Authors

Annamari Korhonen, Tampere University

annamari.korhonen@tuni.fi

Annamari Korhonen is currently working on her PhD in Translation Studies at Tampere University, focusing on translation production processes and editing of translations. She holds an MA in English language and has worked as an in-house translator at language service providers since 1999, most of that time at one of Finland's largest LSPs.

Maija Hirvonen, Tampere University

maija.hirvonen@tuni.fi

PhD Maija Hirvonen is Associate Professor of German language, culture and translation at Tampere University. Her main research interests are human-made audio description and machine-made video description, accessibility, intermodal translation, multimodality, and interaction and conversation (especially between blind and sighted people).

Joint creative process in translation: Socially distributed cognition in two production contexts

Short-form title for running head (max. 55 char): Joint creative process in translation
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Abstract

In this article, we explore socially distributed cognition (SDC) as a theoretical model of translation and investigate it empirically as an aspect of the collaborative and creative translation workflow. With the aim of developing a better understanding of SDC and collaborative workflows in translation, we analyzed two different settings where more than one person works on a translation: commercial specialized translation (CST) services, and the production of audio descriptions (AD) as teamwork between blind and sighted describers. The analysis focuses on how the process of co-creation unfolds in the communication that binds together the systems of SDC. While the process of co-creation was strikingly similar in the two different translation contexts, the differences were bound to channels of communication (with or without direct contact between participants), and the draft translation was identified as a central artifact that carries much of the communication when the participants do not work in the same space. With an emphasis on socially distributed cognition, our study provides a framework for both the cognitive and social aspects of translation and develops the understanding of collaborative translation processes. It also

contributes to the development of translation practices by helping translation operators and trainers make choices between alternative workflows.

1 Introduction

Translation today predominantly takes place in collaborative environments, yet translation process research has mostly focused on the cognitive processes of the lone translator (see, e.g., Englund Dimitrova and Ehrensberger-Dow 2018). Efforts have been made recently to expand the concept of translation process to encompass the whole translation workflow (see Risku, Rogl, & Milosevic 2017) including other participants, tools and resources. Concurrently, new approaches developed in cognitive science have found their way into translation studies. These approaches challenge the traditional conception of cognition being confined to the individual's brain and suggest that cognition extends from the brain to the environment. Various technical systems, memory aids, etc. can be seen as part of cognition, and cognitive operations may be distributed between two or more people who together form a socially distributed cognitive system (Clark & Chalmers 1998, Resnick 1991, Hutchins 1991, 1995a, 1995b).

In our present investigation of situated translation processes, we combine the social, the cognitive, and the creative to show how two or more people form systems of socially distributed cognition (SDC) when carrying out the inherently creative undertaking that aims at producing a translation. To demonstrate this, we turn the focus to the joint process of co-creation that the participates engage in. Other approaches have been used to investigate collaboration in translation (sometimes dubbed translaboration), such as the actor-network theory (Abdallah 2014, Buzelin 2005). However, as Risku and Rogl (2021: 487) point out,

the analysis of distributed cognition (DC) allows an even more specific focus on cooperation and interaction than other approaches do. Risku and Rogl also consider DC well suited for studying collaborative problem-solving; this area of collaboration will be addressed in our analysis of the distributed creative process.

Studies have recognized translation as a collaborative activity even if the collaborators are not always present in the same space; for a discussion of the topic, see for example Cordingley and Manning (2016). Yang (2020) analyses the communication that takes place within a collaborative online translation project, foregrounding the richness of the written communication and the multitude of roles that the participants adopt. Yet many details of collaboration remain understudied. For instance, Jiménez-Crespo (2017: 106) asks how collaboration occurs at the microlevel, that is, in each segment or identified problem. How do the collaborators interact in these cases, and how do they create a system of socially distributed cognition without the immediate presence of the other participants? To answer this question, the communicative practices of two translation contexts will be compared: commercial specialized translation (CST) services, offered by language service providers (LSPs) and independent professionals, and audio description (AD), which is an access service verbalizing the visual contents of visual or audiovisual communication to partially sighted people. The study was designed with the expectation that the juxtaposition of such different translation contexts would help foreground interesting aspects of the translation process that could otherwise be taken for granted and thus ignored. The main focus is on two participants, whom we call the translator and an editor.

In the following sections, we present a brief overview of the most important theories of (socially) distributed cognition and outline how they have been discussed in translation studies so far. Then, we examine the relationship of translation and creativity from the perspectives of psychology, translation studies and distributed cognition. In the subsequent

sections, we move on to our methodology and the results of our analysis. Finally, we discuss these results in light of their theoretical and practical implications.

2 Theoretical background and previous studies

2.1 Distributed cognition

Theories of situated cognition have established the view that cognition should be studied in social contexts, not as an isolated entity (Resnick 1991: 4). Taking the context-bound approach even further, two conceptual frameworks developed in the 1990s describe human cognition as something that is not confined to the individual's brain. These frameworks, 'socially distributed cognition' presented by Hutchins (1991, 1995a, 1995b) and the 'extended mind' presented by Clark and Chalmers (1998) and later renamed 'individual distributed cognition' (IDC) by Perry (1999), both suggest that the brain works in close cooperation with the environment--tools and artifacts--to form a cognitive system. The main difference between these frameworks is that extended mind (or IDC) is an essentially individual-focused system, while socially distributed cognition describes systems that comprise two or more persons plus the external systems.

