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Practical Challenges, Needs and Perspectives for Rwanda's Novice Simultaneous Interpreters:

A Case Study of Scientific Conferences

By

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Huye, 20 March, 2021

CERTIFICATION

The undersigned certify that they have read to their best satisfaction and hereby recommend to the University of Rwanda to accept this dissertation entitled "*Practical Challenges, Needs and Perspectives for Rwanda's Novice Simultaneous Interpreters: A Case Study of Scientific Conferences*" in partial fulfilment of the requirements for the Master's Degree of Arts in Translation and Interpreting Studies at the University of Rwanda.

.....……Prof. Abubakar KATEREGGA (Main Supervisor)

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DEDICATIONS

To my cherished wife and close partner, Rosy KAYITESI, who has always portrayed unceasing patience and love without end, these mere words cannot explain my heartfelt appreciation.

To my wonderful children dubbed the **"**ISHEMA's", particularly**,** Péniel Abraham, Sorhaya Grace, Ariel Nathan and the youngest of all, Ezechiel Dayan, whose innocent presence at home served me, as a real father, with tremendous inspirational motivation and encouraged my research efforts to fruition.

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LIST OF ABREVIATIONS

AAAS: American Association for Advancement of Science

AIIC : Association Internationale des Interprètes de Conférence

CASS: College of Arts and Social Studies

ES: Errors of Syntax

ESV: Errors related to Scientific Vocabulary

EVS: Ear-Voice-Span

EWO: Errors of Word Omission

EXI: Experienced Interpreter

GE: Grammatical Errors

ILR: Inter-Agency Language Round table

LC: Linguistic Challenges

MATI: Masters of Arts in Translation and Interpreting

NIST: National Institute of Standards and Technology

NLC : Non-Linguistic Challenges

NOI: Novice Interpreter

PACTE: Process of Acquisition of Translation Competence and Evaluation

Q & A: Questions and Answers

SAL: School of Arts and Languages

SI: Simultaneous Interpreting

SL: Source Language

SOP: Standard Operation Procedures

STM: Short-Term Memory

TL: Target Language

UNFPA: United Nations Population Fund

UNICEF: United Nations International Childrens' Emergency Fund

UNTerm: United Nations Multilingual Terminology Database.

UR: University of Rwanda

WHO: World Health Organization

WM: Working Memory

WMC: Working Memory Capacity

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ABSTRACT

This study aims at investigating into the practical challenges faced by novice interpreters in Rwanda while interpreting scientific discourses from English into French and other way around. It also intends to explore the causes of these challenges and tout for solutions to improve novice interpreters' performance. In order to achieve the purpose of this study, the researcher used a combination of three instruments for data collection. The first was informal questionnaires with targeted questions; the second was interviews using "open-ended" questions, while the third was recordings out of the scientific discourses interpreted by novice interpreters.

In order to achieve the research objectives, each interview was geared towards probing into various practical difficulties through questionnaires administered to people currently practicing the interpreting profession to express their views, opinions, insights, observation and suggestions that could ease such difficulties. The researcher selected a sample of thirty-five (35) simultaneous conference interpreters, among who twenty (20) were experienced interpreters who had been then practicing the interpreting profession for more than ten (10) years, and fifteen (15) novices who were new practitioners with less than six (6) years of experience in the field. Others were students enrolled in the MATI program in the College of Arts and Social Studies for the academic year 2018 to 2020.

The outcome of the study revealed that interpreting performance of novice conference interpreters is seriously affected by different types of challenges when interpreting in scientific discourses. These difficulties are mostly attributed to lack of knowledge and specialized skills in interpreting scientific matters, lack of linguistic and extra-linguistic skills, lack of specialized terminologies and scientific vocabularies, lack of regular interpreting practice leading novice interpreters' failure to professionally perform, lack of equivalence for specific terms, lack of listening capacity, lack of working memory efforts, lack prior knowledge of the subject matter and above all, lack of production efforts. The study appealed for the need to having professional and experienced interpreters who are specialized in various scientific disciplines to handle interpreting of scientific discourses.

Key words: Scientific discourse, Novice Interpreter's Performance, Simultaneous Conference interpreters, interpreting performance, linguistic and extra-linguistic skills, listening capacity, working memory efforts, production efforts, specialized terminology.

CHAPTER ONE: INTRODUCTION

1.0. Background to the study

This study is based on personal observations during the researcher's professional experience as a continental conference interpreter, more precisely, in the East African Community member states and Rwanda, in particular. It also draws on the researcher's advocacy for the protection and enhancement of the profession. In his many years of experience in the field of conference interpreting, he has found that many simultaneous interpreters - both novices and experienced - face several challenges when assigned to interpret in scientific conferences. In contrast to other technical and ordinary conferences, such as those in the field of law, politics, economics or diplomacy, interpreters who interpret scientific speeches are very often confronted with numerous challenges that hamper their rendition. The causes and effects of these challenges deserved to be investigated.

