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A Study of Effort Models: Theory, Development and Challenge

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Abstract

Interpretation has a profound artistic background, and all interpreters regards their translation as a work of art. The Effort Models (EMs) was proposed by Daniel Gile, an excellent professor regarding interpretation. The model is able to reasonably allocate the energy consumed in each part of the interpretation, and can also help interpreters find their own shortcomings and adjust and then correct them. This paper provides an overview of EMs in interpreting, including their history, and significance in the interpreting process. Then it delves into the development of effort models during the past 40 years. It also discusses the challenges that EMs face in the current era of fast-paced technological advancements, particularly in the field of artificial intelligence (AI). This study concludes that EMs have been useful in the past and facing significant challenges in the current era of AI. With the use of AI, it affects energy allocation in interpreting and the contents of EMs has also been improved.

Keywords

Effort Models; development and challenge; energy allocation.

1. Introduction

In the 1960s and 1970s, the study of interpretation entered the stage of experimental psychology because a large number of psycho-linguists used the experimental paradigm to probe the interpreting process. The first “International Seminar on Interpreting” held at the University of Trieste in Italy in 1986 marked an empirical turn in interpreting studies. Since then, interdisciplinary studies on cognitive operations and processing mechanisms in interpreting have flourished, the number of interpreting researchers has been expanding, and valuable interpreting research results have been published. The theoretical research of cognitive process of interpreting focuses on process modeling and cognitive control modeling of interpreting. The consensus in the field of interpreting is that interpreting is a complex cognitive process.

By introducing cognitive psychology and psycholinguistics into the study of interpretation, the theory-Effort Models (EMs) was then proposed by Daniel Gile in 1995. Those are very useful models that pay attention to interpreter’s processing capability and energy allocation for each part during interpretation. Gile thinks that interpretation requires special brain “energy”, and the supply of such mental resources is limited. At the same time, the process of interpreting consumes almost all the energy, sometimes in short supply, in which case the performance of interpreting will be greatly reduced. The process of interpretation production that based on the understanding of meaning in source language needs a huge amount of energy and the same is true in comprehension of sound. The energy of interpreter is conserved, that is to say, if the language production consumes attention overmuch, the listening comprehension would definitely miss some key information.

To help interpreters get all processing energy utilized, Gile concluded the courses in SI: Listening and analysis Effort(L)[1], Short-term Memory(M), Production Effort(P) and Coordination Effort(C),

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namely:SI=L+M+P+C

The overall ability of SI is demanding and different efforts can be cooperated with each other to save interpreter's energy. Considering the immediacy in conference interpreting, errors within cannot be prevented completely. However, once the four efforts make the most of themselves, the errors in translation can be avoided to the extreme extent. The management of energy is of great importance in the process of interpreting, and it has been proved that practicing repeatedly is a useful way to make some processing capability become the "reflexes", which means that some sentences and words will be produced spontaneously into the target language. In this way the effort-loads are decreased and the interpreters feel less anxious in the meeting[2].

For the Effort Models of simultaneous interpreting (SI), featuring SI=L+M+P+C, the "L" refers the perception and understanding of voice, source text information. Listening practice is necessary in the whole process, understanding of the source text is the basis of interpretation. "M" stands for the short-term memory, and the more information preserved in brain, the more smoothly materials produced later. The process of production can be the most energy consuming part that requires the interpreter to speak in target language while listening to the source language, namely "P". Production load for the interpreter is heavy, and at that time, the listening comprehension and short-term memory before them will offer a lot to help relieve the pressure. As noted above, three Efforts should be well balanced in operations, which introduces the fourth Effort: "Coordination"-abbreviated as "C". The balanced capability in every part is the requirement of a mature and experienced interpreter. For the control of time need hundreds of operations in conferences and then the experience is accumulated[3]. Though the four parts of Effort Model, confusions and difficulties in the SI of conference interpreting are readily solved. When processing the source language, the total capacity requirements (TR) are consist of the capacity requirement for listening (LR), the capacity requirement for memory (MR), the capacity requirement for production (MR) and the capacity requirement for coordination (CR). The formula is TR=LR+MR+PR+CR. To accomplish the SI in conferences successfully, the following demand for SI should be met:

TR ≤ TA (Total Ability)

LR ≤ LA (Listening Ability)

MR ≤ MA (Memory Ability)

PR ≤ PA(Production Ability)

CR ≤ CA(Coordination Ability)

Once one of the components above beyond the interpreter's ability, mistakes in the process ensue. Allocating each component reasonably can increase the efficiency and decrease the pressure loaded on the interpreter. In addition, the capacity of every part does not be distributed evenly in different situations. For example, in a C-E interpreting, a Chinese native speaker will not spend much energy in understanding the source language (LR), but pays much attention on the production of English (PR). In short, the allocation of energy capacity depends on different situations of interpreters.

