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Functions of gestures during disfluent and fluent speech in simultaneous interpreting

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Abstract

This study investigates what types (functions) of gestures occur during disfluencies in speech production during simultaneous interpreting as compared with gesture use during fluent interpreting. Forty-nine participants interpreted two ten-minute audio segments of popular science lectures, one from their first language to their second language and one from their L2 to their L1. The results show that during both fluent and disfluent moments of interpreting, the participants primarily used pragmatic gestures (such as marking emphasis) and self-adapters (e.g., rubbing their fingers). We can conclude that this points to the potentially different kind of thinking that is involved in speaking for simultaneous interpreting than is normally involved in thinking for spontaneous conversation or unrehearsed narratives. Self-adapters may assist the interpreters in the presentation of ideas and help with speech production. The low use of representational gestures may reflect the lack of deep semantic processing during simultaneous interpreting—not the kind of rich mental simulation which might give rise to depiction in gesture—and be a factor of the temporal constraints that do not allow for producing detailed gestural forms. Future research could involve comparison of gestures used by interpreters accompanying their own spontaneous speech with those they use while interpreting.

Keywords

Simultaneous interpreting, disfluencies, pragmatic gestures, self-adapters, thinking for speaking

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1. Background

The realization of the role of gesture in relation to spoken-language interpreting can be traced back to as early as 1971. It was then that the cognitive psychologist and psycholinguist, David McNeill, while giving a talk at a conference in Paris, took notice of a simultaneous interpreter, working in a soundproof booth in the back of the room, who was interpreting his lecture from English into French. He later wrote (McNeill, 2005, p. xi), "I could see a young woman behind the glass vigorously moving her arms in an alarming way," and his realization that this was because she was interpreting, or at least because she was speaking, helped determine the focus of his future research. "I believe I saw then, in a sudden apprehension via this distant yet strangely intimate connection of my speech to another person's movements, that language and gesture were two sides of one 'thing'" (p. xi). This interest led to McNeill developing a lab for gesture research at the University of Chicago whose ground-breaking work helped give rise to the modern field of gesture studies.

One of McNeill's (1992) seminal claims is that during spontaneous talk, our ideas develop and become "unpacked" not only in the words and grammatical forms that we speak, but also in bodily movements—gestures—of various kinds. McNeill named idea units "growth points", building on Vygotsky's (1934/1962) work that explained how, in the process of speaking, we are continually laying out new ideas against the background of ideas already known (either by having been uttered earlier or from context). As each idea unit arises, it is unfurled in speech and gesture, with information being verbalized in speech that can be fit into the linear lexico-grammatical system of the language that one is using, and with wholistic, imagistic information potentially appearing in the speaker's gestures. The production of speech and gesture works in a dialectical relation between the two forms of expression, with each potentially having an influence on the other. This is what is called the Growth-Point Hypothesis (McNeill, 1992; McNeill & Duncan, 2000). Kita et al. (2017) took this research a step further, arguing (based on their empirical studies) that it may not be the act of speaking per se that motivates the use of gesture, but more fundamentally, the formulation of concepts, particularly ones connected to spatial imagery. Since speaking one's own thoughts is based on such processes of conceptualization, gesture use is closely tied to what Slobin (1987) called "thinking for speaking".

In addition, there is a long tradition of research on gesture that concerns the communicative role of gestures, and it is in this tradition that Kendon (2016, p. 44) refers to gesture as "utterance dedicated visible bodily action". With this characterization he is building on several key points in his approach to studying gesture. First, it takes "utterance" as the starting point, viewing speaking a language, gesturing, signing a sign language, and potentially other actions as components of what one is doing when one is attempting to communicate. His choice of the term "action" distinguishes willful behaviors from uncontrolled ones (like spasms). "Visible" can be taken as meaning: available for perception as movement in space. The complement to this is then "utterance dedicated audible bodily action," which is how one could characterize speech. In this way, Kendon (1980) describes gesture (in his sense of "gesticulation") and speech in the sub-title of that paper as "two aspects of the process of utterance."

1.1. On gesture in interpreting

One of the unique aspects of interpreting is that the idea units that are being rendered do not stem from the interpreters themselves, but rather they come from someone else. In a sense, the idea units have to be reconstituted in the interpreter. This process is clearly different from that of how ideas for discussion come to one's mind when engaged in spontaneous conversation with someone else. Another particularity is that those that hear a spoken language interpreter's

audible action (the spoken renderings) may not see the interpreter's visible actions. This is particularly the case when the interpreter is located in a booth in the back of the room, behind the listening audience, which is a common arrangement for conference interpreting.

Consequently, spoken-language interpreting presents a unique context for the study of gesture use, in light of both the cognitively different motivation for interpreters' speech from that of speakers' self-generated talk and the interactionally different placement of interpreters, often working in a booth and out of view of those to whom they are speaking. In addition to this, while the mental effort exerted in speaking in a conversation is regulated by those engaged in the interaction (that is, a listener can facilitate the speaker's utterance production via co-construction or by providing feedback), the cognitive load of the simultaneous interpreter is known to be particularly heavy (Gile, 1997; Seeber, 2013). Beyond the fact of engaging in listening to new information while uttering information that had just been heard, the time constraints on keeping up with the interpreting, dependent on the rate of speech having to be interpreted (among other factors), is an additional demand on the task.