Apart from the aforesaid realities, the study conducted also evidenced the fact that the interpreting profession in Rwanda has been gradually infiltrated by many impostors who have added salt to injury and made matters even worse. As a result, participants in previous conferences have always complained of the poor quality of interpreters' performance. This state of affairs prompted me to conduct a study that would seek to address the current problems in the interpreting industry and suggest solutions. Interpreting scientific discourse' falls under the broader context of translating specialized or technical languages. Scientific discourse involves a wide range of science disciplines and is used to communicate scientific findings, knowledge and facts. The language uses in scientific discourses is not only limited to technical vocabularies of specific terminologies, but it also entails a complete system of giving meanings to a terminology (Lemke, 1990).

Scientific language, therefore, is concerned with showcasing scientific thoughts, ideas, statements, theories and different viewpoints. It is also used to persuade the scientific audience about the truth or ideas presented through efficient communication in which scientific information is conveyed among the members of that community using the terminology (Kenneth, 2020). Thus, I decided to conduct an in-depth investigation into the challenges in the interpreting industry and how Rwanda's novice interpreters can overcome the challenges. This work seeks to propose tangible solutions to improve the landscape of interpreting in science-oriented conferences. It is worth noting that, need for conference interpreting in Rwanda gained momentum in 1994, particularly, during the period post-genocide. This was the time when some former refugees who had fled the

country - during the pseudo-revolution of 1959-1961 - decided to return home from exile (Viret, E, 2008).

Some were living in the neighbouring countries to the Republic of Rwanda and others in other parts of the world. Upon their return, they needed to communicate between themselves to rebuild their country which had been torn apart by ethnic wars and the genocide. (*https://www.unhcr.org/news/briefing/2003/11/3fab7c95b/rwanda-voluntary-repatriation-campaign-begins.html).* This was a period during which conferences, workshops and seminars were regularly organized and a period when interpreting and/or translation services were the order of the day (*https://www.gala-global.org/industry/intro-language-industry/what-translation*.). Conference interpreting in Rwanda gradually emerged as a new profession that began taught at the National University of Rwanda effective from 2015. The interpreting programme became coveted by many students. In today's Rwanda, however, serious efforts are presently needed to professionalise interpreters to the level of internationally acceptable standards (AIIC, 1999).

Overall, there are currently very few interpreters in Rwanda who practice the interpreting profession on regular basis. By the present research sampling and personal observations on the ground do not exceed twenty (20) in numbers. Many of them are considered /viewed as novices who work as part-time freelance practitioners. However, novice interpreters do not have specialized training in the field of interpreting and nor do they have experience. Most of them have a background of three languages of at least, that is to say, Kinyarwanda as their vernacular (mother tongue), English and French. They are also employed on a full-time basis in traditional disciplines such as teaching, communication or journalism[1] and many others. Only a few of them studied science-related disciplines in universities. However, owing to the increased demand and high pay of conference interpreters in Rwanda, interpreting is currently attracting many practitioners some of them lack the natural potentials to do it well. As noted by Santiniello (2018), many complaints in the simultaneous interpreting industry in Rwanda include poor-quality interpreting standards. Besides, many novice interpreters make no effort to prepare beforehand nor do they acquaint themselves with the linguistic and non-linguistic challenges of conference interpreting. As a practitioner on the ground, I have also noted that many of the current conferences organized in the country deal with 'scientific discourses' which scare off many interpreters because of their specialized nature in terms of their unique terminologies, syntax as well as unfamiliarity to interpreters.

Notes:

[1]. I could cite the example of people I know among the Rwandan interpreters but for not touching their privacy or professional intimacy, I have opted to remain politely silent.

Furthermore, experience has also revealed the fact that most of the interpreters in Rwanda face problems due to a lack of scientific background. Indeed, most of them have simply inherited language skills out of their life experience acquired from their past convenient linguistic environment. Yet, others encounter a lack of memory efforts to keep and remember what has been said while others are faced with the problems of poor communication skills. All these combined culminate into poor renditions in terms of 'cultural transfer' of meanings'. Some of the agencies engaged in the conference interpreting industry in Rwanda[2] are ignorant about basic interpreting norms, standards and principles. This is because the industry is still new and growing and, therefore, a reason for the lack of highly professionalized career interpreters. As a result, these locally-based agencies prefer hiring locally-based interpreters at a relatively lower cost on the pretext that foreign interpreters are expensive!

