Turn-taking in dialogue interpreting

Coping with cognitive constraints

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This study addresses cognitive aspects of turn-taking and the role of experience in dialogue interpreting, by investigating the temporal and textual properties of the *coupled turn* (i.e. the original utterance and its interpretation). A comparison was made using a video-recorded scripted role-play between eight interpreters, with Swedish-French or Swedish-Spanish as working languages and with different levels of experience. Cognitively challenging long stretches of talk were introduced in both directions of the working languages and analyzed with a multi-modal approach. We identified a number of quantitative measures, such as the number of coupled turns and the time used. Furthermore, we qualitatively analyzed the types of renditions. The findings suggest that the mean length of time of the coupled turn, which we label *processing span*, is a measure that is not primarily related to interpreting experience but rather reflects the constraints of the interpreter's working memory. A further finding is that the inexperienced interpreters have a higher percentage of reduced renditions than the experienced interpreters, and this difference is statistically significant.

Keywords: dialogue interpreting, experience, processing span, turn-taking, quantitative analysis, qualitative analysis, working memory

1. Introduction

For the dialogue interpreter, working memory is crucial for the task of perceiving an utterance in one language in order to render it in its entirety into the other language. This involves a number of complex cognitive operations, including problem solving and monitoring their own memory and cognitive processes (Englund Dimitrova & Tiselius 2016). As the dialogue interpreter in most contexts

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cannot off-load working memory, whether by producing the target utterance simultaneously or taking elaborate notes, they need to use other coping strategies. Central to this is turn-taking, that is, the management of taking turns at talk, which is necessary to allow for the interpreter's processing and also, as shown by Wadensjö (1998), to coordinate the participants' interaction.

The cognitive processes of dialogue interpreting have recently come into focus in a number of research studies, which have looked at the gaze of the interpreter (Tiselius & Sneed 2020), the interpreter's language proficiency (Tiselius & Englund Dimitrova 2019), online self-regulation (Herring 2018), and strategies in dialogue interpreting (Arumí Ribas & Vargas-Urpi 2017). However, as far as we have been able to ascertain, the cognitive aspects of turn-taking in dialogue interpreting have not yet been investigated.

1.1 Aim

The present study approaches the cognitive processing of the dialogue interpreter through a study of what we, following Geiger Poignant (2020: 65), call the *coupled turn*, where "the original turn and its subsequent rendering are explored as a united adjacent pair." We suggest that the coupled turn, as a situated sequence, from the onset of the source utterance to the end of the interpreted (target) utterance, encompasses the minimal cognitive processes of dialogue interpreting at the local level (see further below for explication and example of coupled turns). Hence, the analysis of coupled turns can give an indication of the interpreter's *processing span*, their cognitive and processing capacities.

The aim of the study is more specifically to investigate both temporal and textual properties of the coupled turn in relation to the interpreter's experience, since we believe that both types of properties are important indicators of the processing span of the individual dialogue interpreter. To this end, the study was designed to investigate potentially long stretches of talk, that is, utterances planned by a primary speaker that are longer than an interpreter can be expected to remember and render without notes and that can thus be assumed to exceed the interpreter's processing span (see below). Our focus is on how experienced and inexperienced dialogue interpreters handle such stretches of talk in the interpreting process. Further, we investigate the completeness and accuracy of the interpreter renditions using Wadensjö's typology of renditions (Wadensjö 1998) in order to observe differences possibly due to experience.

More specifically we are interested in investigating the following questions:

1. Is there a difference in mean length of time per coupled turn (i.e., the processing span) between experienced and inexperienced interpreters?

2. Are there observable differences regarding rendition types of the interpreted turns between inexperienced and experienced interpreters?

2. Literature review

2.1 Cognition in interpreting

The advanced type of language use required for interpreting implies a flexible cognitive ability, and interpreters' cognition has interested researchers for decades. Previous research into cognitive aspects of interpreting has mainly focused on simultaneous interpreting, although recent studies have also put cognition in dialogue interpreting in focus (Tiselius & Albl-Mikasa 2019). In an overview of research on simultaneous interpreters' cognition, Liu (2008: 168–169) finds that experienced interpreters have been shown to be better than inexperienced ones at concurrent articulation and articulatory suppression, two skills necessary for simultaneous interpreting, and also that they seem to be able to use a more semantic-based processing strategy for comprehension. In meta-analyses of previous research on simultaneous interpreters' working memory, Mellinger and Hanson (2019) and Wen and Dong (2019) find that experienced interpreters show larger working memory capacities than non-interpreters, regardless of the modality (visual or verbal) of the test stimuli. Furthermore, Wen and Dong found stronger correlation between interpreters' memory capacity and orally presented memory tasks (2019: 778). Mellinger and Hanson also show a tendency toward positive correlation between working memory capacity and the quality of the interpreter's output. Wen and Dong (2019) suggest that updating (i.e., the ability to concurrently monitor actions and behavior while carrying out a task in order to adapt and adjust to the task, crucial for the interpreter's monitoring ability) is the "first taxed and trained memory skill in interpreting training" (Wen & Dong 2019: 780). Another important factor of working memory capacity and monitoring is the cost of switching attention between different tasks; here, Babcock (2015) found that interpreters exhibited a smaller switching cost compared to multilinguals without interpreting experience. We are not aware of any experimental studies of working memory based on data from dialogue interpreters, but we find it reasonable to assume that experience from dialogue interpreting also gives cognitive advantages, analogous to the findings reported above.

Ear-voice span or lag – that is, the time elapsed between the onset of the original utterance and the onset of the interpreter's rendition – is an indication of cognitive effort and is also used as a strategy in interpreting (Shlesinger 1998; Liu 2008). Typically, the object of study when exploring ear-voice span is simulta-

neous interpreting. However, as ear-voice span is indicative of the simultaneous interpreter's working memory, it can be seen to some extent as an analogue of the concept of processing span as introduced above. Both concepts capture how much of an utterance the interpreter can store and process. Therefore, we believe that previous research on ear-voice span may be relevant for dialogue interpreting. Ear-voice span in simultaneous interpreting has been studied in relation to speed, language asymmetries, message complexity, and experience (Goldman-Eisler 1972; Barik 1973; Cokely 1986; De Groot 1997; Lee 2002). It has been shown that ear-voice span increases when cognitive load increases, for example due to speed (Barik 1973), and also that interpreters' accuracy declines when ear-voice span increases (Cokely 1986; Lee 2002). Goldman-Eisler (1972) suggests that ear-voice span may be determined by the segmentation of the input. There seems to be a general consensus that ear-voice span in simultaneous interpreting ranges between two and five seconds, with ten seconds as the upper limit (Timarová et al. 2011: 122). Lamberger-Felber (2001) finds individual ear-voice span differences between interpreters, and this is confirmed by Timarová et al. (2011). For simultaneous interpreting, ear-voice span is thus a useful tool to tap into interpreters' different and possibly individual processes.

