Introduction

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Aim

The Routledge Handbook of Translation and Cognition aims at bringing together in a single volume a full overview of the current state of research-based thinking about Translation and Cognition in 30 invited chapters, all written by leading scholars in their respective specializations. Cognitive Translation Studies (CTS) is a term introduced by Halverson (2010) to refer to a variety of “process-oriented” translation research activities. CTS has developed rapidly in the last three and a half decades in interaction with disciplines like anthropology, philosophy, psychology, computer science, artificial intelligence, neuroscience and linguistics, in full accordance with the vision of the pioneers of the “cognitive turn” in the 1950s (see Miller, 2003, and Chapter 3 of this volume). The details of the development of CTS, especially since the middle of the 1980s, are fully covered in the Handbook, theoretically, methodologically and by topic, with a particularly strong focus on written translation, as a Routledge Handbook devoted specifically to interpreting and cognition is being prepared.

Despite the rapid development of CTS, or possibly because of it, CTS is not at present a unified discipline with a shared grand theory, methodology, epistemology or even ontology. The very nature of what is the subject or object studied is contested, and therefore a variety of research methodologies are used, some of which explore translational language as a way of getting to know about the mind, while others attempt to explore the mind from behavioural observation of either body or brain. In both approaches, computational models are also invoked. Our aim in this regard has been to openly acknowledge this lack of unity by admitting space to reflect the variety of conceptualizations, approaches and topics that collectively represent the current state of CTS as the editors see it.

Translation and cognition

The word “and” in the title of the Handbook gives wide scope for discussing the relationship between the two concepts it connects, but it should also signal that the Handbook is not about all aspects of translation. Nor is it about cognition in general. Translation can be, and has been, studied from historical, sociological and other approaches as well as from functional,
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technological or linguistic perspectives, without any consideration of cognition. Likewise, there are psychological, physiological and medical interests in cognition that we need not be particularly concerned with in CTS. The focus in the Handbook is on what translation is cognitively and what it means to study translation from a cognitive perspective. What qualifies all the chapters for inclusion in the volume is that they consider translation and Translation Studies from a cognitive perspective.

The chapters have been organized into the following four parts:

Part I, Foundational aspects of translation and cognition, tackles questions of the kind just mentioned, presents two current, influential theoretical views of CTS, and offers an overarching theory under which Cognitive Translation Studies can perhaps be subsumed.

Part II, Translation and cognition at interdisciplinary interfaces, surveys concepts and methods in neighbouring disciplines that are all concerned with cognition, from which inspiration has been drawn in an effort to develop CTS.

Part III, Translation and types of cognitive processing, is concerned with different types of cognitive processes, what triggers them, how they are managed and measured, and how knowledge about translation as a whole is acquired.

Finally, Part IV, Taking Cognitive Translation Studies into the future, offers five bids for the future direction in which CTS is moving, complementing the chapters in Part I.

Cognitive Translation Studies—an introductory overview

Representing meaning in language

Wonderland 2016 is a video recorded by Erkan Özgen, which shows a 13-year-old deaf and dumb Kurdish boy, Muhammed, as he apparently attempts to share his experience of war in Syria. Muhammed has vision and body movement and can utter inarticulate sounds, but, as he is both deaf and dumb and has not been taught sign language, he has no verbal language. As part of his motivation for making the recording, Özgen has said that “perhaps only Muhammed could truly communicate this unseen and unheard brutality […] The power of his body language made any other language form insufficient and insignificant” (quoted from the Tate Modern presentation material). Özgen’s message with the video has been interpreted differently, but what it very movingly illustrates is the loneliness of a communicatively handicapped individual and our inability to know the boy’s mind. The boy’s physical situation very severely constrains his ability to engage socially and interpersonally with others, except emotionally, and illustrates the dependency of communicative verbal skills on physical and biological human factors, with respect to both representing our meaning to others and making sense of other people’s meaning representations.

There are similar physical, social and interpersonal dimensions to translation. It is possible to translate mentally without attempting to represent translation in a medium, but if we want to share a translation with others, our mental translation will have to be represented in a physical code to which others can assign relevant and probable meaning.

The big issue in the history of translation ever since antiquity has been whether to translate from the word (verbum e verbo) or from the meaning (sensum de sensu), often formulated as a distinction between translating literally and freely. At different times this debate has been prescriptive, pedagogical, author oriented, reader oriented and/or text-type oriented. In the cognitive paradigm, the issue goes by other names and is modelled differently, e.g. by reference to Kahneman’s distinction between slow and fast thinking (2011), but it remains unresolved and a bone of
contention. The reason for this is the inextricable interdependence and interactivity between experienced meaning and the language we use to articulate and share meaning. The association is so close and routinized that we are not sure there is such a thing as “deverbalized” meaning, for without language there is no shareable translatable meaning beyond that demonstrated by Muhammed. On the other hand, can we say that he was not attempting to convey meaning? Several of the ensuing chapters tackle the issue, and some will present a different view of the relationship between language and meaning. Is language a way to understanding the mind? Do we construe experience through linguistic meaning? Or do we construe experience as meaning pre-linguistically?

Construing reality as meaning in language and translation

In CTS it is widely assumed that we cognitively construe or translate experience into meaning. It is this meaning that we learn to articulate in language, and this is the meaning that translators translate. Our lived meaning-making process is initially an individual affair, and philosophers and psychologists tell us that we cannot know exactly what a person’s experienced meaning is, but learning a language and speaking a language involve processes of cognitive alignment in which an individual’s experience of reality is constantly modulated by language use and adapted to the way members of the language community perceive and construe reality. Knowing a language thereby gives us reason to believe that our construal of the world is both similar to that of other people and shareable with them if we speak the same language, for knowing a language is having learned how to conventionally represent our meaning, our perception of reality, in speech or writing (or some other physical medium).

There is no doubt that the language a person speaks has considerable impact on how the person construes meaning, how an episode will be reported and how the report will be understood by others. The language a speech community develops collectively is bound to have signs for concepts that are particularly important, salient and functional in the community’s physical, social and cultural environment. Therefore, every language will have a unique lexical-conceptual profile articulating a bias reflecting the blend of what a community cognitively foregrounds and what it is less attentive to or ignores. This is well known from anthropology and commonly identified as a special challenge in Translation Studies, for regardless of whether our point of departure is cognition and meaning or language, the challenge is there. All members of a culture and all languages have “unique items” (Tirkkonen-Condit, 2004).

From a cognitive perspective, meaning can never be exhaustively represented in a language or other representational system. Symbolic representation is vague, ambiguous, polysemous and indeterminate (Quine, 1960, pp. 73ff.). Therefore, every language depends on language users’ ability to activate relevant meaning, but since it is based on “interpretation”, i.e. on the meaning a language user assigns to an utterance, a huge variety of potentially relevant meaning can be activated, and reports can be endlessly retold, represented and re-represented from new perspectives and new focuses. For the same reason, the meaning a translator construes from the representation of meaning in a source text is necessarily creative. As there is no meaning in the material source-text representation itself, meaning always has to be supplied by a listener/reader familiar with the code. In CTS, this process is traditionally referred to as a process of comprehension, and it is understood as no less creative than the process of articulating meaning. Comprehension is a very active and creative semiotic, meaning-making process (Pickering & Garrod, 2013).

On the production side, similarly, translation (and interpreting) require(s) a creative meaning-representation effort, not just when it comes to translation of text with language rich in imagery
and other rhetorical effects, although it is most clearly seen here (see Chapters 17 and 18).