However, albeit cheap and lacking performance, locally based interpreters are still largely hired for interpreting assignments Conversely, unlike locally-based agencies some foreign conference organizers prefer coming with their interpreters, especially those who have received in-house training, those who are certified and actively subscribed to recognized associations of conference interpreters, and who are familiar with the basic norms governing conference interpreting profession (AIIC, April 2004: *"Essential do's and dont's when using simultaneous conference interpreters on TV"*.).

It is therefore important to note that, as long as the aforesaid challenges remain unsolved, effective performance in conference interpreting of scientific discourses will continue to be compromised. The purpose of this study is to investigate the challenges, needs and perspectives of novice interpreters in Rwanda. This study seeks to analyse the practical challenges encountered by locally-based novice interpreters and to suggest their way forward[3].

[2] Some events management firms like Rwanda Events Ltd, Symposia Consult Ltd, Conference & Interpretation Services (CIS) are registered and governed by tendering instructions and principles of the Rwanda Development Board for the conference interpreting service delivery.

[3] Recently, clients complained through local companies (The Events Factory Ltd) against poor performance by some local interpreters who did not capture key information on scientific discourse during a medical conference on Family Planning, held in the Kigali Convention Centre, between 9th-15th Nov 2018, which had been organized by the United Nations Population Fund (UNFPA) and the World Health Organization (WHO) and the United Nations International Children's Emergency Fund (UNICEF). In their polite defence, the offending company explained that it was experiencing a shortage of qualified staff and that outsourcing some from outside the country was extremely expensive in terms of airfare, lodging while in the country and subsequently their remunerations.

1.1. Statement to the problem

Interpreting scientific discourses is very demanding (Hervais-Adelman et al, 2020). This is because it is always loaded with a lot of hurdles for cognizable pieces of knowledge, that is to say, it entails a high level of concentration in the working memory (Baddeley & Hitch, 1974). Much effort and capacities are needed to perform a variety of tasks in interpreting that deal with highly specialized and technical terminologies compared to interpreting discourses of the general nature (Gillies, 2013). This field of discourse becomes more challenging when it comes to novice interpreters. The majority of them have sufficient skills in interpreting speeches of a general nature but not in science-oriented discourses. Many of them are confronted with challenges relating to linguistic and non-linguistic nature (Kim et al, 2010). In this study, the researcher attempted to contribute to the meagre documentation available, one that already exists in the area of scientific conferences while identifying the existing practical challenges for Rwanda's interpreters and how they come them. Based on the literature review I carried out at the beginning go this study, many interpreters in the developing world face specific challenges which the following:

Locally-based interpreters lack sufficient work tools such as terminologies' databases, dictionaries and powerful internet research drives to aid them in the work. The few available tools and resources at hand are limited and insufficient to respond to the existing needs (Wood, 2011).

- Novice conference interpreters usually face problems of 'fear for the unknown' when they first enter the conference booths, a phenomenon quite common to many of them, and which, if not properly managed, can adversely affect their performance (Liu et al, 2004). This is a cause for emotional stress potential for serious mental imbalance. Other interpreters suffer from poor listening skills, particularly when it comes to terminologies that are unfamiliar to them (Enrique, 2015). Many novice interpreters work as part-timers and on a freelance basis. They mostly depend on contract-based assignments that haphazardly come by. Such a kind of seasonal employment on the part of locally based interpreters in Rwanda deprives them of the time to create and develop regular reading and learning habits necessary to enrich them
- with linguistic and non-linguistic knowledge. It also denies them of important tools and resources necessary to improve their performance. (Moser-Mercer, 1996). Indeed, when interpreters have sufficient time to carry out promiscuous research on various topics, it equips them with important terminologies and other resources to perform better (Velickovitc, 2015).

- Poor quality interpreting equipment is another challenge to r novice interpreters. The cost of purchasing high-tech equipment is too high to be afforded by many interpreting firms in Rwanda and as a result, they purchase fairly cheap or poor quality equipment whose sound frequency and clarity remain a challenge.
- Work contracts were given to interpreters in Rwanda are erratic and unpredictable and always given on short notice. . This denies them sufficient time to prepare themselves ready for rendition and subsequently poor interpreters' performance. (Gile, 2002; Díaz-Galaz, 2011).
- Many novice interpreters in Rwanda are seen to be job seekers and hungry for money. When they are called upon on/t short notice, they agree to take up the offer albeit ill-prepared. As a result, they fail to perform to the standards.
- the ultimate purpose of this study, however, is to focus on the analysis of challenges encountered by Rwanda's novice conference interpreters and to suggest a way forward.

1.2. Research objectives

1.2.1 General Objective

The general objective of this study was to identify and analyze practical challenges encountered by novice conference interpreters in Rwanda.