In her literature review of studies on working memory in interpreting, Liu (2008: 165) stresses that strategy management in simultaneous interpreting (e.g., the control of attention and switching back and forth between the different tasks during interpreting) can be manifested as more frequent pauses or a slower speaking rate, and that this strategy management differs between novice and experienced interpreters.

2.2 Turn-taking in monolingual dialogues

The study of turn-taking in monolingual dialogues originates in conversation analysis, a seminal paper being the one by Sacks, Schegloff, and Jefferson (1974). Taking turns in conversation is a fundamental systematic feature of the use of human language for communication and in interaction, and as such it is also subject of psycholinguistic modeling. A central question of relevance to our paper is how to account for the fact that most turn changes in monolingual conversations are achieved smoothly, without either long gaps or overlaps. In data from large corpora, gaps between speaker turns are shown to vary between 100 ms and 300 ms, averaging around 200 ms (Heldner & Edlund 2010: 563–564; Levinson & Torreira 2015; Holler et al. 2016: 6). Longer gaps between turns, 300 ms or more, occur before responses showing dispreferred actions or indicating decreased likelihood of unqualified acceptance (Levinson & Torreira 2015: 12). Psycholinguistic research on planning shows that production planning of a single word requires

at least 600 ms (Levinson & Torreira 2015: 10). This means that for the listener to take the turn with minimal gap, they must start planning their response already during the speaker's turn,[1] which shows that the central processes of comprehension and planning of production must run in parallel. Furthermore, the listener needs to anticipate when the speaker will reach a so-called *transition relevance place* (TRP), that is, a place of possible completion of the current speaker's turn and possible transfer of speakership (see Sacks et al. 1974: 703). Listeners use a variety of linguistic cues for this anticipation, most importantly semantic cues (Holler et al. 2016: 7). The role in turn-taking of the listener's anticipation of an upcoming TRP versus reaction to verbal and non-verbal aspects of the turn (i.e., gaps, gaze, etc.) is probably not yet clear (see the arguments for assigning both anticipation and reaction a potential role in Heldner and Edlund 2010, and the critique in Levinson and Torreira 2015). Although a common assumption is that the tolerance for length of gaps before responses differs widely between different cultures, Stivers et al. (2009: 10590) find such variation to be a "minor variation in the local implementation of a universal underlying the turn-taking system, in which speakers aim to minimize the perceived gap before producing a following turn at talk. This target for ideal turn transition remains within a narrow window within each language." (See also Heldner & Edlund 2010: 557).

2.3 Turn-taking in dialogue interpreting

Turn-taking was one of the topics in studies of dialogue interpreting from early on, the important role of the interpreter being pointed out by for example Englund Dimitrova (1991, 1997), Wadensjö (1992, 1998), and Roy (1993). Several studies focus on the more specific question of how dialogue interpreters handle potentially long stretches of talk from different perspectives. Based on an analysis of verbal and non-verbal elements in two authentic videotaped interpreted medical encounters, Englund Dimitrova (1991, 1997) analyzes the interpreter's active turn-taking and interruptions, concluding that turn-taking is an important issue for interpreting ethics. Englund Dimitrova and Tiselius (2016) connect differences in handling turn-taking to differences in professional self-concept of professional and non-professional interpreters. Davitti (2018: 14) uses the term 'chunking,' analogous to processing in simultaneous interpreting, for the dialogue interpreter's management of potentially long stretches of talk, finding that "chunking is mostly initiated by interpreters through a combination of the

1. Corps, Gambi, and Pickering (2018: 230) suggest that an interval of 200 ms requires listeners to "begin preparing their own response at least half a second before the speaker reaches the end of their turn."

embodied resources of gaze shift and head movements initiated at possible TRPs" (Davitti 2018: 17); Licoppe and Veyrier (2020: 64) similarly observe that "the interpreter uses gaze to manage collaboratively the 'chunking' of the answer in progress for the sake of consecutive interpreting."

Vranjes shows in eye-tracking data from dialogue interpreting that gaze is an important tool for the interpreter's turn management. She finds a strong correlation between mutual gaze between participant/interpreter and interpreters' production of visual backchannel responses, such as head nods (Vranjes 2018: 164), and suggests (p. 125) that this might be either an inclusive or a coordinating action.

Arumí Ribas and Vargas-Urpi (2017) studies strategies in dialogue interpreting using role-plays. Their role-plays included *Rich Points*, that is, units related to possible translation problems (PACTE 2005, see further below), also including interaction problems. The authors find that "[w]hen faced with a particularly long segment or one that contains too much information, the interpreter applies various strategies: these include, in some cases, a request for the speaker to pause and, in others, restructuring of information without interrupting the speaker" (Arumí Ribas & Vargas-Urpi 2017: 130).

Herring (2018, see also above) investigates inexperienced and experienced dialogue interpreters' self-regulation, that is, how an individual cognitively controls their functions, states, and inner processes (2018: 21), through the use of simulated interpreting scenarios with inserted difficulties and retrospective interviews. She concludes that the least experienced interpreters displayed a less active management style and longer self-authored turns, while the most experienced interpreters have a more active management style and shorter self-authored turns.

Active turn-taking is a way for the dialogue interpreter to control the process by adjusting the size of the utterance to be interpreted. Hence the need for the interpreter to monitor the speaker's unfolding turn in relation to the interpreter's memory capacity. Within the coupled turn, the interpreter's processing involves a number of subprocesses: *comprehension* of the speaker's unfolding turn, while simultaneously *planning* the interpreted utterance and *buffering* it, as well as *predicting* a suitable TRP, in order to subsequently *take the turn* for *production* of the interpreted utterance. In such complex cognitive processing, a number of problems are likely to arise, and it can be assumed that experienced dialogue interpreters handle them more skillfully than inexperienced ones. A speaker, unaware of the interpreter's turn-taking needs, talking for long stretches without allowing for interpreting, increases the interpreter's cognitive load. In this study, we created such a cognitive challenge for the participating interpreters by inserting a number of potentially longer stretches of talk in the role-play.

