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Gabarro-López, Silvia; Meurant, Laurence; Hanquet, Nicolas

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Crossing Boundaries: Using French Belgian Sign Language (LSFB) and Multimodal French Corpora for Contrastive, Translation and Interpreting Studies

Sílvia Gabarró-López[1,2] ORCID Laurence Meurant[2] ORCID and Nicolas Hanquet[3,2] ORCID

[1] Pompeu Fabra University, Spain

[2] University of Namur, Belgium

[3] UCLouvain Saint-Louis Brussels, Belgium

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ABSTRACT

The French Belgian Sign Language (LSFB) corpus is the cornerstone of a unique multilingual data system in the world including four corpora. The first is a reference corpus containing dialogical LSFB data produced by deaf signers, which is also translated into written French, and the second one is a comparable multimodal corpus of Belgian French containing dialogical data produced by hearing native speakers. The other two corpora are made up of interpreted data, namely a parallel bidirectional corpus of LSFB - French data produced by hearing bimodal interpreters and another unidirectional parallel corpus of French > LSFB co-interpreted data produced by hearing and deaf interpreters working in tandem. This paper aims to describe these four corpora and to provide an overview of previous contrastive research drawing on their data and applications which have been developed so far. A new study contrasting reformulation structures in semi-spontaneous LSFB dialogical data and co-interpreted LSFB data is presented in order to exemplify how these corpora can be further compared to shed light on unknown issues to date such as the specificities of co-interpretation.

KEYWORDS

French Belgian Sign Language (LSFB), French, multimodality, corpora, contrastive studies.

Corresponding author. E-mail: silvia.gabarro-lopez@upf.edu, silvia.gabarro@unamur.be

1. INTRODUCTION

Signed language research started in the middle of last century (Stokoe, 1960; Tervoort, 1953; West, 1960). In the early stages, recorded data were viewed with the help of a video player and were transcribed using pencil and paper. Transcription was later done in word processing and spreadsheet software until the advent of annotation software in the 2000s (Vermeerbergen & Nilsson, 2018). Back then, data only featured one or few signers. Most of the time, signers narrated a story elicited by hearing researchers, but some spontaneous conversations were also recorded (e.g., Baker, 1977). Despite these limitations, this research laid the groundwork for the development of the field.

Similarly to what happened with contrastive linguistics in the 1990s (Johansson, 2012), the generalization of digitalization and the possibility of collecting large corpora revolutionized the study of signed languages. The collection of large samples of signed productions, representative of the language and its users, machine-readable and documented with relevant metadata (Johnston, 2010; McEnery & Wilson, 2001) resulted in dramatic changes of the research agenda in the field. The existence of modern corpora allowed scholars to move from introspective approaches to functional usage-based approaches, to focus on discourse aspects, to carry out sociolinguistic studies and the preservation of languages and cultures without a written tradition.

In French-speaking Belgium, the development of French Belgian Sign Language (LSFB, *langue des signes de Belgique francophone*) studies coincided with the collection of the first large machine-readable corpus for this language, namely the LSFB Corpus (Meurant, 2015). It was collected from 2012 to 2015 by a team of deaf and hearing researchers (see below Section 2.1). LSFB is the natural language of deaf and deafblind people from Wallonia (the southern region of the country) and the region of

Brussels. LSFB co-exists with French in these two regions, so communication between deaf LSFB signers and hearing non-signing speakers of French frequently takes place via bimodal LSFB-French interpreters. As a result, French and LSFB are not only naturally used as communication systems among speakers and signers respectively, but these two languages can also take the form of interpreted productions. In order to study this diversity, the LSFB Corpus was soon envisioned as the cornerstone of a multilingual data system including translated, LSFB and French productions. To the best of our knowledge, such an endeavor is unique in the world.

The objectives of this paper are threefold. First, we aim to describe the multimodal signed and spoken language corpora which have been (or are being) built around the LSFB Corpus. Second, we aim to summarize some results that have emerged from contrastive research drawing from the different corpora, as well as highlight certain applications and tools that have been developed. Third, we aim to exemplify what type of insights can be gained from contrasting available LSFB-related corpora, which have not been compared before. Each objective constitutes a section of this paper, which we conclude with an overview of the questions and directions that can be considered for future research.

2. THE FOUR CORPORA FEATURING LSFB AND FRENCH

The data system organized around the LSFB Corpus includes four datasets, namely the LSFB-French parallel corpus (Meurant, 2015); the FRAPé (Multimodal Spoken French) Corpus (Meurant et al., ongoing; Lepeut et al., in press), the CorMILS (Multimodal Corpus of Sign Language Interpreters) pilot project (Gabarró-López, 2018) and the parallel Co-interpretation Corpus (Hanquet et al., in press). Fig. 1 gives an overview of

the whole system of data, while the following subsections present each corpus separately.