Historically, it has often been argued that translation of texts of this kind requires a certain relaxation of such norms as equivalence, adequacy, accuracy or loyalty (Chapter 19), but theoretically the constraint that most often applies is the one that applies to all translation, i.e. that of interpretive resemblance (as proposed in relevance theory; see Gutt, 1991, p. 100; see also Chapter 7).

When understood meaning is re-represented, it may become the subject of public negotiation in the community and part of the process of constant adaptation by which a language community’s norms for regulating the connection between language, experience and meaning are maintained. The meaning construed by the translator is the translator’s theory of what was on the mind of the source-text author, and this theory of an author’s meaning can be represented, revised and re-represented in a thousand different articulations, constrained to some extent by the translator’s (or interpreter’s) assessment of the relevance and possibility of achieving similarity of meaning in specific cases. Whether strict similarity in the form of equivalence or some form of transcreation is aimed for will depend on multiple social and professional considerations, but in the end listeners/readers will be assigning their meaning to the chosen representation, based on their meaning-making ability.

Cognitive processes in translation

The distinct characteristics of CTS are that it locates the centre of interest in the mental operations performed by translators when they translate and that it sees translation as inseparably linked to human meaning making.

Since the beginning of the cognitive turn in the 1950s, the concept of a cognitive translation process has changed quite radically from being understood until the 1980s as a primarily intellectual and rational process by which problems were solved and decisions made in a logical way that could be simulated computationally to being construed from the 1990s on as a far more complex and full-bodied process, at once rational and irrational, calculated, emotional and intuitive, dependent on processes both in the brain and in the body from its interaction with the environment and other agents in the environment.

Perhaps the main change brought about by the cognitive orientation of Translation Studies was the shift of focus from translation product studies to process-oriented research. Research in the 1980s and 1990s often used the think-aloud protocol (TAP) method (see e.g. Chapter 12) with a view to discovering by what labyrinthine processes, described as language operations, translation students arrived at their final translation solutions. Much of this research was strongly classroom oriented, inspired by the tradition for contrastive linguistics and by ideas then current in foreign language learning research (e.g. the concept of “interlanguage”; Chapter 6). As a by-product of the method, which successfully identified numerous language operations, a lot of what was verbalized was found to indicate that translation was far from being a neat, controlled process. It was not very linear, often not a process driven by conscious decision making; problem solving was often random, and verbalizations were often only indirectly related to the actual performance of the task; they were questions to the experimenter, comments on the situation and expressions of emotions.

The TAP method remains a strong method, as there may not be a better way of getting information about a person’s mind than by having the person tell us about it in words. The problems with relying on verbal reports, in daily life and in research, are well known: people may not know what motivated a certain decision, may not give a true report and may not give a full report. From a research perspective, the TAP method is also cumbersome. After a session, recorded data have to be transcribed. This involves interpretation and a risk of data misrepresentation. Then,
data have to be categorized, which involves further interpretation, and only then analysed as data, not as ordinary statements.

The difficulty of interpreting verbal reports as data was part of the motivation behind the invention of the Translog program in 1995, which has been an important research tool in translation process research. The program aimed at producing a complete and very accurately timed data record of a translator’s typing process while performing a translation task. The timed records produced in the program not only showed all edits, deletions, typos and changes and exactly when they were made, permitting measurement of production speed and editing effort, but also showed pauses before identifiable trouble spots and the rhythm with which solutions were typed, which could arguably be related to cognitive processing characteristics. It may be true that much of the research done with keylogging was technology driven rather than theory driven. The technology was invented to enable accurate exploration of translational behaviour as a means of getting underneath language and making inferences about cognition from another type of data. The aim was to access behavioural data that could be taken as evidence of cognitive phenomena related to meaning-making and meaning-representation processes.

The same was true of the addition of eye tracking, which made it possible to combine gaze and key data and obtain data both about reading/comprehension processes and from writing/typing processes and to observe how they were coordinated. Analysis of combined key and gaze data, especially the way attention was shifted between reading and typing and (visual) monitoring of the whole process, clearly confirmed what keylogging had already demonstrated: that written translation proceeds in “bursts” or “chunks”, i.e. chunks of words, such as phrases. Phrase-level translation has been found to produce more idiomatic solutions than word-level translation in machine translation, but the fact that translation is observed to proceed behaviourally and presumably also cognitively in this manner is evidence that humans translate the meaning signalled by phrases. They do not translate from a mental phrase book but know how to represent the meaning they have construed from phrases (see e.g. Chapters 12 and 15).

If cognitive translation research was technology driven in the early phases, the most recent development has been more clearly driven by theories of mind, cognition and meaning developed by cognitive scientists who have insisted that cognition is situated and distributed as well as embodied, embedded, enacted, extended and affective (Chapters 2, 3, 27 and 29). Just as cognitive linguistics has been seen as essentially a recontextualization movement (Geeraerts, 2002), especially as a reaction to formal generative grammar, so “translatology” was launched as an attempt to recontextualize or “reembed” translation process research (Muñoz Martín, 2016). The aim was to broaden the scope of CTS to include consideration of extended and affective dimensions, to pull CTS away from computational models and mechanical information processing thinking, and to philosophically bury Cartesian ideas of certainty and dualism by uniting mind and body and grounding mind in matter. Several chapters contribute to the discussion of what methodological consequences follow from this recontextualization and how it affects the scope of CTS.

Epistemological considerations

Thinking about translation takes us to the core of some of the toughest philosophical questions about how we experience and know the world, how we build the assumptions by which we interact with other people and our environment, how we develop cognitive skills like communicating and speaking, and how we manage to understand each other across language barriers and cultural and personal differences by means of translation. Translation makes us think about what truth is, and how we can have certain knowledge of anything (Chapter 1), seeing how much our perception of the world varies across cultures and languages (Chapter 5) and how
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much members of the same cultural environment, even family members, may differ and disagree. And yet, despite differences and a lurking suspicion that we may never hope to achieve certain knowledge, we carry on our lives on the—possibly false—assumption that we are part of one world, physically and biologically, although we do not fully understand it cognitively. We interact with this perceived reality, mostly quite confidently, and assume that there is a reachable common humanity that makes it possible for us to have similar, explicable and translatable thoughts and experiences despite the differences in the reality we construe, within and across languages and cultures. Without being certain that the sense we get from another person's communication to us is a reliable and fair reflection of what this person intended to communicate, we carry on and enjoy mediating our thoughts and understanding to others in our environment and find that there is wonderful life to be lived, reported and translated without epistemic certainty, just as there is valuable understanding to be gained from imperfect translations, as long as the meaning they activate in us is perceived to be relevant and interesting.

Ontological considerations

To Jerome Bruner (1960), a central figure in the cognitive turn, our construal of reality begins as an “act of meaning”, an idea similar to ideas propounded earlier by phenomenologist philosophers like Husserl, Bergson and Merleau-Ponty. From the perspective of language and cognition, the basic ontological question is whether there is a world that we begin by perceiving and construing pre-linguistically and then perceive in greater culture-specific detail as we learn a language, or whether we construe what we call reality through the language(s) we learn to speak. Do we need a language to know reality, or do we know reality through acts of meaning, which we learn later to report in language?