Perry (1999: 87–89) points out that research into socially distributed cognition must focus on the means and practices of communication between the participants; one important aspect of that communication being the double role of physical artifacts, which act as both cognitive resources and channels of communication (see our empirical analysis in Section 4). These artifacts thus act as social affordances that the socially distributed cognition is built on (Gallagher 2013: 4). Communication between team members essentially comprises externalized mental representations (Hutchins 1995b). Zhang (1997: 180), cited in Dragsted (2006: 445), states that "external representations are not simply inputs and stimuli to the

internal mind; rather, they are so intrinsic to many cognitive tasks that they guide, constrain, and even determine cognitive behavior." Later, it has also been suggested that a cognitive system may consist of people who are not present at the same time, and of systems that are used at different times and in different places; the scientific community is an example of such a system (see Giere & Moffatt 2003, Resnick 1991). However, such wide-reaching cognitive systems also bear the risk of 'cognitive bloat' by extending cognitive systems too far without proper justification (Rupert 2004). The debate on establishing the boundaries of cognition has been lively (see Marsh 2010) and has also continued under other terminology, such as group cognition (Theiner et al. 2010) and team cognition (McNeese et al. 2021). The concept of shared intention, described by Lyre (2018) as a mechanism that connects cognition with the social domain, constitutes another interesting step forward.

2.2 Distributed cognition in translation studies

The theory and terminology of socially distributed cognition have been introduced into cognitive translation studies gradually over the last decade or so, although not yet as comprehensive and consistent approaches (Risku & Rogl 2021: 481). This has meant looking beyond the individual and their background and skills, focusing instead on the individual's interaction with the world. Even though Dragsted (2006) used the concept of collaborative cognition to describe joint translation production, and Risku (2010) and Muñoz Martín (2010) discussed the value of the (new) paradigm to translation process research, empirical research based on these theories remains scarce.

Risku and Windhager (2013: 41–42) coined the term 'extended translation' for investigating translation as a situated and distributed cognitive action; extended translation appears in the technologization of translation work (artifacts and tools as extensions to human translators), and in networks and distribution of work (distributed problem solving instead of one sole

translator). Based on an ethnographic, multi-case study into freelance translation, Risku (2014: 347–349) shows how many of the translators' cognitive processes--usually investigated as aspects of internal cognition--actually take place outside the head during translation. The work involves a complex network of actors and tools from both the client's and translator's side as well as various tools and artifacts of cognitive support, such as online dictionaries, prior translations and the translation draft, which function as a tool for testing and manipulating alternative translation solutions (Risku 2014: 345–346).

Muñoz Martín (2017) summarizes the various cognitive dimensions at play by the 4EA concept of cognition (for 4E cognition, see, e.g., de Bruin et al. 2018). It involves several individual-centered extended cognitive aspects such as embodied, enacted, and affective cognition. Muñoz Martín (2017: 564) also notes a sixth aspect, 'distributed cognition' in which "several cognizing and not cognizing agents conjointly perform complex tasks, such as translating." 'Distribution' thus frames cognitive processing as an a priori *collective* phenomenon (see also Jiménez-Crespo 2017: 101), while the 4EA focuses on *individual* cognitive processing.

Since the seminal works by Muñoz Martín and Risku and colleagues, few studies have dealt with distributed cognition, and even fewer with SDC. Jiménez-Crespo (2017) discusses it as a necessary approach to studying collaborative translation in online environments. Mellinger (2018: 321) argues that SDC is a relevant concept to approach translation revision and to describe "shared responsibility for the final translation product" in computer-assisted and machine translation. Nurminen (2020) applies distributed cognition to an empirical analysis and operationalizes it in describing patent professionals' use of raw machine translations. In a 'coupled system' (Clark & Chalmers 1998), patent professionals enhance their knowledge and competences with input from an MT engine. Other than the MT engine, a network of artifacts and people--the original source document and alternative machine translations, inventors, and

other stakeholders--are involved in the work process, and interaction with these individuals constitutes meaning-making within a system of distributed cognition (Nurminen 2020: 115).

2.3 Translation as distributed creativity

In this section, we discuss some theoretical underpinnings for seeing translation as an inherently creative activity comparable with other text production tasks (see Dam-Jensen & Heine 2013: 90; Dam-Jensen et al. 2019: 158; Jakobsen 1994: 144). In translation studies, creativity has mostly been discussed in terms of literary translation or as deviations from the source text content (see Bayer-Hohenwarter & Kussmaul 2021). However, the value of creativity as "a crucial resource to overcome linguistic and cultural difference" has also been recognized (Rojo 2017: 352). The production of an appropriate target text in *any* area of translation is a complex task involving "the ability to create understanding and produce texts in a new, meaningful, situated way; each translation is a new challenge that requires differentiation and creativeness" (Risku 2010: 100). Idea generation and evaluation, also called divergent and convergent thinking, which are the building blocks of any creative process (see Guilford 1950) also form the basis of making translation decisions. Translation also meets the definition of creative activities generally accepted in psychology (see, e.g., Kaufman & Glăveanu 2019: 27): the product being created is both new and appropriate for the task--i.e., fit for purpose, a phrase familiar to any translation scholar.

To understand translation as a creative activity of interpreting and creating meanings, we must look at translation as both an individual and a social event. Firstly, meaning is not located within words; it is created in an individual's mind as activated episodic and semantic information. Thus, not only the production of a translation but also the act of understanding is a creative process; meaning is, above all, encyclopedic[1] and relies on individually stored knowledge or knowledge networks (Muñoz Martín & Rojo López 2018: 62–63; Langacker

1987; see also Jakobsen & Alves 2021: 3–4). On the other hand, the formation of meanings is a social process: we adjust and adapt our language use to the addressees and correct it based on feedback (Muñoz Martín & Rojo López 2018: 62). According to Resnick (1991: 2), "our daily lives are filled with instances in which we influence each other's constructive processes by providing information, pointing things out to one another, asking questions, and arguing with and elaborating on each other's ideas." This seems a valid description of how translations are created in collaboration. Creative group processes where "no single participant's contribution determines the result" (Sawyer & DeZutter 2009: 81) have been investigated under the label of distributed creativity. Glăveanu (2014), for example, explores distributed creativity in the context of folk art, characterized by traditions and networks of artists and artisans who influence each other's work, and rejects the notion that creative ideas are born within individual minds, isolated from the context. This approach perhaps constitutes another level of distributed creativity: instead of producing a joint creative product, participants base all their work on that of others who have come before them.