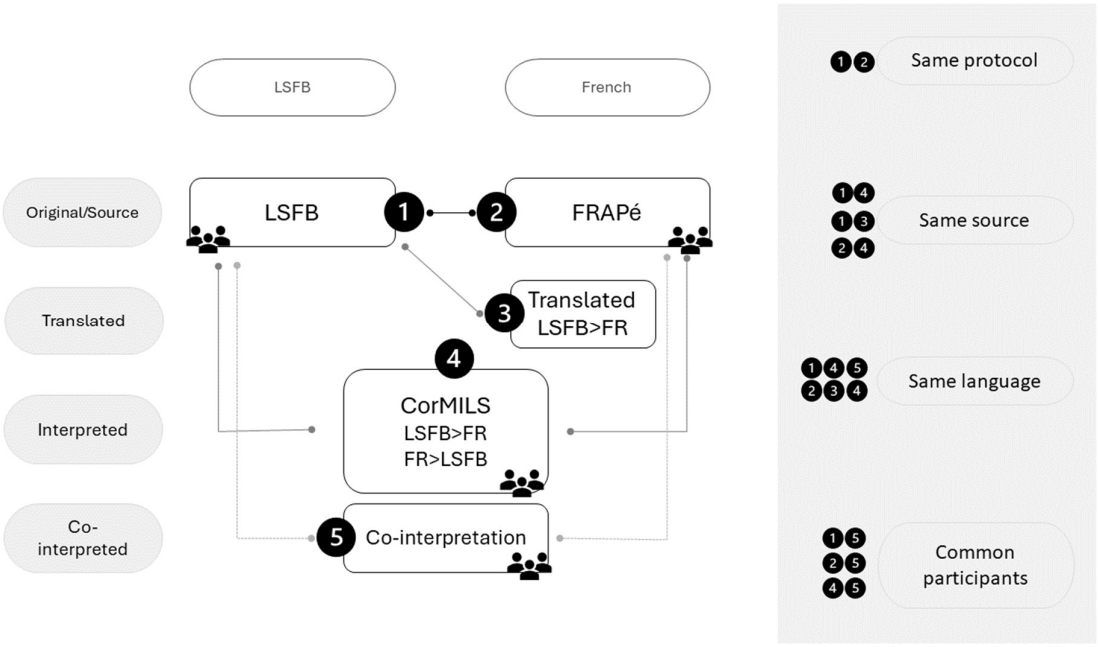

Fig. 1. Dataset overview

2.1. The LSFB Corpus and the LSFB-French parallel corpus

The LSFB Corpus (Meurant, 2015) is one of the representative, machine-readable, and open-access corpora that have been collected to date to document signed languages. Inspired by the pioneering initiatives devoted to Auslan (Australian Sign Language), NGT (Sign Language of the Netherlands), BSL (British Sign Language) and ISL (Irish Sign Language), the LSFB Corpus was designed and collected between 2012 and 2015, alongside the VGT (Flemish Sign Language), DGS (German Sign Language), PJM (Polish Sign Language) and FinSL (Finnish Sign Language) corpora.[1] Nowadays, the list of existing sign language corpora is longer and includes not only sign languages from Europe but also from other continents such as Asia and Africa (see Kopf et al.,

2022, for an overview of the existing digital resources for signed languages suitable for research).

The LSFB Corpus contains recordings of 100 deaf signers from different regions of French-speaking Belgium (www.corpus-lsfb.be). A balance was sought in terms of age, gender and region when recruiting participants. Signers were invited in pairs to a studio. A deaf moderator asked them to perform nineteen tasks aimed at eliciting different genres such as narrative, explanatory, descriptive, argumentative and conversational discourses. As illustrated in Table 1, the tasks covered both topics related to the deaf community (the first meeting with a deaf adult, school life, relations with hearing people, etc.) and topics unrelated to deafness, to promote lexical diversity.

Table 1. Tasks used for the LSFB Corpus recordings

Task	Aim of the task or question
1	Completing metadata files *(due to confidentiality reasons, the recordings of Task 1 are not available)*
2	Presentation and explanation of each signer's sign name
3	Childhood memory
4	Deaf or hearing: advantages and disadvantages
5	Good signing: what does this mean?
6	The influence of emotions on signing
7	Description of a procedure
8	Description of a journey
9	Explaining an image
10	Argumentation on conflictual societal topics (general topics)
11	Short story: a joke, the story of the cow and the horse, a comic strip or a short cartoon
12	Long story: Frog, where are you? (picture book) or Paperman (animated film): one signer tells the beginning of the story and the other one invents the end

13	Role play: Imagine that you have the opportunity to meet the major or the minister to convince him/her about... (different topics related to the deaf community)
14	Variations in LSFB: Do you understand young deaf signers? What about interpreters? What about deaf people from other regions? What are the differences?
15	Explain your hobby, your job, your passion: equipment, actions, movements, rules, etc.
16	Description of drawn faces
17	Classify the pictures and explain the criteria for your classification
18	Explain the differences between objects or similar tools
19	Conclusion: Discussion with the moderator about the tasks, the development of the session, etc.

As a result of these tasks, signers produced dialogues that were recorded by different cameras. Before the recordings, participants were asked to fill in an informed consent form as well as a metadata form. The annotation of the data was inspired by the Auslan corpus annotation guidelines (Johnston, 2019).

Most existing sign language corpora include translations into the respective ambient spoken language or into English. Following this convention, the translation of data from the LSFB Corpus into written French has been carried out by deaf and hearing professional interpreters and translators. As of now, 25 hours of LSFB data have been translated, encompassing 18,000 French sentences or 220,000 words. In order to ensure that the translations remained as natural as possible in written French, the translations were initially written in a text document, and were subsequently aligned by a professional translator with the videos using the ELAN software. Alongside the LSFB data, this collection of translations forms a unidirectional parallel corpus. An alignment

algorithm has been developed to synchronize the parallel data at the sign/word levels (see Meurant et al., 2016a).[2]