From the perspective of CTS, the ontological question is whether translation is fundamentally a matter of meaning, separately from how it is represented, or whether meaning and meaning representation in language are so inextricably connected that they cannot be teased apart. E. M. Forster's famous “How can I tell what I think till I see what I say?” (1927, p. 99) suggests that meaning and its articulation in language are inseparable, that there is no knowable meaning until it has been articulated in language. This view is epitomized in the Saussurean concept of the linguistic sign as at once form and meaning (expression and content; see also Chapters 11 and 29). On the other hand, we all interact wordlessly with other people in our environment by interpreting meaning from their face, appearance and behaviour, showing that there is a lot of non-verbalized meaning in our lives. This is related to why two competing construals or conceptualizations of how the mind construes reality have dominated cognitive science since its start. One construal sees the brain as a large computer working on symbolic representations of the world (associated with linguistic signs) or on so-called sub-symbolic representations and outputting consciousness and meaning. This goes back to the information processing theory initiated by Shannon and Weaver, Allen, Miller and others (Chapters 3 and 28) and to the later branch of cognitive science known as connectionism. Both these construals are sometimes referred to as cognitivist, and the associated theories as representing the computational theory of mind.

The other, recent construal focuses on the complexity and embodiment of experience and mind and on seeing the jungle-like, biological and neuro-physical processes in the brain as connected to what we experience consciously in the mind rather than as belonging in a qualitatively different realm. In this construal, perception and cognition are preliminaries to making sense of the world—both our outside world and our inside world. We partake of the world and interact with our environment, with our senses, our minds and our bodies, and we construe reality from this interaction. The claim from this perspective is that what goes on in the brain
is quite different from what goes on in a computer’s processor. Symbols (such as words) can only very sketchily represent meaning, it is claimed, which is a reason why meaning cannot be computed by processing of symbols. Meaning is not in symbols. Meaning is in people. It has its origin in perception but can also be activated by symbols in humans who know how to generate meaning from them. This second construal, now often referred to as situated or 4EA cognition, rejects the mechanical and finite nature of the computer as a model of the mind and prefers metaphors that highlight translation as a living, biologically grounded activity, somewhat like a complex eco-system in which there are all kinds of organic systems in constant interaction and adaptation. As will be apparent from several chapters in the volume, this construal is still under development. In one version, that of cognitive linguistics (Chapter 2), language use is proposed as a means of cognitive discovery. In another, the process of meaning construal is seen as a phenomenon we need to understand before we can hope to understand how meaning is represented in language and translation (Chapter 3). The computer is still used as a metaphor of the brain, especially in the neural version, as in neural machine translation (Chapter 28). Giant networks are also used as metaphors referring both to the brain and to the way cognition is argued to extend beyond individual minds into the environment, particularly into the social networks which translators and the rest of us increasingly operate in. According to Edelman (1992, p. 162), whose metaphor for the processes in human minds was a jungle (see Chapter 1), “[m]inds do not exist disembodied”, but several contributors to this Handbook make reference to the view that minds are not necessarily embodied in individual organisms but extend into giant networks or complex adaptive eco-system-like structures (Chapters 4 and 27). This is where the discussion stands at present, and we leave it to readers to contribute to the debate.

**Translation and multimodal/multimedia communication**

The concept of translation is still mostly associated with translation of a written text into another text written in a different language. Sometimes the notion of “text” is expanded to include a spoken or signed source (as e.g. in Chapter 14). The widespread use of multimodal communication using multimedia (Chapter 24) is expanding the scope of what is translated even further and has made it abundantly clear that translation is not a monomodal language operation. For instance, in audiovisual subtitling, it is customary to include titles for certain audible non-verbal features in the audio track to give people with reduced or no hearing access to what may be important contextual cues to making sense of a situation or narrative. Similarly, in an effort to allow persons with reduced or no eyesight (but with hearing) access to visual information, e.g. in the cinema, audio description has been developed (see Chapter 24). This is widely accepted as a form of translation, although the “text” that is translated is not text as traditionally understood, but visually represented action in a filmed environment. Roman Jakobson’s (1959/2000) famous categorization of translation into intralingual, interlingual and intersemiotic translation has been a reminder that the concept of translation could be understood broadly, but intersemiotic translation was often categorized as adaptation, and it is only now beginning to be fully appreciated that there is no clear demarcation between interlingual and intersemiotic translation. “No text is, strictly speaking, monomodal”, as Gambier rightly stated (2006). But if text is always multimodal, and translation can include rendition of visual cinematic narrative into a verbal narrative, then we no longer need to distinguish theoretically between interlingual and intersemiotic translation. All translation is intersemiotic. A sports journalist’s radio narrative reporting on a Bundesliga football match is an act of translation. The journalist has an immediate and direct visual and auditive experience of the action. As we listen to the spoken report, we are able to invest the description with an idea of the action and share the journalist/translator’s emotional excitement, probably
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aided by the so-called “paralinguistic” features of the reporter’s narrative brought into play to help listeners visualize and sculpt the experience: quality of voice, loudness, stress, speed and effort imitation. In the widest interpretation, as already stated, the meaning we make of reality is created in acts of translation and can be mediated in different modes.

The preceding explains why we are always able to reformulate an utterance if asked what we mean. We can engage in intralingual translation because we know what we want to say, we have the meaning we wish to communicate, and there are a thousand different ways in which this meaning can be represented. Therefore, knowing how to use language is knowing how to translate experience, intention, memories, emotions and the rest. In that sense, all language users are natural (intralingual) translators. In Chapter 3, the question is asked why it is that some bilingual language users with no training in translation or interpreting nevertheless have acceptable translation or interpreting skills, but this is perhaps not very surprising, for having an idea, having something you want to say and being bilingual means that you can represent your idea in either language. What we learn in learning a language or several languages is how to materially represent meaning in it or them.

Translation, technology and cognition

The increasing use and availability of translation technology as an automatic service for Internet users in many countries and in several social media as well as in dedicated smartphone apps, some offering speech-to-speech machine translation, has already changed the face of global communication. It has vastly extended our ability to translate across several languages and to make sense of texts in many languages. It has extended our range of meaningful interaction and enabled us to better navigate the ocean of available information. Working methods and conditions in the translation industry have been very deeply affected by the increasing use of machine translation, computer-assisted translation (CAT) tools and other technological solutions. In Chapter 17, the development is described in the following way: “What production robots, autonomous vehicles, surgery robots, telemedicine and legal technology are for these professions […], Google translate, post-editing of machine translation and translation vendor platforms are for the translation business.” This technological revolution has created new areas for CTS to explore and given rise to numerous studies of cognitive effects on users, in ergonomics (Chapter 8), translator–computer interaction (Chapter 21), risk evaluation (Chapter 25) and post-editing of machine–translated text (several chapters).

The use of technology in experimental research and its potential effect on participants’ performance is a topic taken up in several chapters, e.g. in discussions of the reactivity of concurrent think-aloud and the consequent potential skewing of data, the ecological validity (or invalidity) of data from keylogging and gaze data collected in a laboratory environment, and the degree of invasiveness of technologies like eye tracking, electroencephalography (EEG), functional near-infrared spectroscopy (fNIRS) or functional magnetic resonance imaging (fMRI). Advantages and disadvantages are weighed in several chapters, but the general observation one can perhaps suggest is that in each research situation, the observer’s paradox applies. Each situation has its own ecology, which it is up to the researcher to explicate as far as possible.

Using computational methods to explore translational phenomena does not commit one to a computational theory of mind. Corpus analysis is a proven method for exploring translational language, also from a cognitive perspective. In the present Handbook it is used to explore a cognitive phenomenon like “shining through” (Chapter 23), notions like expectancy, surprisal and entropy (Chapter 20), and ideas that combine artificial intelligence with findings in user-activity
corpus data to build an up-to-date computational view of translation that integrates the most recent ideas of extended and distributed cognition (Chapter 28).

