggest, following e.g. Sandler (1999) and Dachkovsky and Sandler (2009) that the role of NMMs in sign language grammar is analogous to that of prosody and intonation in spoken languages. As a consequence, it is plausible that RS-NMMs merely represent cues that help signers signaling or processing Role Shift structures, rather than elements that are systematically interpreted as such - something that was already suggested in earlier work by Kimmelman and Khristoforova (2018) about Role Shift in RSL - just like intonation helps listeners identify focused constituents in spoken languages (Beaver and Clark, 2009). As a consequence, the versatility of RS-NMMs with regards to their semantic import might explain the *a priori* unexpected results of Group 2, in which participants adopted an across-the-board shifting strategy. While a full-fledged discussion of the status of NMMs in sign language grammar far outscopes the goals of the present paper, we would nevertheless like to point out that, although adopting the Overt Operator Hypothesis in §2 was warranted by our results (especially those of Groups 1 and 3), the hypothesis might eventually prove to be too strong a claim - something we return to in §6.

To summarize, we observe that our participants are distributed in three different categories, depending on their sensitivity to RS-NMMs and their interpretation of IX_1: in one (Group 1), signers seem to have interpreted a fully exhaustified form IX_1^{π} prior insertion of the 👻-RS operator, leading to a systematically shifted value; in yet another Group (Group 3), participants interpreted another, featureless form $\text{IX}_1^{\emptyset}$ with no person restrictions after exhaustification, leading to vacuous context-shift and fully compatible reference to both actual and reported signers alike. Last, we suggested that Group 2, which shifted every pronoun regardless of presence vs. absence of RS-NMMs, simply ignored the semantic import of RS-NMMs, a conclusion warranted by the versatility of NMMs in sign language grammar in general.

5 An alternative account: partial quotation

So far, our theory has been assuming that semantically, Role Shift is a kind of intensional construction (much like English indirect discourse) and that syntactically, the complement clause marked by RS-NMMs is embedded by the matrix attitude predicate,

in line with much of the formal literature on the topic (Quer 2005; Schlenker 2017a, 2017b; Kawasaki 2024 i.a.). However, this claim has not gone unchallenged, with some viewing Role Shift as a kind of unembedded, appositive-like construction, sharing many properties with direct discourse in spoken languages (Lee et al. 1997; Davidson 2015; Maier 2016, 2018; Hübl et al. 2019 i.a.). According to these theories, Role Shift is to be viewed as a special kind of quotation – a *demonstration*, by which the signer selectively depicts some of the external properties of the reported content she is conveying at the same time. The most worked out account in this tradition is the demonstration theory of Davidson (2015), and extended in Maier (2016) and Maier (2018).

Davidson (2015) uses event semantics in order to derive the meaning of RS-NMMs, which she argues equates that of *be like* constructions in English: in her system, both are viewed as arguments of the *demonstration* type, which acts as a modifier, specifying the iconic properties of the argument it modifies.

(39) a. $[\![\text{ be like }]\!] = \lambda e.\lambda d.\text{demonstration}(d, e)$

b. $[\![\text{ RS-NMMs }]\!] = \lambda e.\lambda d.\text{demonstration}(d, e)$

Maier (2018) augments Davidson's analysis in introducing a mechanism of unquotation, by which some elements of the reported content can be suspended from the demonstration they partake in. The partial quotation analysis has been applied to NGT by Maier (2016) and Maier (2018) in order to account for examples very similar to our own data such as (40), where IX_1 is interpreted as shifted in its first occurrence, and unshifted in the second, in spite of RS-NMMs taking scope over the entire embedded clause.

(40) a. *Martine to friend:*
IX_1 BETTER SIGN THAN MACHA
'I sign better than Macha.'

b. *Macha reports:*
MARTINE $\overline{\text{IX}_1 \text{ BETTER SIGN THAN IX}_1}^{\text{rs}}$
'Martine$_i$ said that she$_i$ signs better than me$_m$.'