2.2. The FRAPé Corpus

The *Corpus de Français Parlé* (FRAPé Corpus) is made up of multimodal spoken Belgian French. The collection started in 2016 and is still ongoing. The FRAPé Corpus has been designed as the French counterpart to the LSFB corpus, allowing for contrastive research between LSFB and French to be developed. The recording setup and battery of tasks mirror those of the LSFB Corpus. So far, fifteen pairs of hearing French Belgian speakers have been recorded at the University of Namur, guided by a native French speaker. The only changes in the protocol, compared to the LSFB Corpus, are limited to the topic of certain tasks. For example, the conversation task about the relations between deaf and hearing people has been replaced by a task about the relations between Flemish and Walloon people in Belgium. Together, FRAPé and the LSFB Corpus, constitute one of the rare comparable corpora between a signed language and a spoken language, alongside the Marqspat corpus (Parisot et al., 2008) and the Auslan and Australian English Archive and Corpus (Hodge et al., 2019). Some spoken productions were transcribed following the Valibel guidelines (Bachy et al., 2007), whereas bodily activities have not been annotated. Consequently, each study using the FRAPé data has developed its own annotation system. To date, FRAPé has not been used to investigate multimodal French in itself, but only within contrastive studies (see below the Section 3).

2.3. The CorMILS pilot project

The CorMILS pilot project was collected in 2018 as a parallel corpus of LSFB and French interpreted data. Source texts were taken from the LSFB Corpus to be

interpreted into French and from the FRAPé Corpus to be interpreted into LSFB. Participants' monological renditions were recorded in the same studio where the other two corpora had been recorded. Because of the heterogeneous profiles of LSFB-French interpreters before the profession became a university degree in 2014, six final-year students of the Master in Sign Language Interpreting participated in the recordings. Although other corpora of signed language interpreters have recently been collected (Janzen et al., 2016; Nicodemus et al., 2017), none has been collected to achieve direct comparability with the corpora of non-interpreted data.

2.4. The Co-interpretation Corpus

The parallel Co-interpretation Corpus was collected during the Covid-19 press conferences given by the Belgian government and the Federal Crisis Centrum from 2020 to 2022. French > LSFB co-interpreting is a process in which a French speaker is interpreted into LSFB by a hearing interpreter who acts as a pivot or 'feeder' for the deaf interpreter, who in turn reformulates discourse in LSFB (Hanquet & le Maire, 2021). The latter is filmed live to appear on the same screen as the speaker on television and the internet. Therefore, the parallel Co-interpretation Corpus consists of the press conferences, which are publicly available (https://news.belgium.be/en/corona), the recordings of hearing interpreters behind the screen, and the final renderings by the deaf interpreters. This corpus features 12 different speakers, five hearing interpreters with various backgrounds and four deaf interpreters, and it covers different types of discourse genres. The scheme, supported by the Belgian federations for the deaf and on the initiative of hearing interpreters, allowed co-interpretation to take place in more than 200 conferences (Hanquet et al., in press). As far as we know, this is the first corpus of its kind given its size and the distinctiveness of this naturally co-interpreted data. The deaf interpreters' renditions are in the public domain and are not regulated by the

General Data Protection Regulation (GDPR). While the hearing interpreters consented to the collection and analysis of data, the recordings are not accessible to the general public to safeguard the interpreters' anonymity. Annotation efforts have primarily focused on the pivot interpreter's renditions, with the aim of comprehending the linguistic and interpersonal strategies employed by the team of hearing interpreters.

3. OUTLINE OF CONTRASTIVE STUDIES AND APPLICATIONS

Contrastive research including LSFB has so far drawn on semi-spontaneous and interpreted data, using the LSFB Corpus, the FRAPé Corpus and the CorMILS pilot corpus project. LSFB and multimodal Belgian French have been compared from the point of view of interaction (Lepeut, 2022; Lepeut & Shaw, 2022), prosodic marking of contrast (Lombart, 2021) and enactment, also referred to as 'constructed action', i.e., "a depictive communicative strategy whereby language users imitate referents in signed and spoken languages" (Vandenitte, 2022, p. 1). These studies make us reconsider how different signed and spoken languages are when comparable multimodal data are analyzed. For instance, Lepeut & Shaw (2022) show that there are no significant differences in frequency of use of some manual interactive markers, viz. palm-up (open hands with palms up) and index pointing, between LSFB and French, and Vandenitte (2022) points out that the differences in enactment cannot be automatically related to modality but are concerned with other factors such as sociolinguistic and cultural ecologies.

Semi-spontaneous LSFB and multimodal French data have also been compared with interpreted data from the perspective of reformulation structures (Meurant et al., 2022), which had been mostly investigated in written and oral data. Comparing data from the three corpora mentioned earlier in the previous section, this study provides evidence of

the pervasiveness of this type of structures and of the use of different semiotic repertoires employed by speakers, signers and interpreters. Gabarró-López (2023) compares reformulation structures in source LSFB dialogues and in the target French renditions produced by bimodal interpreters. Although fewer reformulation structures are found in target French than in source LSFB, these mechanisms are similar in form in both languages. Contrary to what was expected, interpreters did not copy signs from LSFB source discourse or use LSFB signs as co-speech gestures. Finally, palm-up gestures have also been compared in target LSFB and target French renditions (Gabarró-López, 2024). The analysis shows that palm-up is also polyfunctional and highly frequent in interpreted discourse, and that most functions can be found in both modalities regardless of the interpreting direction. Furthermore, this study provides evidence about interpersonal and intrapersonal variation in the use of this gesture.