1.2.2. Specific Objectives

The specific objectives to be achieved are mainly to:

- Identify t linguistic and non-linguistic challenges encountered by novice interpreters in Rwanda;
- Identify causes of poor performance by novice simultaneous conference interpreters;
- Propose solutions and recommendations aimed at improving the quality of the conference

interpreting in Rwanda.

1.3. Research questions

This study is aimed at answering the following questions:

- What are the practical challenges faced by conference interpreters in scientific discourses?
- What are the causes of poor quality performance for Rwanda's novice interpreters?
- Way forward?

1.4. Scope of the study

The scope of the present study was mainly confined to identifying linguistic and non-linguistic challenges faced by novice conference interpreters in Rwanda, particularly as regards scientific discourses, an area in which most novice interpreters in Rwanda express a lack of confidence, mastery in interpreting and competence. As regards the scope in terms of time is was the time that coincided with the research requirements that would lead the researcher to the awarded of a Master's degree in 'Conference Interpreting'.

1.5. Significance of the study

This research is useful to various stakeholders within the interpreting industry in various ways. It is particularly useful to the University of Rwanda (UR), especially, the School of Arts and Languages which constantly trains students to join the interpreting industry. The study findings s, therefore, will inform both students and lecturers of the interpreting needs, challenges and perspectives for novice interpreters in Rwanda. It will equally help the stakeholders to focus on the real and practical needs the industry has. As for Rwanda's interpreting industry, the study will be of benefit to it because very little documentation currently exists in the books repositories.

In fact, unlike in translation, few studies have so far been conducted in the field of interpretation. The industry will be of benefit to this particular study because it particularly focuses on a rare field of interpreting - the scientific discourse. Indeed, many of the current conferences organized in Rwanda deal with creativity and scientific innovation, for example in the fields of mining and extraction, agriculture, industry and many others. The study also comes at a time when Rwanda Convention Bureau needs skilled personnel to participate in interpreting and other language-based tasks and operations. The Bureau will make use of this study findings to advise interpreters on how best to improve the quality and efficiency of interpreters.

1.6. Limitations of the study

When I began the present research in March 2020, I was straight-away confronted with the problem of *Covid-19* which not only hit but also the entire world. Rwanda was not spared either, by this health disaster. On 20th March 2020, the Government of Rwanda reacted to the pandemic by instituting a nationwide lock-down as a result of which all business in the country was closed down. It was, therefore, impossible for me to make travels within the country for purposes of collecting data. Such a strenuous situation impacted negatively my research progress.

Other control measures of lockdown were later announced and this my efforts to concentrate on the multi-dimensional nature of my research work. The other challenge I faced, as a resident of Kigali city, was my inability to access relevant literature to review in the main library in Huye Campus due to the ongoing restrictions in human movements during the lockdown period of Covid-19. The said library is fortunately blessed with a huge stock of hard copies of books, particularly, in the field of interpreting. The last challenge was that the field of interpreting is still new in Rwanda and more specifically in the field of 'interpreting scientific discourses'. This made it very difficult for me to access relevant documentation by Rwandan scholars.

1.7. Study variables

Insofar as this study was concerned, the most preferred variables considered were those supported by Pym, A. (2009) and other scholars, like Gille (1995 / 2009). These variables provided a methodical strategy that guided any study on simultaneous interpreting. They included, among others, the ***Listening Effort***, ***Working Memory***, ***Production Effort*** or ***fluency of delivery and Co-ordination of the processing capacity***. According to Daniel Gile's Effort Model, five parameters should be respected when implementing an analysis of interpreting task. These are summarized in the following formulae: SI = L + M + P + C

Where*:*

- SI = Process of simultaneous conference interpreting;
    - L = Listening Capacity,
    - M = Short Term Memory;
    - P = Production effort
    - C = Co-ordination

1.8. Organization of the study

The present research is subdivided into five chapters. Chapter one contains the general introduction of the study where the research objectives and research questions are formulated. It includes a list of research questions, the study scope, the significance of the study and limitations encountered.

In chapter two, includes the literature that describes the viewpoints by different scholars in the field of conference interpreting is reviewed. Chapter three describes the methodological steps and approaches used in conducting this research. In chapter four a systematic analysis and discussion of the data collected is made. In chapter five, a summary of the findings and conclusions are formulated and recommendations are drawn.

CHAPTER II: LITERATURE REVIEW

2.0. Introduction

This chapter highlights the practical challenges common to simultaneous interpreting of the scientific discourse. It attempts to define terms and concepts related to the topic under study, making particular reference to 'Daniel Gile's Model' and its application to conference interpreting, linguistic knowledge mobility and language combinations. The literature discusses the problems and challenges found in simultaneous interpreting and provides benchmarks against which the said challenges can be addressed to improve the quality standards of the interpreter's performance.

