Forty years of Effort Models of Interpreting: looking back, looking ahead

Daniel Gile

Keynote lecture for the *Japan Translation and Interpretation Forum 2020*
Organized by JACI – Japan Association of Conference Interpreters
Delivered remotely on August 4, 2020

After the introduction by the host, Dr. Morita

Thank you, Doctor Morita

Dear Colleagues

I should like to thank the Japanese Association of Conference Interpreters for giving me the opportunity to talk to you today. It is a great honor indeed.

…Then a few words in Japanese to apologize for giving the talk in English, not in Japanese…

President Sekine suggested that I speak about the Effort Models, how I view them now, and how they could be applied to practice. He added that many of you are non-academic practitioners of interpreting.

I am happy to oblige, though clearly, the Effort Models are not the only theoretical construct that deserves attention from practitioners.

Encountering Interpretive Theory

Let me start with some prehistory.

I had been a technical translator and occasional liaison interpreter for close to ten years when I first encountered theory in translation and in interpreting. This happened while I was a Conference Interpreting student at **ESIT** in Paris, during the second half of the 1970s. This sounds almost like 江戸時代. As many of you may know, ESIT is the temple of **Interpretive Theory**, initially known as "**Theory of Sense"**.

Basically, what this paradigm says is that when translating or interpreting, rather than seeking linguistic equivalents to words and structures in the source language, **translators and interpreters first read the relevant section of the source text or listen to the relevant source speech segment and construct a mental representation of its 'sense'. t**hen they ***forget*** **the linguistic structure of the source text or speech, and reformulate its "sense" on the basis of its 'deverbalized' mental representation**.

I found this theory attractive, because it justified some freedom from the linguistic form of the source text and told us students not to worry about whether a sentence in the target text is linguistically similar to the sentence in the source text. We only needed to make sure it meant the same thing.

The theory did not ban terminological equivalents, but basically, as regards everyday words and sentence structures, it said "don't worry about similarity of form, just take care of the sense of the sentence, and the words will take care of themselves", as Danica Seleskovitch used to say.

Intuitively, this made sense, and it certainly provided us with a welcome type of guidance, which helped avoid language interference.

At this point, let me tell you about a French colleague, an experienced translator who worked from Japanese into French. She was self-trained and had never been exposed to Interpretive Theory, or to any other translation or interpreting theory for that matter.

She told me once that one thing she found difficult when translating Japanese texts into French was that she was forced to change completely the structure of the Japanese original in order to come up with an acceptable French translation.

I am sure she also had to introduce some minor changes in the information content, like removing some politeness or formality markers that were only relevant in Japanese, adding singular vs. plural indications, adding explicit logical links etc.

The point is that she was uneasy about that, probably because she wondered whether she was 'faithful' enough 'to the Japanese text'.

In other words, what she did was right – at least, this is how I see it – but she was uncomfortable about it, because she did not know whether it was right or not.

I speculate that had she been exposed to Interpretive Theory, she might have felt more comfortable with her decisions. She might even have been able to work faster, more efficiently, and perhaps more creatively, thanks to Interpretive Theory.

This is one example of how a simple theory *might* be useful to practitioners

Challenges around Interpretive Theory

As I said, I found Interpretive Theory attractive. However, I also had some issues with it because, besides its core principle which I just explained, it made some problematic claims.

One such claim was that between the moment the source language text or speech is understood and the time it is reformulated in the target language, there is an intermediate stage during which translators and interpreters *keep no memory of the linguistic form* of the source text.

This was a heavy claim. Introspection by anyone shows that generally, some memory of linguistic form does remain in the listener's mind. I have to say that meanwhile, proponents of Interpretive Theory have toned down this claim, which bothered me and others in the 1970s and 1980s.

Interpretive Theory also claimed that the difficulty of interpreting is the same whatever language pairs are involved. This contradicted claims made by experienced interpreters whose qualifications were not challenged by anyone.

In the Interpretive Theory package, you also find the claim that language production into one's A language is *spontaneous*, with no difficulties. This again contradicts anybody's daily experience in life in general, and in the booth in particular. So does the claim that while ambiguity is ever-present in language as such, it is absent in discourse, thanks to the context.

I can understand the reasons why proponents of Interpretive Theory would make these claims, but formulating them as part of an academic theory without the caution that is fundamental in science was problematic and jeopardized the credibility of the theory as a whole.

Now if speaking in one's A language is supposed to be effortless, when students encounter difficulties in finding a word or in finding a grammatically correct ending to a sentence, something which happens frequently for a number of reasons, this can make them lose self-confidence. I have seen this happen in the classroom, very regularly.

The Effort Models: first steps

This is what I reacted to, perhaps because I had background in mathematics (where proofs are a very demanding component of the discipline) and research (where critical reading and thinking are essential) and had a rather critical mind.

When I started teaching translation and interpreting, in 1979, I thought I should try to contribute by at least avoiding inaccuracies and excessive claims, but also by adding some elements which I thought would be useful to students.