When discussing translation as a creative activity, it is important to note that not all creativity is the same--and when saying this, we do not refer to personal abilities or factors that foster creative abilities (see, e.g., Amabile 2018). Instead, we are considering the nature of different tasks as creative activities. Distributed creativity may take place in "relatively predictable and constrained" as well as unpredictable and unconstrained tasks, such as improvisational theater (Sawyer & DeZutter 2009: 82). Translation as text production is a creative task that is relatively constrained--even predictable--in that the target text usually follows the source text more or less in detail. In organizational psychology, Unsworth (2001: 290–291) presents a matrix of creativity types based on whether the problem is open or closed (which is a continuum rather than two distinct categories) and whether the task is voluntary or required. On these axes, translation is characterized by closed problems (the text provided for

translation) and an external driver for engagement (a translator is asked to produce a translation). Unsworth calls this section of the matrix ‘responsive creativity’ and describes occupational creativity, required and expected in many professions, as its prevalent manifestation.

3 Data and methods

We base our analysis on two sets of data: one from commercial specialized translation (CST) (three research subjects) and one from the audio description (AD) of films and television (three AD teams). Both data sets include recordings of translation editing, with think-aloud verbalizations in the CST data and video-recorded work meetings of teams in the AD corpus, as well as interviews with all (CST) or 5 of 6 participants (AD). To obtain data that would inform us of professional working practices, we selected experienced and/or trained professionals as research subjects.

Similar to much of the previous research on socially distributed cognition (Perry 1999: 88, Risku 2014: 336), we gathered our datasets with ethnographic methods in two different research projects: The CST data stem from the first author’s PhD project which uses triangulated data (a survey, interviews, TAP transcriptions and textual data) to describe the working processes of translation revisers and editors with a particular focus on collaborative creativity in situated translation workflows.]The AD data was compiled from the second author’s microethnographic and ethnomethodological research project MUTABLE (Multimodal Translation with the Blind, Academy of Finland, 2017–2020) which describes the practice of collaborative AD from socio-cognitive and interactional perspectives (see e.g. Hirvonen & Tiittula 2018). Instances of socially shared cognition (Resnick et al. 1991) taking place in collaborative AD have been observed by Hirvonen (in prep.), and for this article we wanted to dig deeper into this phenomenon with a theory-informed qualitative analysis of two

different translation processes. In Perry's (1999: 88) terms, we examine "the emergent behaviours generated through interactions between its [the functional system's] component parts", which in our cases are – in particular – the translator and the editor participating in the functional system of collaborative translation process. Our data analysis is qualitative and interpretive (see Perry 1999: 89) as we apply theoretical frameworks of SDC to interpreting our empirical, authentic or semi-authentic, data.

The AD data was compiled from the MUTABLE corpus which includes video recordings from authentic teamwork processes in Austria, Germany and Finland. For the present study, only data from AD editing processes were included for the sake of data comparability. The analyzed data involved recordings of face-to-face meetings of teams that tested, commented and revised audio descriptions as part of six different translation commissions; two teams worked in Austria (CFAD7 and CFAD8) and one in Finland, the latter completing four commissions (CFAD2–5). The teams included one sighted translator and one blind editor, and they worked either at home or in an office.[2] The participants were explicitly asked to work as regularly as possible in the presence of a video camera and a researcher. The meetings were of varied length, from 2 to almost 7 hours. The participants (5/6) were interviewed a posterior to the recorded work about their experience in AD, their regular work practices and about the teamwork in AD.

Table 1. The AD dataset.

Identifier	*Language*	*Video data length*	*Interviews*
CFAD2	Finnish	04:08:00	2/2 participants
CFAD3	Finnish	04:20:00	-"-
CFAD4	Finnish	05:10:00	-"-
CFAD5	Finnish	04:38:00	-"-
CFAD7	German	02:48:00	2/2 participants
CFAD8	German	06:50:00	1/2 participant
		27:54:00 in total	

The CST work task was carefully simulated using a draft translation from a genuine customer project of an LSP. The strict confidentiality requirements make it very difficult to record authentic CST work, as permission would have to be asked from the client for each recording, most likely resulting in slowing down editing schedules beyond acceptable limits. Three highly experienced editors (further sessions were cancelled due to COVID-19 restrictions) were asked to use their regular working procedures and tools to edit a text with the goal of producing a well-written online article fit for publication. The editors were told that the text had been translated by a professional, and that the client wanted the style to be clear, natural and to the point and would pay for one hour of work, but was not currently available for direct queries. No instructions on specific working methods were given, which is usual in the CST context (Korhonen 2021), and the editors were not told who would process the text after them. The editors worked on their own computers and in a familiar working environment, and were asked to verbalize all thought processes, including emotions. A short warm-up text was used before the actual editing simulation to familiarize the editors with working while thinking aloud. The three TAP recordings varied in length between 28 and 52 minutes; the amount of verbalizations produced also varied greatly, with one research subject verbalizing considerably less than the others. The interview questions focused on the type of work that the research subjects do, their different editing tasks, which procedures they prefer, and who they cooperate or collaborate with and how.

Table 2. The CST dataset.

Identifier	*Language*	*TAP data length*	*Interviews*
RS1	Finnish	00:27:32	1 participant
RS2	Finnish	00:51:17	1 participant
RS3	English/Finnish	00:39:44	1 participant

Our use of think-aloud protocol (TAP) when gathering the CST data was somewhat novel. In translation studies, TAP has traditionally been used to learn about translators' internal

cognitive processes; in the present study, we used it to learn about the research subjects' use of external cognitive resources and socially distributed cognition. When obtained as part of a simulated situation instead of authentic work, the TAP data is somewhat similar to interview data; the researcher must rely on what the research subject tells them. As the research subjects in this case were experienced professionals whose working methods were highly developed and established, the data thus achieved can be considered a sufficiently reliable source of information on the social aspects of the work as well as other working practices.

