MAKING THE MOST OF RETROSPECTIVE PROCESS TRACING IN DIALOGUE INTERPRETING RESEARCH. / REFLEXIONES Y RECOMENDACIONES SOBRE EL USO DE MÉTODOS RETROSPECTIVOS VERBALES EN LA INVESTIGACIÓN EN INTERPRETACIÓN BILATERAL.

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Abstract: Retrospective verbal process tracing is a popular research method in Interpreting Studies, employed by a growing number of scholars, particularly in studies of conference interpreting, but, to date, it has not been widely employed in studies of dialogue interpreting. This paper begins by introducing process-tracing methodologies, defining types of verbal process tracing, and presenting a brief critical review of publications employing this research methodology. The bulk of the article provides concrete, practical information and guidance for scholars of dialogue interpreting who are interested in employing retrospective process tracing in their research. We discuss the theoretical underpinnings of the method, methodological considerations that must be taken into account in the design and procedure of such studies, data analysis and reporting on the basis of retrospective process tracing, and recommendations for best practices.

Keywords: Retrospective process tracing; Retrospection; Dialogue interpreting; Public service interpreting; Research methods.

Resumen: El seguimiento retrospectivo verbal de procesos se utiliza cada vez más en los Estudios de Interpretación, sobre todo en la interpretación de conferencias. Con todo, este método se ha utilizado poco hasta la fecha en el campo de la interpretación bilateral. En la primera parte de este artículo, presentaremos los métodos de seguimiento de procesos, definiremos los tipos de seguimiento verbal de procesos y examinaremos brevemente algunos estudios que han empleado estos métodos. El objetivo principal es ofrecer recomendaciones concretas y prácticas que puedan resultar útiles para aquellos investigadores en interpretación bilateral que se interesen por estos métodos. Presentaremos las bases teóricas, las consideraciones metodológicas relevantes para el diseño y el procedimiento de tales estudios, el proceso de análisis y presentación de los datos obtenidos a través del seguimiento retrospectivo y algunas recomendaciones de buenas prácticas.

Palabras clave: Seguimiento retrospectivo; Retrospección; Interpretación bilateral; Interpretación en los servicios públicos; Métodos de investigación.

1. Introduction and background

Interpreting involves a set of cognitive and social processes that require specialized knowledge and skills. Some portion of this knowledge and skill —for example, reading, writing, command of languages— is likely to be acquired independently of any specific aim

to use the knowledge or skill in the context of interpreting, while other portions —for example, discourse analysis, note-taking, situational management, specialized terminology— are often acquired as part of a goal-directed learning process, such as an interpreter training program. The study of the processes involved in interpreting and translation[1] ('process research') is of great interest to researchers interested in issues such as bilingual language processing, cognition, and training (Pöchhacker, 2004; Schwieter and Ferreira, 2017).

While the word 'process' can be employed to refer to both social and cognitive phenomena, most process research in interpreting focuses on the cognitive dimension (Shlesinger, 2000). The acts involved in any cognitive process draw on the individual's prior knowledge, skills, and experiences (Groome et al. 1999). While cognitive processes may be automated, such automated processes are often acquired through effortful (non-automatic) learning and practice (Englund Dimitrova, 2005). Interpreters' online (that is, during task performance) monitoring processes and their online responses/reactions to challenges encountered during performance have been of particular interest to scholars.

As has been discussed in the literature, the cognitive processes involved in interpreting are difficult to observe and study, inasmuch as, on the one hand, they are not directly observable, and, on the other, interpreters may not be conscious of said processes (Shlesinger, 2000; Englund Dimitrova and Tiselius, 2009; Alvstad, Hild, and Tiselius, 2011; Englund Dimitrova and Tiselius, 2014). Researchers studying the processes involved in interpreting must use methods that tap into the interpreter's brain at work. This implies studying the interpreter's cognition during the online (performance) phase. In the next few paragraphs, we introduce a number of nonverbal and verbal methods used by process researchers of translation and interpreting before discussing retrospective verbal process tracing (see Section 2, below) —the method that is our focus in this article— in detail.

One set of process-tracing methods involves the use of technology to gain direct information about brain function during interpreting performance, including the use of electroencephalogram (EEG) (Elmer and Kuhnis, 2016), functional Magnetic Resonance Imaging (fMRI) (Hervais-Adelman and Babcock, 2019), and functional Near Infra-Red Spectroscopy (fNIRS) (Lin et al. 2018). While these methods provide direct evidence of the parts of the brain that are (dis)engaged during a given task, they are quite sensitive to confounding variables. Task performance draws on a combination of cognitive resources (working memory, language) and muscular resources (i.e., producing speech or signs). All these resources leave traces in the brain, which makes it difficult for researchers using these types of methods to distinguish between neurological traces related to interpreting and those related to other motor and cognitive activities. Because of the potential for such traces to confound the data, interpreters are often only tested on single or two-word tasks or asked to interpret in their heads (without voicing or signing the TL output). Both of these approaches can be seen as problematic in terms of ecological validity.