2.1. Theoretical framework

The theoretical framework of this study underscores Daniel Gile's effort model theory in conference interpreting (Gile, 1995/2009). Daniel Gile is a renowned scholar who in 1989 carried out some in-depth investigations into the performance of simultaneous conference interpreters. He came up with the famous model known as the "effort model" which deals with interpreting difficulties confronted by simultaneous conference interpreters. As cited in Hu (2011), the model focuses much on the basic operations that take place during the process of simultaneous interpreting and the efforts required to implement them (SI). These operations include: detecting a source language (SL) unit, receiving and storing information in the short-term memory (WM) and checking the accuracy of the source message for its rendition in the target language (TL). Hu strongly advocates for a strict application of and adherence to this model and its theoretical principles to achieve quality performance in conference interpreting.

Gile's effort model, therefore, helped the researcher to understand the challenges faced by simultaneous conference interpreters all over the world. It identifies the competencies needed for interpreters to improve their performance and enables them to overcome all the likely practical challenges encountered in their profession. Gile (1992) further proposes some reasons which deny conference interpreters to achieve quality renditions. The model shows how the human brain works and how it is limited in terms of its capacity. He further sums up the essence of the difficulties in interpreting, as either related to time constraints or towards divided attention of an interpreter who has to attend to other various mental and physiological operations simultaneously (Gile, 1995). Gile's theory further proposes some basic conditions that should be met before simultaneous interpreting. According to him, the focus should be weighed on practical

simultaneity and cognizable / resources and the proportion of the interpreter's total analytic resources needed in the process of simultaneous interpreting. He goes on to compare how the capacity of a simultaneous interpreter helps him to accurately turn their efforts into a smooth interpreting process.

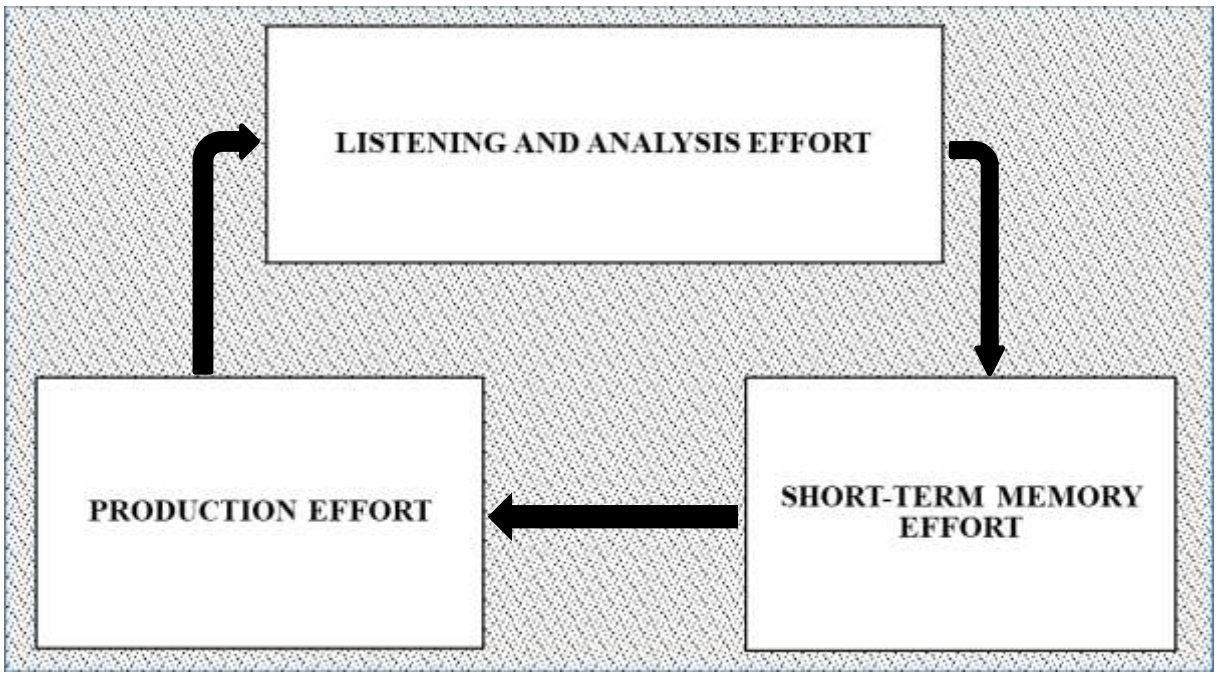
He proposes a formula whose components are needed to achieve quality conference interpreting. They are summarized as follows:

$$SI = L + P + M$$

Where:

- SI = Simultaneous Interpreting;
- L = Listening Capacity;
- M = Short Term Memory;
- P = Production effort

Figure 1: The three main components of Daniel Gile's Effort Model:



Source: (Özer. 2017).