One of the most outstanding applications of contrastive research, based on data from the LSFB-French parallel corpus, has been the development of the first ever bilingual and contextual dictionary bridging a signed language and a spoken language (Fink et al., 2023). This resource is freely accessible online (https://dico.corpus-lsfb.be/) since October 2022 and can be accessed by typing French words via keyboard or LSFB signs through webcam capture. Beyond the translation of the word or the sign, the dictionary provides the user with parallel examples (in LSFB and in written French) shown in the context. The contextualized examples are taken from the videos in the LSFB Corpus; the French translations are taken from the parallel corpus, made up of the alignment of these videos and the translations (see above Section 2.1).

This tool is designed primarily to meet the needs of students and teachers who continuously switch from one language to the other as part of their training or work. In

particular, the dictionary can be used to answer questions such as: how does this sign translate into French? Is there a better translation for this particular context? What is the difference in meaning or usage between these two French words? How should this term be expressed in LSFB, in this context? Is there a better way of expressing this term in LSFB? Moreover, it can serve as a support for interpreters or a translation memory for translators. In the field of linguistic research, this tool can help guide researchers more quickly to the data most relevant to their object of study, for example by giving them an overview of the variety of ways in which a given temporal value, syntactic structure or discourse marker is expressed in LSFB, or of the many ways a palm-up gesture in LSFB discourse is translated into French. It also enables any linguist who usually works on spoken languages to have access to LSFB productions, thus extending their field of investigation.

4. MORE POSSIBILITIES FOR CONTRASTIVE STUDIES: AN ILLUSTRATION

The existence of this multilingual and multimodal dataset creates an opportunity for numerous contrastive studies, enabling the revelation of characteristics in languages and language usage that have seldom been explored and continue to be relevant today, especially in the field of translation and interpreting. In order to exemplify these contributions, this section aims to delve into the benefits of comparing data from the Co-interpretation Corpus and the LSFB Corpus, shedding light on the unique aspects of language usage within a co-interpretation context.

In the context of the Covid-19 pandemic, the co-interpretation system was chosen in many countries to best reach the entire deaf-signing community and ensure that they properly understood the information and instructions given by the authorities in the current crisis situation. From the experience of both hearing and deaf interpreters, this

system seemed to be the most appropriate, the assumption being that the skills of a deaf interpreter were necessary to ensure that the on-screen message was as natural as possible and adapted to the wide variety of targeted interlocutors. Beyond these intuitions derived from experience, we still know little about what makes the specificity of the productions generated by the co-interpretation device as compared to the productions of a hearing interpreter working solo or to the spontaneous productions of signers in ordinary contexts.

The availability of the Co-interpretation Corpus and the LSFB Corpus opens up the possibility of investigating this second aspect, namely the ways signers adapt their signing to the constraints and the objective of clarity of co-interpretation. We will illustrate the interest of the comparative use of the two corpora by observing a sample made of the productions of the same signer across both contexts. More specifically, we will focus on the way she uses reformulations in semi-spontaneous conversation and in co-interpretation.

4.1. Reformulation

Reformulation is a prevalent mechanism in discourse that involves saying an utterance again in a different way, giving the opportunity for the speaker to adjust or clarify the message (Cuenca, 2003; Güllich & Kotschi, 1987; Murillo, 2016; Rabatel, 2017). Several functions can be achieved by a reformulation: it can be used to define, clarify, correct, repair and summarize the previous statement (Murillo, 2016). Reformulation covers all the cases where a speaker rephrases the words previously used, be it by himself or herself, by the interlocutor or any other participant in the communicative practice. This effort to rephrase offers overt indications of the ways speakers regulate their language use and their interaction according to the communicative context of their

social interaction (Meurant, 2022). Example 1 (see also Fig. 2) is drawn from a task in the LSFB Corpus where signers were asked to explain what constitutes good signing for them. The signer begins her response with a reformulation structure.

(1) <X>[SIGN-LANGUAGE VISUAL MORE] SAME <Y>[GIVE IMAGINE PT THERE][3]

'A sign language that is as visual as possible, like a language that helps me visualize.'

(Corpus LSFB_1205_00:00:08.090-00:00:13.226)

SIGN-LANGUAGE	VISUAL	MORE	SAME	GIVE	IMAGINE	PT THERE
<X>			marker	<Y>		
a sign language that is as visual as possible			like	a language that helps me visualize		

Fig. 2. Reformulation in LSFB (Example 1)

The phenomenon of repair, which is related to reformulation, has been studied in several works on different signed languages (e.g., Buyn et al., 2018; Manrique, 2016). Moreover, many studies have highlighted different resources and structures in signed languages that allow us to express something in multiple and diverse ways. However, reformulation has rarely been studied in signed languages as such. It has been shown that reformulations are prevalent in LSFB productions (Meurant & Sinte, 2016; Meurant et al., 2022). However, individual variation has been observed as regards the frequency of use of reformulations and the discourse genre. Narrations prompt fewer reformulation efforts than explanations, and in turn, explanations show fewer

reformulations than conversations. Among the diverse reformulation markers that have been identified in LSFB productions, one of them consists in the repetition of a sign or a sequence of signs from the first utterance to the reformulated one (Meurant et al., 2022). When looking at the way interpreters deal with reformulation, within the CorMILS dataset, Meurant et al. (2022) showed that interpreters produce fewer reformulations than LSFB signers and French speakers do in non-interpreted data. A part of their reformulations stems from the source message, but they also produce reformulations that are not present in the source discourse.