For the Effort Models of consecutive interpreting (CI), consisting of:

Phase One: Interpretation=L+N+M+C;

Phase Two: Interpretation=Rem+Read+P.

For consecutive interpretation to proceed smoothly, the following conditions must be met:

LR+NR+MR< TA

LR< LA

NR< NA

MR< MA

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CR< CA

In simple terms, total processing requirements must not exceed the total available capacity

2. Development of Effort Models

Stage1:

The very first version of the Effort Models for simultaneous interpreting had three "core" components: the Listening Effort, the Memory Effort and the Production Effort: Simultaneous interpreting: L + M + P

All three were non-automatic operations. Gile speculated that interpreting can proceed smoothly as long as enough processing capacity is available to cover the sum of the needs of the individual Efforts—and that at any time, each Effort has enough processing capacity available to complete the task in which it is engaged (listening, production or short-term information storage or retrieval from memory).

Stage 2:

Years later, besides the three "core" components, a fourth Effort, the Coordination Effort were included into the EMs. It in charge of distributing capacity between the three core Efforts.

Simultaneous interpreting: L + M + P + C

This Effort too was easy to understand for students: when studying consecutive, they were instructed to direct more attention to listening and less to note production, but also to take notes in a particular way to allow this; when studying simultaneous, they were told when to increase and when to decrease their lag behind speakers. Thus, they were aware of the importance of attention management.

Stage 3:

Then, when considering signed language interpreting, the listening component L was renamed R, to include reception of a signed source speech.

Simultaneous interpreting: R + M + P + C

Stage 4:

Moreover, for simultaneous interpreting from a spoken language into a signed language, on the basis of input from signed language interpreting colleagues—in particular, Sophie Pointurier-Pournin—, two further components were added:

Simultaneous interpreting from spoken to signed languages: R + M + P + SMS + ID + C[4]

SMS refers to self-management in space: signed language interpreters often need to manage their physical positioning so as to see speakers and often a screen and at the same time be seen by Deaf users of their services, which can require significant attention. ID refers to Interaction with the Deaf: Deaf users often sign to each other while the interpreter is signing for them. Sometimes they sign back to the interpreter, indicating for instance that they wish the speaker or interpreter to clarify something. Signed language interpreters therefore need to pay attention to signing from the Deaf audience while interpreting[5].

Stage 5:

The Reception Effort includes the auditive and visual perception and processing of the incoming speech and associated stimuli, including gestures and facial movements, but also various visual aids such as script and/or images projected on a screen or shown on a whiteboard etc., from perception to the elaboration of a mental representation of the intended meaning of the speech. In simultaneous with text, when the speaker is reading out of a text which the interpreter has before him/her, the reception component includes both listening to the source speech as it is spoken and reading the text provided. In such a case, it makes sense to use a different model, namely:

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Simultaneous interpreting with text: L + R + M + P + C (L: Listening; R: Reading)

Stage 6:

However, as technology progresses and if augmented reality environments gradually get introduced into the booth, simultaneous interpreters might have to juggle between screens offering them different views and perhaps online subtitling or trans-lexicographical and terminological tools, which could require significant attention. When considering such settings, the addition of a Human-Machine Interaction (HMI) Effort becomes desirable. It is also relevant in remote interpreting, as interpreters working remotely often have to use several devices simultaneously.