The recorded materials were transcribed, and they were analyzed by repeated observation of the video material (AD data) as well as by coding in Atlas.ti software (CST data and part of AD data). The analysis was characterized by increasingly narrowing focus. As the current body of empirical research on distributed cognition in translation is so scarce, our original aim was rather broad, and we began the analysis by looking for theory-informed indications of distributed cognition in general (see 4.1). Gradually, our focus was directed toward two main themes: the composition of the system of SDC in terms of communication channels and participants – which we later set aside in favor of a narrower scope – and the distributed process of collaborative creation (co-creation) that became observable as different types of externalized representations (see 4.2). We saw that our findings resonated well with the view of Perry (1999: 87–89), who emphasizes the importance of studying communication as evidence of a system of SDC.

4 Results: Socially distributed cognition in translation editing

A system of socially distributed cognition (SDC) is essentially a network of communication (see Perry 1999: 88), which is also amply demonstrated in our data. Furthermore, communication is an essential basic element of collaborative creativity; co-creation can only take place when there is communication between the participants. In this section, we first

examine the practices and channels of communication that can be identified in the two translation contexts, identifying similarities and differences that will help us understand translation as SDC in general. We then describe the process of co-creation and how divergent and convergent thinking, the two main phases of the creative process, materialize in the external representations that make up the observable communication in the system of SDC.

4.1 A system of socially distributed cognition: Channels and participants

In the two types of workflow that we analyzed, the core translation production takes place as follows:

A. CST: A translator has prepared a draft translation, and a reviser later edits the text to produce a final translation. The two do not work in a face-to-face situation. The workflow around the translator and reviser or editor usually follows fairly standardized paths.
B. AD: A sighted audio describer has prepared a draft audio description and meets a blind co-author/AD consultant. The two work face to face to test the audio description and discuss (and solve) any translation problems.

The most striking difference between the CST and AD environments is that in CST, the translator who has produced the raw translation is usually not present when the editor carries out the editing task, while in AD, the translator and the editor work side by side (see Images 1-4 in section 4.2). This leads to many differences in how the participants communicate with each other. The rich natural interaction of the AD team is replaced in CST predominantly with written communication, some of which takes the form of comments added to the translation file. This is not, however, the only way in which the draft translation is used as a communication channel between the translator and the editor. As was previously mentioned, physical artifacts included in a system of socially distributed cognition may act as both

cognitive resources and intermediaries of communication (Perry 1999: 87). The draft translation clearly holds a crucial position as such an artifact in the CST system observed in our data: the editor receives information of the translator's solutions in it and then uses it to formulate their own proposed translation solutions and to communicate them back to the translator. The system is not perfect: in Example 1, the editor expresses the wish that the translators communicated more.

Example (1)

(RS1): *enhän mä voi tietää kuinka paljon kääntäjä on (.) ellei kääntäjä oo sellanen että se (.) niinku kommentoi siinä (.) tekstissään että tutkin tätä ja löysin tämän termin täältä olen aika varma tästä (.) niin sillon siit on hyötyä sillon se tieto menee (.) sillon ei tehdä tarpeetonta työtä mut jos ei tuu mitään (.) mitään tulee pelkkä (.) review-tiedosto jossa ei oo mitään kommentin kommenttia niin (.) sillonhan se menee (.) väkisinkin siihen että on varmuuden vuoks (-) nnh tutkittava asioita*
I can't know how much the translator has (.) unless the translator is one who (.) like comments in (.) their text that I have looked into this and found this term here I'm fairly certain of this (.) then that is useful that information is conveyed (.) then needless work is avoided but if there's nothing (.) nothing just the (.) review file that has nothing not a single comment so (.) then it (.) must be so that to be sure (-) nnh I need to look into things

In some cases, the text may be sent directly to the end client after the editor has worked on it. It is important for the editor to know which will be the case: If the text goes back to the translator, the editor sometimes just indicates a problematic passage or gives a tentative solution for the translator to consider. Without knowing who will receive the corrections and comments, the editor will find it very difficult to do the work properly. In Example 2, the CST editor first makes a tentative solution, then finds that they are not certain who will receive the text next, and considers changing the working method accordingly.

Example (2)

(RS1): *siis tässä (.) pistäisin huomautuksen kääntäjälle ja kysyisin että (.) että (.) mitä mieltä se tästä on (-) no mä voisin sen nyt pistää sitte tähän "korvaavat" (-) voin olla aivan väärässä mutta ei haittaa (-) ai niin mutta tässähän ei puhuta kääntäjästä vaan siis (-) jos tää menee sitten korjattuna suoraan asiakkaalle niin sitten mun pitäisi tätä miettiä vähän enemmän*
so here (.) I would add a comment for the translator and ask (.) that (.) what do they think about this (-) well I could use the word "replace" here (-) I could be quite wrong here but that's okay (-) oh but we are not talking about the translator but (-) if this will go directly to the client when I have corrected it I should consider this more carefully

This is indicative of the extreme closeness of collaboration between the participants and the great flexibility of the distribution of the work effort.

In the AD context, the participants have no similar need to rely on an artifact as the primary communication device, as the participants are directly available to each other. However, they do use the target text (the draft AD) in a somewhat similar fashion to test the AD in context. The AD draft is an important part of the decision-making process: The problem is either solved definitively as the solution is typed into the text document and thereby 'stored,' or it is solved tentatively, adding a note to the draft about the need of revising or finding a solution later. Example 2 illustrates a decision-making sequence in which a problem is solved jointly, and the solution recorded into the AD script (the relevant transcript part is bolded; TR = translator, ED =editor).