I did not reject the *core principle* of Interpretive Theory, which I thought of – and still think of – as correct and useful, but besides the problematic claims that I just mentioned, the theory failed to provide good answers to some very unsettling questions, especially for students.

One phenomenon that I found quite striking and which Interpretive Theory did not address was the ever-present **effortfulness** of interpreting, in particular simultaneous interpreting. Not that proponents of Interpretive Theory were not aware of it, but they chose not to integrate it into their theoretical construct.

Students, including myself, found it effortful to produce their target language speeches even in their A language, as painfully experienced through many hesitations, infelicities and even language errors which they usually did not make in everyday life.

They also missed some information in source speeches quite often, including many cases where, when trainers or other students pointed out what was missed, these words or clauses turned out not to present particular comprehension difficulties.

Students could not understand why they missed them. This was very unsettling. Most of us started doubting that we really mastered our working languages, or even wondered whether we were suffering from massive personal brain-drain.

I came up intuitively with a potential explanation based on my constant feeling of effortfulness during interpreting:

Could it be that speech production and speech comprehension actually require some kind of 'mental energy', and that failure for them to function properly was a result of lack of such 'energy'? This might be due to competition between speech comprehension and speech production if both require this energy?

This would mean that failure to produce speech or understand speech in the interpreting context is not necessarily linked to lack of 'knowledge' of the relevant languages, but to another factor which could perhaps be dealt with separately.

I started exploring the scientific literature to see what experts had to say about language production and comprehension and found very interesting theories.

But before we go into that, let me just complete the presentation of my first Effort Model for simultaneous interpreting, developed in the very early 1980s:

Besides listening and speaking, interpreting involves memory operations over a short period of up to a few seconds. This is known to all and quite natural, because generally, you need to understand before you reformulate, and re-expressing ideas in the target language requires some time, as you have to construct new sentences.

But what students experienced in the classroom with respect to these short-term memory operations is that often they understood something the speaker said, and forgot it before they could reformulate it in a target language sentence. This was also rather mysterious – and unsettling). Why should one forget things that one heard and understood just a few seconds ago?

Again, I thought of a possible answer: perhaps short-term memory operations used the same 'mental energy' as speech comprehension and speech production?

I combined these three *functional* efforts into a model, whereby speech comprehension of the source speech, speech production of the target speech, and memory operations over a short term used a limited 'mental energy' resource, and many errors and omissions in interpreting could be due

to either **excessive energy requirements** or **mismanagement** of this energy (I soon decided to call this 'energy' 'processing capacity', and now like to use the term 'attentional resources').

By 'mismanagement', I meant too much focusing on one function, namely comprehension, production or memory, to the detriment of another function. This could happen at any time. Actually, I felt that it happened all the time, in other words, that interpreters tended to work close to cognitive saturation, close enough to be vulnerable to problem triggers and to the effects of attentional resource mismanagement. This is what I called the **Tightrope Hypothesis**.

Since interpreters work close to saturation, they have to juggle with their attentional resources so that enough attention is available for each Effort when it is required (depending on the particular task they are engaged in at any time) without taking away what is necessary at the same time for another task

Let me also add that when I refer to **cognitive saturation**, I mean *two distinct cases*:

One is when **attentional resources are actually insufficient** to successfully complete the interpreting process around a particular speech segment,

and another is **when the interpreter gives up on trying**, which may even happen when available resources could be sufficient for the task if s/he tried harder. Unfortunately, initially, I did not explain explicitly that I included both cases when referring to "cognitive saturation", and some misunderstandings in the literature are attributable to my failure to do so.

Input from cognitive psychology

As I started to explore the scientific literature, I found out that psychologists had come up quite some time before I did with the idea that many mental operations – actually not only mental operations – required some 'processing capacity' or 'attentional resources', that it was limited at any time, and that when two such operations were conducted at the same time, this led to a deterioration in the performance of one or another (or both) if at least one of them was made more difficult.

Also, that psycholinguists considered that language production, even in one's native language, was actually a complex cognitive operation, not at all "spontaneous" and "effortless". This was a welcome corroboration of my intuitions.

I also learned from cognitive psychology that when attention needs to be divided between two or more concurrent operations, this involves additional cost in processing capacity. This also made sense intuitively, and I added the so-called Coordination component to what I called the Effort Models, because they revolved around the effortfulness of interpreting.

So I ended up having a model of simultaneous interpreting which was composed of 3 core Efforts, plus a so-called Coordination Effort

SI: LA + M + P + C. (Listening and Analysis, Short-term memory, Speech Production, Coordination)

Each of them requires some processing capacity, and when two or three of the core efforts operate at the same time, the total processing capacity requirements are more than the individual requirements for each of them.

I soon developed models for consecutive interpreting, sight translation and simultaneous interpreting with text on the basis of the same rationale.

One other thing that I found out from cognitive psychology is that when repeated often, operations that require processing capacity tend to require less and less processing capacity. This is called **automation**, and of course does not mean that translation itself becomes automatic.