Other methods involve non-verbal means of tracking the translation/interpreting process. One such method, keystroke logging, involves tracking the translator's keystrokes while translating (Jakobsen, 1999; Muñoz Martín and Cardona Guerra, 2019). Another method is eye-tracking, in which the translator's gaze on the translation task is followed (Hvelplund, 2017). A third method using non-verbal means measures interpreters' electrodermal (or galvanic skin) responses (Korpal and Jasielska, 2019). Keystroke logging is not particularly relevant to the study of interpreting, given that interpreters do not use a keyboard; however, a variation on this method has been employed in studies logging

[1] We include translation process research in this section because of its relationship to and influence on interpreting process research.

interpreters' use of visual support (Seeber, 2012; Stachowiak–Szymczak, 2019). Eye-tracking is a potentially productive method for use in interpreting studies, as illustrated by its use in studies involving reading back notes from consecutive interpreting (Chen, 2018) and tracking dialogue interpreters' gaze (Vranjes et al. 2018; Tiselius and Sneed, submitted). Measurement of electrodermal response has been employed to investigate interpreters' responses to emotional speech during interpreting (Korpal and Jasielska, 2019). All three of these approaches are viable methods for tapping into the working interpreter's processing. At the same time, they provide information about only some portions or aspects of the process; they also do not give insight into the interpreter's experience or perception of the task.

A last set of methods involves eliciting verbal reports from the task performer (that is, the translator/interpreter). A key feature of verbal process-tracing methods is their focus on the performer's cognition during task performance (Ericsson and Simon, 1993). There are two principal types of verbal process-tracing methods, differentiated by their timing vis-à-vis task performance. Concurrent process tracing (more commonly known as Think-Aloud Protocol, or TAP) takes place during task performance, while retrospective process tracing takes place after task performance (Ericsson and Simon, 1993). While popular in Translation Studies research (Jääskeläinen, 2000; Muñoz Martín, 2014), concurrent process tracing cannot feasibly be employed to gain insight into interpreting processes, due to the impossibility of verbalizing (or signing) thoughts while also engaged in the act of interpreting (Monacelli, 2000; Englund Dimitrova and Tiselius, 2009, 2014).[2] For this reason, process-oriented researchers of interpreting have employed retrospective verbal process tracing methods, in which study participants are asked to recall their online processing (e.g., Ivanova, 2000a, 2000b; Vik-Tuovinen, 2002; Tiselius, 2013; Herring, 2018).

To date, retrospective verbal process tracing has primarily been employed in the study of simultaneous interpreting of monologues (Herring, 2018; Tiselius, 2018b); indeed, regardless of method, very few scholars have taken a process-focused approach to the study of dialogue interpreting (Englund Dimitrova and Tiselius, 2016). We argue that a process-focused approach to dialogue interpreting is warranted, and that retrospective verbal reports are a potentially productive method for use in such efforts. At the same time, retrospective process tracing is a potentially problematic method which requires careful planning and execution, both in terms of study design and data analysis. Researchers planning to employ this method must clearly understand its theoretical underpinnings, considerations for design and procedure, and the scope and limitations of the data they collect in such studies.

In an overview of studies employing retrospective verbal process tracing, Herring (2018) points out that there is a great deal of variation in the methodological approaches employed by scholars, as well as inconsistency in their application. She argues that this situation makes it difficult for researchers to effectively compare findings, concluding that "given retrospective process tracing's increasing popularity as a research method, the inconsistency with which it is carried out, and the need to reliably compare results across studies, […] the time has come to work toward determining methodological best practices in retrospective process tracing in Interpreting Studies research" (Herring, 2018: 116).

This paper is intended as a contribution to such an effort. In the remainder of the paper we describe approaches to retrospective process tracing; present a critical overview of the literature and our own experiences with this data elicitation method; and discuss

[2] There are potential uses for concurrent process tracing methods within the broader context of Interpreting Studies, such as Russell and Winston's (2014) use of a think-aloud protocol to study interpreters' processing during preparation for an interpreting task. Note, however, that the processes being investigated in this case are those involved in an auxiliary/related task —preparation— rather than those involved in interpreting.

recommendations for best practices for design, procedure, and data analysis. Our hope is that the paper will serve as a resource for scholars of dialogue interpreting who are interested in employing this method in their research. In closing this section, we note that we employ the term "retrospective process tracing" in long form and "retrospection" in short form, and that retrospective process tracing may be stimulated/cued, uncued, or a combination thereof, as further discussed in Section 3.3, below.

2. Retrospection in Interpreting Studies

2.1 Studies employing retrospective methods

Herring (2018) lists thirteen studies published between 1999 and 2017 that employed methods involving retrospection or post-task interviews (see below). Most of these studies are focused on simultaneous conference interpreting or long consecutive with notes, although a few scholars have employed retrospective methods to study dialogue interpreting (e.g., Herring, 2018; Tiselius, 2018b).