Example (3)

01 TR: ((looking at tablet and tapping on it)) *joo Saa- Saaran isä*
yeah Saa- Saara's father
02 ED: *joo Saaran*
yes Saara's
03 TR: ((turns face to Päivi)) *mä mä laitan tänne että yritä ahtaa Saaran isä tähän* ((laughs))
I, I just put here that try to stuff Saara's father here
04 ED: ((laughs)) *joo*
yeah
05 TR: ((turns back to tablet, laughing)) *jotenki näin* **((taps on tablet))**
like this somehow
06 ED: ((smiling)) *joo ja…*
yep and
07 ED: *joo eiku sano vaa sitte ku sä oot laittanu sen*
oh well just tell when you've put it there
08 TR: *joo (.) meni*
yep done
09 ED: *no sit ku se äiti ajaa siellä* (…)
okay then that when the mother drives there

(CFAD3_S1370006)

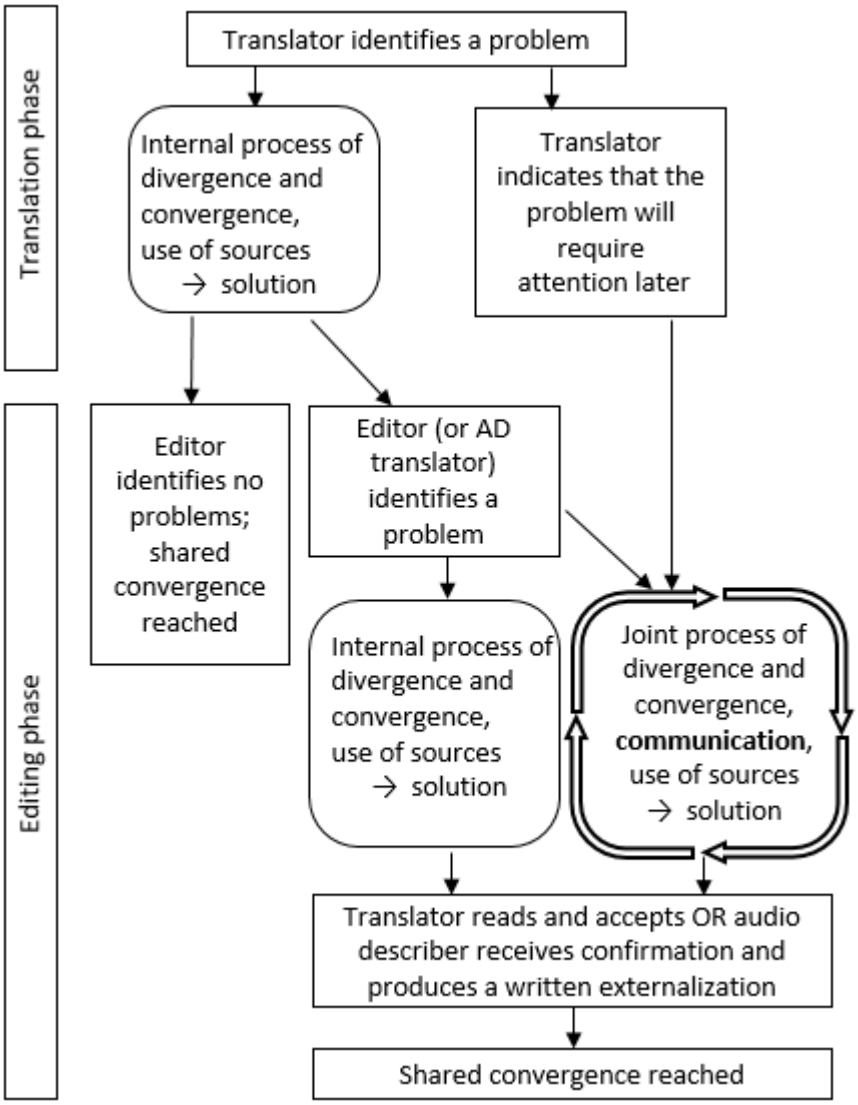
Having agreed on a translation solution (lines 01-02), the translator announces humorously to the editor that she writes a note in the AD script (03). Then she does that (tapping on tablet, 05-08). The editor waits until the translator is finished (06-07), who again verbally indicates when the note has been recorded into the script (08). Only then does Päivi continue to the next problem (09).

Many tools and artifacts in the socially distributed cognitive system can be seen not only as information sources but also as intermediaries that relay information from the people who have prepared them. By using these tools and artifacts, editors become part of a wider system of socially distributed cognition (and creativity) in a somewhat similar sense as the folk artists described by Glăveanu (2014). In CST, these tools and artifacts include instructions and style guides, search engines and end client websites, terminology services, dictionaries, the editor's own word lists and client-specific termbases. In AD, knowledge tools like the Internet were used to verify verbal-visual correspondences that were first found by the team.

4.2 Co-creation: Distributed divergence and convergence in action

When the task at hand is one of responsive creativity and thus has a pre-defined problem (a piece of communication for which a translation must be produced), a suitable solution for that problem is found through a process of divergence and convergence. Co-creation can thus be described as a process that comprises, firstly, the communication of proposals (divergence), and, secondly, the exploration of these proposals as discussion leading to the final resolution (convergence). We are interested in the *joint* process of divergence and convergence that spans both the translation and editing phases and takes place in a socially distributed cognitive system. This joint process, which becomes most intense in the part illustrated by circular arrows in Figure 1, can be defined by observing the communication practices, i.e., the externalization of representations.

Figure 1. A joint process of divergent and convergent thinking in the translation workflow.



In the first stage of the co-creation process, which has taken place before the stages observable in our data, the translator has engaged in an individual creative process without the presence of other human agents; external components may include various technical and human information sources and intermediaries (see Section 4.1).