**Brief presentation of individual parts and chapters**

**Part I**

The four chapters in Part I, Foundational aspects of translation and cognition, are all foundational in the sense that each of them offers reflections on the epistemological and ontological bases on which CTS is currently conceptualized as standing. The opening chapter asks the most fundamental questions of all about the epistemological basis of human knowledge: Can we really obtain certain knowledge about translation and cognition? If so, with what methods; and with what degree of certainty can we hope to obtain knowledge? The next two chapters ask questions about the ontological nature of translation. Is translation essentially a language operation, something that people (and machines) do with words, or is it primarily an operation based on meaning? Is language ontologically primary in our conceptualization of translation, or is meaning? One answer, given in Chapter 2, prioritizes language, as understood in cognitive linguistics. Here, a concern with language is posited as the ontological core of our discipline and cognitive linguistics as the theoretical and methodological centre. A different, more purely cognitivist answer is given in Chapter 3, where translating is said to be a matter not of language but, rather, of meaning or communication. Throughout the volume, readers will find this oscillation between the primary focus being placed on language as a means of discovery about translation and cognition and the focus being on cognition and meaning as the primary source of knowledge about language and translation. The last of the foundational chapters offers a theoretical framework for viewing translation as a complex adaptive system (CAS).

Chapters 2, 3 and 4 should be read together, as they have all been written with the positions in the other chapters in mind. They are also theoretically and thematically close to two of the chapters (27 and 28) in Part IV.

Chapter 1, by Andrew Chesterman, examines our attempts to know about cognitive aspects of CTS from an **epistemological** standpoint, asking how we can extract reliable information from introspection or from subjective verbalizations recorded in a TAP and how we can analyse such verbal data as reliable evidence or even as explanations of cognitive phenomena. Chesterman also asks, quite critically, how we can make reliable inferences about cognition from recorded keystrokes and the intervals between them during the typing of a translation, regardless of how accurately they have been recorded. The answer given can perhaps best be described as sceptically optimistic. Chesterman affirms belief in the value both of conceptual and empirical research and of hypothesis testing, whereby some real knowledge can be found—at least about some things, such as the things we need to know in order to be able to navigate our immediate environment. Although he adopts a “fallibilistic” standpoint, meaning that what we think we know today may turn out not to be true tomorrow, he firmly repudiates nihilistic relativism. There are things that we can know, or think we can.

In Chapter 2, Sandra Halverson makes a plea for grounding CTS in a **linguistic commitment**. She also takes up fundamental ontological and epistemological questions concerning cognitive translation and looks for “clearer lines of demarcation between major approaches to the study of cognition in general and to the study of translational cognition in particular”. One major approach is the information processing approach, which sees the mind as a symbol manipulating engine, much like a computer, and is firmly based on language as the dominant representational system. Halverson sides with the other major approach, the translatological approach, but argues
that a clearer commitment is required to a view of language as “central to our fundamental ontology in all cognitive approaches to translation”. She argues that cognitive linguistics can be the unifying element and rewrites its cognitive commitment to what is generally known (in cognitive science) about the mind and brain into a commitment that cognitive translatology should accept to ensure that its account of translation should always accord with what is generally known about language from cognitive linguistics.

In Chapter 3, Ricardo Muñoz Martín and Celia Martín de León trace the beginnings of cognitive science in the 1950s and survey several strands in Translation Studies that contributed to developing CTS. In interpreting studies, the influential concept of deverbalization suggested that meaning could be held in an interpreter’s mind independently of a fixed verbal form or other symbolic representation. One main model of communication was Shannon and Weaver’s information processing model, which represented the human brain as a computer operating “intelligently”, i.e. logically, on symbols and problem solving. This is largely the model that continues to underlie computational attempts to model cognition and cognitive translation. In the 1990s, new ideas began to develop, jointly leading to the construal of 4EA cognition (embodied, enacted, embedded, extended and affective), which involves a radical recontextualization and socio-cognitive expansion of the scope both of cognitive science and of CTS and challenges the importance of language as a means of understanding cognition. Cognitive science is appealed to as the science that will give us proper insight into the sub-symbolic processes in the mind by which meaning is generated, the meaning that we construe in listening and reading and the meaning we articulate and represent in translation (and in interpreting).

In Chapter 4, Gregory Shreve takes up the challenge of exploring the theoretical implications of the key proposals from information processing, cognitive linguistics and cognitive science put forward in the previous two chapters. Rather than attempting to explore and integrate all key concepts, Shreve’s proposal is to include CTS (translatology) under the umbrella of CAS theory. Arguments are given in support of viewing translation as a CAS. If conceptualized in this manner, translation is multi-scale and can be studied at all levels, from the level of cell activity or below to the social and cultural level or beyond. It is therefore important that the scope of a piece of cognitive translation research is always specified. This is particularly important when notions of distributed and extended cognition are brought into play, for any “system we study is linked to systems both above and below it in a multi-scale hierarchy”. As translation is understood as inevitably communicative and functional, goals should be specifiable at all hierarchical levels. The question of who or what can have goals leads to the question of agency. Shreve concludes that because words can signal their producer’s goal orientation, they embody agency, thereby accepting a view of embodiment and agency that extends beyond living bodies.

Part II

In Part II, Translation and cognition at interdisciplinary interfaces, all nine chapters deal with the interfaces between CTS and such disciplines as anthropology, contact linguistics, pragmatics, ergonomics, language ontologies, corpus linguistics, linguistics, psycholinguistics and neuroscience. CTS has overlapping research interests with all of them, shares a number of epistemological and ontological assumptions with them, uses the same or similar methods, and attempts to explore and model translation in ways that constantly adapt to what is known in these interface disciplines. Translation and cognition penetrate every human activity, every knowledge field and every institutionalized discipline and are therefore eminently interdisciplinary. The disciplines we have selected for special attention illustrate some of this variety, but they have historically been
disciplines with which CTS has interacted most vigorously. Sometimes the contact has been chiefly mediated through conceptual overlaps (exchanges, borrowings and lendings); at other times the contact has mainly resulted in methodological inspiration.

Where *anthropology* (Chapter 5) is focused mainly on studying people in their cultural environment and from their language, “the most articulate code of human experience”, *ergonomics* (Chapter 8) is particularly aimed at studying the environments that people work in, with the central focus on how well working environments are in tune with human bodies and minds and how everything in the environment affects employees’ cognition. Chapter 6 studies what happens when speakers of different languages have contact. The phenomenon of translational interference has been studied intensely at the level of individual translations or corpora of translations, but there is a broader way of approaching linguistic change, not as a result of translation but in the context of *language contact*. Chapters 7 and 9 through 12 all concern interfaces with various ways of studying language, *pragmatics* (Chapter 7), *domain ontology* (Chapter 9), *corpus-based CTS* (Chapter 10), *linguistics* (Chapter 11) and *psycholinguistics* (Chapter 12). Whatever our view on the relative importance of cognition, meaning and language in CTS, language and the various branches of linguistics remain crucial. The final chapter concerns the increasingly important interface with *neuroscience* (Chapter 13).