A number of labels are employed to describe the method(s) used in these studies. For example, Mead (2002) refers to 'retrospective evaluations' and 'interviews,' Napier (2004) to 'task review' and 'retrospective interview,' Vik-Tuovinen (2002) and Englund Dimitrova and Tiselius (2009, 2014) to 'retrospection,' Chang and Schallert (2007) to 'stimulated retrospective interview,' Takimoto (2009) and Russell and Winston (2014) to 'stimulated recall,' Shamy and de Pedro Ricoy (2017) to 'retrospective protocols.' Despite some variation, there is a clear trend toward use of the words 'retrospection' and 'retrospective', often in combination with another word or words. 'Stimulated' refers to a specific methodological choice (that is, the use of a cue for retrospection), but the term is not employed consistently by authors who used a cue to elicit post-task recall/commentary —indeed, while all of the studies listed by Herring (2018) employed cues, many did not specifically identify their method as 'stimulated' or 'cued' retrospection.

One parameter that tends to vary from study to study is the timing of the post-task session/retrospection. While the majority of scholars report carrying out retrospection immediately after task completion (e.g., Ivanova, 2000a, 2000b; Mead, 2002; Bartlomiejczyk, 2006; Gumul, 2006; Chang and Schallert, 2007; Englund Dimitrova and Tiselius, 2009; Tiselius and Jenset, 2011; Englund Dimitrova and Tiselius, 2014; Hild, 2015; Shamy and de Pedro Ricoy, 2017; Herring, 2018; Tiselius, 2018b), some scholars report carrying out post-task interviews as many as a few days or even weeks after task completion (e.g., Monacelli, 2000; Vik-Tuovinen, 2002; G.C. Major, 2013; G. Major, 2014; Russell and Winston, 2014).[3] The timing of the retrospection or post-task interview has significant implications for the validity and reliability of the data, as is further discussed in the following section.

Other parameters which vary from study to study are the procedure employed to elicit retrospection and the type of cue used to stimulate recall. The procedures and stimuli documented in the literature include asking the study participants to:

- read a SL transcript and recall everything they can (Ivanova, 2000a, 2000b; Englund Dimitrova and Tiselius, 2009; Tiselius and Jenset, 2011; Englund Dimitrova and

[3] In the case of Vik-Tuovinen and of Russell and Winston, some participants provided immediate post-task process tracing while others completed retrospection sessions after a lapse of several days.

Tiselius, 2014; Hild, 2015), with the researcher present/observing but providing no or minimal prompts/interaction; sometimes followed by a debriefing interview.
• view a video recording of the SL original and recall everything they could, with minimal interaction/prompting from researcher (Shamy and de Pedro Ricoy, 2017).
• view a video recording of the SL material, pausing the recording at will to recall information; verbal probes (Russell and Winston, 2014).
• listen to or watch the TL rendition and comment on specific aspects of performance to which the researcher has drawn their attention (Mead, 2002; Napier, 2004; Napier and Barker, 2004).
• listen to or view an audio/video recording of the SL material and TL rendition, with a transcript of the SL material also available, both researcher and participant pausing the recording at will to recall information (Vik-Tuovinen, 2002).
• listen to dual-track audio of SL material and TL rendition, pausing at will to recall information; no researcher present in booth (Bartlomiejczyk, 2006).
• listen to dual-track audio of SL material and TL rendition, pausing at will to comment on specific aspects of performance to which the researcher had drawn their attention (Gumul, 2006).
• refer to dual-track audio of SL material and TL rendition and transcript of SL material, with instructions to recall everything; some prompting from researcher (Chang and Schallert, 2007).
• comment on a transcript of portions of the SL material accompanied by corresponding portions of the TL rendition (Monacelli, 2000).
• listen to an audio recording of a dialogue, containing both SL and TL utterances; researcher asked questions, participant also made comments (Takimoto, 2009; Takimoto and Koshiba, 2009).
• view specific moments from a video recording of an interpreted interaction (containing both SL and TL utterances), comment on specific aspects of performance (G.C. Major, 2013; G. Major, 2014).
• provide uncued process tracing followed by the provision of a minimal cue and then verbal probes (Herring, 2018).
• view a video recording of both source-language sides of a 'sample'/similar interpreted dialogue (interpreter's renditions not visible/audible on the video), with instructions to recall everything they could about the interpreted interactions, with minimal interaction/prompting from researcher (Tiselius, 2018b).

Use of a transcript of the source material as a cue for post-task recall is most feasible when the source is a static one (e.g., a speech to be interpreted simultaneously). In the case of spontaneous or unscripted but planned/structured dialogues, production of a transcript of the interaction (or, indeed, multiple transcripts, one per participant) would be time consuming and preclude immediate post-task process tracing (Herring, 2018; Tiselius, 2018b).

While all of the studies mentioned above employed a cue for retrospection, this is not a methodological requirement. In fact, retrospection may be uncued, as in the first part of Herring's (2018) three-stage approach to eliciting process tracing. The strengths and limitations of the various types of stimulus, as well as those of uncued retrospection, are further discussed in Section 3.

