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Lepeut, Alysson; Lombart, Clara; Vandenitte, Sebastien; Meurant, Laurence

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Make it a Double: The Building and Use of the LSFB and FRAPé Corpora to Study and Compare French Belgian Sign Language and Belgian French

Alysson Lepeut, Clara Lombart, Sébastien Vandenitte and Laurence Meurant

NaLTT, LSFB-Lab, University of Namur, Namur, Belgium

Abstract Linguistics has often relied on written language or on transcripts of oral data to make claims about language, overlooking signed language (SL) research and the multimodal dimension of spoken languages (SpL). This situation has resulted in a biased and incomplete understanding of language. In this paper, we report on the building and use of two directly comparable datasets of a SL and SpL, namely the LSFB Corpus and the FRAPé Corpus. After introducing the datasets separately in their respective research contexts, we present the theoretical significance of collecting and using directly comparable corpora of SpLs and SLs. We then highlight the extent to which directly comparable corpora can help overcome challenges in (SL) linguistics and gesture studies. With this aim in mind, we present comparative work conducted at the LSFB-Lab investigating the use of depiction, reformulation, prosody, and interaction management in LSFB and Belgian French. Finally, we point to potential cross-linguistic research avenues offered by corpora that capture language use in a directly comparable way.

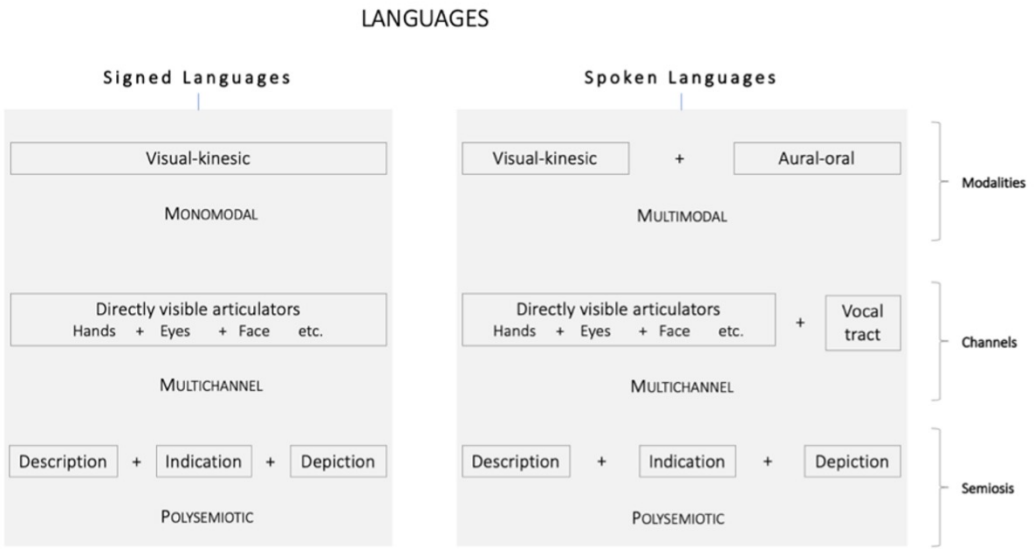
1 Introduction

The human ability to communicate through language is not confined to spoken words alone, but also involves the body (e.g. manual actions, facial expression and eye gaze). These resources form the core of signed languages (SLs) but are also frequently used in spoken languages (SpLs), i.e. in actions commonly labelled as ‘gestures’. However, the tight connection between language and the body has not always been evident to linguists. Traditionally, most accounts of language have drawn on observations from SpLs, primarily based on the analysis of writing or on transcribed examples of oral data (Linell 2011). Indeed, the development of modern linguistics as a scientific discipline from the late nineteenth century onwards centred on the phonological, morphological, and syntactic analysis of Greek, Latin and then, Western SpLs (Kendon 1986). The importance of writing in Western societies has led researchers to let written production define the perimeter of linguistics, leaving different aspects of situated language use aside (e.g. the use of bodily resources) (Vigliocco, Perniss and Vinson 2014). As a consequence, features deemed as arbitrary were considered a defining property of language (Martinet 1957). In this context, the visual components of speakers' productions in interaction, as well as the existence of SLs, long remained at the margins of the linguistic discipline (Kendon 2014).

Throughout several decades of research in SL linguistics and gesture studies, some terms have been used to refer to related, yet different phenomena (see Fig. 1). As a result, terminology in both fields and in cross-disciplinary work has become rife with ambiguity. In this paper, we refer to modality as the way through which communicative actions are produced and perceived. SL interaction may then be described as resorting to the visual-kinesic modality. By contrast, SpL use is multimodal: speakers employ both the visual-kinesic modality (when moving their bodies in meaningful ways to point, enact, or use gestures that manage interaction) and the aural-oral modality (when producing and hearing speech). This picture might be an oversimplification, as it essentially describes deaf/deaf signed interactions and hearing/hearing spoken interactions (see Kusters et al. 2017; Ferrara and Hodge 2018). However, it is useful to acknowledge the material differences between SpL and SL use to explore their potential consequences.

Keeping this distinction in mind, both SLs and SpLs may also be described as comprising multichannel communicative practices. Indeed, signers and speakers use different channels, including one's vocal tract or directly visible articulators such as one's hands, eyes, and face.

Fig. 1 Modalities, channels and semiosis in SLs and SpLs



Finally, SL and SpL use, independently of the channels and/or modalities involved, may be described as polysemiotic. Indeed, signed and spoken communicative actions rely on different semiotic modes or means of signalling (Clark 2016; Ferrara and Hodge 2018; Puuponnen 2019). Language users are well-known to describe, i.e. to conventionally encode meanings. However, there is a growing recognition that they also use two other means. First, they anchor referents in space and/or time, as in the case of indexical expressions or pointing. Second, they provide resemblance-based illustrations of what they mean, e.g. through the use of iconic gestures (e.g. representing the size or shape of an object with their fingers). In other words, in addition to describing, language users also indicate and depict meanings.