2.4 Hypotheses of the study

Our hypotheses are that, regardless of language direction:

1. Experienced interpreters will encounter overall fewer problems, hence the analyzed Rich Points of experienced interpreters will take less time than those of inexperienced ones.
2. The coupled turns in the analyzed Rich Points of experienced interpreters will be on average longer than in those of the inexperienced interpreters.
3. Experienced interpreters will render the information in the speakers' utterances more completely and accurately than inexperienced ones.

3. Data and method

3.1 Material

To create units of data that are as comparable as possible across participants, we based our study on scripted role-plays. The interpreting situation was simulated by actors, one playing a Swedish job counselor and the other a newly arrived immigrant. Since the role-plays were interpreted by different interpreters, the recordings, and consequently each data set, are not exact copies of one another; indeed, actors were asked to follow the interpreter, but also stick to the script as much as possible. We therefore label the research design of this study as quasi-experimental.

The Swedish manuscript of the role-play had 39 lines, each line comprising a shorter or longer planned utterance by one of the role-play participants, with 20 lines for the job counselor and 19 for the newly arrived job-seeker. The role-play was 1,074 words long and supposed to take approximately 15 minutes to enact. The actors who played the immigrant translated their lines into their L1, well before the recording took place, thereby creating a written manuscript in their L1. The actors were encouraged to learn their lines by heart, but were allowed to have their manuscript in front of them. We aimed for a situation where the role-player could act out the manuscript but still keep as close as possible to it. Since we were interested in studying interpreters' handling of long stretches of talk in relation to working memory, the interpreter participants were told not to use notetaking during the interpreting task.

Rich Points were inserted in the role-play. Rich Points are defined by PACTE (2005: 614) as textual elements that provide a variety of the typical problems studied, are salient, do not lead to immediate solutions, and are homogenous in the different languages studied (so that they can be compared). PACTE (2011: 38)

further defines problems in Rich Points as being either linguistic (lexical or morphosyntactic), textual (coherence, cohesion, text type, genre, and style), extralinguistic (cultural, encyclopedic, domain knowledge), intentionality (understanding), or contextual (relating to the surrounding situation). We follow Arumí Ribas & Vargas-Urpi (2017: 124) in also including interaction problems in Rich Points.

The data for this study is based on 12 Rich Points (henceforth RP or RPs) in the original script – six in Swedish (367 words) and six to be translated into the other language (314 words)[2] – comprising long stretches of talk, where the actors were instructed to show emotion, stress, or irritation, in order to be able to enact maximally long turns. We classify such long stretches of talk as a RP as they are a typical problem in interpreted discourse, salient and challenging for the interpreter, and following PACTE, can be considered 'extralinguistic' and 'contextual' (see above).[3] An example of a RP from the French version of the roleplay is given in Example 1 with stage directions in parentheses.

Example 1.[4]
(avbryt tolken innan hen är klar, gå upp i varv och visa att du är orolig)
mais je me fais aussi du souci. Est-ce que les activités sont à temps plein ?
Comment ça se passe avec les enfants? Parce que je suis toute seule
à m'en occuper. Leur père et moi, on a été séparé pendant la fuite et j'ai
toujours pas eu de ses nouvelles. *(bli ledsen och tala tyst istället)* C'est
vraiment horrible, je sais même pas s'il est en vie… *(ta fram näsduk).*
English translation:
(interrupt the interpreter before s/he finishes, get upset and show that you are worried)
but I'm worried too. Are the activities full time?
What's going to happen to the children? Because I'm all alone
to care for them. Their father and I got separated when we fled and I have
still not heard from him. *(become sad and speak silently instead)* It's
really horrible, I don't even know if he's alive *(take out a handkerchief).*

The role-play was recorded on the premises of Stockholm University. It was video-recorded with two cameras, and the interpreter also wore eye-tracking glasses (see Tiselius & Sneed 2020).

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2. The RPs of the translated versions into French and Spanish varied slightly in number of words; they were checked by members of the research team for consistency between the different versions.

3. The role-play also comprised a number of other possible RPs, e.g., possibly challenging terminology, numbers, lists, and other interaction challenges, but these will not be addressed here.

4. RP job seeker (stage direction in Swedish in parenthesis). English translation below.

3.2 Participants

The study consisted of two groups of participants: experienced interpreters ($n = 4$) and inexperienced interpreters ($n = 4$). All interpreters had Swedish as one of their working languages, the other language being either Spanish (2 experienced and 2 inexperienced) or French (2 experienced and 2 inexperienced). Table 1 gives an overview of the participants.

Table 1. Interpreter participants

	Gender F:M	Mean age	Mean years of experience
Experienced			
French	2:0	50	11
Spanish	0:2	51	23
Inexperienced			
French	2:0	27	n/a
Spanish	2:0	48	n/a

The experienced interpreters were Swedish trained and state-authorized with at least five years of interpreting experience. The inexperienced interpreters were last-term students at the public service interpreting program at the Institute for Interpreting and Translation Studies at Stockholm University. In the tables in the result section, the interpreters have been given fictitious names.

The interpreter participants were briefed on the nature of the encounter one week before the recordings. Experienced participants were recruited through the Swedish register for state-authorized interpreters and remunerated the same amount as an interpreting assignment. The students were recruited through their teachers and remunerated a standard participant fee. All participants signed an informed consent form.

This study is part of a larger project financed by the Swedish Research Council (VR/2016-01118). The project addresses selected aspects of cognition and working memory in dialogue interpreting from a range of perspectives, also with a variety of other types of data from the participants, such as psychometric tests, retrospection, and eye-tracking.

3.3 Transcription and parameters for analysis

During the transcription phase, a rough transcription of the video recordings was done by a research assistant. Subsequently, the RPs were transcribed multi-

modally by the two authors first individually and then together. This transcription takes all the participants' gaze, gestures, and body movement into account, as well as utterances and their prosodic features.