Another parameter that varies in the studies cited in this section is the amount and type of interaction that occurs between the researcher and the study participants. Some researchers avoid interaction with the study participant, providing only limited guidance and redirection;

in this type of study, the retrospection session often concludes with a period of time in which the researcher asks questions or follows up on specific points from the process-tracing. In other studies, researchers interact and intervene more frequently, directing the participant's attention to specific aspects of the task. The latter approach is problematic, given the potential for such interventions to lead study participants to draw inferences, provide explanations rather than direct recall, or make guesses about what might have happened. As stressed by Gass and Mackey (2017), data gathered through introspective methods, including retrospection, is vulnerable to criticism on the grounds of lack of veridicality (that is, that the data does not accurately reflect the reality of unobservable cognitive phenomena). In light of this vulnerability, it behooves researchers to take a great deal of care with study design, procedure, and data analysis. These issues are further discussed in Sections 3 and 4, below. Before moving on to that discussion, however, we briefly comment on pedagogical approaches that involve self-assessment/reflection.

2.2 Self-assessment in interpreter education: Some brief remarks

Self-assessment and reflection are commonplace in many interpreter training programs. Reviewing one's work, reflecting on patterns of strength and weakness, and evaluating one's performance and progress are considered fundamental components of skill acquisition, especially within pedagogical approaches informed by expertise studies and the notion of deliberate practice (Herring and Swabey, 2017; Tiselius, 2018a). While we wholeheartedly subscribe to the importance of these activities for interpreter trainees, we wish to offer a word of caution with regard to labelling such approaches as 'think-aloud,' 'stimulated recall,' or 'retrospection' (e.g., Smith, 2014; Latorraca, 2018; Sowa and McDermid, 2018).

Self-assessment (or self-reflection, or self-observation) is a pedagogical tool which, by nature, requires the learner to review and evaluate performance —to identify patterns and seek explanations for (and solutions to) problems and challenges (Winston, 2005; Moser-Mercer, 2008; Motta, 2011; Russell and Winston, 2014). These goals are not compatible with the aims of retrospective process tracing, which focuses on tapping into online processes to the exclusion of inferences, explanations, or evaluations. Just as we argue for precision in labelling of research methods (see below), we urge instructors, many of whom are also researchers, to take care to distinguish between retrospective process tracing as a research methodology and self-assessment/reflection/observation as a pedagogical tool.

3. Methodological considerations

As mentioned above, retrospective methods are, at heart, process-focused. Their aim is to obtain access to cognitive processes —to gain information about mental activities that are by nature unobservable. Such a focus precludes exploration of rationale, motives, inferences, explanations, and so forth; its primary concern is what Henderson and Tallman (2006: 80) refer to as the "there and then" of task completion, rather than the "here and now" of the retrospection. The method is, however, vulnerable to the possibility that participants may explain an ideal process rather than the actual processes involved in the recently completed task, draw inferences about what must have happened, or offer information that they feel (whether consciously or unconsciously) 'fits with' or 'responds to' the researcher's focus or area of interest (Henderson and Tallman, 2006; Gass and Mackey, 2017; Shamy and de Pedro Ricoy, 2017; Herring, 2018). Nevertheless, the method, when well-planned and executed,

offers valuable insights into the interpreting process (Ericsson and Simon, 1993; Ivanova, 2000a; Henderson and Tallman, 2006; Englund Dimitrova and Tiselius, 2009; Gass and Mackey, 2017). In this section we discuss key methodological considerations regarding the use of retrospection in interpreting research and make a number of recommendations of best practices.

While some scholars use the terms 'retrospection' or 'retrospective' to refer to any post-task interview with the participant (i.e., the interpreter), as discussed in Section 2.1, above, it is important to stress that not all methodologies involving post-task interviews can be classed as retrospection in the sense in which we employ it here. For example, post-task interviews in which participants are asked to explain their decision-making and debriefing sessions in which participants are asked to assess their performance cannot be described as retrospection. In our view, using 'retrospection' and 'post-task interview' as interchangeable terms is detrimental and should be avoided in the interests of clarity and scientific rigor. Using terms such as 'think aloud protocol' or 'stimulated recall' to refer to verbal data-collection methods that involve explanation, evaluation, or reflection muddies the methodological waters and creates confusion, as disparate (and sometimes incompatible) approaches are referred to with the same name, as described in Section 2.1. This situation is compounded by use of these terms to describe pedagogical activities (see Section 2.2). As a result, comparing studies and findings becomes difficult. Furthermore, replication of studies is undoubtedly complicated by lack of consistency with regard to design and procedure.

We therefore argue that it is important to identify some basic criteria or commonalities characteristic of the class of methodological approaches referred to as 'retrospective process tracing,' or, in the short form, 'retrospection,' in the interests of terminological consistency and scientific rigor. In our view, methodological approaches appropriately classed as retrospection/retrospective process tracing are characterized by the following features:

- the retrospection takes place immediately after task performance.
- the retrospection is focused only on the immediately-preceding task.
- the retrospection is focused on the participant's processing during task performance.
- the retrospection protocol is structured and carried out consistently across participants.