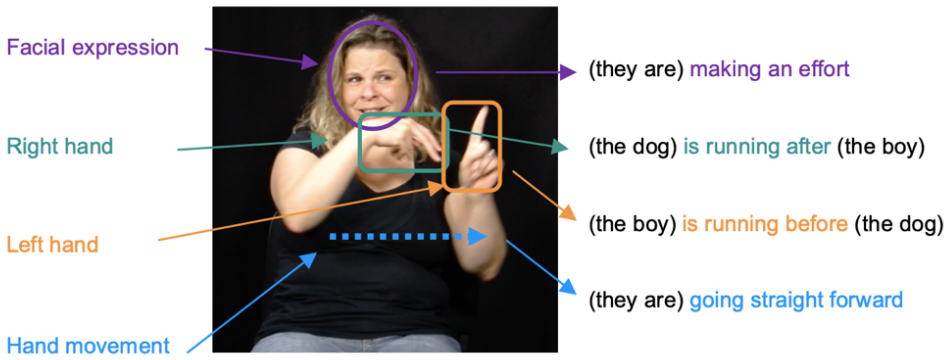
The remainder of this paper is organised as follows. In Sects. 2 and 3, we highlight important aspects of the history of research on SLs and on the multimodality of SpL use as well as some persisting theoretical and methodological gaps in each field. The present paper contributes to filling these gaps by reporting on the building and use of two directly comparable corpora, namely the LSFB Corpus (French Belgian Sign Language) and FRAPé Corpus (Belgian French, BF). It will be argued that these corpora enable researchers to go beyond traditional analyses of SpLs and SLs. Comparative research on SLs and SpLs is discussed in Sects 4 and 5. Finally, Sects 6 and 7 respectively introduce the limitations and applications of the LSFB and FRAPé corpora, while Sect. 8 concludes the paper.

2 The LSFB Corpus in the Context of SL Linguistics

SLs have struggled to be considered real languages and, to this day, some persistent misconceptions about SLs are that (i) SLs are universal, (ii) there is one SL per country or per SpL, or (iii) SLs are by nature less abstract than SpLs and therefore limited in terms of meanings they can convey (Vermeerbergen and Nilsson 2018). Yet, Stokoe's (1960) publication first brought linguists' attention to ASL (American Sign Language) and, subsequently, to other SLs. In his study, Stokoe argued that ASL signs could be broken down into smaller and meaningless components, i.e. handshapes, positions, and movements, just like SpL morphemes can be broken down into phonemes. After Stokoe's study, several researchers argued that similarities also extend to other levels of linguistic analysis, likening phenomena identified in SLs to morphosyntactic structures already described in SpLs (Sandler and Lillo-Martin 2006). For instance, ASL was described as a "highly abstract, rule-governed, combinatorial linguistic system" (Klima and Bellugi 1979: 318). Examples of morphosyntactic phenomena claimed to exist in SLs include classifier morphemes and verb agreement. SLs, deemed to be structured according to the same principles as SpLs, were sometimes forced into categories initially developed for (written) SpL phenomena. This tendency to establish similarities between SLs and SpLs was motivated by the need to legitimise SLs, thereby overlooking some of the characteristics that might have prevented their recognition (see e.g. Vermeerbergen and Nilsson 2018).

Although some pioneers had already expressed contrary views (e.g. DeMatteo 1977; Mandel 1977), it was only around 1985 that another way of approaching SLs gained momentum, moving away from an assimilation perspective. Researchers began to reanalyse some properties of SLs that had been previously likened to SpL morphosyntactic phenomena, e.g. the use of space, or whose importance had been minimised, e.g. iconicity (Vermeerbergen and Nilsson 2018). Some of these properties are illustrated in the LSFB utterance found in Fig. 2, translatable as: 'The dog chases the boy, they both quickly run in a straight line". To convey this process, which involves two referents, the signer relies on three different strategies: (i) the relative position and movements of the hands (i.e. use of space), (ii) the representation of a human with the left index finger and of an animal with the 'V' handshape (i.e. visual iconicity), and (iii) the signer's hand movements and facial expression showing the referents' effort and running speed (i.e. simultaneous use of articulators).

Fig. 2 Example of properties previously downplayed in SL linguistics: use of space, iconicity and simultaneity (LSFB Corpus, Task 12, S067: 00:03:00.005)



With the growing realization that SLs exhibit properties not found in SpLs (when the latter are conceived of as script or speech), scholars like Cuxac (2000) pointed out that traditional concepts and categories devised for SpLs fell short of capturing some key aspects of SLs. Hence, a 'sign language differential' approach, as coined by Karlsson (1984), became increasingly prominent (Vermeerbergen and Nilsson 2018). This paradigm shift coincided with the emergence of gesture studies. The increasing contact between gesture research and SL linguistics meant that more attention was drawn to the similarities between speakers' and signers' visual-kinesic communicative practices. Hence, traditional analyses of SLs have been gradually revised by considering that SLs may exhibit unique properties and/or characteristics found in speakers' gestures rather than in speech.

Yet another development in SL linguistics consisted in the emergence of documentary approaches to SLs in the 1990s, then more decisively from the 2000s onwards. The first collection of large samples of SL production was initiated in the USA as part of a sociolinguistic approach to ASL, particularly for the study of linguistic contacts within the American deaf community (Lucas and Valli 1989; Lucas et al. 2001; Quinto-Pozos 2002). Research on SLs had indeed been conducted using mostly intuition and observation of elicited monological discourse by a few individuals for the purposes of specific research questions rather than on more naturalistic, spontaneous, and authentic data featuring diverse discourse genres (Meurant, Sinte and Bernagou 2016). Making broad generalisations based on such data was problematic for several reasons. First, such samples do not constitute authentic language use, as they are intentionally produced for research purposes outside an interactional context. Second, as language use is subject to important genre-based variation, narrow language samples may not reflect the diversity of language practices across different contexts.

Relying on a few individuals also makes it harder to distinguish between individual preferences and patterns of language use shared by a larger group. This is crucial for many deaf signing communities. In past research, it was current practice to ask deaf individuals who acquired a SL from birth from their caregivers to act as informants (i.e. native signers). However, for many signing communities, this meant that the majority of signers were not represented. Indeed, as shown for ASL by Mitchell and Karchmer (2004), 90-95% (sometimes even more) of members of deaf signing (macro-)communities are not exposed to a SL in the context described above. Studies on several SLs have shown that factors such as differences in

the age of acquisition, affect multiple aspects of language use (Boudreault and Mayberry 2006; Cormier et al. 2012; Zorzi et al. 2022).

In summary, as long as the discipline focused on small and elicited datasets, our understanding of SLs ran the risk of being based on observations that might be inauthentic, relatively infrequent, or restricted to specific community members or discourse contexts. While these earlier approaches constituted an important first step, new corpus projects have since provided researchers with machine-readable datasets to investigate more authentic and diverse samples of SL use on a larger scale, thus enabling them to test, nuance, or revise past claims in a more generalisable and reproducible manner than prior methodological approaches (Fenlon et al. 2015; Fenlon and Hochgesang 2022).