Previous research has begun to address a few of the ways in which gesture use relates to the process of simultaneous interpreting (SI). While the work to date provides fascinating insights, the findings so far have been limited in terms of the number of interpreters studied and disparate in their foci. Galhano-Rodrigues was one of the initiators of research in this field. In her 2007 study involving close description and analysis of the work of one simultaneous interpreter, she pointed out the important role that beat gestures played in the process of interpreting, movements which normally serve the pragmatic function of indicating emphasis. Though the interpreter in question here produced gestures serving different functions, beats, being aligned with prosodic stress, appeared to serve as a kind of "motor impulse" (p. 750), helping drive the interpreting process. However, since it was a qualitative study of one individual's performance, it is not possible to draw conclusions about interpreters' gestural behavior more generally. Zagar Galvão and Galhano-Rodrigues (2010) investigated two minutes of a session by one interpreter viewing the video of the speaker whom he was interpreting, considering whether he would imitate the gestures of the person speaking the source text. They found imitation of some of the original speaker's gestures on a small scale, but also some of the speaker's emphasis expressed in manual gestures was reproduced by the interpreter in other ways, such as with prosodic stress or head movements. Zagar Galvão (2015, 2020) researched two and four interpreters, respectively, with a similar goal and found that gestural imitation varied widely between the individual interpreters. This was a factor of individual differences between the interpreters in terms of both the quantity of gestures used and their functions (e.g., referential versus pragmatic functions). Martín de León and Fernández Santana (2021) examined gesture use when an interpreter looked at, versus looked away from, the video of the speaker being interpreted. Representational and deictic gestures appeared to support the construction and organization of meaning, while pragmatic gestures appeared to help manage the progress of the interpreting process. However, as an exploratory descriptive study, the research involved only one participant.

Overall, most of the research in this area to date has only considered very small numbers of participants for more qualitatively-oriented analysis. In addition, as initial explorations in this field, previous studies have had diverse goals, making it as yet difficult to draw broader conclusions. The following section lays out the motivations for the present study, which will focus on the question of gestures' potential role in relation to disfluencies during SI.

1.2. Motivations for the present study

1.2.1. On disfluency in interpreting

The heavy cognitive load that simultaneous interpreters experience in doing their work is known to result in various forms of disfluency in speech as they are rendering utterances in the target language (see Ren & Wang, this special issue). These include the truncation and restarting of utterances (Dayter, 2020; Gósy, 2007), the use of fillers like *uh(m)* (Plevoets & Defrancq, 2018), and long silent pauses (Ahrens, 2007). Particular elements in a source text/ speech being interpreted that are known to be more likely to lead to moments of disfluency include mention of numbers (e.g. Kajzer-Wietrzny et al., 2024), proper names, and the overall lexical density of the source text (Plevoets & Defrancq, 2016). Numbers, for example, are frequently interpreted incorrectly or are omitted (Mazza, 2001; Pellatt, 2006) in SI. This is due to factors such as their low predictability, the low redundancy in the information they convey, and yet the high information load constituted by them (Mazza, 2001; Pinochi, 2010). But as Plevoets and Defrancq (2016) point out, the cognitive demands in interpreting come not only from the source text (the "input load"), but also from the constraints on expressibility imposed by the target language (the "output load"), such as the grammatical forms available in it and what fixed phrases are frequently used in the language.

1.2.2. On the potential role of gesture in relation to disfluency in interpreting

There are several reasons to hypothesize that gestures serving different functions might play a role as interpreters attempt to resolve moments of disfluency in their speech. Here we will consider representational gestures, deictic gestures, gestures serving pragmatic functions, and self-adapters, as explained below. With the term "representational gestures" we are referring to use of one or both hands employing one or more of Müller's (1998a, 1998b, 2014) modes of representation. These involve either tracing a form, embodying a form, or acting as if touching or manipulating a referent that is mentioned in the co-gesture speech or that is inferable from the context of the talk. Interpreters might resort to representational gestures when trying to express concepts they have heard in the source text to help them with formulating that idea in the target language; witness the known role of depictive, iconic gestures in lexical retrieval (e.g., Krauss et al., 2000) and in information packaging that might aid in the lexicalization of concepts (Kita, 2000). Deictic (pointing) gestures are known to be used by speakers to identify referents in narration as they may point to different spaces to stand for different topics, referents, or times—what is known as abstract deixis (McNeill et al., 1993). This function of gesture could, in theory, aid interpreters in keeping track of ideas that they mentioned previously, or in differentiating new ideas by pointing to different spaces, thereby easing their cognitive load during disfluencies by offloading (Risko & Gilbert, 2016) some of the information onto the gesture space. Considering pragmatic gestures, one of the functions they are known to serve is that of word search—and of displaying in interaction the fact that one is engaged in searching for a word, thus helping the speaker hold the floor during an extended pause (Dressel, 2020). Some commonly recurring forms for such gestures are an open hand rotated at the wrist—the so-called cyclic gesture (Ladewig, 2011)—and a palm up (or diagonal) open hand (Clift, 2020; Müller, 2004). Finally, self-adapters[1] are self-touching movements such as rubbing one's fingers together, stroking one's hair, scratching oneself, etc. In particular, self-adapters involving sustained movement (e.g., a rubbing motion versus a simple one-time scratching movement) are known to help with maintaining one's mental focus and controlling stress (e.g., Ekman & Friesen, 1969).