For the present study, the multimodal analysis and transcription served as a tool in the analysis of the coupled turns but will not be further accounted for here. Duration of each RP was measured with the software Audacity version 3.0.0;[5] the measurement procedure departed from the transcription of the RP, locating the onset and the end of the RP in the visualized sound waves of the Audacity audio track. Any pause before or after the RP was not included, but pauses within the RP were included. In the following text we use the term 'length' to denote 'length of time'. Example (2) shows a transcribed coupled turn, comprising the original utterance and its interpretation. It is the first coupled turn from the RP in Example (1), from the recording of an interpreting by a professional interpreter from French into Swedish. It is 4.72 s in length, and for the sake of this article the transcription is simplified (gaze and gestures have been omitted).

Example 2.[6]
Transcribed coupled turn (original utterance and its interpretation).

```
78 JS   mm oui c'est bien parce que vraiment je me fais du souci .hh (0.3)
        mm yes that's good because I'm really worried
        [[euh
          euh
79 I    [[ja det är bra för jag är verkligen orolig=
          yes that's good because I'm really worried
```

Our basis for analysis was the length of each RP and its number of coupled turns. In most RPs the number of turns is even, that is, for each speaker utterance there was a corresponding interpreter rendition. The few cases of uneven numbers mostly reflected the interpreter asking for clarification. We added the number of all turns for the RP and divided them by two. To determine the average length of the coupled turn, we measured the length in seconds of all RPs for each interpreter. We then divided the length of the RPs with the number of coupled turns in the RPs. This gives us an average figure of the length of the RP.

The RPs in the data were analyzed and classified with a particular focus on turn-taking strategies (not reported here) and rendition types, first by each author independently and then by the two authors together. Both the transcriptions and the recorded video material were used in order to capture all relevant levels of the

5. Audacity Team (2021). Audacity(R): Free Audio Editor and Recorder [Computer application]. Version 3.0.0 retrieved March 17th 2021 from https://audacityteam.org/

6. Transcription conventions: [[simultaneous onset of talk, = latching, .hh breathing in. Pauses 0.2 ms and longer are marked in the transcript. JS = Job seeker, I = Interpreter.

interaction; this was of particular importance for determining the development of the turns in the RPs.

Rendition types were classified following Wadensjö's (1998) taxonomy. Wadensjö argues that an interpreter's rendition can normally be analyzed as reformulations of a preceding utterance. She defines a 'rendition' as a "stretch of text corresponding to an utterance voiced by an interpreter" (Wadensjö 1998: 106). Since renditions usually relate to original utterances, but do so in many different ways, Wadensjö proposes to categorize interpreter renditions in the following way: *close renditions, expanded renditions, reduced renditions, substituted renditions, summarized renditions, two-part or multi-part renditions, non-renditions, and zero-renditions*. Table 2 gives the definitions of these categories.

Table 2. Rendition types in dialogue interpreting (Wadensjö 1998: 107–108)

close renditions	Propositional content in original utterance is explicitly present in rendition. Similar style.
expanded renditions	More explicitly expressed information than the preceding original utterance.
reduced renditions	Less explicitly expressed information than the preceding original utterance.
substituted renditions	A combination of expanded and reduced renditions.
summarized renditions	A rendition which corresponds to two or several preceding original utterances (not necessarily from the same speaker).
two-part or multi-part renditions	Two interpreter renditions corresponding to *one* original utterance.
non-renditions	The interpreter's own initiative or response, not reflecting a prior original utterance.
zero-renditions	An original utterance left untranslated.

The typology has been used for similar analyses by Arumí Ribas and Vargas-Urpi (2017) and also Thomsen (2018). Arumí Ribas and Vargas-Urpi classified the strategies used by the interpreters, where talk as text corresponded to linguistic problem-solving strategies and talk as activity corresponded to conversation management strategies. Thomsen's work identified interpreters' challenges depending on directionality.[7]

7. The data set analyzed in Thomsen (2018) is partly the same as in the present study, but the analyses are not directly comparable, since we work only with parts of the transcripts, as described in the text; furthermore, the two authors re-analyzed the rendition types of the coupled turns independently.

The main focus of this study is to investigate the interpreters' memory capacity, and the rendition type classification is here an instrument for that measurement and not intended for quality assessment of the interpreting. Our hypothesis is that experienced interpreters are more efficient at monitoring both their own working memory capacity and the other participants' contributions and will therefore produce a higher share of close renditions.

The statistical analysis of the temporal aspects and renditions was made with independent sample t-test and three-way ANOVA using SPSS. The ANOVA showed significant interaction between experience and language direction, which will be further explored below.

4. Results

Table 3 presents the temporal aspects of the role-play and the RPs. Table 3 shows the total time for the whole role-play in seconds. The experienced interpreters spend less time on the task than the inexperienced ones, a difference that is statistically significant ($t(4.945) = -2.655$, $p = .046$).[8] For time spent on RPs, the same difference holds, both at the individual and group levels; on average, the experienced group interpreted the RPs faster than the inexperienced ones ($t(5.992) = -3.988$, $p = .007$). Also, on an individual level, all inexperienced interpreters needed more time to interpret the RPs than all the experienced ones. However, the number of turns in the RPs, on both the individual and group levels, show large individual variations, especially in the experienced group. Although the inexperienced group on average needed more turns to interpret the RPs, the difference between the groups is not significant ($p = .115$). Our first hypothesis regarding the time spent on the RPs is confirmed: the experienced interpreters spent less time on the RPs than the inexperienced did.

In Table 3, we also give the mean length in seconds for coupled turns within the RPs, a value obtained by dividing the length of the RPs with the number of coupled turns in the RPs. This gives us a mean figure of the length of the coupled turn. Table 3 shows that there are quite large individual variations, which are mainly due to the individual variations in the number of turns. The mean values for length of coupled turns are 16.42 seconds for experienced interpreters and 15.10 seconds for non-experienced ones. Hence, on the group level, the mean coupled turn managed by the two groups was of similar length. The small numerical difference between the groups does not reach statistical significance ($p = .563$).