Such corpora have documented varied SLs such as Auslan (Australian Sign Language, Johnston 2008), NGT (Sign Language of the Netherlands, Crasborn, Zwitserlood and Ros 2008), BSL (British Sign Language, Schembri et al. 2013), STS (Swedish Sign Language, Mesch 2015), VGT (Flemish Sign Language, Van Herreweghe et al. 2015), FinSL (Finnish Sign Language, Salonen, Kronqvist and Jantunen 2020), and DGS (German Sign Language, Konrad et al. 2020). In 2015, the LSFB-Lab published the LSFB Corpus online (Meurant 2015), the first large-scale and searchable corpus of LSFB.[1] This corpus provides a representative sample of the SL used in Wallonia and Brussels. In total, 50 dyads (100 participants) of native, near-native and late signers participated in the data collection.[2] Signers came to the studio in pairs. The only requirement for participating in the data collection was that they came with someone whom they knew well, such as a friend or a relative. They were asked by a deaf moderator to perform 19 semi-directed tasks (see Annex 1). The corpus amounts to approximately 88 hours of edited video material containing only the moments of actual exchanges.[3] The LSFB Corpus is further balanced according to different sociolinguistic factors, including acquisition profile, LSFB regional variant, and gender. By including the linguistic production of diverse signers, the corpus goes beyond the limitations imposed by studying only one profile (e.g. only native signers or signers using the same regional variant).

Furthermore, the LSFB dataset was designed independently of any specific research question and is adaptable to a wide range of research purposes. The diversity of the 19 tasks precisely aims precisely at obtaining various discourse types (narration, explanation, argumentation, conversation) and degrees of interaction (e.g. some tasks, such as narrations, are more monologic while others prompt dialogic interactions between participants). In addition, the tasks do not consist of short elicitations collected under experimental conditions but rather aim at generating the most spontaneous conversations (despite being collected at a university lab, see Section 6). As shown in Fig. 3, participants sat ¾ facing each other. Three different cameras were used (one for each participant and one filming the dyad) and recorded

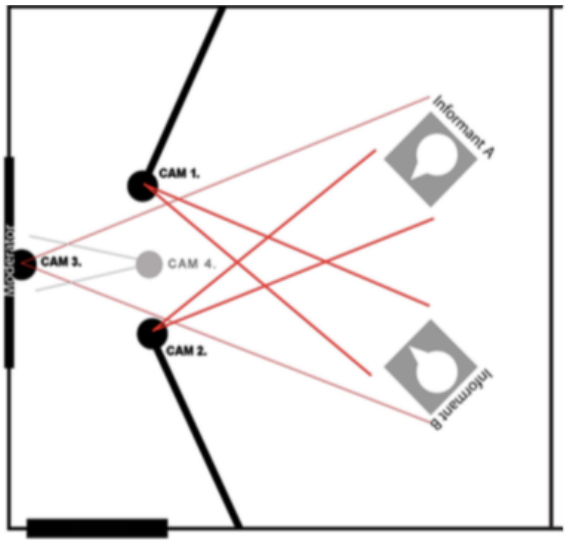
[1] https://www.corpus-lsfb.be

[2] In the LSFB Corpus project, participants were categorised in different acquisition profiles. Native signers have been exposed to LSFB from birth. Near-native signers have acquired LSFB at an early age (between three and seven years old), have been educated in a school for the deaf, and use LSFB to communicate daily. Late learners have learned LSFB after the age of seven or even at the start of adolescence (Meurant, Sinte and Bernagou 2016).

[3] In order to be able to query the LSFB Corpus, the dataset has been manually annotated through ID-glossing (Johnston 2010). To date, 27 hours of video have been annotated. Depending on specific research projects, a free translation or additional annotations have also been added (see Sect. 5).

movements of signers' bodily articulators (torso, head, facial expression, gaze, and lower half of the body).

Fig. 3 Recording setting in the LSFB Corpus (Meurant, Sinte and Bernagou 2016: 167)



In summary, SL corpora provide researchers with tools to assess claims which may have been biased by a focus on SpL and a reliance on small samples of few informants. SL corpora like the LSFB Corpus make it possible to re-examine language use in conditions more similar to naturalistic face-to-face interaction. These characteristics, combined with the large number of participants and the diversity of the data, make it an ideal dataset for a wide range of research directions, as outlined in Sect. 5.

3 The FRAPé Corpus in the Context of Gesture Studies

The conception of SpLs as being multimodal has now gained traction in the scientific community. However, the visual-kinesic aspects of SpL use have not always been deemed worthy of linguistic analysis.

Indeed, despite interest from classical rhetoricians (e.g. Quintilian's *Institutionis oratoriae*, first century BC) or early ethnographic work (e.g. De Jorio 1832/2000), multimodal facets of language have long been neglected by linguists. The nineteenth century research community downplayed the role of the body as a worthy object of linguistic inquiry. From the twentieth century until the 1970s-1980s, gestures were largely overlooked, as most researchers studying language gave precedence to written and spoken aspects of language and rarely paid attention to the visual-kinesic aspects. Indeed, manual actions, facial expressions, and bodily movements were often categorised as non-linguistic elements of communication and treated as separate from language proper (Müller et al. 2013).

However, contemporary linguistics has gradually been widening its scope by incorporating multimodality (McNeill 1992; Kendon 2004). As McNeill (2005) stressed, two major shifts triggered the rebirth of gesture studies by the end of the twentieth century. The first shift was initiated by Efron (1941). Efron's study on the gestures of Italian and Jewish

immigrants living in New York in the 1930s is often regarded as a turning point in gesture research as it focused on real-life examples of gestures accompanying speech. The second shift occurred with Adam Kendon's work. From Kendon (1972) onwards, more researchers started to investigate gesture and treat it as part and parcel of language (McNeill 2005), shedding light on the relation between gesture and concurrent speech. This shift from gesture outside language to gesture in language led to the field offering "new insights into the nature of speaking, thinking, remembering, and interacting" (McNeill 2000: 9).

While the tight link of gesture with speech has now been established, the concept itself remains a subject of debate. The multiple ways in which researchers have approached and defined gesture have led to different positions and categorisations in the literature (e.g. binary approaches vs. gradient approaches, Kendon 2014; Goldin-Meadow and Brentari 2017; Müller 2018). After becoming an important object of experimental research in cognitive psychology, more recent exploratory studies have also impacted the description and categorisation of the phenomenon (Cienki 2022). In addition, the concept of gesture becomes fuzzier when the phenomenon is approached from a perspective which aims at including SLs (see Kendon 2014 for a historical overview; Wilcox 2004). Indeed, the attempt to understand and describe language while doing justice to speakers' and signers' communicative practices, and thus to (re)define the very boundaries of what is considered linguistic, has been a key factor in bringing together a growing number of SL and SpL linguists. It has led researchers to raise crucial theoretical questions for the understanding of language and express the need to develop comparative studies of SLs and SpLs (see Sect. 4).