[1] The American English spelling "self-adapter" is used here, but the British spelling "self-adaptor" is also common in the literature.

As the explanations above suggest, there is ample reason to suppose that any of these functions of gestures could aid simultaneous interpreters during moments of disfluency. The previous studies, discussed in section 1.1, do not yet provide a clear answer about this. A pilot study involving ten simultaneous interpreters (Cienki & Iriskhanova, 2020) did show self-adapters being used more than other gesture types, regardless of the fluency of the interpreting, but the distribution of other gesture functions was uneven across the participants, showing great individual variation. This leads to the research question for this study: What functions of gestures are used during moments of disfluency in SI and with what relative frequencies, and how does this compare to the functions and frequencies of gestures used during fluent SI? The answer to this question will contribute to the growing field of research on interpreting from a multimodal perspective.

2. Data collection

2.1. Participants

Two pools of participants were involved in the study. The first subset of data was collected in 2019-20 and involved interpreters working between Russian and English (N=29, 13 female), in both directions with different source texts. The second subset was collected in 2020-21 and entailed interpreting between Russian and German (N=20, 7 female), also in both directions. English and German were chosen as two languages which are from the same Indoeuropean language family (Germanic) but which have syntactic differences in the structuring of verb phrases, thus potentially providing a greater variety of reasons for disfluencies to arise in interpreting to and from Russian, a language relying more on pragmatic motivations for word order. All participants were native speakers of Russian and were either in training or working as professional simultaneous interpreters. Though each group consisted of interpreters with a range of experience, the results obtained in this study did not differ depending on the amount of experience, after we compared the results of those with three or more years of interpreting experience to those with less than three years' experience. Therefore, this factor was not taken into account any further in the study.

2.2. Stimuli for data collection

All participants interpreted excerpts from educational lectures about biodiversity and the extinction of species that were presented for the general public (laypeople) (see details in the section on the Procedure below). Those interpreting between Russian and English heard part of a lecture in Russian from the popular science website Postnauka entitled "Is there a threat today of a sixth mass extinction of species?"[2] which they interpreted into English, and also part of a TED Talk in English on "Mass extinction and the future of life on Earth"[3] which they interpreted into Russian. Those interpreting between Russian and German heard the same part of the same lecture in Russian noted above but interpreted it into German, and they also heard a portion of a lecture in German from the ARD TV website on "The end of evolution"[4] which they interpreted into Russian.

[2] "Существует ли сегодня угроза шестого массового вымирания видов?" https://postnauka.ru/video/49851, lecturer: Nikolai Dronin.

[3] https://www.ted.com/talks/michael_benton_mass_extinctions_and_the_future_of_life_ on_ earth?language=en, lecturer: Michael Benton.

[4] "Das Ende der Evolution" https://www.ardmediathek.de/video/tele-akademie/prof-dr-matthias-glaubrecht-das- ende-der-evolution/swr/Y3JpZDovL3N3ci5kZS9hZXgvbzEyMDkzOTk/, lecturer: Matthias Glaubrecht.

2.3. Procedure

Several days before coming in for their interpreting session, participants were provided with two glossaries, one per video, of about 20 discipline-specific terms that were used in the lectures, with possible translation equivalents for each term in the relevant target language. After obtaining informed consent from participants to take part in the study, they were only told that we were interested in the process of interpreting; they were informed of our interest in gesture research in a debriefing after their interpreting was completed. Each participant was brought to a booth used for training interpreters at Moscow State Linguistic University. They were not allowed to bring any materials with them, such as the glossaries, any paper or pens, or their phones. While this does not completely replicate interpreters' authentic conditions, we implemented this constraint so as to research how interpreters would handle the cognitive load of their task using only what Gibbon (2005) calls one's natural media—one's own body as a resource. In the booth they listened with headphones to the audio recordings to be interpreted, which were played on a laptop out of the interpreter's view. It is important to note that the participants only *heard* the portions of the lectures; they were not shown any video of the speakers. Before each turn at interpreting (Russian to English/German or English/German to Russian), they first heard a one-minute excerpt from the lecture so that we could properly adjust the volume to their choosing and so that they could become accustomed to the speaker. After that, they heard and interpreted the ten minutes of the lecture that followed the sample segment. The order in which the interpreting was performed (to or from Russian) was counterbalanced, differing randomly per participant. During the interpreting, they were left in the booth and the researcher sat in a nearby booth so that they could not be seen. The interpreter therefore looked out of the glass door of the booth into an empty classroom. After completing the two interpreting tasks, the participants filled in a second consent form, specifying how their video-recorded image could be shown in publications (choosing whether only as anonymized drawings or as screen shots/photos) and whether or not video clips could be shown at academic conferences or posted on academic websites in connection with publications of the research results.