8. T-values and degrees of freedom (in parenthesis) are only given for significant p-values.

Table 3. Temporal aspects of the role-play and RPs

	Yvette/ French	Marie/ French	Cesar/ Spanish	David/ Spanish	*Mean exp.*	*SD*	Made-leine/French	Juliette/ French	Ana/ Spanish	Beata/ Spanish	*Mean inexp.*	*SD*	*p*
Total length of role-play in seconds	687.00	808.00	656.00	800.00	*737.75*	*77.61*	859.00	796.00	868.00	910.00	*858.25*	*47.07*	*.046*
Total length of RP (s)	402.00	461.00	410.00	463.00	*434.00*	*32.51*	520.00	498.00	509.00	569.00	*524.00*	*31.32*	*.007*
Total number of coupled turns in RPs	28.00	37.00	23.00	22.00	*27.50*	*6.86*	30.00	37.00	37.50	35.50	*35.00*	*3.44*	*.115*
Mean number of coupled turns/ RP	2.33	3.08	1.92	1.83	*2.29*	*.60*	2.50	3.08	3.13	2.96	*2.92*	*.29*	*.114*
Mean length (s)/ coupled turn in RP	14.36	12.46	17.83	21.05	*16.42*	*3.80*	17.33	13.46	13.57	16.03	*15.10*	*1.90*	*.563*

We further divided the data into two data sets: RPs in interpreting from French/Spanish into Swedish (Table 4) and RPs in interpreting from Swedish into French/Spanish (Table 5). Tables 4 and 5 show the values for both individuals and groups.

Table 4 shows that when interpreting from French/Spanish, the inexperienced interpreters spend on average significantly more time on each RP than the experienced group ($t(5.059) = -3.223$, $p = .023$). The number of coupled turns is quite similar for the two groups. The mean length of the coupled turn in this condition is longer for the inexperienced group than for the experienced group, but this difference could not be confirmed as statistically significant ($p = .506$).

Table 5 shows that when interpreting in the other direction, from Swedish into French/Spanish, the pattern is repeated (significance not confirmed, though), that is, the experienced interpreters spend less time on the RPs than the inexperienced interpreters ($p = .069$). Numerically, the experienced group uses on average fewer coupled turns ($p = .077$), but this does not reach statistical significance. Even though there is a numerical difference in the mean value of the length of the coupled turn in this condition, it does not reach statistical significance ($p = .233$).

Hence, our second hypothesis – that experienced interpreters would manage longer coupled turns, as measured in length of time, than inexperienced ones – was not corroborated; we certainly found numerical differences between the groups, but they were not statistically significant. This holds both for all RPs taken together and for the RPs in either language direction.

We now give the results for the rendition types. Table 6 and Figure 1 show rendition types for all RPs on the individual and group levels. Most interesting here are the shares of close versus reduced renditions. As hypothesized, close renditions account for the largest share in the experienced group, with 44%, while reduced renditions were found in 26% of the coupled turns. In the inexperienced group, the pattern is the reverse, with reduced renditions being more common (38%) than close renditions (35%). The difference between the two groups is significant for the reduced renditions ($t(5.990) = -2.467$, $p = .049$), but, although numerically different, they are not statistically significant for the close renditions ($p = .346$).

We also present the data divided into the same two data sets as above, that is, from either French/Spanish (Table 7 and Figure 2) or from Swedish (Table 8 and Figure 3).

Table 7 and Figure 2 show that when interpreting from French/Spanish, the experienced interpreters have a higher percentage of close renditions than the inexperienced ones (52% vs. 23%), though the post hoc comparison is not significant ($p = .078$, uncorrected). Conversely, the inexperienced interpreters have a

Table 4. Temporal aspects of interpreting RPs from French/Spanish ($n = 6$)

	Yvette/ French	Marie/ French	Cesar/ Spanish	David/ Spanish	*Mean exp.*	*SD*	Made-leine/French	Juliette/ French	Ana/ Spanish	Beata/ Spanish	*Mean inexp.*	*SD*	*p*
Total length of RPs in seconds	138.00	143.00	161.00	172.00	*153.50*	*15.80*	188.00	173.00	217.00	227.00	*201.25*	*25.06*	*.007*
Length (s) /RP	23.00	23.83	26.83	28.67	*25.58*	*2.63*	31.33	28.83	36.17	37.83	*33.54*	*4.18*	*.023*
Total number of coupled turns	10.00	13.00	9.00	8.00	*10.00*	*2.16*	9.00	11.00	11.5	14.00	*11.38*	*2.06*	*.392*
Mean number of coupled turns/RP	1.67	2.17	1.50	1.33	*1.67*	*.36*	1.50	1.83	1.92	2.33	*1.90*	*0.34*	*.396*
Mean length (s)/ coupled turn	13.80	11.00	17.89	21.5	*16.05*	*4.61*	20.89	15.73	18.87	16.21	*17.93*	*2.41*	*.506*

Table 5. Temporal aspects of interpreting RPs from Swedish ($n = 6$)

	Yvette/ French	Marie/ French	Cesar/ Spanish	David/ Spanish	*Mean exp.*	*SD*	Made-leine/French	Juliette/ French	Ana/ Spanish	Beata/ Spanish	*Mean inexp.*	*SD*	*p*
Total length of RPs in seconds	264.00	318.00	249.00	291.00	*280.50*	*30.45*	332.00	325.00	292.00	342.00	*322.75*	*21.65*	*.069*
Length (s) /RP	44.00	53.00	41.50	48.50	*46.75*	*5.07*	53.33	54.17	48.67	57.00	*53.79*	*3.61*	*.563*
Total number of coupled turns	18.00	24.00	14.00	14.00	*17.50*	*4.73*	21.00	26.00	26.00	21.50	*23.63*	*2.75*	*.077*
Mean number of coupled turns/RP	3.00	4.00	2.33	2.33	*2.92*	*.79*	3.50	4.33	4.33	3.58	*3.94*	*.46*	*.078*
Mean length (s)/ coupled turn	14.67	13.25	17.79	20.79	*16.62*	*2.36*	15.81	12.50	11.23	15.91	*13.86*	*2.36*	*.233*

Table 6. Rendition types, all RPs, individual level and group level (% in parenthesis)