When used in the present paper, the term 'gesture' refers to all visual-kinesic bodily practices that speakers and signers use to communicate. Indeed, we follow other researchers (Dingemanse 2015; Kusters et al. 2017; Hodge and Ferrara 2022) in adopting a modality-agnostic view and recognising the importance of considering the semiotic diversity of signers' and speakers' bodily actions and speech in their multiple spatio-temporal contexts of interaction (see Sect. 4).

In addition to the theoretical challenges that pertain to the study of visual-kinesic aspects of communication, there are also certain methodological challenges. With technological advances in exploiting digital video data and the use of different types of annotation software (e.g. ELAN, ANVIL, Transana, and EXMARaLDA), several corpus projects that include not only sound but also video materials have been created over the years to analyse the multimodal aspects of speakers' utterances (see Allwood 2008; Paggio et al. 2010; Knight 2011; Brône and Oben 2015). However, due to the technical complexity and time-consuming nature of data preparation and processing, these multimodal SpL datasets remain relatively scarce in comparison to the abundant written and spoken data available, e.g. in the BNC Corpus. Moreover, these multimodal datasets often vary in size, with a limited number of participants or discourse types (e.g. narration vs. conversations), making it challenging to compare or connect results across different studies. All these aspects are problematic to some extent, as studies on SpLs have identified differences in the use of communicative practices among speakers based on the type of data and discourse (e.g. Léon 1993). Consequently, studies on the multimodal aspects of SpLs have faced similar theoretical and methodological issues as those identified for SL linguistics (see Sect. 2).

With the aim of addressing these issues, the collection of the FRAPé Corpus (*Corpus de FRAnçais Parlé* or *Spoken French Corpus*) contributes to the ongoing effort to document SpLs with data that enable the investigation of multimodal components of language practices (Meurant et al., in preparation). This corpus is still under construction, and to date includes videotaped data of 15 pairs of BF speakers from Brussels and Wallonia (approximately 20 hours of edited videos). Each dyad of speakers is filmed with the same recording protocol and conditions as those used for the LSFB Corpus (see Sect. 2). With a French-speaking moderator guiding their exchanges, the participants complete the same 19 semi-directed tasks as those presented in Annex 1. As is the case in the LSFB Corpus, dyads in the FRAPé Corpus are made up of people who are familiar with each other. The participants are selected gradually in order to achieve a balanced distribution of genders, age groups, and BF regional variants.[4]

Although it can be used for its own sake, and as a basis for multimodal studies of BF interactions or multimodal comparisons between different SpLs, the FRAPé Corpus was initially designed as a counterpart to the LSFB Corpus in order to facilitate comparative studies between LSFB and BF (Meurant, Sinte and Bernagou 2016; Lepeut et al., 2024). Together, the two corpora constitute a directly comparable dataset of face-to-face communication, serving as the basis for addressing the theoretical issues mentioned above through a contrastive linguistic approach.

4 Comparing Signed and Spoken Languages

The comparison of SLs and SpLs is not a new research endeavour. On the contrary, comparison has always been an underlying theme in the study of SLs, whether to highlight similarities to legitimise SLs or, conversely, to assert their uniqueness (see Sect. 2). However, comparability was more an issue or a means to support the ideological, theoretical, and pragmatic aims of SL linguistics rather a research object in its own right. Consequently, SL linguists' descriptions of potentially intriguing phenomena, e.g. the ways in which signers make use of space, the simultaneous use of several articulators, and iconicity (see Fig. 2), have rarely led SpL linguistics to renew its approach to language by questioning its theories and concepts (Steinbach 2021 mentions research on constructed action or role shift as an exception). As a result, the transfer and sharing of knowledge was a one-way street: while SL linguists were influenced by the approaches taken to account for SpLs, SpL scholars often failed to engage with SL research (Shaw 2019).

As mentioned in Section 3, the situation has changed with the development of gesture studies and the debates between SL and SpL linguists over the definition of gesture and its status in language (Goldin-Meadow and Brentari 2017; Ferrara and Hodge 2018; Müller 2018). For instance, Vermeerbergen and Demey (2007) highlighted the crucial issue of data comparability when studying SLs and SpLs. The authors questioned the common assumption that all of signers' manual actions should be considered strictly linguistic and could not be likened to speakers' gestural behaviour. Instead, Vermeerbergen and Demey analyse specific VGT

[4] The FRAPé Corpus is still in its first stage of annotation as the transcription of the data began only recently. However, the various studies based on this dataset have also applied annotation schemes relevant to their respective research goals (see Sect. 5).

phenomena by stressing the importance of comparing SLs and SpLs by taking into account the multimodal aspects of SpL use:

> [W]e would also like to suggest that when the communication of signers and speakers is being compared, it is speech in combination with (co-speech) gesture – and not speech by itself – that constitutes the appropriate level for cross-linguistic analysis. Thus, we state that human communication, in signers and speakers alike, should be seen as a primarily multi-channel activity." (Vermeerbergen and Demey 2007: 279).

Since 2010, this new type of comparison between a SL and its ambient SpL has begun to emerge. Some researchers have used existing samples of either a SL or a SpL, which they have supplemented by collecting similar data in the other language (Quinto-Pozos and Parrill 2015; Fenlon et al. 2019). Others have exploited two previously existing datasets which were constructed under different circumstances and for different purposes (Barberà and Zwets 2013), or have relied on parallel rather than comparable corpora (Ebling 2016).[5]

However, several researchers have recently started collecting SL and multimodal SpL datasets for comparative purposes (Parisot et al. 2008; Earis and Cormier 2013; Hodge et al. 2019; Shaw 2019; Morgenstern et al. 2021). This kind of dataset was first constructed by Parisot et al. (2008), who collected (essentially narrative) data in English, French (from both Quebec and France), ASL, LSQ (Quebec Sign Language), and LSF (French Sign Language). Hodge et al. (2019) present an innovative dataset enabling the comparison of Auslan and its ambient SpL, Australian English. Recorded with the same filming conditions, five pairs of participants in each language performed the same set of tasks. The Dinlang Corpus is another example of a comparable bilingual dataset. It gathers conversations recorded in LSF and French at the participants' homes during family dinners. The aim is to compare the different resources activated in signing and speaking families under the same recording conditions (Morgenstern et al. 2021).