To Kathleen Macdonald (Chapter 5), “*Anthropology*, as a discourse of disparate cultural communities, has always been concerned with translating the minds and behaviours of individuals and collectives within one culture, across to those from another context.” Anthropologists are intensely aware of the interplay between thought, culture and language. To Sapir, language was an instrument that made thought possible, while thought, in turn, helped refine the language instrument. Whorf’s view of the inextricable tripartite of thought, language and culture led him to identify isolates of experience and isolates of meaning from both explicitly (overtly) and implicitly (covertly) signalled meaning to identify the distinctive particularism of a culture. His celebrated linguistic relativity principle is not representative of an essentialist view of culture and meaning (making translation impossible), nor is it a mere compromise between universalism and essentialism. In the words of Penny Lee, Whorf assumes “that there are universal configurations of experience upon which different linguistic schemes of classification operate in a variable way” (Lee, 1996, p. 96). “Thick” descriptions of linguistic (or other semiotic) articulations are a way of bringing out both the specificity and the complexity of culture-specific meaning making.

Where anthropologists have tended to study cultures without much interaction with other cultures or languages, Haidee Kotze (Chapter 6) looks at the kinds of language change that result from different languages being in close contact, both socially and in the minds of language users, not only translators. Her focus is on the interface of CTS with *contact linguistics*, particularly on (socio-)cognitive aspects of cross-linguistic influence (CLI) of the kind sometimes referred to (in translation) as interference or shining through. The cognitive effects of simultaneous activation of two languages in a translator’s mind may produce instances of CLI, which may in turn propagate into non-translational uses of language and may—in the long perspective—contribute to language change. The process has both an individual and a social dimension and is viewed as embedded in two simultaneous socio-cognitive processes: text production and reception. Whereas many CLI effects and other contact effects are well documented in language production, especially by means of corpus studies, the wider effects through reception to more permanent effects on monolingual production in the recipients’ language are difficult to establish. To explore them, corpus methods have to be supplemented with process-type or experimental methods in order to establish longer-term language change effects and what (socio-)cognitive and social factors mediate such changes. Relevant factors may be language users’ perceived
relative power, the dominance and prestige of languages, and the relative strength of purism or openness to change with which a language is socially supported.

In Chapter 7, on translation, pragmatics and cognition, Fabio Alves, quoting Morris (1938), defines pragmatics as “the science of the relationship of signs to their interpreters”, i.e. the science of how humans use language to exchange thoughts. The perspective from which Alves approaches pragmatics is first through the Anglo-American tradition of language philosophy with its strong philosophical and increasingly cognitive orientation, as well as its discovery of the many ways language users “do things” with words in so-called speech acts, and the subtle ways in which intended and understood meaning depends on context and situation and implied meaning as much as on explicitly stated meaning. The main focus of the chapter is on the approach of relevance theory (RT) to pragmatics as applied to translation. It revisits the axioms of RT and expounds the way RT describes comprehension and the notion of cognitive environment. RT sees translation as an act of interlingual interpretive language use, based on Gutt’s concept of interpretive resemblance. The chapter also looks at processing effort and cognitive effects in translation as well as instances of metarepresentation (how communicators interpret each other’s minds) and higher-order representations. It further looks at the semantics–pragmatics interface and issues related to explicitation and explicitness in translation. Here the difference between explicatures and implicatures is clearly expounded. The chapter ends by reporting on experimental pragmatics as a current and future development.

In Chapter 8, Maureen Ehrensberger-Dow examines the interface between translation, cognition and ergonomics, placing translators physically in a workplace environment and studying the way in which external factors, including other humans, impact on them as well as on their translation performance and their own (cognitive) perception of their work and work situation. Field study methods are preferred in order to get as close as possible to where the real action is, with screen recording as a possible source of supplementary data. Although the primary concern of ergonomics has been aimed at seeking to optimize behaviour by designing the tools used in production, including desks, chairs, keyboards, computer screens and interfaces, and other elements in the work environment, ergonomics also takes an interest in softer factors like social organization, and there is a concomitant concern for health, well-being and cognitive ergonomics. From the point of view of program designers, much effort has gone into developing ergonomically attractive screen and keyboard layouts, especially now that nearly all translation is done in interaction with computers.

In Chapter 9, Adriana Pagano tackles the concept of domain in theories of translation and theories of competence and expertise. After criticizing code-oriented models of translation that separate language, thought and reality by distinguishing between language “form” and language “content”, she adopts an approach through systemic functional linguistics (SFL), which offers a language-based approach to human cognition that sees “language as inextricably embedded in social context” and a domain as “construed through language”, whether in translation or not. A language-based ontology of a domain can help translators know “how meanings are worded in a particular domain”. Text mining in a domain makes it possible to build an ontology in which conceptual categories are all based on natural language expressions, e.g. by nurses. Building an ontology on natural language use makes it easier to extend ontologies multilingually. Artificial intelligence routines applied to natural language ontological data can successfully identify connections, make inferences, formulate new axioms and suggest translations, and can also assist with making accurate diagnoses and suggest treatment. Ontologies are stronger than bilingual dictionaries by providing a richer linguistic modelling of the action and the full social experience in a domain by drawing on the natural language used in the domain. There is therefore great potential in multilingually oriented ontologies to assist translators.
Chapter 10 by Stella Neumann and Tatiana Serbina concerns the kinds of contribution corpus linguistics techniques can make to Cognitive Translation Studies. One way is by testing hypotheses about cognitive phenomena. Text corpus data do not give access to process data but can nevertheless lead to assumptions about cognitive causes of phenomena manifested in the product data. For instance, machine learning programs are very good at discriminating between translated and non-translated texts, which makes it fair to assume that translated texts (often) share certain recognizable features that may have a cognitive origin. Explicitation, normalization, simplification and shining through are familiar examples of features that can be documented by corpus methods to be frequently found in translations. More subtle frequency effects that have no known cognitive explanation can also be detected by corpus analysis. Cognitive phenomena like chunking, schematization and entrenchment are more difficult to demonstrate with corpus linguistic methods, although attempts have been made to relate translation shifts to different levels of entrenchment in the translators’ minds. Assumptions arising from frequency observations in corpus data illustrate the usefulness of multi-method approaches. If combined with experimental research, and if assumptions are supported by experimental evidence, speculative assumptions can grow into strong hypotheses. This multi-method (triangulating) approach is strongly advocated by the authors.

In Chapter 11, Kirsten Malmkjær, writing about the interface between translation, cognition and linguistics, points out the fundamental difference between rationalism and empiricism as two ways of understanding human reason. Rationalism “ascribes considerable innateness of cognitive phenomena to people” and tends to assume that being human involves sharing universal cognitive abilities and constraints. Empiricism, by contrast, “considers socialization and cognitive development to be mainly a question of acquiring and learning from experience”—and not necessarily arriving at the same understanding or speaking about experience in similar ways. Contemporary rationalist thinking in linguistics is associated not only with Chomsky, who has had very little influence on Translation Studies, but also with the cognitivist tradition. The main influence on Translation Studies before the cognitive turn was from empiricists like Boas, Sapir and Whorf, whose main observation was that we do not develop identical cognitive pictures of the world across different languages and cultures, and from descriptivists like Halliday and Toury. Contemporary cognitivist approaches to language, as represented e.g. by Langacker, Dirven and Fillmore, and also relevance theorists, like Sperber, Wilson and Gutt, are categorized as continuing the rationalist tradition, but at the end it is clear that rationalists, empiricists and descriptivists need one another. As the author states, “there can be no language use without cognitive engagement, just as there cannot be […] thought that is not expressible in language”.