2.4. Recording set-up

Each interpreter sat on a chair in front of the small desk in the interpreting booth. Participants were recorded from three angles. A Sony videocamera (recording at 25 fps) was placed on a tripod and positioned behind the seated interpreter, to the right side, such that the view it provided looked over the interpreter's right shoulder onto the desk, where the interpreters' arms and hands were. This afforded clearly seeing the forward and lateral movement of the interpreter's hands. In addition, a small GoPro camera (25 fps) was placed on the far edge of the desk in front of the interpreter, facing them. This recorded a close-up view of the interpreters' hands and also their face.

3. Methods of analysis

The videos and audio from the three cameras were synchronized and combined into one composite video for each interpreting session. Each composite video was imported into the software ELAN[5] (Sloetjes & Wittenburg, 2008) for analysis. This involved transcription of the speech and coding it for disfluencies, annotation of the gestures, and coding of them for their functions, as described below. Given the large amount of data obtained from the two interpreting sessions of each of the 49 participants, we selected two minutes from each

[5] https://archive.mpi.nl/tla/elan, Max Planck Institute for Psycholinguistics, The Language Archive, Nijmegen, The Netherlands.

session for coding and analysis, providing us with 196 minutes of analyzed data. The two specific parts chosen for analysis from each ten-minute session were minutes 3:00-3:59 and 8:00-8:59, taken as samplings of different points in the task. These were chosen as random portions after the interpreter had gotten into the interpreting task (not the initial minutes) and yet before the very end when the interpreter might have been more fatigued. Nevertheless, all the interpreters were hearing the same minutes of the respective lectures (the portions spoken in minutes 3 and 8) and thus within each language, they heard the same content.

The ELAN files were randomly distributed among three teams involved in the analysis for the project, with each team comprised of three coders. In each team, the annotation and coding described below was performed independently by each of the three team members, followed by a consensus check within that team. In addition, second coding was performed by one of the other teams, randomly assigned, for the presence of and the type of disfluencies in speech and the presence of and the functions of gesture phrases. Disagreements in coding were discussed and resolved at regular research group meetings, resulting in cross-checked files which were used to obtain the results.

3.1. Analysis of speech

The interpreters' renderings were annotated for moments of disfluency, coding for the following categories:

- Truncation. This involved suddenly cutting off a word or phrase, including when an utterance was begun, but abandoned (including "false starts") (Du Bois et al., 1993).
- Restart. This involves beginning an utterance again after a truncation (Du Bois et al., 1993). Some utterances were restarted more than once, in which the non-final attempts were also truncated. These were simply counted as restarts.
- "Stumbling". This was our collective term for instances of stuttering or mumbling. Stuttering involved quickly repeating a sound in a word in an apparently uncontrolled way. Any rapidly repeated truncations were counted here. Mumbling involved speaking for a short time in a low, indistinct manner or quickly saying a series of pieces of words.
- Filler. This was the term we used to cover words such as *well* in English or *nu* in Russian and non-lexical sounds (like *uh*, *uhm*), which Du Bois et al. (1993) call "marginal words".
- Dragging out of words or sounds or markedly slower tempo of speech, given the interpreter's rate of speaking otherwise.
- Long pauses were not determined based on absolute time criteria, as their length can vary per interpreter. They were only annotated as such if they were immediately followed by a stretch of very fast speech (catching up) or clear omission in the interpreting of the source text. Otherwise, pauses were not counted, as they constitute part of the normal process of uptake of information from the source text (Ahrens, 2007).

The remaining, non-disfluent interpreting is what we called fluent interpreting. It should also be mentioned that any time the interpreter replicated disfluencies on the part of the speaker of the source text (the original lecturer being interpreted), this was not coded, but such instances were also extremely rare.

3.2. Analysis of gestures

Given the particular role of manual gestures in relation to speech known from the literature in gesture studies and with the aim to delimit the scope of the study for practical reasons, only gestures of the forelimbs (hands and arms) were studied. The unit of analysis chosen was the gesture phrase (Kendon, 2004, ch. 7). This consists of the gesture stroke and any hold that

occurs after it. The stroke is defined here as a dynamic phase of clear, effortful movement, usually with an apex of movement. A post-stroke hold occurs when the hand "is held still in the position it reached at the end of the stroke" (Kendon, 1980, p. 213).

Gesture phrases were then coded for one of the several possible functions noted below. Although gestures are often multifunctional (Kok et al., 2015), we focused on our assessment of the most prominent or primary function of each gesture phrase. The relation of the gesture to the speech was taken into account in determining the gesture function. If the gesture phrase involved two hands, and the hands were not working in a complementary fashion (creating a two-handed gesture), the gesture of the speaker's dominant hand was coded, that being for our purposes the hand with which the speaker gestured the most during the interpreting session. We employed the following categories for determining each gesture's primary function.