Given the search for clarity that co-interpretation aims to achieve, one might assume that the deaf interpreter's output will rely heavily on reformulations. Yet, since co-interpretation doubles the number of intermediaries compared to conventional interpreting, one can expect the time constraints to weigh even more heavily than for the interpreter working solo, and that, as a result, the final production in LSFB will contain fewer reformulations than those found in non-interpreting signers. Reformulations would then be confined to unfamiliar technical concepts or instructions of primary importance.

4.2. Methodology

The sample contains data produced by a single signer in two different contexts, namely as a deaf interpreter in a co-interpreted press conference on Covid-19 (namely the press conference of 1st June 2021), and as a participant to the LSFB Corpus, namely S083, discussing with a friend of hers (S084) what good or bad signing means in their view (Task 5). The co-interpreted data consists of a single segment, taken from the beginning of the press conference. The corpus sample is made up of four turns by S083, separated in the original conversation by S084's turns of speech, as well as by a few S083 own

short turns, which were excluded as they were too short. The total duration of the sample is 5 min. 44 sec (see Table 2).

Table 2. Distribution of data across the interpretated vs. non-interpreted productions

Corpus	**Duration**
Co-interpretation Corpus	2 min. 39
LSFB Corpus	3 min. 05

The same annotation template has been used for both parts of the sample and implemented in ELAN (Wittenburg et al., 2006). Besides the lines devoted to the sign glosses, specific lines have been created to systematically identify both segments of the reformulation structure, namely the first utterance (X) and its rephrasing (Y), as well as their respective markers.[4] Additional lines are devoted to the type of marker (i.e., a lexical marker, a palm-up gesture, a fragment buoy, namely a bimanual sign held by one hand while the other continues signing, from the X segment to the Y one, or a repetition), and to the type of adjustment reached by the act of reformulation. In line with Meurant (2022), four types of adjustment have been considered, inspired by the typology of metalinguistic comments of Authier-Revuz (1995). Speakers can reformulate their utterances (1) to adapt and adjust them to their interlocutor (e.g., *X or if you prefer Y*), (2) to adjust them to other utterances (e.g., *X or as some say Y*), (3) to adjust their words/signs to the referents they are trying to mention (e.g., *X or to say it better, Y*), or even (4) to reduce the ambiguity inherent in the words/signs, i.e. to adjust them to themselves (e.g., *X but in its original sense, more or less Y*). In Example 1 (see above), the signer reformulates her first utterance (X= 'a sign language that is as visual as possible') in order to make her signs more adapted to what she means, specifying what 'visual' means in her perspective (Y= 'a language that helps me visualize'), thus illustrating the third type of adjustment.

4.3. Results

The sample includes a total of 28 reformulation structures (i.e., X-Y combinations): 18 appear in the co-interpretation part and 10 in the conversation part of the data, which represents respectively an average of 6.8 vs. 3.2 reformulations per minute.

Counting only the reformulated parts of the reformulation structures, i.e., the Ys but not the Xs, the co-interpreted reformulations account for 1 min. 16 seconds of the total of 1 min. 51, which means 48% of the signing time. In conversation, the Ys represent 24 seconds out of the 3 min. 05, i.e., 13% of the considered turns. On average, the Y parts last 4 seconds in the co-interpreted discourse vs. 2 seconds in conversation. However, it must be considered that the signer signs more slowly when co-interpreting: on average, her signing pace is 20% slower in co-interpretation (158 signs/min.) than in semi-spontaneous conversation (200 signs/min.). Therefore, each Y part of a reformulation covers an average of 11 signs in co-interpretation vs. 8 signs in conversation (see a summary of these figures in Table 3).

Table 3. Overview of the average frequency, proportion and length of the reformulations

	Co-interpretation	**LSFB corpus**
Sample duration	2 min. 39 (159 sec.)	3 min. 05 (185 sec.)
Number of reformulations (X-Y) with marker	18	10
Frequency of reformulations (X-Y)	6.8/min.	3.2/min.
Total duration of reformulation structures (X-Y)	1 min. 51 (111 sec.)	52 sec.
Total duration of reformulation parts (Y)	1 min. 16 (76 sec.)	24 sec.
Average duration of a reformulation part (Y)	4 sec.	2 sec.
Proportion of reformulation structures (X-Y) /total time	70%	28%
Proportion of reformulation parts (Y) /total time	48%	13%
Average sign duration	0.38 sec.	0.30 sec.

Average sign pace	158 signs/min.	200 signs/min.
Average duration of a reformulation part	4 sec.	2 sec.
Average number of signs in a reformulation part (Y)	11	8

These figures offer an indication that the signer adapts her way of signing to the communication context. In the conversation sample drawn from the LSFB Corpus, the frequency of reformulations produced by the signer (3.2/min.) corresponds to the average frequency found in the same conversation task performed by four other signers in the corpus (see Meurant, 2022, p. 13). According to the sample considered here, the particular context of the co-interpreted productions (i.e., the objectives of the press conference, the informative genre, the importance of a good understanding of the instructions given, the diversity of the public) causes her to slow down her signing pace, and to use more and more extended reformulations. Fig. 3 shows the distribution and extent of reformulations within each sample considered.

a) Distribution and extent of reformulations (XY and Y alone) across the Co-interpretation sample

b) Distribution and extent of reformulations (XY and Y alone) across the LSFB corpus sample

Fig. 3. Distribution and extent of reformulations within each part of the sample (Co-interpretation and LSFB Corpus data)

Unsurprisingly, the reformulations found in the co-interpretation sample mainly show the signer making efforts to adapt her signs to the topic she is explaining, i.e., to adjust them to what she refers to (11 cases out of 18). In the other cases (6/18), the purpose of the reformulation is to get as close as possible to the audience (whom the signer cannot see), to limit the risk of the message not being properly conveyed. Example 2 illustrates this function: after mentioning the maintenance of health measures (X), the signer reformulates them by listing the measures (Y). In doing so, she calls on the audience's previous knowledge (‘you know’).