In Chapter 12, Agnieszka Chmiel examines the interface of translation and cognition with psycholinguistics, itself a discipline at the interface of psychology and language. This is undoubtedly where there has been the closest and most intense interaction in CTS since the 1980s. The aim of psycholinguistics is to “explain how language is processed in the human mind”, which resonates perfectly with CTS’s aim to explain how translation works in the human mind. The chapter gives a full account of psycholinguistic methods used (from TAPs, keylogging and eye tracking to EEG and other neuroscience methods) in the analysis of lexical and syntactic processing, reading and writing patterns and pauses, memory and executive functions, and the question of directionality. Psycholinguistically motivated models of translation (horizontal/vertical, monitor and recursive models) are also treated, as well as Halverson’s gravitational pull hypothesis. The chapter also deals with how to design relevant tasks using authentic or manipulated materials; how to find a proper balance between control of variables and an ecologically valid simulation of experienced reality; what data to elicit and what measures to make; and how to triangulate findings based on analysis of qualitative and quantitative data. Finally, a strong plea is made for
the use of mixed-method approaches applied to well-powered experiments and the use of strong statistics with reports of effect sizes.

In Chapter 13, Adolfo Garcia and Edinson Muñoz study activity in the brain that can be associated with translation and cognition from a neuroscience perspective. In their terminology, translation is “interlingual reformulation” in either the “forward” or the “backward” direction. Scientific interest in neuroscientific approaches has developed so rapidly that the authors declare it a full-blown sub-discipline of CTS. Neuroscience employs methods like EEG, positron emission tomography (PET), fNIRS and fMRI to study electrical and haemodynamic activity in the brain to identify which areas are particularly active during the execution of specific translation tasks. Research in this paradigm is experimental and laboratory oriented and includes a battery of behavioural and linguistic tasks. Most methods are non-invasive, but certain methods involve insertion of electrodes into brain regions to assess a specific region’s role in the execution of a task. Important findings include knowledge about each brain hemisphere’s contribution to translation skills, neurocognitive routes, temporal task dynamics, and the impact of interpreting expertise on neuroplasticity. Although activity is widely distributed in the whole brain during translation, the left hemisphere appears to dominate in the vast majority of the population in the execution of translation tasks. Broca’s area and neighbouring areas appear to be particularly involved, with word translation and sentence translation engaging different brain regions, associated with different kinds of processing (faster or slower) along different neurocognitive routes. Evidence has been found that interpreters’ grey matter increases in volume with growing expertise, demonstrating the functional adaptability and biological plasticity of the human brain.

Part III

In Part III, Translation and types of cognitive processing, all 12 chapters look at different types of cognitive processes related to translation task execution. They are concerned with what triggers them, how they are managed and measured, and how knowledge about translation as a whole is acquired. The chapters in Part III concern different aspects of cognitive processing involving greater or lesser effort (Chapter 14), attention (Chapter 15), emotion (Chapter 16), creativity (Chapter 17), challenges of translating metaphor (Chapter 18), achieving equivalence (Chapter 19), applying information theory, e.g. to the study of expectancy effects (Chapter 20), dealing with human–computer interaction (Chapter 21) and, generally, how to acquire translation competence (Chapter 22); and further, how a combination of process and product data analysis can throw light on translational cognition (Chapter 23), how multimodal communication is processed (Chapter 24) and how translational risk is managed (Chapter 25). Collectively, the chapters in this part of the volume provide an overview of internal and external factors potentially affecting cognitive translational processes, ways of measuring and managing those effects, and how to acquire and build the necessary translation competence to handle all these factors.

In Chapter 14, Daniel Gile and Victoria Lei discuss the emergence of interest in effort (also known as workload) as a cognitive construal related to the assumption that the central processing capacity in the working memory is limited and to the subjective experience of translation being sometimes more effortful and sometimes less. Cognitive overload has a negative impact on performance, but the relationship between the amount of effort invested in a translation task and the success or quality of the performance is not straightforward. Some research indicates that there is both slow and fast translation, associated with two distinct processing modes, horizontal and vertical, depending on the degree of conceptual mediation required. In simultaneous interpreting, effort is often challenged to the limit, especially in adverse conditions caused e.g. by a speaker’s fast delivery of information–dense speech, perhaps in an unfamiliar accent and in an acoustically
bad environment. A frequently used metric of effort is processing time per unit, as reflected in typing speed (for written translation) and in patterns of eye movements on source information. Hesitations and omissions in interpreters’ spoken output are other potential indicators of high-intensity effort. Pupillometric and brain imaging techniques are also used, sometimes in combination with subjective reports to underpin the construct. A limitation pointed out by the authors is the current inability of research to relate specific levels of effort to specific comprehension or formulation issues.

Chapter 15, by Kristian Hvelplund, discusses attention as a cognitive process by which specific environmental objects are attended to while others are ignored. The main methods used in CTS to know what a translator or interpreter attended to at any given point in time include verbal reports in the form of concurrent think-aloud verbalizations or retrospective reports and behavioural measurements like keylogging and eye tracking (including pupillometry). Physiological data from brain imaging and EEG are especially useful for identifying what brain regions were particularly active when a certain item was attended to and with what speed and intensity. What a translator attends to visually (mostly one or a few words) is referred to as an “attention unit”, but gaze data can only identify what graphic representation of meaning was attended to, not what meaning the translator was cognitively attending to and working on. Therefore, what is identified as being visually attended to may be considerably displaced relative to what was being cognitively processed at the time. The fact that attention can be split between multiple concurrent tasks and very quickly switched from one task to another also contributes to the difficulty of knowing what exactly is attended to, when and for how long. Better technologies will hopefully advance the accuracy with which a translator’s true focus of attention can be identified.

In Chapter 16, Caroline Lehr takes up the theme of the influence of emotions on thinking, which has only recently begun to be researched empirically and systematically integrated into translation theory. Where the emphasis in the classical cognitive paradigm was on viewing cognitive processes as fundamentally rational, increasingly, particularly since the 1990s, emotion and affect have come to be seen as crucially important factors in shaping human cognition and consciousness and in generating situational meaning and understanding. Emotion can be triggered by both external and internal stimuli. It is understood as an episode involving a change in such states as an organism’s action tendency, appraisal of an important event or a subjective feeling, and also has a physiological and expression component. Emotions may be provoked by the source text, the translator’s performance, external working conditions and the translator’s personal well-being and will affect a translator’s attention, judgement, problem solving and decision-making activity. Empirical research has demonstrated how emotions arising from positive or negative feedback have a regulatory effect on a translator’s behaviour, e.g. towards greater creativity or stricter monitoring of accuracy. Lehr ends by stating that emotional competences are an integral part of translation competence and should be part of the training of future translators.

Chapter 17, by Gerrit Bayer-Hohenwarter and Paul Kußmaul, examines the role of creativity in Cognitive Translation Studies. Adopting a functionalist skopos-oriented approach, which they see as an overall framework for creativity in translation, they emphasize creativity as a human translational prerogative, which cannot be emulated by computers. Creativity manifests itself both in the translation process and in translation products. In translations, creativity is manifested in elements of novelty or even uniqueness, which emerge in a process characterized by periods of preparation, incubation, illumination and evaluation. Visualization of comprehended meaning has been found to be helpful in producing creative solutions based on more complex analogical reasoning. Other findings indicate that professional translators are better at switching between a routine mode of production and a cognitively more demanding creative mode. A social media case is used to illustrate the way in which creative translation may result from a translator’s
interaction with many individuals, exploiting their crowd knowledge and creativity to find both the most likely contextual meaning of an unfamiliar expression and an adequate creative translation of it.