One of the major challenges for comparative studies is ensuring the comparability of the setting, topics, and language practices (McEnery and Hardie 2012; Hodge et al. 2019; Granger and Lefer 2020). Indeed, we know that variables such as the recording conditions (e.g. the number of participants, their position in space, the presence of chairs and/or tables, the presence of a moderator or the lighting and cameras), the selection of informants (e.g. their degree of mutual familiarity, their linguistic and socioeconomic profile, or whether or not they have language-centred occupations), and task design (e.g. whether a production is rehearsed or spontaneous, the degree of interaction, the discourse genre elicited, or the subject of the task) influence the ways in which informants use their bodies, what they say, and how they interact (Van Herreweghe and Vermeerbergen 2012).

The construction of the FRAPé Corpus, as a French-speaking counterpart of the LSFB Corpus, is part of this search for comparability. The high degree of similarity between the LSFB and FRAPé corpora firstly lies in the setting. The studio, seating arrangements, and camera setup are similar in both corpora (except for the fact that the FRAPé Corpus collection involves the use of microphones to record the participants' speech), see Fig. 3. In both corpora, the dyadic

[5] A parallel corpus is "a collection of texts in one language and their translations into one or more languages" (Granger and Lefer 2020,167).

exchanges are guided by a moderator. Comparability is also ensured through the use of the same tasks in both datasets (with minor language- or culture-related adaptations). The 19 tasks carried out by the participants in both corpora were designed to elicit diverse discourse types and degrees of interaction and to prompt spontaneous conversations rather than heavily controlled language use, as would be the case with short elicitation tasks (see Sect. 6 for limitations).

A large comparable dataset of LSFB and (multimodal) BF makes it possible to carry out corpus-based contrastive studies, combining the advantages of corpus analysis with the insights gained from cross-linguistic comparison (Granger and Lefer 2020; Gabarró-López and Meurant 2022). This comparable corpus has been built to advance linguistic research towards a more comprehensive understanding of linguistic practices, and a better grasp of the different ways in which language use is embodied and organised across the different modalities, channels, and semiotic repertoires that are available to the interactants (see Fig. 1), an endeavour that has been called for by an increasing number of researchers (Vermeerbergen and Demey 2007; Ferrara and Hodge 2018; Müller 2018; Perniss 2018).

In line with this methodological approach, the comparative semiotic research agenda and its modality-agnostic perspective (see Sect. 3) seem particularly relevant to this holistic investigation of both signers' and speakers' communicative practices. Building on Peirce's (1955) semiotics, a growing number of researchers assume that linguistic productions are fundamentally composite (Enfield 2009), i.e. the result of a combination of different meaning-making strategies (see Sect. 1). These researchers acknowledge that all channels may potentially describe, indicate, and/or depict meaning (Clark 2016; Ferrara and Hodge 2018; Dingemanse 2019; Puupponen 2019). Hodge and Ferrara (2022: 4) describe some research avenues for the emerging field of comparative semiotics:

> This is the aim of comparative semiotics, whereby various aspects of language and communication are compared across interactions, modes of communication, and languages (Kendon 2008, 2014). In doing so, we can move beyond essentialist dualisms of 'signed vs. spoken languages', 'aural-oral vs. visual-gestural modalities', 'iconicity vs. arbitrariness', and 'convention vs. improvisation' to build a richer understanding of all our commonalities and differences, including how and why these emerge.

In developing a directly comparable corpus of LSFB and multimodal BF, we aim to build a reliable tool for contrastive linguistic research that fully acknowledges semiotic diversity and also takes into account the multimodal nature of SpL use. Due to the design of the collection project, this directly comparable corpus makes it possible to carry out a wide range of research, from lexicon to discourse and pragmatics. Some examples of comparative research carried out using the LSFB and FRAPé corpora are provided in the next section.

5 Examples of Studies Based on the LSFB and FRAPé Corpora

Building directly comparable corpora such as the LSFB and FRAPé datasets enables us to tackle some recurrent issues in the literature, e.g. by nuancing or revising wide-held assumptions that some phenomena are unique to either SpLs or SLs. In the present section, we illustrate four different research applications of the two comparable corpora in the following areas of SL and

SpL functioning and use: depictive meaning-making strategies (Vandenitte 2023, 2024), discourse progression in the form of reformulation (Meurant et al. 2022), prosody and information structure (Lombart 2021), and interaction management (Lepeut 2020, 2022).

5.1 Examination of Language Facets often Deemed Specific to SLs

Some SL linguists have described phenomena such as depiction and the simultaneous use of articulators as specific to signers' communicative practices. The directly comparable nature of the LSFB and FRAPé corpora makes it possible to shed light on properties that may have been downplayed in the absence of comparable multimodal SpL data. For instance, in a recent study, Vandenitte (2023) has compared how LSFB signers and BF speakers use constructed action (CA), i.e. use their body and/or voice to enact referents and their actions, their thoughts, utterances, and affect (Cormier, Smith and Sevcikova-Sehyr 2015). This strategy is illustrated for LSFB in the green rectangle in Fig. 4, where the LSFB signer enacts a superior spying on an employee from his office.

Fig. 4 Example of CA in LSFB (LSFB Corpus, Task 12, S059: 00:05:27.888–00:05:29.798)

right hand: BOSS LOOK LOOK DOOR
left hand: DOOR
translation: 'His boss is looking at him, he's leaning backwards on his chair and watches him from behind the door'

Figure 5 illustrates the use of CA by a BF speaker. The words co-occurring with the token of CA shown in Fig. 5 are enclosed in double brackets '[[ ]]' in the BF utterance and the English translation.

Fig. 5 Example of CA in BF (FRAPé Corpus, Task 5, L001: 00:04:57.928–00:05:00.836)

French utterance: C'est pas grave. Nous, on est parfois [[trop dedans et on voit pas]], on voit plus [...]
translation: 'That's no big deal. Even we [[get lost in it and we can't see]], we can't see anymore [...]'

In some traditional accounts in SL linguistics, CA has been described as largely specific to SLs. However, as Vandenitte (2022) shows, some gaps and unquestioned assumptions remained in past research on CA, e.g. a lack of directly comparable datasets and a focus on narration to the detriment of other discourse types. An increasing number of researchers have recently defended the comparison of speakers' and signers' CA practices as a fruitful research agenda, notably by carrying out systematic comparisons on larger, more authentic and/or diverse datasets (e.g. Liddell and Metzger 1998; Earis and Cormier 2013; Quinto-Pozos and Parrill 2015; Parisot and Saunders 2022; Vandenitte 2022; Hodge et al. 2023). It is thus now possible to reassess claims on how speakers and signers use CA. In line with this perspective, Vandenitte (2023, 2024) sheds light on similarities and differences in two aspects of CA in BF and LSFB: (i) its frequency, (ii) the articulators that contribute to the depiction, and (iii) the distribution of degrees of CA. By comparing larger, more diverse, and authentic samples from comparable corpora, research on CA can move past theoretical and methodological challenges towards a better understanding of the phenomenon in both SLs and SpLs.