This was a very interesting finding, one that could generate hope in students: if at least some substantial parts of the Efforts were automated over time and practice, both individual attentional requirements and total attentional requirements could be expected to decrease, which meant in turn that there were less chances of saturation of the available processing capacity, and students could expect to make less and less errors, omissions and infelicities, in other words to improve their interpreting performance. The condition was that they practice a lot.

What the Effort Models explained

I found that the Effort Model of Simultaneous Interpreting explained quite a number of errors, omissions and infelicities as well as other phenomena, such as the fact that sometimes interpreters translated correctly one difficult speech segment, and then missed a much easier segment that came shortly afterwards.

The Model also explained why certain speech items such as names, numbers and enumerations (that is, lists of items) tended to trigger interpreting problems (they are the so-called 'problem triggers').

The Effort Model for consecutive also provided a conceptual framework to think about various pieces of advice that were given about note-taking in consecutive, including what to note, how to note, in what languages etc. In particular, it suggests that **systematically taking notes in the target language is not necessarily a good idea**, because this adds processing capacity requirements at a time where the interpreter is already under heavy pressure because s/he has to listen and take notes at the same time at a speaker-paced rhythm. This does not mean that taking notes in the target language should be banned. It can be a good option in some cases. But making it a fundamental principle is hazardous.

I will not go into that and into other implications of this initial model now, and will refer you to the book *Basic Concepts and Models for Interpreter and Translator Training* (2009, the revised version) in which you will find more explanations. There is also a Japanese version of the book.

The Gravitational Model of Language Availability

The automation principle also widened the horizons that could be reached using the Effort Models, and generated further ideas.

One model associated with the Effort Models, in which the idea of automation is very important, is the so-called Gravitational Model of Language Availability.

This theory or model postulates inter alia that when words, collocations and sentence structures are encountered repeatedly in either 'active' form (when they are used for speech production), or 'passive' form, when a speaker produces them and you have to identify and understand them, their production or comprehension becomes increasingly automated (it requires less time and less attentional resources), which results in lower processing capacity requirements for the whole interpreting process and good chances of improved interpreting performance.

Conversely, when these words, collocations and structures are not used, they become less available, and their use for interpreting gradually requires more and more processing capacity and time, which can result in poorer interpreting performance.

The model is also associated with other rules, as explained in *Basic Concepts and Models*.

Reactions from literature and students

The Effort Models became popular in the literature. I did not expect this, as I had essentially developed them for myself and for students, but of course, I was happy to see their popularity.

I was even happier when students started telling me that the Effort Models helped them be less upset by their failure to perform well in class, that they reassured them, that they gave them hope for future improvement in spite of current difficulties. All these reactions amounted to the same thing: the Effort Models seemed to often boost the students' morale at a time where it was under heavy strain.

As the Effort Models gained popularity in the literature, they also started to draw the attention of some cognitive psychologists and psycholinguists. What I found is that cognitive scientists often sought to interpret them using the language of cognitive science as if they were cognitive models in the traditional sense of cognitive science. This is natural, but it also led to some misunderstandings. Let me explain why.

The underlying philosophy of the Effort Models: a metaphor

Let us take a metaphor, in other words a comparison between the way the Effort Models represent the interpreting process and something else, in this case a process that can be found in business life:

Imagine a data processing service company which takes on complex projects to be developed and completed under time pressure at their clients' site, and dispatches its employees to this site.

Imagine a case where such a project requires the participation and collaboration of several experts or many experts who work simultaneously on their computers at the client's site.

If we observe the overall advancement of such a project (which, in this metaphor, corresponds to interpreting), we may find that at times, there is considerable slowing down of the development work, or even failure to complete this or that task satisfactorily.

A production engineer who wishes to understand what is going on and perhaps give some advice to the service company to improve its service performance may consider, for the sake of convenience, that the experts work in teams, each having a particular function (in the Effort Models, I called these functions "Listening", "Memory" and "Production").

In a project involved in data processing, the experts dispatched to the client's site may indeed form teams dedicated to specific functions, but they may also be organized differently.

At any time, the advancement of the work of one team depends on where the other teams stand in *their* work. In simultaneous interpreting, at any time, the ability to listen and analyze the source speech, to assign content to short-term memory or retrieve it from short-term memory or to reformulate it depends on the state of progress of the task the other Efforts are involved in. For instance, you generally cannot reformulate something that is still stored in short-term memory or hasn't been understood yet.

In the project metaphor, I speculated that if the development work slowed down or failed to complete this or that part of the project, in many cases, this was due not to the lack of professional competence of the experts, though this might happen at times, but mostly to insufficient availability of some resource which was only available in a certain amount and was shared by all employees who worked on the computers. At times, when teams work on tasks with high requirements, there is not enough of this resource to complete them, and at other times, the total amount of available resources is enough, but somehow, not enough is available for a particular team at a particular time, perhaps because the sharing of this resource was not very efficient.