- Representation involves depiction of some form or action. This was determined using an adaptation of Müller's (1998a, 1998b) "modes of representation". That is, if a gesture phrase primarily appeared to fulfill, given the speech and context in which it occurred, one of the modes of representation described by Müller, it was coded as representational. The modes were just used as a means of making a decision about representation or not; we did not perform analyses in relation to the individual modes. We used the following categories. Acting encompasses moving in a way in which the hand would normally perform some function, such as when a clasped hand is rotated as if turning an object around. Molding involves moving as if touching the surface of something, thereby showing its shape. Holding entails one or both open hands, usually with palm and fingers slightly cupped, briefly sustaining a position in space, as if holding something. In Tracing, one or more extended fingers move to show the outline of something with the fingertips. In Embodying, the hand takes on the form of the thing represented, involving displaying the hand or fingers in the shape of the referent, as when one's extended index and middle fingers alternately move back and forth to represent a person walking.
- Deixis involves specifying a referent or a spatial or temporal location from the perspective of either the situation described or the surrounding discourse. This can be accomplished by pointing with extended fingers or by touching (e.g., the interpreter tapping the desk in front of them with one or more extended fingers).
- Pragmatic gestures: for our purposes, this category was reserved for gestures which were not seen as primarily involving Representation or Deixis. As Kendon (2004, p. 158) notes, pragmatic gestures relate to features of what the speaker is expressing that are not part of the referential meaning of the utterance. This encompasses showing one's stance towards a topic (e.g., by shrugging), making emphasis (with a beat), indicating negation (with a lateral sweeping movement of the open hand), etc. This category usually involves gestures that recur across speakers and contexts within a given culture with similar function ("recurrent gestures" as described in Bressem and Müller, 2014; see also Grishina, 2017, ch. 14, on the pragmatic gestures frequently used in Russian culture).
- Adapters, for our analysis, can be self-adapters or other-adapters. Self-adapters involve a form of self-touching. This can include scratching oneself, rubbing one's own fingers or hands, or adjusting something on oneself, like one's eyeglasses or clothing. Other-adapters entail rubbing an external object, i.e., something that is not on the person, such as the desk in the context of the present study.

4. Results

4.1. Quantitative results

4.1.1. Gestures with disfluencies

To answer the question of the role of gesture with disfluencies during SI, we first consider the relative amount of disfluencies that occurred with gesture phrases. Co-occurrence was assessed here with an ELAN search for temporal overlap, full or partial, between annotations of disfluency in the speech and annotations of gesture phrases. Considering the interpreting in both directions between Russian and English, 73% of the total amount of disfluencies in the data that were analyzed (950 of the total of 1300) occurred with gestures. In the Russian-German interpreting in both directions, 62% of the disfluencies in the data analyzed (579 instances out of 933) were produced with gestures. However, it is worth noting that the percent per individual interpreter varied greatly, namely from 10% to 85%.

In terms of the gesture functions with disfluencies, for the interpreting in both directions both between Russian and English and Russian and German, the gestures most commonly used were self-adapters or those serving pragmatic functions. This is indicated in Table 1.

	RUS-ENG & ENG-RUS		RUS-GER & GER-RUS	
	N	%	%	N
Self-adapter	415	**44%**	**54%**	313
Pragmatic	417	**44%**	**35%**	201
Representational	53	6%	5%	32
Deictic	23	2%	3%	17
Other-adapter	42	4%	3%	16
Totals:	950	100%	100%	579

Table 1. Gesture functions used with disfluencies

4.1.2. Gestures without disfluencies

The gestures that were produced in the 196 minutes analyzed that did not occur with disfluencies were also analyzed according to their functions (N=1250 in the Russian-English interpreting and 592 in the Russian-German interpreting, in both cases covering the interpreting in both directions). Once again, the predominant categories were self-adapters and pragmatic gestures, as shown in Table 2, but with pragmatic gestures predominating somewhat more as compared with the results of gestures with disfluencies.

	RUS-ENG & ENG-RUS		RUS-GER & GER-RUS	
	N	%	%	N
Self-adapter	477	**38%**	**43%**	255
Pragmatic	654	**52%**	**41%**	240
Representational	59	5%	8%	49
Deictic	37	3%	5%	30
Other-adapter	23	2%	3%	18
Totals:	1250	100%	100%	592

Table 2. Gesture functions used without disfluencies

4.1.3. Discussion of quantitative results

The similarly frequent use of self-adapters and pragmatic gestures, and infrequent use of representational and deictic gesture, during disfluency in rendering utterances and during non-disfluent interpreting suggests that manual gestures may not play a role that is unique to moments of disfluency. Rather, these categories of gesture may relate to functions of co-verbal behavior while interpreting in general, as discussed below. The stress that interpreters experience in their work is not something that is turned on like a switch during disfluencies and turned off during fluent interpreting. Instead, interpreters are constantly managing the cognitive load of the task, and while some moments involve a greater cognitive load than others (Chen, 2017), the stress is spread to varying degrees throughout the task (see, for example, Gile, 2008, on how a problem trigger in the source text might lead to a difficulty in rendering utterances not in the moment but further 'downstream' in the interpreter's flow of talk).