Next, in the *distributed* creative process, the translator submits the results of their idea generation for evaluation by the editor. The editor may then add their ideas to the joint mix of idea generation (divergent thinking). If the editor does not indicate a problem, this means that a shared convergence has been reached, and the process of co-creation has ended for that part

of the text. In the following CST example, the editor finds the translator's version nice and perhaps a little funny, guesses the source text expression, and accepts the solution:

Example (4)

(RS2): *oi ihanaa (nauraa) (-) joo oliko se "ilo" (.) suomeksi oli (.) "heidän iloksi" joo (.) joo (-) en keksinyt parempaa (.)*
oh wonderful (laughs) (-) yes was it "joy" (.) in Finnish yes (.) "for their joy" yes (.) yes (-) I couldn't think of anything better for that (.)

Example 5 represents a typical acceptance sequence in the Austrian AD data when no problem has been indicated. The editor simply acknowledges the candidate description of the translator with a response token *mhm* with a slightly rising intonation (marked with '¿'). The translator interprets this as an agreement and immediately proceeds in the script.[3]

Example (5)

01 TR: *Entschlossen fährt er den Convoy in die Siedlung.*
determined, he drives the convoy into the settlement
02 ED: **mhm¿**
03 TR: Caesar hebt eine Panzerfaust.
Caesar hoists a rocket launcher
04 ED: **mhm¿**

(CFAD8_S1460003)

If, however, the editor notices a problem, two possible paths for the process can be identified once again: the editor may launch an internal creative process of idea generation and selection or initiate discussion with the translator. In Example 6 on CST, the editor engages in an internal process, building on the translator's solution to achieve the final translation "Wind power is a relatively recent industrial energy generation method in Finland".

Example (6)

(RS3): "From an industrial point of view, wind power is a relatively young energy production" (-) "wind power is a relatively recent energy p-" mm "industrial energy production (-) generation (.) method in Finland" (-) cut out that whole (-) fluff at the start of the sentence

The same two options--internal process or launch of discussion--exist if the translator has been the one who initiated the discussion by indicating a problematic item in the draft translation.

Since the translator is readily available in the AD context, a discussion will naturally follow more frequently than in the CST context--although the amount of internal processing may be higher in AD than the recordings seem to indicate. Interviews revealed that in CST, the editor's internal processing is influenced by the ultimate reader of the text as a "simulated participant" (see Risku 2014: 347). The communication channels that are used differ considerably, with multimodal communication used in AD, and written communication dominating in CST. Let us first examine the AD context.

Once a problem has been raised, the discussion between the AD translator and editor is characterized by their need to come to a shared understanding, a solution that they both approve of, as illustrated by Example 7.

Example (7)

((the film plays in the background: violin music is audible))
01 TR: ((reading out loud)) *Betroffen blicken die* [name] *auf ihren toten Gefährten. Gunnar…"*
shocked, the [name] look at their dead comrades. Gunnar…
02 ((the film is stopped))
03 TR: **((rubbing his forehead, eyes closed))** *ähm wie sagt man da… nicht verschämt sonder- also heimlich*
uhm how does one say… not bashfully bu- I mean secretly
04 ED: *verstohlen*
surreptitiously
05 TR: **((raises head and points up with forefinger, looks at screen))**
VERSTOHLEN danke das habe ich gesucht.
SURREPTITIOUSLY thank you that I was looking for
((types text to the AD script))
06 *Verstohlen wischt sich Gunnar…*
Surreptitiously, Gunnar wipes…

(CFAD8_S1460013)

As the translator is testing his draft AD, he verbalizes a problem with a wording and displays this also bodily (line 03). His utterance makes the problem a collective one--accessible to the editor--whose immediate response with a candidate solution (04) indicates that she has been monitoring the translator's work. The translator readily accepts the editor's proposal and displays agreement again both verbally and bodily (05).

The problem-solving does not always occur this rapidly in the AD data but requires extensive meaning negotiations and clarifications. The co-participants express their individual views in a process of rich multimodal interaction, such as by using gestures to display their ideas about the meanings of the verbalizations. In Example 8, the blind editor informs the translator about how he perceives certain concept, and this leads to a lengthy exchange of ideas between them.

Example (8)

01 TR: ((looking at AD script)) *genau Margarete formt Teiglinge*
right margarete molds **dough pieces**
(…)
02 ED: **((folds hands together to a ball form))**
Teiglinge stelle ich mir so faustgroß und rund vor irgendwie
dough pieces I imagine as fist-sized and round or so
TR: ((looks at Lars))
03 TR: ((looks at TV screen)) *ja in dem Fall sind die größer aber auch rund*
yes **in this case they are bigger but also round**
04 ED: hmm?
05 TR: ((turns to Lars and depicts size with palms)) das soll schon so Brotlaibegroße draus warden… so
that should actually **become the size of bread loaves**… like this/that
06 ED: ja
yep

07 TR: ((glances at TV screen)) was würd' ich sagen
what (would) I say
ein halber Handball also schon oder ein Handball groß so
half of a handball really **or a handball size** like this
08 ED: **((depicting roundness with palms))** mm?
09 TR: **((looking at ED's hands))** ja ja ja ja oh ja kommen wir hin
yes yes yes yes oh yes that's about right
(2.0)
10 TR: **((depicting with palms and fingers))** also jetzt nicht für für Brötchen also Semmeln oder so sondern für Brotlaibe schon aber
so **not for for bread rolls that is bread rolls or so but for loaves of bread** yes indeed
11 ED: okay

(CFAD7_S1450004)

In reviewing one part of the AD script (01), the blind editor seeks for confirmation that his mental image of certain item is correct (02). He even visualizes this with a hand gesture. An exchange of verbal and embodied descriptions follows (03–11; the blind editor's gesture in line 08 is visible in Image 3 below). Finally, the team arrives to a shared understanding.