I then learned something about how computers were linked on computer networks, and thought that this particular resource could be the available internet or intranet bandwidth, which had to be shared by all. But it could also be available money, cars for transportation, access to some remote site or computer program, tools etc. In the Effort Models, this shared resource is processing capacity (attentional resources).

I also learned a bit more about the management of projects in industrial environments and learned that there are project managers who monitor the teams' work and coordinate the progression. So the metaphor still works, because these project managers can be compared to what I called the Coordination Effort in the Effort Models.

I did not look at the electronics of the intranet/internet networks, or at the specific computer programs that members of each team used to work on the project.

In the Effort Models, I did not speculate on the specific interactions of various parts of the brain or on how the various cognitive operations could be explained in a fine-grained way using the most up-to-date theories and findings of cognitive psychology and neuropsychology. I do try to keep abreast of major developments in theoretical and empirical research by cognitive scientists, and check that my models are still compatible with current thought in cognitive science, but my level of modeling is **functional** and **holistic**, not fine-grained in the way cognitive scientists work.

Working Memory and Executive Functions

Cognitive scientists tend to first look at holistic phenomena, "at the surface", and then try to see what could account for them best at a very fine level of analysis, which includes theories about interactions between very small cognitive units, which need not be actual physical entities such as parts of the brain. What counts is that in the abstract cognitive architectural constructions that scientists develop, the operations of the various units and their interactions produce results that they can measure and which are compatible with what they know about actual behavior. They try out many potential 'architectures', and define small operating units which do not necessarily correspond to actual behavioral phenomena.

When they test them, they generally use tasks in the laboratory and measure success/failure rates and reaction times, meaning that when they investigate interpreting, generally, they do not measure actual interpreting behavior, as such behavior cannot be easily qualified as right/wrong or measured with an accuracy of fractions of a second.

I am not criticizing this approach, which I believe has merits and has taught us a lot, mostly indirectly – but the approach which underlies the Effort Models is different: I started out with a description of natural behavioral phenomena, and remained in my speculations and analysis at a holistic level.

Some cognitive scientists, on the neuropsychological side, conduct investigations of physiological phenomena in various parts of the brain. Most of their work is bottom-up work.

This is also different from the Effort Models. The approach I adopted when developing the Effort Models was a top-down approach and a functional one, not an architectural one nor an anatomic or physiological one. I looked at overall phenomena that occur in real life, and tried to account for them starting with **functions** that could be easily be understood by students and practitioners on the basis of their daily experience.

I used finer level analyses and theories **only to the extent to which this was necessary** to account globally for holistic phenomena. I made virtually no assumptions about the underlying cognitive architecture. Inter alia, I did not initially postulate the existence of working memory, though, when I discovered its existence in cognitive psychology, I assumed that it played a role in listening, in production, and obviously in short term memory functions.

But the short-term memory function in the Effort Models is not the same as Working Memory, and I do not make any assumptions about the cognitive architecture of Working Memory.

Similarly, when speaking about coordination as a function, I only assumed that it managed processing capacity, but made no assumptions about how it functioned, what parts of the brain were involved, etc.

The approaches are very different, and mixing them is hazardous, despite some superficial similarities that can be considered striking.

Think of the concept of 'menu' in a restaurant and in a computer program. In both cases, the term refers to some choices that a user can make and which will have some consequences, but the menu in a restaurant depends on the availability of various types of food, various types of cooking and cooking expertise, whereas the menu in a computer program is just a human-machine interface that allows a user to direct the program to a certain set of instructions which are performed using electronic cells. One should not mix the two.

`The Effort Models and empirical testing

The Effort Models **can** be tested and are being tested at holistic level, not at fine-grained level, simply because they are holistic by nature.

Actually, as long as they are compatible with current knowledge and theories in cognitive psychology, and I am referring to the effortfulness of the core Efforts, to the idea that Attentional Resources (processing capacity) are finite, that concurrent effortful operations compete over such resources, that automation occurs with repetition, that Attentional Resources can be deliberately directed to one set of cognitive operations or another to a significant extent, the only part of the Effort Models construct which requires testing as a theory is the Tightrope Hypothesis, namely the idea that interpreters tend to work close to cognitive saturation, and that this is a good explanation for many errors, omissions and infelicities in their performance.

I am happy to say that so far, to my knowledge, holistic research which tested it either corroborated it, or did not turn up evidence that refuted it. Some references of reports on such tests can be found in a PowerPoint presentation that I posted online on the website www.cirinandgile.com

I have to mention one experiment by Kilian Seeber from the University of Geneva, who looked at cognitive load during interpreting by measuring the diameter of the interpreters' pupils, which is a well-known physiological indicator of cognitive load. Most of the time, in the short extracts that his subjects interpreted, their pupils were dilated by less than 50% of their maximum value. On this basis, Seeber says that he found no evidence supporting the Tightrope Hypothesis.

For several reasons which I will not explain here, this rationale is weak and does not really refute the Tightrope Hypothesis, which makes no quantitative claims as to how close to saturation interpreters tend to work, only that they work closely enough to saturation to be very vulnerable.