Finally, as in all empirical research, published studies must detail the methods used and protocols followed for the retrospective process tracing sessions, and must describe the data analysis process clearly and minutely (Gass and Mackey, 2017).

3.1 Timing of the retrospection

The literature on retrospective methods highlights the need to carry out the retrospective process tracing session immediately after task completion (Englund Dimitrova and Tiselius, 2009, 2014; Gass and Mackey, 2017; Herring, 2018). Retrospection, by definition, draws on information stored in long-term memory, which can decay, be forgotten, or become inaccessible with the passage of time (Cowan, 2005; Anderson, 2015). Thus, the longer the period of time between task performance and retrospection, the less complete (and valid) the data collected during process tracing is likely to be. As Gass and Mackey (2017: 13-14) put it, "when the time between the event reported and the reporting itself is short, there is a greater likelihood that the reporting will be accurate."

3.2 Design of the interpreting task

When preparing the interpreting task that precedes the retrospective process tracing session, several design elements must be carefully considered. Among these are the type of interpreting task (e.g., mode, setting), the time and place in which the interpreting task will be carried out, whether participants will be given time to prepare or warm up before beginning the task, and the parameters of the interpreting task itself. These parameters include the length of the task, the content/subject matter of the material to be interpreted, the parties involved in the dialogue (and who will play them during the interpreted interaction), and specific challenges or 'rich points' (Arumí Ribas and Vargas-Urpi, 2017) to be included in the dialogue.

While Ericsson and Simon (1993) describe the ideal task length for subsequent retrospection as being less than ten seconds, such a short duration is not practicable in the case of interpreting. In the case of interpreting, the tasks undertaken by study participants should resemble, as much as possible, a real-world interpreting task (see, for example, Gile, 1994; Shlesinger, 2000). Similarly, Ericsson (2006: 231) suggests using "naturally occurring activities" to study expert performance. The interactions in which dialogue interpreters carry out their work last longer than 9 seconds, and, indeed, investigating the interpreting process in nine-second chunks is unlikely to lead to valuable insights into the range and complexity of processes that mediate interpreting performance (Hervais-Adelman and Babcock, 2019). Thus, the interpreting task preceding a retrospective process tracing session must be long enough to accurately simulate a real-life interpreting task. In the studies discussed in Section 2, the majority of the interpreting tasks described range from 10 to 20 minutes in length, which seems to be long enough to be realistic but short enough to allow participants to recall at least some portion of their online processing during retrospection.

The desire to create a realistic task/environment also informs decisions with regard to the time and place in which the dialogue interpreting session takes place, the amount of advance information and preparation time that participants are allowed, and the subject matter of the interaction. In most cases, these should closely align with the conditions in which the participants are used to working. In some research studies, however, aspects of the research questions may lead to one or another of these variables being purposefully modified or adjusted. For example, while Tiselius's (2018b) participants received advance information about the topic and purpose of the interaction, Herring's (2018) desire to create a dynamic, unpredictable situation for her participants led her to decide to provide participants with very minimal advance information about the setting/purpose of the simulated interaction and the participants involved.

While it is desirable for the interpreting task to be realistic, it is also important for it to be fairly stable across participants. If the task itself varies too much from one participant to the next, it is difficult to analyze the retrospection data at a group level (that is, if each participant is process tracing about a significantly different interpreted interaction, it is difficult to make comparisons between different individuals' processing). Researchers are faced with the question of whether to employ unscripted, planned/structured but unscripted, or fully-scripted dialogues. Fully-scripted dialogues allow for identical input across participants (Dahnberg, 2015) and facilitate the creation of a cue for retrospection (see Section 3.3, below), but they lack realism, which, as highlighted above, is a serious threat to validity. On the other hand, use of completely unscripted dialogues increases the likelihood that each iteration will be substantially different from the others, resulting in the aforementioned difficulties with inter-participant comparison and causing problems in terms of cueing retrospection. In-depth discussion of approaches to creating simulated interpreted

interactions is outside the scope of this paper; however, interested readers are referred to Herring (2018), Tiselius (2018b), Major (2013; 2014), Anazawa, Ishikawa, and Kiuchi (2012), Russell (2002), Cambridge (1999), and Arumí Ribas and Vargas-Urpi (2017) for accounts of use of simulated dialogues in interpreting research and for further discussion of the merits and potential pitfalls of the various options.