5.2 Examination of Language Facets More Studied in SpL Research

Directly comparable corpora also allow to further examine certain facets of language that have received more attention in SpL than in SL research, such as the use of reformulation (Meurant, et al. 2022). Reformulation only began to be examined by linguists since the 1980s when the study of recorded speech became possible (Gülich and Kotschi 1983). The phenomenon, however, has not been extensively addressed in SL research, nor indeed in studies on the multimodal aspects of SpLs. Previous studies on SLs (e.g. Cuxac 2007; Meurant and Sinte 2016) have underlined that the available alternation between saying by showing, i.e. depiction, and saying without showing, i.e. description, constitutes a resource for reformulation that is abundantly exploited by signers, as shown in Fig. 6. The second still (<X>) displays the discourse segment that is reformulated in stills 3-6 (<Y>). The reformulation involves both depictive (i.e. DS:LONG-SHAPE) and descriptive (i.e. BEE, WITHIN, and HOUSE) semiotics.

Fig. 6 Example of a reformulation in LSFB (LSFB Corpus, Task 12, S068: 00:01:13.371–00:01:18.395)

Hands	TREE	DS: oblong-shape	BEE	WITHIN	HOUSE	DS: long-shape
Reformulation parts		<X>	<Y			Y>
Translation	There's an oblong object in the tree [a beehive], the thing where bees make their home					

Meurant, Sinte and Gabarró-López (2022) carried out the first comparative study of reformulation in a SL and its ambient SpL exploring how LSFB signers and BF speakers use this phenomenon in different text types, i.e. conversations, explanations, and narrations. Their results indicate that speakers, similarly to signers, make extensive use of the combination of description and depiction when they reformulate, and that reformulation is not necessarily a linear phenomenon, as shown in Fig. 7 for BF.

Fig. 7 Example of a reformulation in BF (FRAPé Corpus, Task 09, L002: 00:00:04.120–00:00:09.310)

French sentence	en fait ça joue sur euh l'illusion d'optique	c'est-à-dire que	euh il y a deux perspectives
Reformulation structure	<X>	marker	<Y>
Translation	so it plays on uhm optical illusion	that is to say that	uhm there are two perspectives

During the first utterance (<X>), the speaker performs a hand movement in which the handshape (index finger and thumb spread apart) and repeated movement (left and right rotation of the wrist) depict an alternation between two perspectives. This gesture is interrupted during the marker 'that is to say that' before being resumed during the reformulation (<Y>). The repetition of the same manual action from the first utterance to the reformulated one underlines the equivalence relation established by the speaker between the two constituents of her reformulation.

Meurant, Sinte and Gabarró-López's (2022) study also sheds light on some differences in the articulators used by signers and speakers for reformulation through description vs. depiction. Among BF speakers, the descriptive and depictive modes are unequally distributed across articulators: the voice is preferably used for describing and the hands for depicting. Conversely, despite a greater tendency for non-manuals to have a depictive rather than a descriptive role, bodily articulators in LSFB exhibit more versatility and are less bound to one semiotic mode or the other.

Because it combines redundancy, reflexivity, and a search for clarity, the act of reformulation offers a window onto language users' strategies of processing and adjusting their discourse. Comparing LSFB and BF productions reveals that signers and speakers both rely on semiotically complex utterances in reformulating discourse, but it also highlights differences between signers' and speakers' strategies.

5.3 Using Data to Challenge Wide-Held Assumptions about SpLs and SLs

In line with the two studies mentioned above, comparable datasets of a SpL and SL make it possible for scholars to empirically (re-)assess widespread beliefs about a broad range of phenomena often deemed outside the realm of language proper, i.e. the tight link between speech, speakers' visible bodily actions and SLs.

From this perspective, using the FRAPé and LSFB dataset, Lombart (2021, 2024) investigates the oral, manual and/or non-manual markers that LSFB signers and BF speakers exploit to prosodically encode information structure (IS) and more specifically, an information unit called 'contrastive focus'.[6] This approach allows us to include visual facets of BF that are not investigated when only speech is considered (but see Brown and Prieto 2021). Such features include some well-known SL prosodic cues, e.g. body leans and eye gaze (see Wilbur 2012; Kimmelman and Pfau 2016, 2021 for reviews), that have not been extensively investigated in SpLs. Indeed, most research on multimodal prosody in SpLs has focused on manual actions, leaving non-manual cues aside for the most part (Ambrazaitis and House 2022). In this way, research based on comparable corpora can shed light on the importance of non-manual markers in SLs and SpLs, as illustrated in Figs. 8 and 9 where body leans are used in similar contexts. Moreover, most SpL studies have focused on one type of form-function pairing (vocal prosody + IS or gesture + IS), while research on IS, vocal prosody, and gesture remains scarce. The same is true of SLs: even though IS and prosody have been studied in some SLs, the topic remains understudied in others such as LSFB.

Fig. 8. Example of a forward body lean during a contrastive focus in LSFB (LSFB Corpus, Task 15, S041: 00:06:25.316–00:06:26.606)

[6] In this paper, we define contrastive focus as the opposition between several explicit alternatives that form a limited set of possibilities (e.g. Repp 2016).

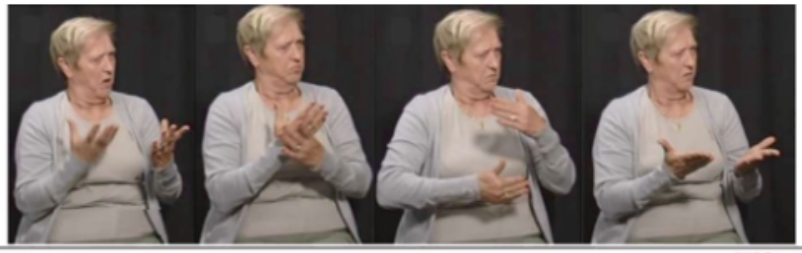
Fig. 9 Example of a forward body lean during a contrastive focus in BF (FRAPé Corpus, Task 9, L002: 00:01:24.231–00:01:25.880)

	
Body leans	lean-forward
Contrastive focus	CF
French utterance	Monsieur Bricolage©, c'est pas alimentaire
Translation	'Monsieur Bricolage©, it's not a food store'
Context	the same speaker says just before 'I see food stores uh Carrefour© and Colruyt©'

The functioning of the building blocks of social interaction, e.g. the turn-taking engine, has also been largely disregarded in multimodal SpL and SL research in comparison with other linguistic aspects, e.g. the lexicon and morpho-syntactic structures (see Sect. 1) (but see Lepeut and Shaw 2024).