In Chapter 18, Christina Schäffner and Paul Chilton look specifically at metaphor translation, which has traditionally been approached in terms of whether or not to translate a linguistic metaphor into another linguistic metaphor. Metaphorical expressions have frequently been considered a challenge to translation and have stimulated discussions of translatability. Schäffner and Chilton approach metaphor translation from a cognitive perspective, looking at metaphors from the perspective of Lakoff and Johnson’s conceptual metaphor theory, which sees metaphor not primarily as a language operation but as a mapping across conceptual domains, which can be represented in a variety of language manifestations. The theory makes a distinction between primary and complex metaphors, with primary metaphors being potentially universal, as they relate to mappings related to bodily experience. Manifestations of primary conceptual metaphors generally translate more easily than complex metaphors, which tend to make use of culturally based conceptual frames. Empirical research tends to agree that metaphor translation is more cognitively demanding than translation of non-metaphorical expressions, but much remains to be empirically investigated, multimethodologically and in real-life, technology-supported contexts.

Chapter 19, by Erich Steiner, tackles the question of equivalence, perhaps the most hotly debated concept in the history of Translation Studies. According to Steiner, “it is not easy to define translation entirely without it”. He uses the concept to distinguish between paraphrase and variation by truth-conditional rather than cognitive criteria, with translation as an “approximation to a multi-functional paraphrase of the ST [source text] by some TT [target text]”. Translation is “text production under the constraints of a ST”. Translation of multimodal genres is said to be in need of a motivated notion of equivalence. Models of translation and cognition are also still lacking in detail and concreteness. Equivalence can be applied at any level of textuality, but linguistic representation at any level is full of ambiguity before it is read, interpreted and disambiguated by a reader/translator. It is stated that this interpreted and understood meaning is what the translator represents (“instantiates”) in the TT, but existing models of translation need to be more explicit about their commitment to either text or reading (interpreted meaning), Steiner argues. He is more comfortable working with proven naturalistic language corpus data (within an SFL theoretical framework) than with venturing into research based on what he sees as problematic process data recorded by immature methods. However, if product and process studies are integrated, linguistic evidence is likely to emerge showing that translation involves a search for equivalence.

Chapter 20, by Elke Teich, José Martínez Martínez and Alina Karakanta, deals with the interface between cognition, information theory and cognition. Using a computational calculation of predictability in (a linguistic) context to model human translation based on an information processing (“noisy channel”) theory of communication, they seek to relate probabilities of occurrence of words or phrases to cognitive notions like “expectancy”, “surprisal”, “choice”, “difficulty”, “world knowledge” and “assumptions about the addressee”. Mathematical entropy applied as a measure of the complexity of a translational choice has been found to correlate positively with cognitive uncertainty, surprisal and processing effort. The success of modelling translation in this manner is measured by equivalence (fidelity of TT to ST) and adequacy (conformity of TT with TL norms), and translation is operationalized as “a search task in a space of alternative linguistic options”. “Context” is defined in terms of ambient text and by reference to register, and equivalence and adequacy are established from probabilities of linguistic occurrences in corpora. It will be interesting to see if future machine translation (MT) solutions based on a model of human translation as information processing will be able to further optimize
MT quality without needing to implement a language-independent, cognitive construal of situation and context.

In Chapter 21, Sharon O’Brien discusses cognitive aspects related to human–computer interaction in translation. In less than 30 years, technology has radically changed the way most professional translators work, regardless of whether they work with regular text or e.g. with audiovisual translation, “with the translator in some circumstances becoming almost symbiotic with the ‘machine’”. Interaction with the machine is not just with dedicated translation software like translation memory and machine translation systems, which are increasingly integrated, but with the Internet and the resources to which it gives access. This makes new demands, both physical and cognitive, on translators and interpreters, but it also has the potential to reduce those demands. The benefits of technological aids are evident: translation is speeded up, throughput volume is up and quality is up. There may also be wider social and ethical benefits. More problematically, cost is down, and there are other challenges, many of them cognitive. Technology does away with plenty of routine work, but many translators feel dehumanized by the machine and robbed of their creativity by having to post-edit errors they would never have made themselves. To reduce cognitive friction, translation software should be interactive and adaptive; it should learn from the user and function more as an extension of the translator’s mind. This can be achieved if the translation software of tomorrow is created to allow tailor-made personalization.

In Chapter 22, Amparo Hurtado Albir offers a comprehensive survey of attempts to define translation competence and translation competence acquisition. Most studies have concluded that the construct can be broken down into a number of components such as bilingual competence (at some level), including reception and production competence, strategic competence and transfer competence, but cultural competence, world knowledge, theoretical knowledge and many more have also been claimed as components. “Competence” is widely understood as a scale, which is one source of difficulty in reaching agreement on a definition. Other problems arise from competence being in competition with terms like ability, skill, proficiency and expertise, all of which are also scalable, and all of which can be understood as having both a competence and a performance interpretation, with both a knowledge and a behaviour dimension. Furthermore, there have been relatively few empirical studies of competence seeking to validate a competence model, although a few have been large-scale projects with many participants.

The discussion of translation competence acquisition (TCA) departs from Harris’s notion of “natural translation” followed by Toury’s socialization idea and Shreve’s description of TCA as proceeding from natural translation to professional (“constructed”) translation following an expertise trajectory, perhaps along Chesterman’s proposed five stages, leading to increasing automatization and higher-level, more holistic decision making, but along an itinerary that is not linear but spiral, both progressive and regressive, and unevenly distributed across sub-competences. Large-scale, empirical, longitudinal and replicable research targeting TCA in well-defined contexts is called for.

In Chapter 23, Silvia Hansen-Schirra and Jean Nitzke argue that we need to study the process–product interface to know about translational cognition. Corpus methods are good at discovering linguistic patterns that distinguish translated from non-translated language, but they lack a method for identifying what causes such “universal” patterns as normalization and shining through. Process-oriented research operates with concepts like priming and monitoring. If such patterns and concepts could be convincingly linked and, for example, establish a link between monitoring and normalization and between priming and shining through, our understanding of translation would be improved. Methods for linking data obtained with the two methods, either from different materials or from the same materials, are suggested. Another example concerns translation of cognates. Corpus analysis demonstrates that lexical variety in translation
Introduction

of non-cognates is higher than for cognates. This effect has been shown to be modulated by many factors, including translation mode, level of expertise and others, but also by priming and/or monitoring. A product-process approach would be able to show if such normalization was caused more by priming or by monitoring.

In Chapter 24, Jan-Louis Kruger focuses on the cognitive demands associated with translation of multimodal genres (especially subtitling and audio description) and on the impact of multimodality on recipients’ cognitive processes. After centuries of conceptualizing translation as text translation, it is now apparent that there is more to translation than translating words. In multimodal communication “linguistic content is always framed in, supplemented by, and informed by context, co-texts and non-verbal modes that determine the translation as well as the reception of the translated product”. In audio description the “source text” is not linguistic at all, and translation is not interlingual, but intermodal. What is translated (and represented in speech) is the action shown visually in a movie. Studies of the way multimodality affects the way viewers/listeners/readers construe meaning and how much cognitive load is imposed on them have found that subtitles may be found distractive, because they automatically attract visual attention, but may also help an audience become more fully immersed in a movie. Similarly, redundancy effects in multimodal communication may have both positive and negative effects.

One important methodology used in this research is eye tracking, which shows that the way e.g. living pictures are “read” is very different from the way text is read, showing that we engage differently with the new, more complex representations of reality mediated by multimodal communication.