3.3 Cues for retrospection

While most retrospective process tracing studies of interpreting to date have involved cued retrospection, the use of a cue or stimulus to trigger retrospection is not required. When carried out in a methodologically rigorous fashion, as described by this paper and by scholars including Ericsson and Simon (1993) and Gass and Mackey (2017), uncued retrospection has the advantage of avoiding the possibility that the act of processing the cue (whether visually or aurally) will distort recall. At the same time, researchers using uncued retrospection run the risk that the participant will recall very little, if anything, of their online processing. When uncued retrospection does form part of the design of a study, it is important that the instructions for the process-tracing session be drafted in advance and provided to the participant in writing (or, potentially, via pre-recorded audio or video). Use of a static, pre-scripted set of instructions mitigates the potential for the instructions to vary from participant to participant and lessens the possibility that the instructions will be colored by the just-completed interpreting performance and thereby become a cue in and of themselves.[4]

Many researchers choose to use a cue or stimulus for retrospection. While this approach offers the advantage of providing triggers for memory, it can also be problematic, as discussed by a number of authors (Calderhead, 1981; Yinger, 1986; Wilcox and Trudel, 1998; Englund Dimitrova and Tiselius, 2009; Lyle, 2013). Viewing or reading a stimulus is a new experience and creates a new set of memories, which may potentially interfere with recall. Reviewing the stimulus may also direct the process tracer's attention to aspects of the situation/source to which s/he had not attended during task performance. In the case of interpreting, viewing or listening to the target language output —that is, the performance— increases the likelihood that the process tracer will (negatively) evaluate or react to his/her performance (Ivanova, 2000a, 2000b; Shamy and de Pedro Ricoy, 2017).

The ideal cue thus triggers the participant's memory without skewing memory by adding information. The cue for retrospection and the interpreting task should ideally be planned in concert. The most popular option for a cue for retrospection in studies of simultaneous conference interpreting has generally been a verbatim transcript of the source language material. This approach, however, is not feasible in the case of spontaneous or partly-scripted dialogues, given the likelihood that each iteration of the dialogue will differ to some extent as the interaction develops.[5] A variation on this approach is to create a recording

[4] For example, one participant makes frequent use of gestures while interpreting, in contrast with previous study participants, there is a risk that a researcher who is not reading a scripted set of instructions might make some reference to the gestures while providing (unscripted) instructions, thus drawing the participant's attention to a specific aspect of the performance and thereby running the risk of skewing the participant's retrospection to focus on that aspect.

[5] Automated transcription software may be seen as a potential solution to this difficulty. However, at present, such technology is not capable of dealing with multi-party, multi-lingual interactions. Moreover, the time needed to process and print an automated transcript would affect the immediacy of the retrospection.

(whether video[6] or audio) or transcript of one potential version of the dialogue, as a prototype, and subsequently use that prototype as the cue for retrospection. The risk, in this case, is that the participant's recall may be skewed, inasmuch as the cue will not be identical to the interpreted interaction s/he actually interpreted. The participants may also be distracted from recalling the just-completed task by the differences between the cue and the original (see, for example, Tiselius, 2018a). Another option is to employ a written synopsis of the interpreted interaction as a cue for retrospection. One risk of this type of cue is that the participant may be disoriented by the fact that the cue does not precisely reflect the just-transpired events; another is that the cue may lead participants to re-tell the content or 'story' of the interaction (that is, to recount what happed, along the lines of *so-and-so said such-and-such; so-and-so was unhappy because…*), as described by Herring (2018).

The chosen cue must allow for retrospection immediately after task completion; as noted above, immediacy of retrospection is a vital component of process tracing. In light of the need for immediacy and the difficulty in producing source language transcripts of unscripted or partly-scripted dialogues, researchers may be tempted to use an audio or video recording of the interpreter's performance (i.e., that includes the target language utterances). While such an approach may seem expedient, using the participant's own performance as a cue is risky, as the participant may easily begin to comment on, justify, or explain the performance, rather than limiting her/himself to recalling his/her processing during the interpreted interaction. Should this approach be chosen for some reason, it is important for the researcher to instruct participants in advance (and perhaps repeat the instruction during the course of the retrospection) to try to remember what they thought/did at each moment in time, rather than to evaluate or react to the performance they are hearing/viewing.

A last type of retrospection is question-probed retrospection, in which a pre-determined set of questions are asked as a trigger for memory. The questions ('verbal probes') used in this approach must be carefully prepared in advance, so as to avoid biasing the participants' answers. In addition, they must be focused on process, rather than on performance or product. For example, questions asking participants to explain their decision-making or to evaluate the quality of their output are not appropriate in retrospective process tracing as we define it here. It is important to ask the same questions of all participants in order to get comparable data across participants. Individual participants may be asked appropriately-worded process-focused questions about specific phenomena observed by the researcher during the interpreting performance, but such questions must avoid leading the participant or suggesting a response. They should be worded along the lines of "do you recall *X*?" or "do you remember anything about *Y*?" rather than as "Tell me what happened when *X*." or "Can you explain *Y* to me?"

3.4 Procedure for eliciting retrospection

To conclude this section, we discuss the procedure employed for eliciting retrospection. The information presented in the following paragraphs is quite detailed, as our experience has demonstrated that seemingly obvious or minor points may be overlooked, with potentially significant consequences. As pointed out several times in this text, we argue that retrospection should take place immediately after the interpreted event. It can be done in the same room or space in which the interpreted event took place, or in a nearby room. The first

[6] As in, for example, Tiselius (2018b), in which the video used as a cue was framed such that the resulting stimulus showed the Swedish speaker and the Swedish Sign Language user, but not the interpreter who was interpreting the interaction.

step, which should not be delayed, is to begin recording, as seemingly inconsequential small talk or side comments may prove important. It may be wise to use a videorecorder so as to capture gestures and facial expressions; this may be accomplished either by using a traditional video camera, or by using the built-in camera of a computer, with the participant sitting within range. Once the recording has begun, the researcher provides the instructions for the process-tracing session. These instructions, which should be pre-written, may be read out loud to the participant, or handed (on hard copy) to the participant for her/him to read.