From the same comparative perspective, Lepeut (2022) examines the interactional potential of certain bodily actions, such as the Palm-Up gesture (PU; see Fig. 10 in LSFB and Fig. 11 in BF) and pointing actions, in spontaneous dyadic face-to-face conversations of LSFB signers and BF speakers.

Fig. 10 Example of a PU in LSFB serving a turn-giving function (LSFB Corpus, Task 04, S001: 00:00:00.475–00:00:06.209)



Hold				(799ms)
Hands	HOW	HAPPEN	EVOLVE	PALM-UP
Translation	'How did it go for you?'			

Fig. 11 Example of a PU marking shared knowledge (common ground) between speakers (FRAPé Corpus, Task 20, L006: 00:04:09:234–00:04:09:823

Palm-up	PU	
French utterance	(.) et puis après j/on/ou quand	on va promener les chiens
Translation	'(.h) and then after I/ we/ or when	we take the dogs for a walk too'

Lepeut's (2020, 2022) results highlight how social interaction can be viewed as a situated and mutual achievement led by participants in face-to-face conversations. Specifically, drawing on data from the LSFB and FRAPé Corpora, the results indicate several intra- and inter-linguistic differences in the frequencies of manual markers as well as similarities in their interactive functions. While PU frequencies do not show any clear distinction between LSFB signers and BF speakers, a difference can be identified regarding the form and use of pointing actions (Lepeut and Shaw 2022). Nevertheless, when analysed for their respective interactive functions in SpL and SL discourses, both forms perform similar roles. Signers mainly use PU and index pointing for turn-taking regulating purposes, whereas speakers perform these moves to manipulate the content of the information conveyed, i.e. for delivering new and shared information.

Overall, using a direct comparison of the bodies in signed and spoken discourse, Lepeut's research underlines the different strategies that LSFB signers and BF speakers use depending on contextual and interactional demands. The LSFB-BF comparison reveals that interactants make choices in dialogic situations and continuously deploy

bodily practices that correspond to their (and their addressees') needs as the conversation unfolds.

5.4 Intermediary Summary

Using the LSFB and FRAPé datasets, several research projects comparing diverse communicative practices in SLs and SpLs have been carried out. This directly comparable corpus enables researchers to better inform language theory by investigating or re-examining the joint contribution of different channels and semiotics to diverse aspects of language use. Thus, not only do directly comparable corpora address important questions about SLs and SpLs separately, but they also hold the potential for a more coherent and comprehensive understanding of language functioning, structure, and use. The next sections address the limitations of the LSFB and FRAPé corpora (Sect. 6) as well as their applications (Sect. 7).

6 Limitations of the LSFB and FRAPé Corpora

The LSFB and FRAPé corpora present certain limitations that are worth mentioning. First, because many SpL and SL corpus compilers seek to include ever larger amounts of videotaped data, the collection process often takes place in a recording studio, i.e. an unfamiliar setting in which the participants are initially aware of cameras and of the presence of the moderator guiding the exchanges (Schembri et al. 2013; Fenlon and Hochgesang 2022). This bias applies to the LSFB and FRAPé corpora too. While the setting facilitates "the high-quality recording of all aspects of multimodal communication" (Hodge et al. 2019: 5), future research should be encouraged to collect language data in more natural settings (see Shaw's 2019 data in ASL and American English during a game night and Morgenstein et al. 2021 for data in LSF and French during family dinners).

In addition, while it is common for participants to be asked to converse in dyads (as in the LSFB and FRAPé corpora), this often means that less is known about language use in multiparty interactions (but see Shaw 2019 or Beukeleers 2020 for exceptions). While Beukeleers' (2020) study took place in a university lab and addressed VGT, Shaw (2019) analysed the bodily practices deployed in the natural interactions of ASL signers and American English speakers in their homes while playing *Guesstures*, i.e. a game similar to charades. Shaw's corpus-based approach is instructive given the contrastive perspective adopted along with the ecological nature of the data (see also Morgenstein et al. 2021). Incorporating multiparty interactional data to complement existing corpora such as the LSFB and FRAPé datasets will enable future research to either confirm or re-evaluate claims predicated on dyadic interaction studies.

Another shortcoming arises from the time-consuming annotation of the multimodal SpL and SL discourse (between 20 and 60 hours of work per hour of video, according to Tellier 2014; see also Wille et al. 2022). A considerable part of the workload when analysing filmed data is dedicated to manually annotating bodily articulators – most often the hands, but also non-manuals – in both SpLs and SLs. This is due to the absence of automation in the annotation process (but see Kimmelman et al. 2020 for the use of *OpenPose* to analyse eyebrow position in Kazakh-Russian SL). Consequently, despite following strict data collection protocols with specific criteria, e.g. a rigorous sampling procedure, the fact remains that "corpus-based analyses have often been conducted on a much smaller portion of corpora" (Fenlon and Hochgesang 2022: 6) – but see the next section for a possible solution).

Another limitation of the directly comparable dataset lies in the conclusions that can be drawn from it. The comparison of a given SL and its ambient SpL does not systematically inform us about the factors that could explain the results (Vandenitte, 2022). Indeed, potential differences observed in the two datasets may be attributable to language- or culture-specific norms (LSFB vs. BF) that do not necessarily apply to other signed or spoken languages. Implementing and conducting more direct comparisons involving multiple pairs of diverse SL-SpL corpora could potentially elucidate the factors that contribute to the observed similarities and/or differences.

Despite the limitations of the LSFB and FRAPé corpora, additional directly comparable datasets of this kind will provide more reliable grounds for making comparative claims about SLs and SpLs based on situated language use. The next section introduces various applications that can be derived from the LSFB and FRAPé corpora.

7 Applications of the FRAPé and LSFB Corpora for Future Research

Information drawn from the FRAPé and LSFB corpora could be used in several ways. Research highlighting similarities and differences between BF and LSFB could support efficient responses to language needs in LSFB-BF bilingual contexts, e.g. for professionals such as LSFB or BF teachers and LSFB-BF interpreters/translators. Indeed, BF and LSFB exploit resources similar in terms of form, e.g. using the same bodily articulators, and/or function. These resources can be capitalised on and transferred from one language to the other, e.g. SL manual signs and non-manual resources also found in SpL use (e.g. Casey and Emmorey 2008; Brentari et al. 2012). Therefore, understanding similarities and differences of both SpLs and SLs gives professionals the tools to identify shared resources and to exploit them in teaching and training programmes.