Be it as it may, at this time, I have not seen an equally powerful, let alone a more powerful explanation than the Tightrope Hypothesis to the numerous errors, omissions and infelicities observed in interpreting performance.

An Effort Model for Simultaneous into Sign Languages

I also developed, with my PhD student Sophie (Pointurier) Pournin, an Effort Model for simultaneous interpreting from a spoken language into a sign language. In this version, two components were added, namely 'Online Interaction with the Deaf' and 'Self-Management in Space':

SI into a sign language: R + M + P + OID + SMS + C

I am happy to report that this Model is popular among teachers of signed language interpreting. I do not think it teaches them anything they do not know, but I suppose they consider that it is a convenient tool to explain and discuss various phenomena and challenges.

How useful are the Effort Models for practitioners?

In an M.A. study conducted by Frauke Kleibs from Leipzig in 2018, she found that the Effort Models and Interpretive Theory were the most popular interpreting theories among students and teachers in a rather large sample which covered mostly Europe, but also other countries. In a more recent (not published yet) study that I conducted in 2019, I found similar results.

It seems that what students and teachers want is simple theories, that are directly related to what they experience in the classroom. Both Interpretive Theory and the Effort Models meet this criterion

Other theories, such as Relevance Theory, or Seeber's model, or Moser's model, or Setton's model, or Mizuno's model to cite just a few, are more detailed, more engaged in cognitive disciplines. But they are more complex, and require the acquisition of more abstract notions. Also, they are more remote from classroom experience.

Interpretive Theory provides simple, useful direct guidance on a very fundamental principle in translation and interpreting: for best results, translate on the basis of sense, not language correspondences. The Effort Models do not provide prescriptive guidance. What they do is offer a conceptual framework to explain challenges and to assess tactics and strategies to overcome them.

Neither directly provides *new information* about actual interpreting performance to students, teachers or practitioners. But then, no other interpreting theory does.

Neither offers *quantitative descriptions or predictions*. Neither do other interpreting theories, except for an attempt by Kilian Seeber who used a theory by Wickens, which is interesting, but not very convincing, and at this point, not indicative of what actually happens in the booth.

The usefulness of Interpreting Theories in general

So, are interpreting theories useful to practitioners beyond their use in the classroom? If they do not teach you anything directly useful that you do not know, if they cannot make accurate predictions as to what happens in the booth, what *can* they contribute?

Since President Sekine asked me to talk about the Effort Models, I will take the liberty of talking about them first:

The first potential contribution of the Effort Models that I should like to recall is that they help understand many challenges that we are confronted with, in a *simple, unitary* way, using the construct of limited processing capacity and its use at the same time by several mental operations.

The second contribution of the Effort Models is, as I also mentioned earlier, that they provide conceptual tools to assess the merits and drawbacks of tactics and strategies, and to analyze some received ideas that may not be so good after all as seen from the cognitive angle. This includes ideas on how to take notes in consecutive, or how to improve one's mastery of languages, or on directionality preferences.

Perhaps such analyses will produce some intellectual satisfaction, the pleasure of understanding. But is this *necessary*?

I would not claim it is, but I do think it **can** lead to some changes in ideas and practices, and *perhaps* to subsequent improvement of interpreting performance… Or not.

One other possible use of the Effort Models is **persuasion**. When discussing interpreting with people who believe that interpreting is only a natural spin-off of knowing two languages, especially clients who do not understand the importance of briefings, of providing documents in advance to the interpreters, of arranging for excellent sound etc.

The Effort Models are a convenient tool, or so I believe, to explain to them what cognitive efforts interpreting actually involves, and what difference good working conditions can make.

Of course, people, and in particular clients, may not want to listen to you. But if they do, rather than take them through complex cognitive-science based explanations, it is probably more efficient to explain the Effort Models.

Empirical research

While in the field of translation and interpreting, theories as such do not teach us new facts, empirical research does.

For instance, on the basis of your experience in the booth, you may want to find out if an interpreter's foreign accent influences overall quality perception by the delegates. You may have heard, or may believe, that such a foreign accent is damageable. This is definitely a question that could be useful to practitioners, because it could influence decisions on the recruitment of interpreters.

Andrew Cheung from the Polytechnic University of Hong Kong just published such an empirical study. He found that when listeners heard the same interpretation with a foreign accent and were led to believe that the interpreter was Chinese, they gave lower ratings on five quality criteria to the interpretation than when they believed the interpreter was a Westerner. Surprising and thought-provoking, isn't it? Is this something that is specific to the Chinese and to the Chinese-English combination? Is it even replicable? In other words, if the experiment were repeated with other people, would the results be the same? The only way to find out is to conduct replications.

Or you may have heard, or believe, that listeners are able to assess the fidelity of interpreters reliably – or the opposite, that they cannot. Empirical research can test this. And a number of empirical studies actually have.