Following the instructions, the cue (if one is to be used) is provided. If a manuscript or recorded cue is used, the participant is encouraged to read/watch it from the beginning, pausing at will to retrospect; if a recorded cue is used, the cue can be viewed on the same computer that is also recording the participant. As the participant starts the retrospection, it is advisable that the researcher sit slightly behind the participant, so as not to be in her/his line of sight. Our experience is that it is important for the researcher to be physically present in case of technical difficulties and also to add the human dimension, including encouragement. The participant is likely to ask for confirmation that they are on the right track or have understood the instructions. In such cases, it is important for the researcher to be encouraging without interfering. The researcher should refrain from asking follow-up questions until the participant has finished the process-tracing session.

Throughout the session, researchers should (re)act as little as possible, taking a passive role. As previously stated, the aim of retrospective process tracing is to tap into the participant's thoughts/actions during the actual event, with as little interference as possible, rather than to lead the participant to (re)create or (re)construct what might have happened (Englund Dimitrova and Tiselius, 2014). Thus, the researcher's interventions should be kept to a minimum. Necessary interventions, such as the instructions for retrospection, or verbal probes used at the end of the retrospection, must be meticulously planned (preferably, pre-scripted and scrupulously adhered to during the session). They must also be consistent across participants, since inconsistency of interventions, questions, or actions on the part of the researcher can skew the data.

Researchers must take care to use lay terms, rather than technical terms or jargon, during the process-tracing session. Participants cannot be expected to be familiar with the terminology used in the field to describe the processes involved in interpreting. Furthermore, use of terminology in this area is sometimes fuzzy or imprecise, such that a given term might mean one thing to one participant and something quite distinct to another participant (and perhaps something else entirely to the researcher); thus, it is preferable to communicate in lay terms, avoiding, to the extent possible, confusion or ambiguity.

4. Data analysis

The analysis of data gathered through retrospective process tracing must be undertaken carefully, and with a clear understanding of the method's strengths and limitations, as mentioned in the preceding sections and discussed in detail by scholars such as Ericsson and Simon (1993), Henderson and Tallman (2006), Englund Dimitrova and Tiselius (2009, 2014), and Gass and Mackey (2017). Under the heading of data analysis, we would like to address two issues: first, interpretation of the data, and, second, the issue of categorization/coding (acknowledging that the latter of these precedes the former from a chronological perspective).

Inasmuch as retrospection draws on long-term memory, the participant's recall cannot be considered complete, nor free of error or mis-recall, even when it occurs immediately after

task completion. Participants may not be aware of all aspects of their processing (that is, some aspects of their processing are unconscious/automated); may not remember everything; may remember incorrectly (i.e., remember things that didn't actually happen); may remember correctly, but in the wrong place (i.e., remember that something happened but 'place' it at a different moment in the interaction); or may self-edit, distort, or omit information, whether consciously or unconsciously (Vik-Tuovinen, 2002; Englund Dimitrova and Tiselius, 2009, 2014). Recall may also be influenced by factors such as "willingness/mood, desire to present oneself in a positive light, and/or reactions to the researcher or the task" (Herring, 2018: 125). Our experience also suggests that interpreters who have habitually engaged in reflective self-assessments as part of a training program may process trace differently than those whose background has not included explicit instruction in reflection and self-assessment; researchers should thus be aware of prior exposure to introspection in a pedagogical setting as a variable that may influence the length and content of retrospections provided in research studies.

Given the fact that the data provides only a partial (and possibly a faulty) picture of the participant's actual processing, one may naturally ask whether retrospection data can be trusted. In our view, the answer to such a question is in the affirmative. The content of the retrospections gives us information about the task-performer's experience of the task, which is valid and important. Even if the participant recalls something that is not evident/locatable in the performance data, that instance of (mis-)recall is a datum that may point to something useful or important. For example, a participant may report that a certain passage was difficult and therefore s/he omitted (a) portion(s) of it; however, upon checking the product (the TL rendition), the researcher finds no omission of material in the passage indicated by the participant. This inconsistency between the participant's retrospective report and the performance data does not mean that the report itself was false; rather, it sheds light on the participant's perception or experience of that portion of the task, indicating to the researcher that the participant experienced high cognitive load, despite a lack of observable indications in the performance itself.