Considering the functions of adapters and pragmatic gestures, adapters are known to be related to self-regulation of stress (Ekman & Friesen, 1969; Freedman, 1972, 1977). In that regard, their use may help many simultaneous interpreters try to gain control over the interpreting process and decrease the level of cognitive load (Iriskhanova et al., 2019). While this may generally be the case, it is also worth bearing in mind that there was wide variation found across the individuals in this study in their degree of use of self-adapters, in line with the variation found in the use of gestures overall. This can be a factor of individual gesture styles—gestural idiolects—or as Lemmens (2015) calls them, idiogests.

The reason for such frequent use of pragmatic gestures may be less intuitively obvious. However, pragmatic gestures are known to help speakers structure and organize their discourse (Kendon, 2004, and many others), i.e., as a form of "speech-handling" (Streeck, 2009). Simultaneous interpreters are rendering not only referential content, but are also negotiating more abstract categories like information structure and stance—and gesture may participate in that process (Galhano-Rodrigues, 2007; Iriskhanova & Makoveyeva, 2020), on which see section 4.2.2 below.

The issue that remains is why the interpreters did not use many representational or deictic gestures. The low use of the former may relate to at least three factors: the cognitive processes behind the production of representational gestures, the time constraints of the process of SI, and the absence of any audience viewing the interpreters. The literature on representational gestures argues that their production may stem from mental simulation of the content that is being uttered verbally; this is Hostetter and Alibali's (2008, 2019) hypothesis of Gestures as Simulated Action. However, the cognitive process of SI is known to normally not involve any deeper semantic processing of the content of the speech being rendered than is needed to perform the interpreting (Alexieva, 1998; Riccardi, 1998). Thinking for SI is thus different from the kind of thinking for speaking involved in conversation, for example. Therefore, it does not involve the same kinds of growth points of ideas that McNeill (1992) considers as the sources of gestures with speech, particularly when it comes to representational gestures that relate to imagery associated with the content of the speech. This aligns with the findings in Leonteva et al. (2023) that abstract notions represented metaphorically in speakers' gestures were most often not carried over by interpreters viewing the speakers; when the interpreters did produce gestures in their renderings at similar points as the original speaker, they were most often pragmatic, presentation gestures, involving minimal metaphoricity (e.g., only schematically showing presentation of an idea with a relaxed hand, rather than tracing or molding more detailed imagery with a more tense hand). Furthermore, previous research (Alibali et al., 2001) found that speakers produced more representational gestures in a face-to-face condition than when listeners could not see their gestures, so this factor could also have come into play here.

The low use of deictic gestures could have to do with the lack of visual input that the interpreters had, only listening to the lectures rather than seeing the speakers, and the context of their working in an interpreting booth, looking into an empty classroom. The participants therefore had no inherent spatial grounding of the referents they were speaking about, nor any visually located deictic center of the speaker whom they were hearing. They also did not have any supporting visual aids to refer to that the original speaker might have used, such as slides being shown. In addition, as there was no one observing the interpreters, there was no interlocutor for whom the deixis would be needed.

4.2. Discussion of some qualitative findings

4.2.1. Self-adapters

We found great variation across individuals not only in how much they made use of self-adapters, but also in the manner in which they produced them. For example, a number of the interpreters had been trained in a tradition requiring them to keep their hands folded on the desk in front of them while interpreting. The logic behind that training is that if they should be visible to the listening audience, they should not be seen to be producing much visibly dynamic behavior, which could detract attention from the speaker of the source text. However, while a few of the participants did sit almost motionless at the desk during the task, others exploited the posture with hands folded to produce small self-adapters. Given that in this position the fingers of the interpreter's hands were often interlaced, the self-adapters sometimes involved micro-movements of tension and relaxation of the fingers, sometimes as one hand was gripping the other. In other cases, the movements were larger in amplitude, for example with the hands clasping and gripping each other in a more effortful fashion. Most of these self-adapters were sustained in nature over varying lengths of time.

4.2.2. Pragmatic functions of gestures

Gestures with pragmatic functions also ranged in terms of the specific functions they served and in the degrees of effort involved in their production, leading to lesser or greater salience. Many times, the pragmatic function involved was that of presenting an idea. While the palm-up open hand (as in Figure 1) is the gesture that has probably been researched the most as the gesture form serving this function (Bressem & Müller, 2014; Cooperrider et al., 2018; Müller, 2004), the position the interpreters often assumed with hands or arms folded on the desk in the booth afforded (and constrained) variations in how this was produced, as shown in Figures 2 and 3. Very often a simple turn-out (rotation outward) of the hand and upper arm was involved, as in Figure 2. Sometimes the mere raising of a finger served the same function in a very small fashion, as an outward beat emphasizing a point being made in the speech. With the hands folded, this sometimes just took the form of one or both thumbs being extended upward and then lowered, as in Figure 3. Cienki (2021) discusses these as a continuum of pragmatic gestures, ranging from a finger-lift, to a rotation outward of the hand and upper arm, to a full extension outward of a palm-up open hand.