Or you may wonder whether a particular type of exercise, for instance in converting large numbers as expressed in Japanese, with 万 and 億, which are known to be problem triggers in Japanese-English interpreting, can be efficient in helping interpreters cope with them.

Or whether students can be taught efficiently the principles of professional interpreting when their mastery of their second language is still not up to professional level.

All these, and many other questions, have been tested in empirical research.

Sometimes, results confirm well-established beliefs. Sometimes, they do not. Sometimes, they are contradictory. This may happen when studies are methodologically dissimilar. But when they are not, this can be an indication of high variability in the relevant phenomena, which can also be a useful answer, because it sets you free from certain dogmas, free to consider other factors and make your own decisions.

Empirical research and theory

You may legitimately object that you do not need theories to come up with these questions for empirical research. This is true.

Traditionally, empirical science is presented as starting with observation of a phenomenon, which then leads to speculation about what *causes* what has been observed, or about what lies "behind" what has been observed.

Such speculation, when fully articulated, leads to a theory. Then the theory is tested empirically by testing what it can predict. In other words, researchers go and see whether these predictions are in

line with what really happens. As long as this is the case, the theory is not challenged. When this is no longer the case, the theory is changed or discarded in favor of a better one.

The point is that it is theory that guides empirical research.

At least, this is the canonical view of science. But, as we saw in the case of interpreting, this need not always be the case. You can also see in medicine that some empirical research, for instance testing different posologies of a certain medical drug when fighting a particular medical conditions, is not necessarily based on theory. So why should anyone bother with theory?

To practitioners of interpreting who would ask this question, I have no direct, fully satisfactory answer. It is quite legitimate and useful to come up with research questions based on one's daily practice without having to go through any formal theory.

But when you are trained to do research, learning about relevant theory comes along with the package. And there is good reason for that: When you learn about theory, you generally learn about successive theories, how they were tested and what prompted researchers to leave one and develop another. In other words, the type of analytical and critical thinking that produces research is taught through theory. So for researchers, learning about theory is very important.

Looking ahead

As I think has become clear, the Effort Models are by design simple and holistic. These features may be major contributors to their popularity, which has persisted for close to 4 decades. Just as Interpretive Theory has been popular for about 5 decades.

During all this time, there have been substantial advances in cognitive science, and yet Interpretive Theory has remained virtually unchanged, and the Effort Models have only witnessed one major update, the new version for simultaneous interpreting into sign languages.

My guess is that Interpretive Theory will remain popular in training circles, and basically unchanged. As to the Effort Models, I believe they are also likely to remain popular and will see the emergence of new versions, if researchers and teachers identify new functions that are associated with major attentional resource requirements.

For instance, this could be the case if in the future, technology in the booth requires interpreters to devote substantial attention to interaction with additional screens and controls. This is already the case in remote interpreting in teams, when members of the team are not in the same location, as is the case for the interpretation of this talk. It could also be the case if augmented reality becomes prevalent.

In this case, perhaps a new component would be HMI – Human-Machine Interaction

$$\text{SI: R + M + P + HMI + C}$$

(Where R stands for Reception, which can be both auditive and visual)

Or, if under certain circumstances, perhaps in diplomatic interpreting, practitioners feel they have to constantly pay special attention to what they should say, what they should not say, what they should adapt culturally (provided their view of their professional role allows and prescribes this).

A new component, something like CCSC – Communication Context Social Considerations, could become relevant.

$$\text{SI: R + M + P + CCSC + C}$$

This might also apply to special community interpreting contexts, such as mental health care interpreting, when successful treatment depends on cooperation between health care providers and interpreters beyond the traditional role of interpreters as prescribed by professional codes of ethics.

In all these cases, the Effort Models would probably have the same strengths – and the same limitations.

Conclusion

To conclude: I would not claim that theory is *necessary* for interpreting students and for practitioners. I am not sure at all that at this time, theory allows practitioners to reach better performance. This may happen in the future, on the condition that much theory-related empirical research be conducted and deliver innovative and practice-oriented findings. But I think that theory as it stands, if selected adequately, can be useful for guidance and explanation at very little cost for students, trainers and practitioners.

Thank you for your attention.

Questions and answers:

Note by DG: The answers given online during the talk were not always clear enough or complete enough. This is an attempt to provide corrections, clearer wordings and additional elements. I have also taken the liberty of summing up the questions as I remember them, with apologies to their authors.

Question 1: Will the script used for this talk be made available to JACI members?

Answer: yes, here it is. But the PowerPoint per se will not be made available.

Question 2: Did you observe different attentional resource distribution between novices and interpreters?