Furthermore, thanks to technological advances, there will be more possibilities for the automatic recognition and processing of SL and multimodal SpL data. For instance, new technologies in artificial intelligence developed for SLs may further be applied to the study of

multimodal SpL use. A good case in point is the construction of a searchable contextual dictionary[7] based on the LSFB Corpus.[7] Designed along the same lines as Linguee or Reverso, this dictionary supports queries from LSFB (by signing to the camera) to BF or from BF (by typing the word) to LSFB. It is based on an artificial intelligence that can also be exploited for the automatic identification of visible bodily action (see Fink et al. 2021 for more details), potentially reducing the limitation imposed by the usually time-consuming manual annotations (see Sect. 6).

Finally, the LSFB and FRAPé corpora have in turn been used to create new corpora, such as CorMILS (Gabarró-López 2018). In this corpus, hearing individuals interpret portions of the corpora from LSFB to BF or from BF to LSFB. The collected data make it possible to compare the production of deaf LSFB signers (from the LSFB Corpus), hearing BF speakers (from the FRAPé Corpus), and LSFB-BF interpreters (from the CorMILS Corpus) and to highlight the strategies used by second language learners of LSFB in both languages during an interpreting task (Gabarró-López et al. 2024).

8 Conclusion

For a long time, SLs and speakers' visible bodily actions were disregarded in linguistic research. The primary focus of linguistics was on the analysis of written language, leading to an emphasis on conventionality, e.g. on the lexical, morphological and syntactic levels (Linell 2011). In SL linguistics, the comparison between SLs and SpLs has been influenced by either the compatibility or differential perspective (Vermeerbergen and Demey 2007). In addition to these theoretical issues, most datasets built for the (comparative) study of SpLs and SLs have faced issues related to their degree of authenticity, diversity, and size. Indeed, many descriptions of SLs and of the multimodal components of SpLs have been based on rather small, elicited, and monologic datasets which may not reflect naturally occurring language use. The LSFB and FRAPé corpora aim to overcome some of the above-mentioned limitations. These corpora are directly comparable thanks to the use of the same recording conditions, variety of discourse types, and tasks. The LSFB Corpus also includes different acquisition profiles, allowing for studies that challenge conclusions based solely on analyses of native signers' language use.

This paper has described and illustrated the relevance of the LSFB and FRAPé corpora for a systematic investigation of the similarities and/or differences between the various channels and semiotic resources exploited by BF speakers and LSFB signers. By comparing larger, more diverse, and more naturalistic data, claims about different dimensions of language use across interaction contexts, e.g. regarding CA, reformulation, prosody, and interaction management, can be tested.

In the future, SL corpora and multimodal corpora of SpLs will continue to increase in number, size, representativeness, and diversity, e.g. by exploiting materials available online such as news broadcasts in SLs (Schembri and Cormier 2022). These datasets could be used for typological comparisons involving more SpLs and SLs. Indeed, there have been few studies on non-WEIRD (Western, educated, industrialized, rich and democratic) SL and SpL communities (Majid and Levinson 2010; Meir et al. 2010). Therefore, the conclusions drawn for SLs and

[7] https://dico.corpus-lsfb.be

SpLs described thus far may not reflect the full range of linguistic and cultural diversity of human communication. Including lesser-studied communities and languages, such as SL micro-communities (Fenlon and Wilkinson 2015; de Vos and Pfau 2015) and tactile SLs (Gabarró-López and Mesch 2020), may lead researchers to revise widely-held assumptions based on WEIRD languages (Evans and Levinson 2009, Zeshan and Palfreyman 2020).

Through the use of an identical collection procedure, the LSFB and FRAPé corpora contribute to comparative linguistics by providing a more comprehensive and less biased picture of how SLs and SpLs compare in a wide range of contexts.

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Annotation Conventions

Label	Meaning
DOOR	Gloss for a sign
DS:long-shape	Depictive sign
door	Meaning of a sign
CF	Contrastive focus
PU	Palm-up gesture
<X> and <Y>	First and second parts of a reformulation

See Johnson's annotation conventions for the Auslan Corpus: Johnston, T., Auslan Corpus Annotation Guidelines, available at: http://media.auslan.org.au/attachments/Johnston_AuslanCorpusAnnotationGuidelines_14June2014.pdf (last accessed on September 15, 2023).

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Annex: Tasks in the LSFB and FRAPé Corpora

Task Number	Task Name	Description
1	Preparation + Metadata	The moderator fills in the metadata forms with the informants and provides general guidelines for the recording session.
2	Sign Name/Nickname	The moderator asks the participants to give their name sign and provide an explanation for it
3	Childhood memories	Participants are asked to tell pleasant and/or unpleasant childhood memories to each other (e.g. birthdays, Christmas, …)
4	Culture	Participants talk about the (dis-)advantages about being deaf/hearing (in FRAPé: differences/similarities between Flemish and Walloon people)
5	Norms	Participants discuss the following question: What does it mean to be a good/bad signer/speaker?
6	Language and emotions	Participants talk about how emotions (sadness, anger,…) impact their way of signing or that of others
7	Instructions: procedure	Participants explain a recipe or explain how to assemble a piece of IKEA furniture
8	Itinerary description	Participant A is given an itinerary and has to explain the way from memory to participant B
9	Pictures description	Each participant is given a picture to describe to the other. What does the picture represent? Does it evoke anything special?
10	Debate on polemical points	Each participant receives a picture that entails a polemical topic (e.g. gun violence, smoking, anorexia, …). Both have to explain why the image is shocking and give their opinion about it.
11	Short narrative	Participants A and B tell a short story, e.g. a joke, the Deaf Guy Comic strip, …)
12	Long narrative	Participants A and B tell a longer narrative (Frog, where are you?, Paperman (©2015 Disney)
13	Role play	Each participant is told they have the opportunity to meet a politician of their choice and have to convince them to implement new policies for their community.
14	Language and variations	Participants discuss the topic of variations in language use such as regional differences.
15	Hobby, work, passion	Participants talk about their passion, their work etc.
16	Face drawing	The moderator gives each participant a drawing of a face. The drawing has different shapes, colours, … Each person has to describe to the other participant what their drawing is like so they can reproduce it.
17	Categories	Participants have to group various objects together and explain how they can be best grouped together and following which criteria.
18	Explain differences	Participants have to explain differences between various objects they receive on a picture.
19	Conclusion	The recording is ended with the moderator asking the participants how the session went and if they have any questions.