Simultaneous interpreting: L+ M + P + HMI + C

3. Effort Models in the Era of AI

Artificial intelligence first appeared during the 1950s to the 1960s. The term "artificial intelligence" was initially put forward at the Dartmouth Academic Conference in 1956 [6]. During this period, the reasoning and searching capability of computer made great progress to the extent that it could solve problems based on clear rules. But for real life problems, computer was of little help. Therefore, in the 1970s, the development of artificial intelligence entered a period of stagnation. In the 1980s, the embedment of "knowledge" into artificial intelligence ushered a second flourishing period. Through inputting huge amounts of data, the machine can quickly retrieve relevant knowledge to solve a specific problem. In the 1990s, since the emergence of web pages, machine learning technology has advanced rapidly, leading to a third boom of artificial intelligence. Neural network optimizes the function of machine learning by imitating human brain in processing and memorizing information. It possesses the advantage in self-learning and self-adaptation. At present, deep learning technology is widely applied in image processing, face recognition, speech recognition and other fields.

Interpretation is a high-intensity labor, and technical means can greatly reduce the workload of interpreters and improve the translation quality. Translation technology provides interpreters with different forms and levels of assistance before, during and after the interpretation, such as acquiring knowledge in professional domain, capturing semantic information, extracting knowledge about technical terminology, clarifying the logical relationship in the source text, and managing interpretation language assets, etc. Interpreters who are proficient in using translation tools generally have better job performance than those who are not. The capability to use translation technology and tools to solve problems has now become the essential quality of interpreters.

In AI speech translation, traditional modules include automatic speech recognition (ASR, which converts the acoustic signal of the source language into text), machine translation (MT, which converts the source language text into target language text) and text-to-speech (TTS, which converts the target language text into target language speech) [7].

Technology often imperceptibly restricts or regulates social development with relatively independent variables and logic, and translation technology is no exception. Information technology has changed the way interpreters prepare for the work [8]. They adopt professional tools to quickly access relevant materials, and use remote equipment to assist the interpretation, so as to handle complex and sophisticated interpreting tasks. Translation technology has rapidly penetrated into all aspects of interpreting and exerts a great impact on interpreting activities. The digitalization and automation of technology is creating new working modes [9]. Machine interpret action has opened up brand-new work modes and application scenarios, expanding into areas that cannot be covered by traditional interpretation services.

Driven by technology, interpretation has shifted from a traditional single human mode to a human-machine collaboration mode.The latest Effort Model for simultaneous interpreting: L+

M + P + HMI + C is not completely quite match to it. Using interactive machine translation technology, the speaker's speech is recognized and displayed in text form on the screen synchronously, and the interpreter's work mode is switched from "simultaneous interpretation" to "post-listening interpretation+ sight translation" [10]. The receive mode of interpretation changes from a simple earphone channel to the synchronization of voice and text, and to the multi-modal form of multilingual translation. Multi-modal interpretation tools such as translation pens, portable interpretation gadgets and mobile apps have led to enormous changes in user groups, consumer markets and service patterns. Using the Video Remote Interpretation (VRI) system, interpreters can transcend the space-time limitation to provide consecutive or simultaneous interpretation service. So in the era of AI, more effort or energy will be put into how to select, process, coordinate and edit the machine translation.

4. Conclusion

The Effort Models are almost 40 years old, and arguably, their enduring popularity is due to a large extent not only to their explanatory power in the interpreting classroom and beyond, but also to their simplicity. Can they be improved and still retain it? The recent addition of components for simultaneous interpreting from a spoken language into a signed language seems to suggest they can. Similar improvements could be made when looking more closely at further interpreting environments and working conditions.

Translation and interpreting practice has changed tremendously over recent decades. The changes have been brought about by a combination of technological innovation and societal change, especially increased mobility and demand for translation and interpreting in a globalized world. The rise of ICT-supported interpreting goes hand in hand with the idea of interpreters being available "at the push of a button" and with an undue simplification of the complexity of interpreting. The introduction of ICT-supported interpreting has thus sparked debate and has raised questions of feasibility and working conditions, but it has also been linked to the efficiency of service provision and the sustainability of the interpreting profession.

An EM with a Human-Machine Interaction Effort was mentioned earlier against the background of technological advances and remote simultaneous interpreting. In public-service interpreting, roles are not as clearly defined as they tend to be in conference interpreting and interpreters often need to devote much attention to the evolving social and psychological situation during interpretation-mediated encounters so as to determine the best course of action at each moment. In such settings, adding a Human and Social Consideration Effort (HSC) could be useful as well.

In other words, the Effort Models are essentially a tool which should evolve and adapt to the needs and environments where it is used.

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