According to the above formula, the definition of the effort components enables us to grasp and figure out factors that affect simultaneous conference interpreting process (SI).

Effort 1: (L) – Listening and Analysis.
Regarding the 'listening and analysis' effort, Gile explains it as follows:
« L'effort d'écoute et d'analyse est défini ici comme l'ensemble des activités mentales consacrées à la perception du discours et à sa compréhension. Il s'accentue quand augmentent la densité informationnelle du discours ou sa technicité quand se dégradent les conditions d'écoute, quand le langage de l'orateur s'écarte de la norme. ».

[The effort of listening and analysis is defined as all mental activities related to the perception of speech and its understanding. This Listening effort is accentuated when the information density in the discourse increases, when listening deteriorates, and also when the speaker's language deviates to lose its fluency track". **(My translation)].**

From the above formula, (L) the interpreter's mental faculty helps him to overcome practical listening challenges. With the listening and analysis effort suggested in Gile's effort Model, all the mental operations start with the perception of the discourse to the time when the interpreter decides to speak out or not. This means that the interpreter receives what has been said, encodes it in a source language (SL), stores it in the short-term memory (WM) and then, interprets it to the audience.

Effort 2: (P) – Speech Production.
In effort 2 on 'speech production' Gile explains:
" L'effort de production est l'effort qui fait l'interprète pour donner une forme linguistique aux informations à restituer. Cet effort augmente notamment pendant les pauses d'hésitation tactiques qui servent à choisir les structures de la phrase et les mots, et baisse quand il y a automatisme verbal ».
[The production effort is what the interpreter does to give a linguistic form of the information to be rendered. This effort increases especially during the tactical breaks of hesitation used to choose sentence structures and words and decreases when there is verbal fluency" **(My translation)].**

Accordingly, speech production is another phase explained in Gile's model. Here, the interpreter shapes his/her linguistic knowledge before faithfully rendering the message given by the speaker into a clearly expressed target language (TL). This involves the operations of his/her mental faculty, starting from the moment the interpreter decides to convey the meaning, to the time he/she formulates it in the mirror of the target language.

Effort 3: (M) – Working Memory.

As for effort-3 on 'working memory (M), Gile (1985:44) explains:

" Il intervient quand un élément d'information n'est restitué qu'après un délai plus ou moins long après sa réception, pour des raisons tactiques (l'interprète attend de bien comprendre l'orateur avant de restituer l'information) ou linguistiques (l'information véhiculée par le verbe français est restituée en fin de phrase en allemand) ».

[It happens when a piece of information is not fed back until sometime later after it had been received by the interpreter for tactical reasons (the interpreter awaits to understand what the speaker wanted to mean before rendering the information) or for linguistic reasons (the source information conveyed through the French verb is rendered at the end of the sentence in the target language in German)". **(My translation)]**.

The above effort serves the Working Memory (WM) / Short-Term Memory (STM). The inclusion of memory operations starts from the time when a segment of the discourse is uttered out and heard in the source language, to the time it is reformulated in the target language or gets erased from the memory. In other words, all the memory interpreting operations start from the comprehension of the source of the discourse or text to its storage, retrieval and subsequent integration into the general knowledge or other previously stored information, before rendering the message into the target language (Gieshoff, 2017). Besides, there is another considerably hidden component that does not appear in the formula. This is given by the C value in the figure/ formula below:

$$\mathbf{(P + E + M) < C}$$

The above formula indicates the relational proportionality that exists between the three main efforts illustrated above. By the hidden value C in the above mathematical formula, the sum of the three (3) efforts cannot exceed its maximum level. In essence, the formula above explains the volume of the energy possessed by the interpreter's Listening (L), Memory (M) and Production (P) When he is in a balanced condition. The formula further explains the proportionality dependence existing between different components of the Gile's Effort Model and how these relatively vary. C varies with time because the total sum of energy depends on both known and unknown intrinsic factors as well as extrinsic factors such as fatigue, motivation, lack of skills, unfamiliarity with the speaker's accent and culture, time and energy spent on checking for

equivalent words in a dictionary or documents of reference or checking online for equivalent terminologies and others things. The formula also underscores the root causes of the practical challenges encountered by conference interpreters when they interpret in scientific conferences (Gile, 1985: 45).