Chapter 25, by Anthony Pym, is about the concept of risk management, which may be applied socio-economically, and also to cognitive concerns a translator may have concerning a translation. In particular, risk can be related to cognitive concepts like confidence and uncertainty in the handling of ambiguity and indeterminacy. Professional translators appear to display greater tolerance of uncertainty than novice translators because of their superior ability to assess risk and to discriminate between high-risk and lower-risk situations. This allows professional translators to more effectively allocate cognitive effort, deal routinely with low-risk translation and devote more time, attention and reflection to high-risk challenges. If translation is done collaboratively or in interaction with a CAT tool and a machine translation engine, assessment of the risk scene depends crucially on the trust a translator is prepared to invest in contributions from collaborators (including the machine) and the credibility a translator aims at having with colleagues and clients. If a translation is a text that clients receive and accept as a translation, then credibility is a translator’s most important asset. Managing risk involves reducing, transferring, mitigating and avoiding risk or taking it. Most studies of translational risk have suggested that risk aversion dominates. This tendency could be culturally induced. Recognition “that risk taking can be justified, pleasurable and socially rewarded” could help translators break away from subservience, fear and inadequacy.

Part IV

The five chapters in Part IV, Taking Cognitive Translation Studies into the future, conclude the Handbook and point to important new avenues for CTS. Part IV closes the circle by means of a dialogue with the four chapters in Part I and by offering bids for future directions and reflections on where CTS may be moving.

Chapter 26 discusses expertise and expert performance as alternative concepts to competence and attempts to construct a trail to finding ways of better assessing translation performance. If this could be achieved, it would have very important consequences for translation training.
and for the translation profession. Chapter 27 undertakes to describe some of the far-reaching consequences for CTS, in particular the scope of CTS, of an acceptance and implementation of the ideas of situated, embodied, distributed, embedded and extended cognition. Chapter 28 is an ambitious forward-looking attempt to model human translation computationally in a way that attempts to include several of these notions, in particular embedding and extension. Chapter 29 fits Translation Studies into the fully developed SFL system, offering SFL as an alternative theoretical framework to the CAS framework presented in Chapter 4. Chapter 30 summarizes the editors’ reflections of the overall direction of CTS.

In Chapter 26, Igor da Silva gives an account of ways in which expertise and expert performance have been employed to describe a very high level of consistently superior translation performance, sometimes in an effort to replace the competence construct with a hopefully more robust and theoretically enlightening construct. Like competence, expertise is an acquired skill, but long experience in a domain does not necessarily lead to expertise. According to expertise theory, it takes years of deliberate practice to achieve it. When achieved, it is manifested in consistently excellent superior performance in a particular domain. Cognitively, experts have superior working memories, have better knowledge and produce faster solutions than others, but only within an often quite narrow domain. This makes it very difficult to devise a performance model with well-defined tasks by which expertise can be measured. Expertise is sometimes construed as an absolute concept. In empirical research, it has often been construed somewhat loosely as a relative concept, e.g. in research comparing the performance of a group of “professional translators” (hypothetical translation experts) with a group of “novices” (hypothetically not yet translation experts) and a group of “domain professionals” (professionals in a domain, but non-translators). This type of research has demonstrated considerable difficulty in pinning down translational expertise and devising relevant tasks and metrics.

In Chapter 27, Hanna Risku and Regina Rogl offer their view of translation from the evolving perspective of situated, embodied, distributed, embedded and extended cognition. They first present a historical overview of first-generation (computational information processing) and second-generation (connectionist) cognitive science theories of the human mind and track the itinerary from a view of the mind as a computer-like manipulator of symbols to a view of mind as a giant network of experience-based and action-oriented sub-symbolic activations in neurons organized in a parallel and distributed architecture. Second-generation ideas inspired e.g. prototype and scenes-and-frames semantics and brought contextuality, creativity and individual experience to the fore. The third generation is dominated by situated 4EA cognition, which sees cognition as extending beyond the human mind and brain, into the whole body, into social interaction, and even into the environment and human artefacts. The five varieties of third-generation theories listed in the title of the chapter are described separately, although they admittedly overlap considerably, e.g. in that they all share an enactive view of cognition. One main consequence of the situated perspective is that meaning always emerges in a specific context. Translation, similarly, always takes place in a specific physical and social environment with which translators interact and which impacts on their cognition. The consequences of this for the scope of CTS will have to be clarified, but the third-generation views of cognition should inspire research agendas “that are committed to a non-computational understanding of the cognitive processes in translation”.

In Chapter 28, Michael Carl describes the different ways in which artificial intelligence solutions have been variously conceived of as replacing, simulating or extending human cognitive processes. In the early cognitive science assumption, the human mind was a syntactically driven symbol-processing machine-like organ which generated meaning and intelligent solutions to problems by manipulating symbols. In the strong version of the artificial intelligence (AI) hypothesis,
the machine could be claimed to have intelligence. In a weaker interpretation, the machine would only be said to simulate intelligent human behaviour. Subsequent connectionist modelling of human cognition was based on the idea of cognition as happening in neural networks whose distributed and parallel processing activity was assumed to operate not on symbols but on sub-symbolic representations. Several recent neural MT and AI solutions have suggested architectures that seek to embed the translator in an interactive computational, technological environment in which the computer will engage translators when necessary and learn from them, making user and machine operate like a single agent. In a different architecture, the interactivity between translators and the machine operates as a cognitive extension of the translators’ cognitive powers. Cloud- and crowd-based solutions across distributed tasks and platforms have also been implemented. All such recent solutions provide strong interactive cognitive support to translators, but none of them makes a claim to imitate human cognitive processes.

In Chapter 29, Christian M. I. M. Matthiessen first presents a grand outline of what makes systemic functional linguistics systemic. Then he defines SFL’s conceptualization of translation and multilingual text production as a semiotic “4th order” phenomenon foregrounding meaning, not as a cognitive phenomenon foregrounding knowledge. The two perspectives are complementary, but there are many advantages, says Matthiessen, to viewing translation as a semiotic (primarily linguistic) phenomenon construed as recreation of meaning in context. Together, the two perspectives ideally provide a more holistic view of translation. A semiotic system is an immaterial social system with meaning embedded in it. A system like language both carries (“embeds”) and creates meaning, and it is embodied in semiotic beings, e.g. in “multilingual meaners” like translators. SFL construes language as organized in a multidimensional network of relations in which phenomena get their meaning from the many global and local relations they enter into. As translators recreate meaning, they constantly make choices in different modes of meaning (ideational, interpersonal and textual). Particular interest is devoted to choices leading to “shifts”, instances of “grammatical metaphor” leading to different levels of (un)packing of meaning. Being a semiotic process and a metalinguistic phenomenon operating on existing texts in context, like summarizing, being also “enacted socially (in groups), embodied biologically (in organisms) and ultimately manifested physically”, translation should not be construed and enacted as a distinct discipline, leading potentially to fragmentation of knowledge. SFL is offered as an overarching framework for (Cognitive) Translation Studies.

Chapter 30 is the editors’ envoi, in which they reflect on where CTS is headed. The authors look at the four foundational chapters in Part I in relation to the four concluding chapters in Part IV, suggesting the likelihood of a unified framework for CTS that is epistemologically, ontologically, theoretically and methodologically grounded. The chapter ends with some tentative considerations about how the intricacies concerning translation and cognition are situated in relation to interpreting and cognition. In view of the forthcoming publication of a Routledge Handbook of Interpreting and Cognition, they suggest that further reflections on the nature of translation and interpreting with respect to cognition may give rise to an overarching framework for cognitive translation and interpreting studies (CTIS).

Note
1 https://vimeo.com/354654462

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