	Yvette/ French	Marie/ French	Cesar/ Spanish	David/ Spanish	*Mean exp.*	*SD*	Madeleine/ French	Juliette/ French	Ana/ Spanish	Beata/ Spanish	*Mean inexp.*	*SD*
Close	15	21	6	11	*13.25*	*6.34*	10	12	14	18	*13.50*	*3.42*
	(54)	(51)	(21)	(46)	*(44)*		(32)	(32)	(29)	(44)	*(35)*	
Reduced	8	8	10	5	*7.75*	*2.06*	15	15	17	13	*15.00*	*1.63*
	(29)	(20)	(37)	(20)	*(26)*		(49)	(41)	(35)	(33)	*(38)*	
Expanded	1	5	2	1	*2.25*	*1.89*	1	2	2	1	*1.50*	*.58*
	(3)	(12)	(7)	(4)	*(7)*		(3)	(5.5)	(4.5)	(2)	*(4)*	
Substituted	4	2	2	3	*2.75*	*0.96*	3	6	5	1	*3.75*	*2.22*
	(14)	(5)	(7)	(13)	*(9)*		(10)	(16)	(10)	(2)	*(9)*	
Zero-renditions	0	0	0	0	*0*	*0*	0	0	0	3	*0.75*	*1.5*
										(7)	*(2)*	
Non-rendition	0	2	6	3	*2.75*	*2.5*	2	2	6	5	*3.75*	*2.06*
		(5)	(21)	(13)	*(9)*		(6)	(5.5)	(13)	(12)	*(9)*	
Summarizing	0	2	2	1	*1.25*	*.96*	0	0	4	0	*1.00*	*2.00*
		(5)	(7)	(4)	*(4)*				(8.5)		*(3)*	
Multi-party	0	1	0	0	*0.25*	*.50*	0	0	0	0	*0*	*0*
		(2)			*(1)*							
Total renditions	28	41	28	24	*30.25*	*7.41*	31	37	48	41	*39.25*	*3.57*
	(100)	(100)	(100)	(100)	*(100)*		(100)	(100)	(100)	(100)	*(100)*	

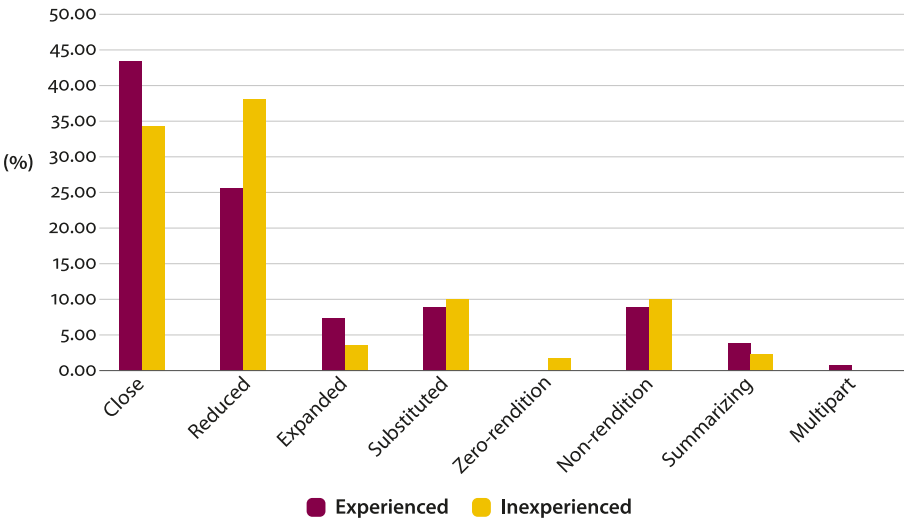

Figure 1. Percentages of rendition types, all RPs, experienced vs. inexperienced

higher percentage of reduced renditions than the experienced interpreters (51% vs. 16%), a difference that is significant ($t(4.827) = -3.615$, $p = .016$, uncorrected).

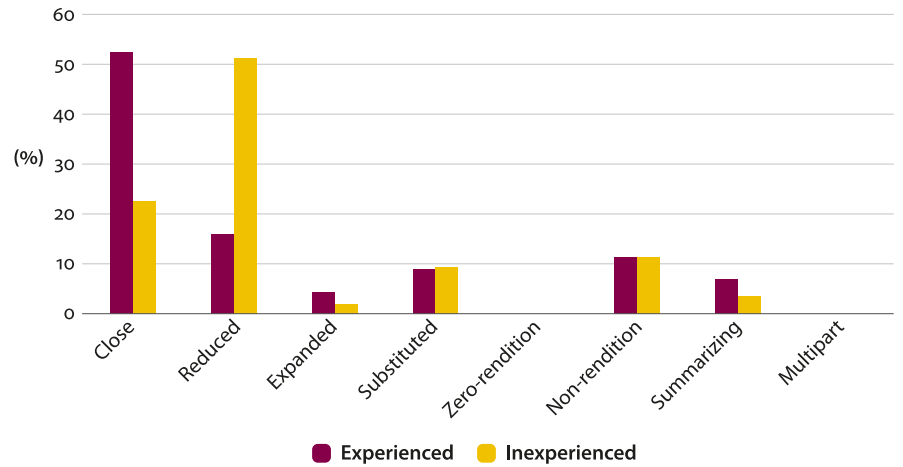

Figure 2. Percentages of rendition types, RPs from French/Spanish, experienced vs. inexperienced

Table 8 and Figure 3 show rendition types in interpreting from Swedish. Here, the groups have more or less the same figures, both for close renditions and for reduced renditions. Hence, there is here no difference between the groups, contrary to hypothesis 3.

Table 7. Rendition types from French/Spanish

	Yvette/French	Marie/French	Cesar/Spanish	David/Spanish	*Mean exp.*	*SD*	Madeleine/French	Juliette/French	Ana/Spanish	Beata/Spanish	*Mean inexp.*	*SD*
Close	6	10	2	5	*5.75*	*3.30*	2	2	1	7	*3*	*2.71*
	(60)	(71)	(20)	(50)	*(52)*		(20)	(18)	(7)	(41)	*(23)*	
Reduced	2	1	3	1	*1.75*	*.96*	7	7	8	5	*6.75*	*1.26*
	(20)	(7)	(30)	(10)	*(16)*		(70)	(64)	(53)	(29)	*(51)*	
Expanded	0	1	1	0	*0.50*	*.58*	0	1	0	0	*0.25*	*0.50*
		(7)	(10)		*(5)*			(9)			*(2)*	
Substituted	2	0	1	1	*1*	*.82*	0	1	3	1	*1.25*	*1.26*
	(20)		(10)	(10)	*(9)*			(9)	(20)	(6)	*(9)*	
Zero-renditions	0	0	0	0	*0*	*0*	0	0	0	0	*0*	*0*
Non-rendition	0	1	2	2	*1.25*	*.96*	1	0	1	4	*1.50*	*1.73*
		(7)	(20)	(20)	*(11)*		(10)		(7)	(24)	*(11)*	
Summarizing	0	1	1	1	*0.75*	*.50*	0	0	2	0	*0.50*	*1.0*
		(7)	(10)	(10)	*(7)*				(13)		*(4)*	
Multi-part	0	0	0	0	*0*	*0*	0	0	0	0	*0*	*0*
Total renditions	10	14	10	10	*11*	*2.00*	10	11	15	17	*13.25*	*3.30*
	(100)	(100)	(100)	(100)	*(100)*		(100)	(100)	(100)	(100)	*(100)*	