[NGT, Maier 2016: (30)]

Here, the second IX_1 is somehow *unquoted*, and therefore being interpreted as referring to the actual signer, Macha. Maier (2018) provides the following semantics for (40):

(41) a. MARTINE $\overline{\text{IX}_1 \text{ BETTER SIGN THAN IX}_1}^{\text{rs}}$
$\approx$ 'Martine$_i$ said "I am a better signer than [me]".'

b. $\exists e.\exists e' \sqsubset [\text{agent}(e, \text{Martine}) \wedge \text{form}(e, \ulcorner \text{IX}_1 \text{ BETTER SIGN THAN} \urcorner) \frown \text{form}(e')) \wedge$
$\text{referent}(e') = \text{Macha} \wedge \text{demonstration}(d, e)]$ [Maier 2018: (13-14)]

Allowing such an operation of unquotation to take place in the semantics, however, might lead to considerable overgeneration, since in principle every constituent could be unquoted. To prevent this, Maier (2017) proposes that the actual semantics of quoted strings are the result of the application of two pragmatic principles working in opposing directions: the first one, *attraction*, denotes a preference for using indexicals to refer to actual speech act participants. The second one, *verbatim*, enjoins the author of the report to be as faithful as possible to the original form of what she is reporting.

(42) a. **Attraction principe** [Maier 2017: (23)-(24)]
When talking about the most salient speech act participants, use indexicals to refer to them directly.

b. **Verbatim**
In direct discourse, faithfully reproduce the linguistic form of the reported utterance.

The conspiracy of these two constraints accounts for the fact that the indexicals in examples (40) from NGT and (4) from DGS seem to systematically escape quoted constituents.

The partial quotation theory, however, falls short in accounting for the results of the experiment presented here. If a similar principle of attraction was at play within our shifted examples, we certainly would not expect the second person indexical under Role Shift to be shifted in the first place, especially in examples where the original report mentions something about J., which is a participant (the addressee)in the reporting context: by *attraction*, the second person indexical IX_2 should be used in order to refer to J., contrary to fact: interpretations in which IX_2 received an unshifted meaning under RS-NMMs were rejected across the board by participants from all groups (Figures 4-9). In a similar fashion, the theory also fails to predict the observed patterns for the interpretation of IX_1: as a matter of fact, the pattern of results observed for Group 1 (in which the first person was shifted in all reports) is precisely the exact opposite of what *attraction* predicts, since these signers systematically never use first person forms to refer to themselves; *attraction* should, however, allow for such use.

Another, more serious concern for the partial quotation theory comes from the systematic sensitivity of person (first vs. second) with respect to the shifty potential of RS-NMMs. As defined by Maier (2017), the attraction principle should allow for systematic unquotation of indexicals, regardless of person: however, our results show that only IX_1 can escape the shifting requirements of RS-NMMs, while IX_2 must abide by them. By contrast, our theory straightforwardly predicts this difference, by positing an inherent ambiguity in the interpretation of IX_1, due to semantic overlap between two different structures. Consequently, it is possible to analyze the RS clause in (40) as involving precisely the kind of $\text{IX}_1^{\emptyset}$ form as interpreted in our experiment by Group 3

participants, leading to no inference about the referent of the pronoun in the embedded clause.

All in all, while the unquotation theory deserves to be tested further in different spoken and signed languages, we therefore conclude that an account such as the one defended in §4 fares better with respect to the data presented here, while being more conservative with standard accounts of indexical shift in both spoken and sign languages.

6 Conclusion and open issues

In this paper, we report the results of an experiment designed to test the interpretation of the indexicals IX_1 and IX_2 under Role Shift in NGT. We also tried to develop an analysis of the data attempting to account for an apparently strange discrepancy between the behavior of both indexicals in such constructions: while the second person form IX_2 was consistently interpreted as shifted (i.e, referring to the reported addressee) under RS-NMMs by all participants, the first person form IX_1 divided participants into three different interpretive strategies. Participants of Group 1 showed a strong preference for shifting IX_1 even in the absence of RS-NMMs, while the opposite strategy - interpreting IX_1 as unshifted even in the presence of RS-NMMs - was observed for Group 3 participants. Lastly, participants of Group 2 shifted both indexicals across the board, irrespective of RS-NMMs.