2.2. Definition of key concepts

2.2.1. Conference interpreting performance

Conference interpreting is defined as the practice of conveying the meaning of a speaker's message orally to listeners who would otherwise not understand it in another language.

Interpretation is usually rendered in multilingual meetings between representatives of national governments or international organizations or non-governmental organizations, just to mention but a few (Pöchhacker, 2004:11). In her article, Adelina (2013), explains that within the performance perspective, a conference interpreter has to interpret only what the speaker says in the source language. Sometimes, however, the real meaning can be completely distorted for the interpretation to be faithful; efforts have to be made by the interpreter. These include a wide range of cognitive processes that overcome obstacles. Interpreters need to perform a self-evaluation regularly and check on whether their performance meets the required standards.

Simultaneous conference interpreting has established performance indicators that help interpreters to assess their level of performance. Below are some of the common indicators that an interpreter should adhere to:

- Difficulty in the original speech (a faithful rendition of difficult source language);
- Practical experience and level of the interpreter's training (knowledge and experience)
- Ethical compliance (respect for professional rules and ethical conduct);
- Respect for quality criteria of interpreting (structure of the original speech, with fewer omissions, addition or distortion, coupled with good oral presentations);
- Satisfaction of the client and audience needs (client and audience satisfaction, confirms whether the interpreter's speech has been well received or not).

Overcoming the above-mentioned challenges is very demanding for interpreters and, therefore, calls for the need for combined efforts beyond mere language competence. Indeed, effective and faithful interpretation requires appropriate linguistic skills acquired through training. It is only when individuals interpret faithfully that they are considered as good interpreters (Downie, J.

2015). In the interpreting profession, interpreting proficiency in languages remains a *sine qua non*. It requires ample experience.

Interpreting requires a high degree of concentration and mental stamina, a fact the 'United States Inter-Agency Language Roundtable (ILR) underpinned in its conclusions in April 2020, during which it defined the term 'interpreting performance' as follows:

"An individual's interpretation performance level depends on (1) the command of two working languages, (2) the ability to choose appropriate expressions (3) familiarity with the cultural context of both languages, (4) knowledge of terminology in specialized fields, (5) observance of protocols applicable to different settings and (6) mastery of modes applicable to these settings".

Normally, an interpreter's performance can be expressed through various modes of interpreting, such as simultaneous, consecutive, whispering, sight and church interpreting to faithfully convey and transfer accurate renditions of informal, formal or highly formal discourse. Faithful or accurate renditions of interpretation include details and nuances, reflected in the style and the cultural context of the source language, without omissions, additions or any kind of embellishments (Liu, Z. 2016 et al.). Furthermore, faithful renditions in an interpreting sequence are contingent on a superior command of interpreting skills, including, but not limited, to the mastery of the working languages, cultural contexts and wealthy expertise in the field of the discourse handled (Pöchhackher, 2004).
Besides, for a rendition to be faithful, the voice of the interpreter must be of high quality, without hesitations nor unnecessary repetitions nor corrections. This is what Pöchhackher (2004:11) refers to as the highest ethical conduct of a professional interpreter.

2.2.2. Scientific discourse

The term "scientific discourse" is not easy to define unless etymologically segmented. The online Collins Dictionary, (*https://www.collinsdictionary.com/dictionary/english/scientific*), defines the term 'scientific', as an adjective from the noun "science" which means the study of the nature and behaviour of natural things and the knowledge that we obtain about them. Based on the above, a 'scientific discourse' refers to the processes and methods used to communicate and debate scientific information. It refers to both written and spoken communication and involves a high level of analytical thinking as well as the use of specialized terminologies used to present information, conclusions and ideas (Roth, W.M. 2005). In addition, it is also defined as a serious

discussion of a particular scientific subject that is intended to teach or explain something, focusing on how best to present scientific ideas and thoughts, to a diverse range of scientific audiences.

In other sources, Roth (2005:50) defines a scientific discourse in terms of specialized languages. He states: "Traditionally, the term 'scientific discourse' is used to refer to the special language employed by scientists in their laboratories or perhaps, more accurately, in their formal papers, journals, articles and textbooks". A scientific discourse constitutes typical processes through which communication and debates on themes of scientific nature are exchanged. It involves presenting scientific ideas and thoughts before a range of audience in conference set-ups. Such audience may include peers, students, teachers, civil society, members of the public and business community, government institutions or any other group of people who are intent on benefiting from or contributing to the scientific discussion (Gunnarson, 2009). Indeed, the discussion of scientific topics in specialized disciplines inevitably calls for the use of specialized languages.