Table 8. Rendition types from Swedish

	Yvette/French	Marie/French	Cesar/Spanish	David/Spanish	*Mean exp.*	*SD*	Madeleine/French	Juliette/French	Ana/Spanish	Beata/Spanish	*Mean inexp.*	*SD*
Close	9	11	4	6	*7.50*	*3.11*	8	10	13	11	*10.50*	*2.08*
	(50)	(41)	(22)	(43)	*(39)*		(38)	(38)	(39)	(46)	*(40)*	
Reduced	6	7	7	4	*6*	*1.41*	8	8	9	8	*8.25*	*.50*
	(33)	(26)	(39)	(29)	*(31)*		(38)	(31)	(27)	(33)	*(32)*	
Expanded	1	4	1	1	*1.75*	*1.50*	1	1	2	1	*1.25*	*.50*
	(6)	(15)	(6)	(7)	*(9)*		(5)	(4)	(6)	(4)	*(5)*	
Substituted	2	2	1	2	*1.75*	*.50*	3	5	2	0	*2.50*	*2.08*
	(11)	(7)	(6)	(14)	*(9)*		(14)	(19)	(6)		*(10)*	
Zero-renditions	0	0	0	0	*0*	*0*	0	0	0	3	*0.75*	*1.5*
										(13)		
Non-rendition	0	1	4	1	*1.50*	*1.73*	1	2	5	1	*2.25*	*1.89*
		(4)	(22)	(7)	*(8)*		(5)	(8)	(15)	(4)	*(9)*	
Summarizing	0	1	1	0	*0.50*	*.58*	0	0	2	0	*0.50*	*1.00*
		(4)	(6)		*(3)*				(6)		*(4)*	
Multi-part	0	1	0	0	*0.25*	*0.5*	0	0	0	0	*0*	*0*
		(4)										
Total renditions	18	27	18	14	*19.25*	5.5	21	26	33	24	*26*	*5.10*
	(100)	(100)	(100)	(100)	*(100)*		(100)	(100)	(100)	(100)	*(100)*	

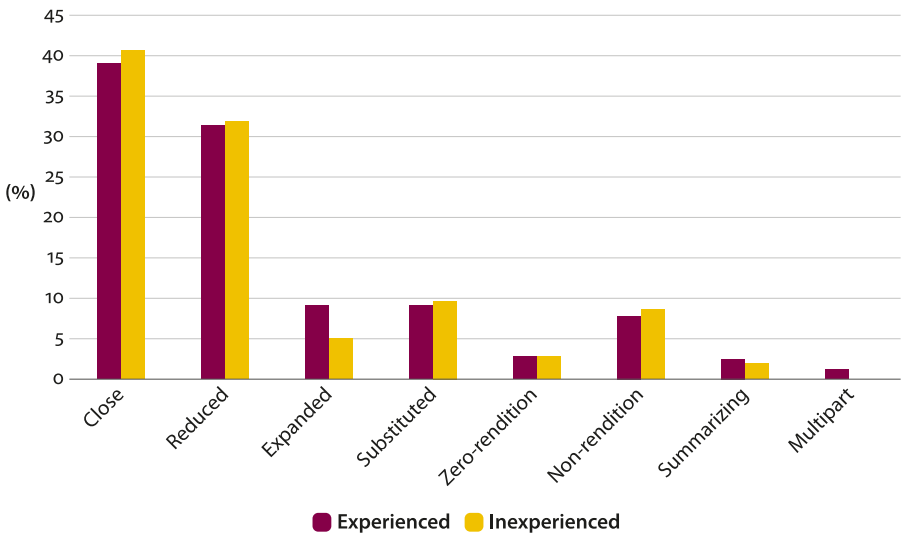

Figure 3. Percentages of rendition types, RPs from Swedish, experienced vs. inexperienced

5. Discussion

We proposed three hypotheses. The first stated that experienced interpreters will encounter overall fewer problems, hence the RPs of experienced interpreters will take less time than those of the inexperienced ones. This was confirmed: on average, the experienced group interpreted the RPs faster than the inexperienced group. This difference is statistically significant ($p = .007$), also on the individual level – that is, each experienced interpreter needed less time than all the inexperienced ones. When looking at the data divided into interpreting direction, we find the same pattern of experienced interpreters managing the RPs in both directions faster than inexperienced ones. This result is also statistically significant when interpreting from French/Spanish ($p = .023$).

Our second hypothesis stated that when faced with potentially long stretches of talk, the coupled turns in the analyzed RPs of experienced interpreters will be on average longer than in those of the inexperienced interpreters. Our results show that there is a difference in mean length of coupled turn between the groups, the experienced group managing longer coupled turns; however, the difference between the groups is not significant ($p = .563$). This result is confirmed, that is with no statistically significant difference between the groups, when the dataset is divided into two subsets, depending on language direction. The experienced

interpreters also needed fewer turns to interpret the RPs, but the difference is not statistically significant ($p = .115$).

Our third hypothesis stated that experienced interpreters will render the information in the speakers' utterances more completely and accurately than inexperienced ones. For this, we mainly looked at the shares of close versus reduced renditions, given that they together tend to constitute as much as around 70% of the data.

We found differences between the groups, with the experienced group showing more close renditions and fewer reduced renditions, while the inexperienced group showed the reverse pattern. The difference between the two groups is significant for the reduced renditions ($p = .049$), though not for the close renditions.

When the data set is divided into two subsets for language direction – RPs interpreted from French/Spanish and RPs interpreted from Swedish – the result from the whole data is statistically confirmed, but only for interpreting from French/Spanish. For interpreting in the other direction, the result is not confirmed, with the shares of close renditions and of reduced renditions being very similar for the two groups (see Figure 3).