(2) <X> [NEAR FUTURE CONTINUE FOLLOW MEASURES] KNOW SAME FAMILIAR SO-FAR <Y> [DISTANCING HAND-WASH DIFFERENT FOLLOW MEASURES]

‘<X> [Over the next few days, we’ll continue to follow the measures] you know as we’re used to by now <Y> [distancing ourselves, washing our hands, etc., we follow the measures].’

(https://www.youtube.com/watch?v=ykYGGZcERRE_17:00-17:07)

The reformulations that adjust the signs to the referents appear in the information passages on the evolution of the epidemic curves, the vaccination rate or the calendar. They are marked by the repetition of a sign, and even more often the repetition of a

sequence of signs, from one part of the reformulation to the other: X and Y echo each other by sharing common signs. The reformulations aimed at adjusting to the interlocutor appear when giving instructions: remain cautious, look after those who have not yet been vaccinated, do not let up on safety measures too quickly, follow them, keep up the mask habit. They are marked by a repetition between the X part and the Y part, by a palm-up gesture or by lexical markers like IT-MEANS or KNOW, as in Example 2.

Within the conversational sample, the signer reformulates almost exclusively (8 cases out of 10) to adjust her signs to the referents, either by specifying or illustrating what she previously said. Only one reformulation structure is exclusively marked by a lexical marker (IT-MEANS). All the others (including one case of adjustment to the interlocutor and one case of adjustment of the signs themselves) are marked by a repetition between the first statement and its reformulation. A lexical marker may be used in combination with the repetition, as in Example 3 (see also Fig. 4), where the reformulation of X into Y is marked both by the sign SAME and by the repetition of NOTHING EASY.

(3) <X> [FOR LOOK-AT NOTHING EASY NO] SAME <Y> [HEARING LEARN SIGN LANGUAGE PT:PRO3 NOTHING EASY]

‘<X> [it’s not easy to get people to listen to you] like <Y> [for hearing people learning sign language, it’s not easy].’

(Corpus LSFB_4105_00:04:39.220-00:04:45.556)

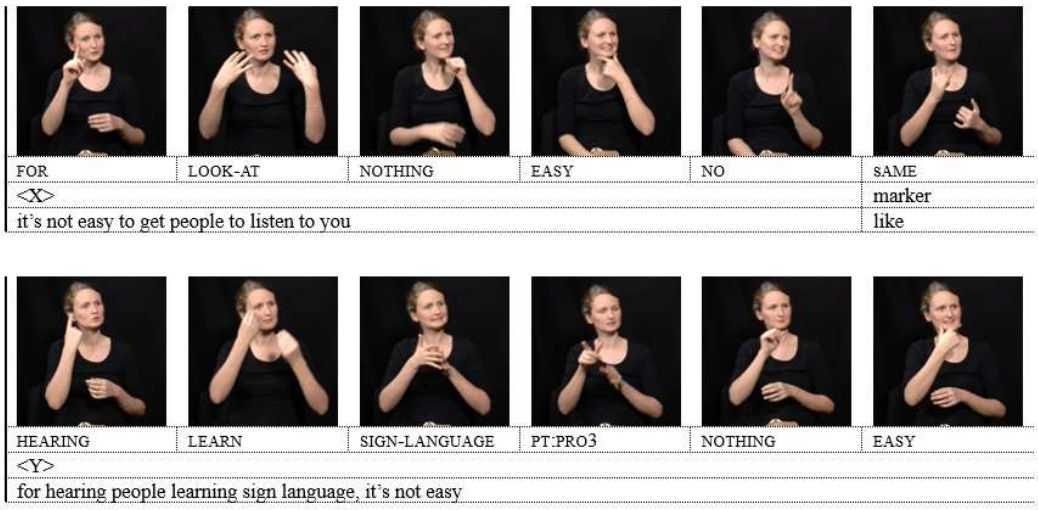

Fig. 4. Illustration of Example 3

As regards the type of adjustment and the marking of reformulation structures, the two data samples are therefore fairly similar. However, the co-interpretation sample stands out due to its notable use of repetition within the reformulations. In conversation, the repetitions that connect the two parts (X-Y) of the reformulations are made up of one sign, sometimes two, but in the context of co-interpretation, up to seven signs may be repeated from one part of the reformulation to the other. In Example 4, in which the signer communicates the instruction to remain cautious so as to protect people who have not yet been vaccinated, six signs are repeated.

(4) <X> [THINK WHO PERSON NOT-FINISHED VACCINE PT+++ NOT-FINISHED] EXAMPLE <Y> [INVITE HOUSE AT-HOME NO THINK ATTENTION WHO PEOPLE FINISHED VACCINE PT+++ WHO]

'<X> [it's important to think about people who haven't been vaccinated yet] for example <Y> [if inviting guests to your home, think about who has already been vaccinated].'

(https://www.youtube.com/watch?v=ykYGGZcERRE_17:32-17:40)

Significant portions of the signer's co-interpreted discourse consist therefore of repeated segments. In total, these segments constitute 21% of the sample's duration (34 seconds out of 159), in contrast to the conversation sample where they account for only 5% (9.5 seconds out of 185). This blend of frequent reformulations and extended segment repetitions imparts a distinctive character to the signer's co-interpreted discourse in comparison to her signing in the conversation sample.