While the communication channels in CST require that the editors always formulate their questions and comments in clear terms, in AD the practices are often subtle. The editor does not always need to verbalize the problem explicitly but may simply think aloud (such as feelings or thoughts during the AD) or display hesitation in order to initiate a problem-solving sequence, as in Example 9:

Example (9)

01 Päivi: **((browsing her notes))**
no sit oli vaan missä kohtaa oli "kultainen kissa vilkuttaa baaritiskillä" mutta jossain oli
ok then there was only where was it "a golden cat waves on a bar counter" it was somewhere
02 Terhi: **((browsing the AD script, looking at tablet))**
se on se… joo semmonen japanilainen koristekissa
that's the… yeah kind of Japanese decorative cat
03 Päivi: *joo niin siis e-*
yeah so I mean -
04 Terhi: *tarvitaanko me sitä?*
do we need it?
05 *Päivi: ei varmaan koska mä en ymmärtäny ollenkaan mikä se… niinku on*
no I guess not because I didn't understand at all what it… is
06 Terhi: *joo*
yeah

(CFAD4_S1390008)

The editor introduces a topic for discussion by a recall of the AD (line 01). The translator explains the description verbally (02). As the editor displays hesitance (03), the translator proposes discarding the description (04). The editor agrees, again with hesitance (05).

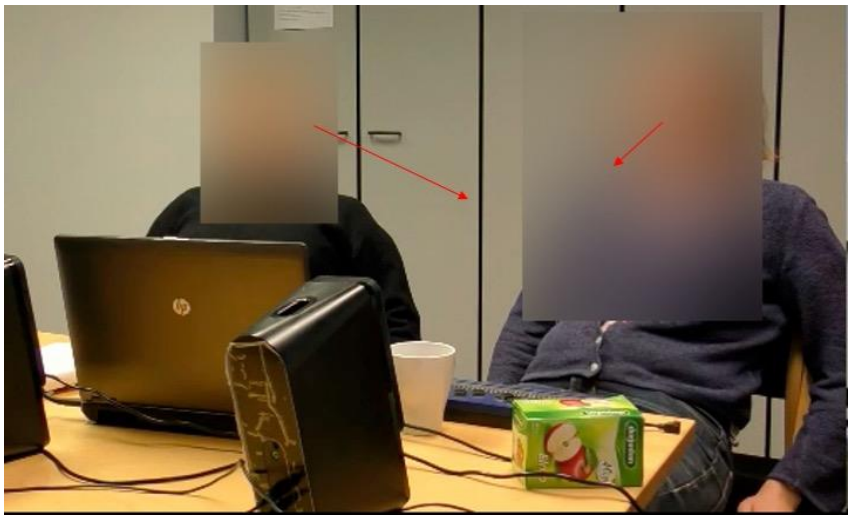
The data excerpts from AD show how seamlessly the teams work together, anticipating and interpreting each other's actions as relevant steps in the translation process. Let us look in more detail at the embodied and material representations that participants in the AD teamwork used for divergent thinking, that is, to discuss verbalization problems and to share their ideas for solutions. Image 1 is an example of joint, embodied idea generation (red arrows represent gaze direction). To understand a concept and with the aim of finding an appropriate word, the translator (on the left) and editor (on the right) engage in embodied action in which they *both* use *similar* hand gestures to display their understanding of the concept's properties.

Image 1

(CFAD2_S1390007)

Images 2 and 3 are examples of joint, embodied idea evaluation. In (2), the blind editor (on the right) performs a body posture to support the sighted translator's (on the left) search for a word that would correspond to the film image. In (3), the blind editor (on the left) uses his hands to indicate his understanding of an object, to which the sighted translator attends to visually and confirms its accuracy (see also Example 8).

Image 2



(CFAD2_S1330006)

Image 3

(CFAD7_S1450004)

In Image 4, the AD team uses an artifact (here: paper) for clarifying a concept. The blind editor (on the left) does not know the meaning of a term even after multiple verbal explanations, so the translator folds a piece of paper to replicate the object and hands it to the editor to feel.

Image 4

(CFAD8_S1460003)

Next, let us consider the CST context. As was mentioned above, comments in the text file are an important medium of communication in the CST context. Based on the current data, the

comments that the CST editor adds to the translation file for the translator are often questions or statements concerning meanings, such as “I think this is what is meant, not sure why the word ‘references’ was used.” or “Is this what you mean?”, see example 10:

Example (10)

(RS2): *tämä on taas siis ”*is this what you mean” *kysymys että ajattelen että se tarkoittaa että se järjestelmä kestää kakskyt vuotta (.) jos (.) mitään ei mene niinku (.) ei käy huonoksi (.) mutta (-) en ole varma*
this is another ”is this what you mean” question that I think that it means that the system will last for twenty years (.) if (.) nothing goes like (.) doesn’t go bad (.) but (-) I’m not sure

The comments may also be stylistic suggestions (“Or if you want a question: How can we secure…. ? ”) or explanations (“This makes the sentence stronger, before it was not clear how “carbon-neutral” fits into the increased electric productions”) that anticipate any questions that the translator may have. Similar questions and suggestions are also found in AD: the questions often illustrate the difficulty of making sense of the draft description (“so what does he have there as a tool for the hay?” (CFAD7). The AD editor may, although less often, also propose a change to the script directly (“there you could say ‘the boy’ because one can’t tell” (CFAD3) or object to the draft (“no, that’s not appropriate at all” (CFAD3). In CST, the communication at least begins in a much more formal manner. One of the editors described a two-phase practice for writing comments (our translation from Finnish): “I may write that this is not really, this is really like bad and then I edit it like, is this actually correct do we want to say it like this […] but the first time I just sort of let it all out.” The first version of the comment is later edited and reframed in a polite business communication style. Such a two-phase procedure is possible in written communication. It may also be necessary in many cases, as written language that is too direct may be understood as being more impolite than intended.

In addition to using comments in the translated file, further discussion may also take place; while our data give no direct evidence of the nature of these discussions, the practice of carrying out such discussions was frequently mentioned during the interviews. Email is a typical channel of communication. When successful, these discussions seem to greatly increase the work satisfaction of the editors.