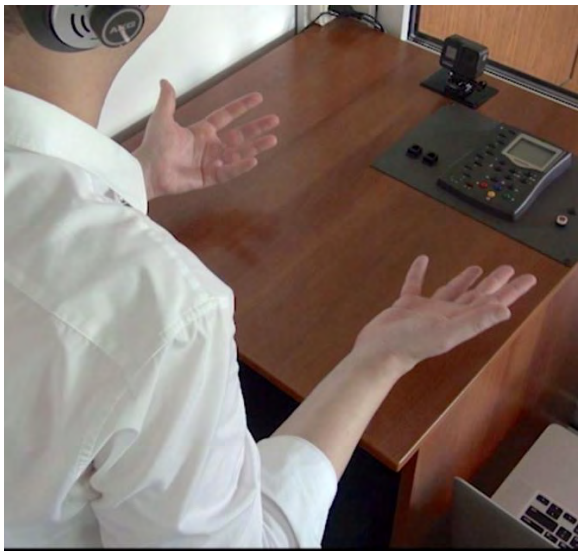

Figure 1. A (double) palm-up open hand pragmatic gesture when presenting an idea

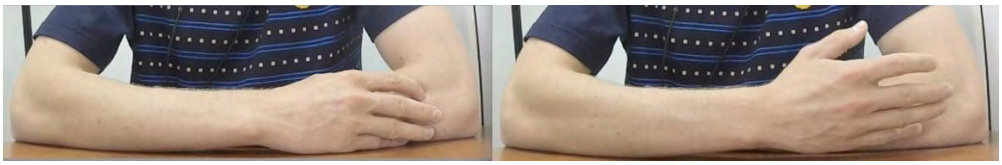

Figure 2. A turn-out of the hand when presenting an idea

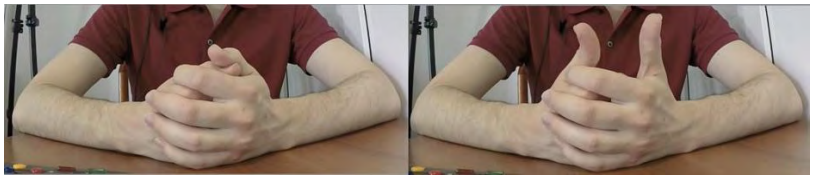

Figure 3. A thumb extension when presenting an idea

In other cases, the pragmatic function was one of more distinct stance-taking. For example, the lifting of one or both shoulders and/or a head tilt or head shake, sometimes accompanied by the opening and turning out of one or both hands, comprise elements of a shrug (Debras & Cienki, 2012). This can reflect a range of stances from indicating uncertainty, to incredulity, to distancing oneself from another's views on a topic (Debras, 2017). In one instance, the interpreter uttered the words in Russian, "*Èto poterya antropotsena. Poteri kolossal'ny.*" ('This is a loss from the Anthropocene. The losses have been colossal.'), and when saying 'colossal' he lifted his right shoulder and quickly shook his head. The co-verbal behavior suggests that the amount of the losses is unbelievably large. Again, it is important to remember that the interpreter was not viewing any video of the original speaker; the gesture was of his own creation. In other instances, some interpreters gestured with the tips of the thumb and index finger pressed together as they mentioned a specific number, highlighting the exactness of the amount with what is known as a precision grip (Kendon, 2004, ch. 12). Such instances raise interesting questions about whose stance the interpreter is expressing (their own, or the imagined stance of the original speaker), and whether this can even be ascertained—something considered further in Cienki (2024).

4.2.3. Other functions of gestures

As described above, the interpreters made little use of representational or deictic gestures. Many of the representational gestures that did occur involved the holding mode of representation when mentioning a quantity (e.g., "two point five species") or a fact (e.g., "what happens to these species"); see Figure 4.

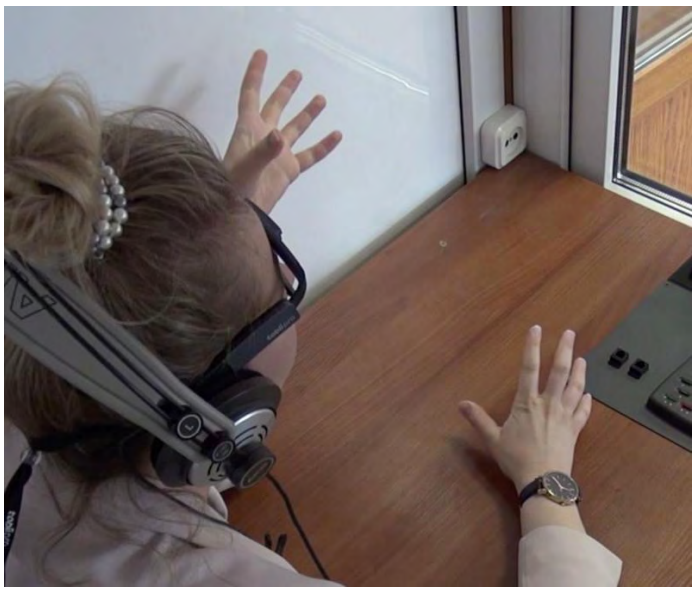

Figure 4. Holding gesture when mentioning a quantity
(here namely: "two point five species")