The fact that retrospective process tracing data contains only a portion of the 'truth' does not invalidate the data or the method; rather, the data must be 'interpreted' advertently, with a clear understanding of its strengths and limitations and, if possible, triangulated with other methods, such as eye-tracking or product analysis. Researchers must be careful not to draw overly strong conclusions or overgeneralize. They must also take care to distinguish between utterances that indicate process tracing and utterances that indicate inference, explanation, or evaluation of performance. This is particularly true when analyzing responses to verbal probes (questions), as verbal probes may lead participants to make general or speculative comments (e.g., I don't know what I did, but usually I…) that are not focused on the just-completed interpreted interaction.

While considerations of space do not allow us to discuss interpretation of data in great detail, we offer the following reflections:

- When studies involve gathering and analyzing both performance data (i.e., the product of the interpreting task) and retrospection data, the two data sets must be analyzed separately, and then later compared (triangulated). Analysis of the two sets of data does not necessarily have to be approached in the same fashion; distinct coding categories or analytical approaches may be used, as required by the research question(s) under investigation.
- Retrospection data should be transcribed. Although transcribing is time-consuming and laborious work, our experience is that it leads to higher-quality, more-detailed

analysis. It is easier to identify patterns in transcribed data. The work of transcribing the data also allows the researcher to become more familiar with the data, thus facilitating qualitative analysis. For further discussion of transcription, the reader is referred to Davitti (2019), Niemants (2012), and Falbo (2005).

• Retrospection data may be analyzed both qualitatively and quantitatively. Researchers may choose to code by hand or to employ software designed for the purpose. The analysis will be stronger if multiple researchers code the data separately and then meet to compare their coding, discuss differences, and clarify category definitions (Gass and Mackey, 2017).

• The process of determining categories to be used in coding of retrospective data is not a straightforward one. Particularly in the area of dialogue interpreting, in which there is a paucity of established coding schemes, researchers may need to develop new categories through a grounded theory approach, or adapt pre-existing coding schemes to their particular research questions. For example, Ivanova's (Ivanova, 2000a) list of categories has been used and adapted by a number of researchers; however, her list is specific to simultaneous interpreting of monologues and thus must be adapted or expanded for use in analysis of retrospections made on the basis of interpreted dialogues (Herring, 2018; Tiselius, 2018b). In addition, the specific research question(s) under investigation may inform the identification of a different set of categories. At the same time, researchers must be mindful of the difficulties in cross-study comparison and replication of studies that may arise from a proliferation of studies each of which relies on a distinct coding scheme. Thus, researchers may be well-served by using a pre-existing set of categories as a foundation and carrying out a data-driven process of refining the categorization scheme in order to reflect the realities of dialogue interpreting and the specificities of their research question.

5. Concluding remarks

Although the first decades of research into dialogue interpreting have been primarily characterized by a focus on its social and interactional aspects, the last few years have witnessed calls for an increase in process-focused studies of dialogue interpreting (Englund Dimitrova and Tiselius, 2016; Herring, 2018; Tiselius and Albl-Mikasa, 2019). Retrospective process tracing is a powerful methodological tool available to researchers who undertake such research (Ericsson and Simon, 1993; Englund Dimitrova and Tiselius, 2009, 2014; Gass and Mackey, 2017), but, as with all introspective methods, researchers must be aware of potential pitfalls and threats to validity associated with retrospection.

In the preceding sections we have defined retrospective process tracing as a method that seeks to tap into the individual's cognition during task performance (Ericsson and Simon, 1993; Englund Dimitrova and Tiselius, 2014; Russell and Winston, 2014; Gass and Mackey, 2017), contrasted it with other types of post-task verbal data collection, and argued for greater consistency and rigor in labelling of such methods. Drawing on our own experience and on the relevant literature, we have described the main issues that researchers must consider in designing and carrying out studies involving retrospective process tracing, and made recommendations for best practices. These include, in summary:

• the central importance of immediacy of retrospection.

- the need to plan and prepare the interpreting task such that ecological validity is preserved, to the extent possible, while also creating a task that will remain (fairly) consistent across participants.
- the decision of whether or not to employ a cue for retrospection and, should one be used, the development of said cue.
- the need to carefully plan and consistently execute the procedure for eliciting retrospection.

The recommendations we have made are not exclusive to dialogue interpreting, indeed they are relevant to retrospective process tracing studies of interpreting across settings and modalities. Scholars who consider using retrospection as part of their research method (in any area of study, not solely in the context of dialogue interpreting) must carefully consider whether this method, narrowly and precisely defined, will productively contribute to answering the research questions they are investigating.

Retrospective process tracing is generally well-suited to providing information (albeit incomplete) about interpreters' online processes (Ivanova, 2000a; Englund Dimitrova and Tiselius, 2009, 2014) and can productively be used in concert with other sources of data in order to paint a more complete picture of processes. It is suitable for answering research questions about interpreters' on-task perceptions of processing problems, strategy use, ethical considerations and discretionary power, among others. It is not, however, generally an appropriate method to employ in studies that seek to explain interpreters' actions, behaviors, or decision-making. Other verbal data collection methods, such as interviews, are more appropriately employed in studies that seek to elicit post-hoc reactions or self-evaluations from participants.

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