In addition to the distinctive characteristics observed in the deaf interpreter's signing, one must consider the extent to which the reformulations she produces are connected to the presence of reformulation in the hearing interpreter's input and the source discourse. In other words, how much of the reformulation is interlingual, i.e., rooted in the input she receives and interprets, and how much is intralingual reformulation, i.e. reformulation that is not present in the input discourse and that she creates in her own production (Jakobson, 1963; Woroch, 2010). Of the 18 reformulation structures produced, 8 are intralingual ones, i.e. they do not appear in the hearing interpreter's input. This may correspond to two different cases:

a) The signer develops a reformulation of her own, from a single utterance by the hearing interpreter (which corresponds to a single utterance in the French spoken source discourse too), as in Example 5 (see also Fig. 5). The hearing interpreter's input is: 'But be careful, that means that half (of the population) has not yet been vaccinated'. On this basis, the deaf interpreter produces the following reformulation: 'But be careful, that means that out of the whole population, only half has received the vaccine; the other half of the population has not yet received anything'. The choice to develop this reformulation is accompanied by the choice to represent the relationship between the whole population and the half of it through an iconic (or

depictive) structure. The iconic structure is symmetrically repeated at the beginning of the X part and at the closing of the Y part of the reformulation sequence, which makes the whole construction totally genuine in LSFB.

(5) <X> [DS:LARGE-ENTITY DS:SMALL-ENTITY-ON-THE-LEFT HALF NOT-FINISHED] <Y> [FIRST TIME VACCINE FINISHED DS:AREA-ON-THE-RIGHT NOTHING DS:LARGE-ENTITY]

'<X> [out of the whole (population), only half has received the vaccine] <Y> [the other half (of the population) has not yet received anything].'

(https://www.youtube.com/watch?v=ykYGGZcERRE_16:29-16:34)

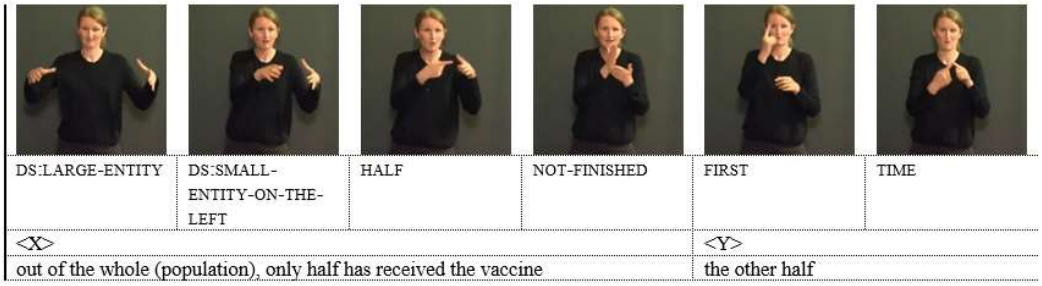

Fig. 5. Illustration of Example 5

b) The signer develops several reformulations from a reformulation already present in the hearing interpreter's input (as well as in the source discourse in spoken French). This case is illustrated in Example 6. The topic of this example can be summarized as follows: "Continue to be cautious, and in particular think about the vaccination status of the people you come into contact with". As the central theme of this part of

the speech, this idea is expressed several times by the source speaker and is the subject of several statements by the hearing interpreter. The particularity of co-interpreted output lies in the fact that this insistence takes the form of statements that reformulate each other and share long repeated sequences, the whole fragment being framed by the repetition of BACK-HEAD ('keep in mind').

(6) <Xa> [BACK-HEAD IMPORTANT <Xb> [THINK WHO PERSON NOT-FINISHED VACCINE PT+++ NOT-FINISHED] MEET NOT] EXAMPLE <Yb=Xc> [INVITE HOUSE AT-HOME NO THINK ATTENTION WHO PEOPLE FINISHED VACCINE PT+++ WHO] <Yc> [EXAMPLE WHO FRIEND CLOSE AT-HOME HOUSE WHO PT+++ FINISHED VACCINE> <Ya> [PT NOT-FINISHED CAREFUL MOVE-AWAY STILL SAME DISTANCE THERE BACK-HEAD]

'<Xa> [it is important to bear in mind that <Xb> [those who have not yet been vaccinated] avoid meeting them] for example <Yb=Xc> [before inviting people to your home, it's important to think about who has already been vaccinated] for example <Yc> [when inviting close friends to your home, think about who has already been vaccinated] <Ya> [with those who have not yet been vaccinated, it's important to remain cautious and keep your distance, it's important to keep this in mind].'

(https://www.youtube.com/watch?v=ykYGGZcERRE__17:26-17:44)

Even in the cases of interlingual reformulations (10/18), i.e., the reformulations which are already present in the hearing interpreter's input and which the deaf interpreter reproduces, it is striking to see that the signer adds repetitions which function as reformulation markers. The French discourse says: "Covid indicators are evolving in a

convincing way, with a decrease", and the hearing interpreter's input is: FIGURES EVOLVE GOOD BETTER BETTER CURVE-DOWN ('figures are evolving well, the curve is moving downwards'). In her final production, the signer adds a sequence of two signs: SEE APPEAR ('we can see'). As Example 7 shows, this sequence appears at the beginning of the first statement (X) and is repeated identically at the beginning of the reformulation (Y).