The kind of representation involved in Figure 4 is quite schematic, whereby the interpreter is as if holding the amount being mentioned, with fingers spread and slightly curved, the palm of each hand turned toward the space in front of her. In this regard, even in many of the gestures with a primarily representational function, one could see a secondary pragmatic function similar to that of presenting an idea with a hand turn-out or palm-up open hand.

Deictic pointing to spaces was rarely used, but the few instances in which it did occur present interesting phenomena. In one case, the speaker of the source text said in German, "*Hier aufgetragen die Summe der Brutreviere in den erfassten Quadranten rund um ähm den Bodensee. Sie sehen, dass es Verluste – rot – und natürlich auch Arten gibt, die...*" ('Here the sum of the breeding territories is plotted in the quadrants recorded around, um, Lake Constance. You can see that there are losses – red – and of course there are species which...'). The interpreter rendered this in Russian as "*eh vy vidite to, chto dannye poteri, oni oboznacheny krasnym na skheme*" ('uh, you can see that the data on the losses, they are indicated in red on the chart') and on the words 'data' and 'indicated' he pointed to the upper right and he looked up to the right during that entire stretch of speech. In this instance, we see the interpreter presenting an imagined deictic viewpoint of the speaker of the source text. Interestingly, the original lecturer had actually shown the chart on his left side and did not point to it when he made reference to it. The deictic reference in gesture and eye gaze was completely the interpreter's invention.

5. Closing points

The findings from the present study show quantitatively similar patterns of use of gesture functions both during moments of disfluency in interpreted speech and during fluent interpreting. Rather than highlighting a special function for gesture during disfluency in SI,

the results suggest more general, overarching roles that gesture plays in this context. The results, with pragmatic gestures and self-adapters having been by far the most frequently used functions, stand in contrast to findings by, for example, McNeill (1992), who found representational gestures (his categories of iconic and metaphoric gestures) to be used even more than pragmatic gestures (his category of beat gestures) in narratives[6]. Overall, this points to the potentially different kind of thinking that is involved in speaking for SI than is normally involved in thinking for speaking (à la Slobin, 1987) in self-initiated talk, as in conversation or unrehearsed narratives. The fact that representational gestures played such a small role in the interpreters' gestural repertoire might be a reflection of not engaging in the unpacking of idea units ("growth points") in the way that McNeill described, but of converting ideas received via one language into another language, and mostly not engaging in deep semantic processing, as Alexieva (1998) and Riccardi (1998) argue. SI is known to entail specialized forms of cognitive processing (García, 2019) and so it makes sense that gesture during SI of a lecture would differ from gesture use during another form of monologic speech, namely self-initiated narration, given the relation of gesture to conceptualization (Kita et al., 2017). In this regard, it is perhaps ironic that it was McNeill's observation of a simultaneous interpreter's gestures that sparked his interest in the relations between thought, spontaneous speech, and gesture.

The interpreters' extensive use of pragmatic gestures and sustained self-adapters highlights two aspects of their role in performing this work. On the one hand, they are presenters of another's ideas to an audience in a different language. In this respect, the use of pragmatic gestures is logical, given the role they are known to play in interaction. Such gestures are outwardly oriented, not only in their form, moving out from the speaker's body, but also in their functions, such as presenting ideas to others for their consideration, or showing one's stance towards the ideas being presented. The interpreters engaged with this role as part of their practice, even when sitting alone in an interpreting booth with no other speaker or listener in view[7]. On the other hand, simultaneous interpreters are dealing with a heavy cognitive load as part of their work. Self-adapter movements may help them handle this through the combined effects that body-focused movements can have of assisting in maintaining one's mental focus while also soothing oneself during stress (Ekman & Friesen, 1969; Freedman, 1972). In this way, self-adapters can be seen as a reflection of the inwardly oriented cognitive and affective aspects that are part of SI.

As argued in Cienki and Iriskhanova (2020), simultaneous interpreters blend the viewpoint of themselves as speakers with the imagined or perceived viewpoint of the speaker of the source text. The fact that interpreters' co-verbal behaviors were found to be generally similar during moments of disfluency and during fluent interpreting suggests that the combining of inward- and outward-oriented perspectives is a process being negotiated throughout the process of interpreting.

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[6] Iconic = 261 instances, metaphoric = 43, beat = 268 (McNeill, 1992, p. 93).

[7] Though they knew they were being videorecorded, the participants rarely looked directly at the small GoPro camera on the desk in front of them, but rather looked into various spaces in the booth and in the classroom in front of them, and sometimes closed their eyes.

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