Building on Khristoforova's (2023) account of person features in RSL, our analysis explains this pattern by appealing to independently motivated assumptions about person-feature hierarchies in spoken languages. Following influential proposals by i.a. Harbour (2016) and Sauerland and Bobaljik (2022), we adopted a morphosemantic account of person features that crucially relies on two components: i) an asymmetric semantics for person features and ii) the systematic strengthening of their meanings via application of a local exhaustification operator (Mayr 2015; see also Paillé 2022). The difference observed in the interpretation of IX_1 for Groups 1 and 3 was explained by assuming (following Alexiadou et al. 2024) an inherent semantic ambiguity for IX_1 stemming from two different structures with similar semantics (IX_1^{π} and $\text{IX}_1^{\emptyset}$), but with very different outcomes with respect to exhaustification: while IX_1^{π} is being able to being strengthened by EXH via exclusion of structurally as-most-as-complex alternatives at the level of features to uniquely denote the actual signer, its featureless counterpart $\text{IX}_1^{\emptyset}$, being structurally strictly simpler as IX_2 and IX eschews competition and retains its ambiguity, being interpreted as the elsewhere form. Under RS-NMMs, which we hypothesized (following Quer 2005 and Schlenker 2017a,b i.a.) realizes a context-shifting operator 👻, IX_1^{π} ends up denoting the reported signer exclusively, while $\text{IX}_1^{\emptyset}$, not being specified to refer to any contextual coordinate, retains its ambiguity under Role Shift. IX_2, on the other hand, being strengthened by EXH to refer to addressees only, is consistently shifted by 👻 when appearing under RS-NMMs, therefore accounting for the

apparent discrepancy between the two forms.

While our analysis satisfactorily accounts for most of the data, it nevertheless leaves some of it unexplained. For instance, while it explains the asymmetry between IX_1^{π}/$\text{IX}_1^{\emptyset}$ and IX_2, it does not account for the fact that Groups 1 signers did shift IX_1^{π} even in the absence of RS-NMMs. Although we have no explanation for this fact, we would like to tentatively suggest (as we did in §4.3) that this might be related to the nonunivocity of the semantic import of RS-NMMs, suggesting that signers use RS-NMMs as semantic cues rather than interpreting them as fully specified semantic objects; as a consequence, it might be the case that Group 1 signers simply accommodated shifted meanings for IX_1^{π} in attitude reports contexts, even in the absence of RS-NMMs. As a matter of fact, such 'freely shifted' readings of first-person indexicals were reported for Hong-Kong Sign Language (HKSL) by Gan (2021): in (43)-(44), the first person singular IX_1 and the first person dual WE-TWO are interpreted as shifted, but no RS-NMMs are present:

(43) MOM SAY-2 IX_1 BUSY
✓ 'Mom said that she is busy.'
✓ 'Mom said that I am busy.'

(44) CONNIE SAY-2 WE-TWO FRIEND
✓ 'Connie$_i$ said that [she and her addressee] are friends.'
✓ 'Connie said that [you and I] are friends.' [Gan 2021: (8b)-(10b)]

While most of studies so far seem to confirm that (following e.g., Herrmann and Steinbach 2012 and Steinbach 2021) Role Shift can be signaled by a distinct set of RS-NMMs – an observation consistent with the data from numerous sign languages – examples such as (43)-(44), as well as our own results for the interpretation of IX_1 by Group 1 signers, suggest that RS-NMMs are not necessary for context shift to occur, thus rendering the Overt Operator Hypothesis adopted in §2 potentially too strong. Further research is therefore needed to assess the role and impact of RS-NMMs on interpretation in Role Shift constructions, especially when it comes to context-sensitive elements such as indexicals or *loci*.[21]

Declarations

The authors declare having no conflict of interest/competing interests. The data and files related to the experiment reported in §3 can be found on OSF at https://osf.io/958ux/?view_only=edeb265b8e2b4dd9a6a3390fea052d96. The authors contributed equally to the content of the article. The data was elicited by Author 2.

[21] Our theory makes the additional prediction that *loci*-specified IX forms should be interpreted as shifted under RS-NMMs, just like IX_1^{π} and IX_2. We leave the confirmation of this prediction to further research.

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