(7) <X> [SEE APPEAR SITUATION COVID-19 WHAT EVOLVE POSITIVE BETTER BETTER] <Y> [SEE APPEAR CURVE-DOWNWARDS TRANSMISSION DECREASE]

'<X> [we can see that the trend is positive] <Y> [we can see that the transmission curve is decreasing].'

(https://www.youtube.com/watch?v=ykYGGZcERRE_15:48-15:57)

These observations converge to illustrate that the use of reformulations is a key element in the signer's strategy to adapt her signing to the demands of co-interpretation in crisis situations. She adds reformulations to the source discourse she receives, expresses insistent statements through reformulation structures, elaborates on existing reformulations, and consistently relies on the repetition of signs and sign sequences. When compared to her conversational output, the main differences lie in the frequency of reformulations and the length of repetitions. However, commonalities persist between the two samples, particularly in the pragmatic function of reformulations (i.e., adjusting signs to referents) and their marking through repetition.

5. DISCUSSION

The sample used in this analysis is too small to draw generalizations from the figures presented above. The purpose of the comparison is limited to illustrating, through a case

study, the kinds of questions that can be explored by contrasting co-interpreted data with LSFB Corpus data.

Examining the use of reformulations, coupled with repetitions, provides valuable insights into the distinct features of co-interpretation language, in relation to language use in interaction. It appears that the signer observed here uses twice as many reformulations in co-interpretation as in conversation (where she is on a par with other signers of the corpus, see Meurant, 2022). Despite the time constraints associated with the system, she also seems to be careful to consolidate these reformulations with numerous repetitions, in order to ensure that she makes clear not only the central pieces of information in the press conference, but also the instructions that her interlocutors, on the other side of the screen, have to follow. The signer's use of reformulation and repetition mirrors what Donato (2003) and Wang (2012) have identified as an 'addition strategy', which allows interpreters to maintain the flow of discourse.

Extending this comparative approach to a broader and more diverse sample of signers and productions will contribute to the understanding of how deaf interpreters adapt their language use to the objectives and constraints of the co-interpretation setting.

6. FUTURE AVENUES OF RESEARCH

The multilingual dataset built around LSFB offers diverse research avenues in the realm of translation and interpreting. The interconnected nature of the available data is facilitated by the many shared features, allowing for meaningful comparisons. As illustrated in Fig. 1, the corpora share common collection protocols and types of productions across languages (LSFB Corpus vs. FRAPé), involve the same source material processed differently (LSFB Corpus vs. translated LSFB Corpus vs. CorMILS; FRAPé vs. CorMILS), use the same language in original, translated or interpreted

productions (LSFB Corpus vs. CorMILS vs. Co-interpretation Corpus; FRAPé vs. CorMILS), or feature the same individuals in different roles (LSFB Corpus vs. Co-interpretation Corpus; FRAPé vs. CorMILS vs. Co-interpretation Corpus).

These diverse points of comparison open up avenues for investigating the nuances of translation and interpreting through contrastive analyses grounded in empirical data. As illustrated above, the comparison between the Co-Interpretation Corpus and the LSFB Corpus has the potential to reveal the way in which LSFB signers, when acting as deaf interpreters within a co-interpretation team, adapt their signing to the constraints and objectives of this specific interpreting setting. Alternatively, by comparing the CorMILS data with those from the Co-interpretation Corpus, it would also be possible to highlight the specific effects of the co-interpretation device on the productions of the hearing interpreter. Furthermore, the specificities of LSFB-French translation compared to LSFB-French interpretation may be explored by comparing CorMILS data (LSFB>French) and translations from the LSFB Corpus.

With the emergence of corpora featuring original, translated, interpreted and co-interpreted content in both signed and spoken languages, such as the ones that are available for LSFB and French at the University of Namur, research in signed languages and sign language translation/interpretation can now be approached using the methodologies of corpus-based crosslinguistic studies and corpus-based translation studies (see Granger & Lefer, 2020). As a result, sign language studies can leverage and benefit from advancements and insights derived from contrastive methodologies, which promises to yield unprecedented perspectives on the linguistic challenges inherent in the diverse spectrum of sign language communication practices.

Notes

[1] For these different corpora, see: Johnston (2008) for Auslan, Crasborn et al. (2008) for NGT, Leeson & Saeed (2012) for ISL, Van Herreweghe et al. (2015) for VGT, Konrad et al. (2020) for DGS, Wójcicka et al. (2019) for PJM, and Salonen et al. (2020) for FinSL.

[2] The alignment algorithm is based on linking the sign-by-sign annotation of LSFB productions to the text of the translations, using the lexical database of the LSFB Corpus. The result of this alignment forms the basis of the bilingual and contextual dictionary presented in Section 3 (Fink et al., 2023). This alignment of LSFB productions and their translation into French, which includes not only the concordances found but also the areas of mismatch, offers an entry point for exploring LSFB data (Meurant et al., 2016b).

[3] In the examples, the signs are represented by the use of capitals. PT refers to pointing signs and DS to depicting signs. The use of '+' indicates that a sign is repeated. The two parts of the reformulation structure are delimited by square brackets preceded by <X> and <Y> respectively. The English translation of the example is given in quotation marks. The reference and timecodes of the signed extracts are given in brackets, enabling the reader to view the corresponding video, be it on the Corpus LSFB website, or on YouTube for the Corona press conferences.

[4] In line with Meurant (2022) and Meurant et al. (2022), only the reformulation structures that contain an explicit marker were taken into account. This makes it possible to compare the reformulation use of the signer under study with the signers investigated in the previous works.

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