Answer: Some differences are clear: for instance, when learning consecutive, beginning students tend to focus too much on note-writing and do not devote enough attention to listening. After a while, this changes, and they learn to listen more before noting. This can be observed when you actually see them taking notes (some empirical research has been done on that, with video cameras first, and now with electronic pens, which provide the possibility of making very accurate measurements – you can find references in the CIRIN Bulletin at www.cirinandgile.com). Some insights can also be gained through retrospection, i.e. when interpreters and student interpreters speak about their experience and explain what and how they made decisions and produced certain reformulations. Inter alia, there are very interesting reports on such studies by Ewa Gumul from Poland. Other differences which probably exist are more difficult to identify, because they are very subtle and have to do with instant decisions during interpreting depending on the unfolding of specific source speech segments and the corresponding target speech segments, and probably occur within fractions of a second. We have no way to actually measure them at this time, but assume that this is part of the acquisition of interpreting expertise over time and experience. Brain imaging techniques might help, but require highly controlled laboratory conditions and are thus somewhat remote from actual interpreting in the booth.

Question 3: Is the management of attentional resources conscious and deliberate, or is it subconscious?

Answer: Undoubtedly, part of this management is subconscious, but part is deliberate and conscious. In consecutive, for instance, you know very well that you can decide to shift your attention to note-taking, or stop note-taking to focus on listening, and in simultaneous, there are

cases where you deliberately focus more on listening or on production, depending on the task and on the difficulties that you perceive.

Question 4: What is the future of the Effort Models against the background of machine translation?

Answer: I think the future of the Effort Models is the same as my own future. At some point, they will disappear.

Also, the Effort Models were designed for human translation, not for machine translation, so they should not be applicable to machine translation, except if, on a provisional basis, designers of machine translation programs decide, in an artificial intelligence mindset, to simulate the operation of the human brain in their programs. But when they use big data statistical techniques and/or deep learning through neural networks, the Effort Models are probably irrelevant.

Question 5: Do the Effort Models differ depending on the language-pair involved?

Answer: Basically, the principles are the same whatever the languages. But depending on the source language, on the target language, and on the direction (Dutch to Japanese vs. Japanese to Dutch, for instance), the distribution of attention between Efforts at each time may differ. For instance, with some language pairs, you have to wait longer until you understand enough to start a meaningful sentence, so you use certain delaying tactics which have implications on how attentional resources are distributed.

Question 6: What are the implications of remote interpreting for the Effort Models? There are already additional Efforts involved. Multiple devices are used, you may need to type messages to your partner and to the technical staff while you interpret, to use more than one screen etc. If in standard simultaneous interpreting, interpreters already work close to saturation, are human beings capable of coping with this additional load?

Answer: I think empirical research may give us the beginnings of an answer. Relevant questions on the interpreters' side include "what part of the additional Efforts can be automated and to what extent?", and on the technological side "to what extent can technology be improved to make the man-machine interfacing easier?"

Question 7: What kind of practice is particularly useful do enhance automation of the relevant cognitive tasks?

Answer: As explained earlier, automation comes from repeated practice. Probably, the most *relevant* exercise for automation of all the skills that come in during interpreting is interpreting as such. The more you interpret, the more these skills are practiced and automated. But it would make sense, from a cognitive psychology viewpoint, to see whether these skills can be decomposed into components, and whether practicing with these components separately could be more efficient. This was contemplated by Barbara Moser from Geneva and by Sylvie Lambert from Canada, inter alia. As far as I know, there has been little empirical research on the question. It would be very interesting to know.

Question 8: Have you tried to control attentional resource distribution? How do you do that?

Answer: I am not sure I understand the question. If you mean whether I have ever tried to control it consciously, deliberately, though awareness followed by action, the answer is yes. It does happen to me to realize that I lag too far behind the speaker, or that I take too much time taking notes in

consecutive, etc., and I try to remedy the imbalance by taking proper action. Like of all of us, I believe. But can you really measure that? I think it is very difficult.

Question 9: Colleagues are already struggling with additional efforts, linked to technology on one hand, and to social contexts on the other. How will this affect further development of the Effort Models?

Answer: Indeed. This will depend on data, mostly introspective and retrospective data, because I believe that at this time, physiological measures do not offer us enough reliable and relevant data.

Question 10: I read a paper you wrote on directionality, and your opinion seemed to be inconclusive. Could you elaborate on that, with a special focus on interpreting with Japanese?

Answer: I think the colleague refers to the fact that when analyzing directionality issues, I did not say clearly whether I believe it is better to work into an A language or into a B language. Well, this would depend on many factors. For instance, on the interpreter's personal linguistic experience in this or that field, on this or that topic. For instance, I used to be a radio amateur, and as a radio amateur, I used mostly English. If I were to I interpret with English and French at a conference of radio amateurs, I would be much more at ease interpreting into English, even though English is only my B language. If you look at Japanese, there are also more objective factors, such as the order and time at which various types of information are indicated in a sentence. Also, in Japanese, when you express personal opinions, there are often predictable sentence endings such as attenuations of claims. This changes the density of information at different points in the sentence, and can have implications by making it easier or more difficult to work in one direction or another, mostly depending on how much information on average you need to keep in working memory before reformulating it in the other language. I have one colleague who has French, English plus Japanese as a C language, and he prefers to work into Japanese rather than from Japanese, perhaps both because his comprehension of Japanese is not quite as good as his comprehension of French and English and because Japanese is syntactically rather flexible, and thus allows him to dispose of incoming information readily without committing himself to a particular grammatical sentence structure before having all the information. I do not know whether this example is meaningful enough for you, but the question is rather complex, and I believe that the answer depends in each case both on the specific linguistic mastery characteristics of the interpreter and on objective linguistic factors, including syntactic and lexical factors in the relevant languages.