There are interesting differences between the two subsets in regard to time, number of coupled turns, and the shares of the rendition types. This raises the issue of the comparability of the two subsets. The number of RPs interpreted from French/Spanish into Swedish is the same ($n = 6$) as the RPs interpreted from Swedish into French/Spanish, but as mentioned above, the role-play script had a slightly larger number of words in the RPs from Swedish. This could help explain why interpreting RPs from French/Spanish into Swedish takes shorter time and also results in fewer coupled turns, for both groups, than when interpreting from Swedish into French/Spanish (see Tables 4 and 5). However, the time of a coupled turn is of course influenced not only by number of words, but also by factors such as speech rate, the number of filled and unfilled pauses during the speaker's and the interpreter's turns, and the length of pause/gap, if any, between the two turns. The French/Spanish-speaking role-players may have spoken faster than the Swedish ones, but this was not explored within this study. Furthermore, since most of the interpreter participants have Swedish as their strongest language, there may be less hesitation and fewer pauses in their interpreting into Swedish than into the other language. Also, we strove for some degree of ecological validity in the role-play by creating a situation with institutional discourse, where the Swedish speaker talks about employment and integration, whereas the French/Spanish speaker provides information about herself and her background, family, and so forth. All those factors can contribute to the overall shorter time for the coupled turns, as well as fewer turns, when interpreting into Swedish. Interest-

ingly, although both groups take shorter time and fewer turns when interpreting into Swedish, the renditions of the experienced group have a higher share of close renditions, and the inexperienced group has a higher share of reduced renditions. The high number of reduced renditions in the inexperienced group in this language direction probably also contributes to the short time.

Interpreting RPs from Swedish into French/Spanish takes longer than interpreting into Swedish for both groups, and the respective shares of close and reduced renditions, that is, the degree of accuracy and completeness, is very similar in both groups. The longer time can probably be explained to a high degree by the higher number of words in the Swedish RPs. As for the similarities in shares for rendition types between experienced and inexperienced participants, the assumption that students are as proficient as the professionals is less likely based on our other findings. Thus, we suggest that one reason may be found in how the role-player enacted the role-play, with the exception of specific terminology that might have caused similar difficulties for both groups. Another possibility, as we have discussed in an earlier paper (Tiselius & Englund Dimitrova 2019), may be that the participants' language proficiency is asymmetrical and thereby causes different results depending on direction.

Also, it should be noted that Wadensjö's (1998) typology is a rather crude measure. For instance, classifying a rendition as reduced means that some part of the propositional content of the original utterance has been left implicit; as we understand the typology, this can be anything from a single word to a much larger part of the original utterance. The characteristics of a reduced rendition may thus be very different in each case. It should be noted that Wadensjö, who consistently advocates a dialogical view on language and interpreting, has not meant the typology for overall characterization of any data and has avoided such use of the typology. Recent work by Dal Fovo and Falbo (2020) also suggests the need to refine Wadensjö's typology (cf. also Gavioli & Wadensjö 2020).

Our most important result is the finding that the mean length of the coupled turn, which we suggest reflects the interpreter's processing span, shows variation between interpreters but not significantly so, and not depending upon experience. We assume that this processing span reflects the processing capacity mainly of the working memory. It is therefore potentially a universal cognitive constraint and very much analogous to the ear-voice span in simultaneous interpreting (see above). In light of our results, and in view of results from the previous studies on working memory in simultaneous interpreters based on more fine-grained tests referred to above (Mellinger & Hanson 2019; Wen & Dong 2019), it seems desirable to conduct dedicated studies on working memory of dialogue interpreters.

In the coupled turns, we have not measured the length of the speaker's turn compared to the length of the interpreter's turn. Even in coupled turns where

we have classified the rendition as close, we must expect temporal differences between the two turns, the interpreter's turn being longer than, shorter than, or equal to the speaker's turn. Such measurements will hopefully follow in future studies and will afford a more fine-grained picture of the processing span in dialogue interpreting.

We have focused on temporal properties and on the number of turns. Turn transitions from the speaker to the interpreter can take form as gaps (i.e., longer or shorter pauses/silences), overlaps (i.e., two speakers speaking simultaneously) or latching (i.e. 'seamless' turn transition without gap or overlap). Table 3 shows a good deal of individual variation in the time for coupled turns, and based on our analyses of transcriptions and recordings, there are indications of individual turn-taking styles. Some participants seem to prefer to let the speaker keep the turn, even if it gets quite long, and only start interpreting when the speaker seems to be ready to leave the turn. Cesar, David, and Madeleine are examples of this strategy. Others work actively to 'chunk' the speaker's turn (see Davitti 2018; Licoppe & Veyrier 2020) by taking the turn as soon as possible. Marie is an example of this; unaware that we wanted to test her managing of long stretches of talk, she at the very start of the role-play points out to the role-players that she has been instructed not to take notes, and they therefore must take short turns. The role-players, however, complied with our instructions to keep the turn, thereby making Marie engage in very active turn-taking with sometimes very short turns.

The study has some limitations. First of all, the number of participants is small, though we nevertheless established significance in a number of conditions. Furthermore, the scripted role-play meant that the two role-players had planned utterances, knowing beforehand when they were supposed to take the turn and roughly what to say, thereby creating a risk of unnatural turn-taking and interaction. However, the interpreter (i.e., the participant in focus here) did not have access to the script and knew only what kind of interpreting situation to plan for. From the interpreter's point of view, the task was therefore actually quite 'natural,' as ecologically valid as quasi-experimental conditions allow. Indeed, several of the experienced interpreters commented after the role-play that the situation had been one that they frequently encounter in their professional practice. Hence, the method of elicitation of the data can be seen both as a limitation and, indeed, as a strength of the study.

6. Conclusion

We have shown a possible cognitive constraint for the coupled turn in dialogue interpreting. Our study contributes to understanding the cognitive underpinnings

of turn-taking both in dialogue interpreting and potentially in monolingual dialogues.

We have introduced the concept of processing span, a time measurement for the coupled turn, where we could not establish significant differences in relation to interpreting experience. Hence, this possibly reflects the more universal working memory constraints of the (dialogue) interpreter. This finding connects to earlier findings on ear-voice span in simultaneous interpreting and thus supports the view that dialogue interpreting is as cognitively challenging as simultaneous interpreting.

For rendition types, we found interesting differences in our data between the two groups, potentially related to language direction, and suggested some tentative explanations, for instance regarding asymmetry in interpreters' language proficiency.

Our findings need to be replicated on larger samples and with other language combinations in order to become more robust. More cognitive studies on dialogue interpreting are therefore much needed.

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