Finally, if an appropriate solution has been found, the overall co-creation process typically ends with the implementation of the solution: the CST translator reads and accepts the solution,[4] or the AD translator receives confirmation from the editor and produces a written externalization of the solution into the text. The solution may be identical to the translator's original solution, but more often it is a new one.

5 Discussion

Our case analyses of two translation contexts revealed striking similarities, notwithstanding their very different translation modalities (interlingual vs. intersemiotic) and work setups (individually or face to face). The analysis showed that, in both contexts, translations are products of socially distributed creativity where divergent and convergent thinking take place both as individual and distributed idea generation and evaluation; we found these concepts well suited for describing collaborative problem-solving in translation processes. The team AD is characterized by multimodal interaction that both structures the collaboration (e.g., question-answering) and helps in achieving shared understanding and appropriate solutions. Although the translator and editor work separately in CST, they position themselves in a joint process, even when not seeking to communicate with the other directly; our analysis demonstrates in practical terms that even editors who seem to work alone do not work in actual cognitive isolation. In this workflow setting, an important part of the back-and-forth

discussion of co-creation takes place on the pages of the draft translation. The differences between the two translation contexts are thus particularly bound to channels of communication. Individual representations are externalized in different material forms (as text or multimodal action). These differences lead to recognizing the translation file ('text') as an artifact that acts as both a cognitive resource and a channel of communication (see Perry 1999, Risku 2014). Understanding the role of such artifacts adds a new angle to descriptions of translation as a task greatly impacted by technical tools.

Overall, the application of the theory of distributed cognition helps us pinpoint that communication within the workflow is the cornerstone of distributed creativity. In the above, we saw that the working setup and the available channels of communication have a great impact on the joint translation process. In CST, co-creation takes place in the text that is sent from the client to translator to editor and back to the translator and client; the participants interpret the previous participants' input and produce their own work based on it. In team AD, on the other hand, interaction and discussion are central 'places' for co-creation, and participants have an equal opportunity to provide solutions. The distribution of work seems to be almost seamless, and the participants interpret each other's views based on rich interaction. Observation of both translation contexts thus also demonstrates how not only the production of the translation but also the act of understanding is shared in a joint process--much like the understanding of machine translated patent texts in Nurminen's (2020) study.

In CST, the lack of immediate communication between the participants seems to lead to an unclear distribution of the work effort. The resulting process is flexible but contains a lot of uncertainty, as the editor must interpret the translator's ideas based on the text alone and does not know how well researched the solutions are. In contrast, AD teams often review justifications for the proposed translation solutions on the spot. It can thus be stated that, in a collaborative workflow, problem solving would be easier if the participants worked side by

side. On the other hand, direct interaction can be time-consuming, as the acceptance of solutions must be sought from each participant, and social interaction involves activities beyond work-related tasks (e.g., small talk). The requirement of financial feasibility, leading to fast working procedures and outsourcing, prevents adoption of this practice in many translation contexts, so other means of securing adequate communication should be sought.

The paradigm of socially distributed cognition offers valuable viewpoints for studying social aspects of translating, such as the translator's role in production systems. It might even offer a new argument in the debate over agency versus structure in translation (see Koskinen and Kinnunen 2010: 7), helping us understand the collective nature of agency, the way agency is formed in continuous negotiation with others, and the manner in which it becomes a complementary and shared feature of individuals. Similarly, socially distributed cognition could prove helpful for translator training as an approach to translating as a collaborative effort and distributed creativity. Explaining how the thinking and, therefore, translation processes are distributed among various information sources and actors could strengthen the notion of agency: The translator is not alone responsible for the end product and gets help from others, just not always in a direct manner. Such meta-skills essential for translators, like interpersonal communication and collaboration, are deemed important in translator training (e.g., Li et al. 2015), but what if we considered these to be the 'core skills' of translating (see Kiraly 2003)?

With our analysis, we have only touched upon the "micro level" of collaborative translation processes (see Jiménez-Crespo 2017: 106) and the potential of empirically (in our case, in real work contexts instead of experimental settings) informed research on socially distributed cognition in translation. More research is required for different translation contexts and cases, with different text types, team compositions, and so forth. An interesting next step would be to study the distribution of cognition in AD that is not realized in teams--which is the more

typical practice--and, vice versa, the teamwork or meetings in CST. It is also relevant to track distributed cognition to where it emerges and analyze the interactive encounters of participants in collaborative translation processes – how interaction shapes problem solving and decision making (Jiménez-Crespo 2017: 106) – as those are the sites in which intersubjectively valid meanings are created (Hirvonen & Tiittula 2018) and the responsibility for a final translation shared (Mellinger 2018). Power relationships in systems of SDC would also present a rich subject of study. The more detailed characteristics of creativity in different translation contexts also require more attention; for example, the impact of translation memories that accumulate the creativity of previous translators, resembling the impact of creative tradition on the folk artists described by Glăveanu (2014), would be an interesting area of investigation.

With the theory of socially distributed cognition, we have sought to provide a valid framework for bringing together the cognitive and social aspects of translation. It is not about deciding which is the correct way of conceptualizing cognition--inside one person's brain or distributed among several people, artifacts, and technical systems. The real question is this: how will our understanding of the translation process benefit from these approaches to cognition? When aiming to understand and develop real-world translation processes and workflows that are essentially collaborative, we believe that the distributed cognition framework offers valuable insights that might never arise without it.

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[1] For knowledge of the world, as opposed to simplified dictionary definitions of words; see Croft and Cruse (2004: 30).

[2] The teamwork style of audio description is typical in Austria, Germany, and Finland. Teams have two or more members of whom one is blind.

[3] That even the smallest communicative expressions are resources for sense-making in interaction becomes evident with the use of varied intonation of the editor's feedback tokens: When they express the feedback with a different vocal contour, such as with continuing intonation, the translator is more likely to interpret this as an indication of a problem.

[4] It is also possible that the translator initiates another discussion about the editor's solutions.