Question 11: Are the Effort Models applicable to all languages and language combinations, including combinations with an Indo-European language and an Asian language such as Japanese because of grammatical differences?

Answer: Yes, I think the principles are the same whatever the languages. And in that respect, I agree with Seleskovitch and other representative of the so-called "Paris School". The fundamental principles should apply whatever the languages. What can differ are the *local* implications of the high cognitive pressure, at every moment, at every second. Depending on whether a word was understood immediately or not, whether it gave you the possibility of building a mental representation of meaning immediately or not, depending on whether you find the right word or the right expression or not, depending on how much of the source speech sentence you have to keep in working memory before you can start reformulating it in the target language, on how long you have to keep the beginning of a sentence you utter in the target language in working memory until you can discard it and how much information will come in from the source speech during this time, depending on whether you work into a language which has many grammatical dependencies like Finnish, or Slavic languages, or into a language which does not have many such dependencies such

as Chinese, speech production, speech comprehension and average short-term memory operation will be more or less effortful. The question is not whether these are Indo-European languages or Asian languages, but what the features of each language are and how they affect local cognitive load at every moment. In all these cases, the Effort Models are basically applicable.

Question 12: Do you believe the Production Effort is larger or smaller depending on the language?

Answer: Yes, probably, to an extent which remains to be determined. It makes sense to consider that in a language which is somewhat rigid in its syntax and in a language with many grammatical dependencies, production is more effortful because on average, working memory will have to work harder, even if some tactics can alleviate the problem. It is also more effortful when working from a spoken language into a signed language because the lexicon of signed languages is far smaller than the lexicon of spoken languages, so you cannot rely on the existence of a single standard sign to express even simple ideas (or designate objects or actions etc.) that are expressed in one word in the spoken language. This forces signed language interpreters to be creative, and sometimes to think of a whole imaginary scene with various 'actors' or 'objects' which are first 'placed' in various places in what is called the 'signing space' (basically in front of the upper half of the body of the signer) and then qualified or described in their interaction. This can take quite a lot of effort and quite a lot of time at cognitive scale (i.e. up to a few seconds). Not being a signer myself, I am relaying this information on the basis of what I learned from my former doctoral student Sophie Pointurier. There may also be cases and circumstances when speech production is more effortful when the relevant language is very socio-culturally sensitive and you do not have all the necessary information to choose the right level of formality or politeness, whereas these aspects are not so problematic in other languages. But how frequently these problems occur and what is the magnitude of their effect remains to be investigated. Or when some information is required in the target language and not provided by the context and the target speech (for instance, on the distinction between the singular and the plural in Japanese and Chinese when working into English). But this is language-pair specific rather than language specific.

Question 13: Do you think that the Effort Models will become different along with the development of remote interpreting?

Answer: Yes, as Dr. Matsushita pointed out in her question, remote interpreting seems to be associated with significant Efforts that can be classified under Human-Machine-Interaction, so there should be changes very soon.

But I would like to stress that the Effort Models are just a very simple idea, one way of pooling together functional, behavioral aspects of interpreting linked to its effortful nature. Of course, I am very much aware that interpreting involves other factors, and in particular social and psychological aspects, but the focus of this particular construct has always been the cognitive aspect in terms of effortfulness, and the question is: "What behavioral component of interpreting do colleagues consider effortful enough to potentially require some of the attentional resources that are used for each of the core Efforts and the Coordination Effort?". So I think, depending on the answers and the evolution of technology, some new Efforts will become relevant, and perhaps others will disappear if machines end up being capable of taking over the tasks that they perform. I do not know whether this will ever be the case, but it cannot be ruled out.

Question 14: Is it necessary to study theory in master's classes in interpreting?

Answer: Setting aside formal academic requirements (which may make some theory mandatory), I do not think it is *necessary* to study theory in interpreting. Neither do I think it is necessary to *formally* study anything, not even interpreting as such. Some interpreters are 'naturals'. They are

‘born’ with certain skills and/or have acquired/developed them through different experiences and activities in life. To me, the real question is not so much whether it is necessary, but how much can be gained from theory considering how much it will cost (in time, efforts etc.). In the specific case of students whose aim is to become professional interpreters as opposed to academics, if you can choose some simple theories that will provide students with explanations to phenomena they experience or to answers and guidance they receive from trainers, if these theories can give them some reassurance when they face unsettling phenomena, and can thus help them find the motivation and courage to keep working towards success, then I think theory is worth teaching. But if theory classes take up 20 or 30 percent of the time, or perhaps even 10 percent of the time, if students are required to write papers and learn many complex concepts and terms, and if they do not gain much from it, then I would say “forget it”.