If scientific concepts have to be correctly dealt with, theories and practices should be properly interpreted or debated upon or contested for and against, understood and evaluated (Orellana, 2012: 83-96). It is a kind of language used in which rational thinking is evoked by the use of methodical vocabularies to exchange informative ideas and to draw conclusions on various topics at hand. Owing to such a specialized nature of the subject matter, scientific discourse is intended for a group of particular professionals, with a clue on the very subject matter under discussion (Gunnarsson, 2009). Scientific discourses purposely present scientific findings orally and textually (Brand, 2008). However, to successively achieve its purpose, a scientific discourse should have a certain level of cognitive complexity that renders it understandable to an extended audience. This means that the choice of the discourse used by scientists can vary, depending on the level of knowledge the audience has and the understanding of the discourse dealt with (Orellana, 2012). It is against this background that a scientific discourse like in journalism communicates more complex technical matters simply and familiarly and in an easier language to understand. Conference interpreters, therefore, need to render technical terms succinctly to strike a balance between abstract and perfect renditions. Brand (2008: 37) underpins other characteristics of a scientific discourse in which he states the following:

"Producing a scientific text requires re-contextualizing and reformulating the source language in such a way that it is comprehensible and relevant to a different kind of audience".

Based on the foregoing statements, one can state that the definition of a 'scientific discourse' denotes skills that give speakers the ability to create and make use of substitute wordings or semantics, rather than scientific words (Orellana, 2012). In other words, a scientific discourse can be replaced by a simple and familiar language of common usage (words of popular usage) that have the same meaning as the scientific term used. Take, for example, a scientific term as "acetylsalicylic acid" that can be substituted for the ordinary word "aspirin" which we use in our daily lives. Take another example of the word "dyspnoea" which ordinarily means "difficulty in breathing" or the term "anosmia" which simply means an "impairment of the sense of smell"; or "prolactin" which can simply mean an organic substance that stimulates mammary glands that produce breast-milk; or the scientific term "angiogenesis" which ordinarily means the proliferation of blood vessels, just to mention but a few (Orellana, 2012). It, therefore means that scientific terminologies should be used following the professional audience present, and where need be, be substituted to ordinary simple language, understandable to all, even to the common man. It, therefore, goes without saying that scientific discourses should only be used specifically in scientific settings (Brand, 2008).

2.2.3. Complexities of scientific terminologies

A 'scientific terminology' is that part of the language used by scientists within the context of their professional activities. These technical-scientific expressions are only known to professionals in a given scientific field. Collins defines the term 'scientific terminology' as a set of special words and expressions used in connection with it. As for Cabré (1999), he describes scientific terminologies as follows:

"Terminology intermediaries are language professionals like translators, technical writers, and interpreters who need terminology to carry out their profession of facilitating. They need glossaries and specialized dictionaries because they assist in technical writing or in translating texts from one language to another". – […] The accelerated development of science and technology in recent times has been accompanied by the appearance of a large number of new concepts and even new conceptual fields that require new names…".

M. Cabré (1999:216-217) classifies the challenges of terminological complexities in the two categories, that is terminology in SL and terminology in TL:

"… Terminology in the source language, is based on knowing or specifying the meaning of terminological units (TU) from the source text; on confirming its specialized nature; on knowing its denominative alternatives and the conditions in which they are used in texts. Then, there is also the terminology of the target language. It is focusing on knowing if there is an equivalent TU in the target language; if so, on knowing what resources can or must be used to adapt or create a reasonable denomination and how to indicate that it is a neologism; on knowing the most adequate equivalent unit taking into account the topic and the approach; on knowing if a term has specific or restrictive grammatical usages; on knowing the prototypical combination of terms; on knowing the usual phraseology in the field; on knowing

denominative alternatives for a single concept and their pragmatic conditions; and on making sure that the selected denominative unit corresponds exactly to the concept, etc".

2.2.4. Language combinations in simultaneous interpreting

Atkinson Maria (2017) states that interpreters bridge the gap between two or more individuals who do not share the same linguistic and cultural backgrounds. Hence, interpreters working in conferences must apply language combinations. These combinations are classified as A, B or C, where A refers to the interpreter's native language; B to the interpreter's foreign language from which he or she interprets. C is the language the interpreter only works from. For example, French A, English B, Russian C means that the interpreter interprets: English and Russian into French, French into English. Working from C to B usually brings bad results and is not professionally advisable in conference interpreting.

2.2.4.1. Active languages

The International Association of Conference Interpreters (AIIC) classifies language combinations into such categories A, B, and C. The term "language combination" refers to such languages an interpreter uses professionally when at work. These 'working languages' can further be subdivided into 'active' and 'passive' languages.

AIIC (2004) classifies active languages as those languages into which an interpreter works and summarizes them as follows: - Language A is the language in which the interpreter has native proficiency in terms of listening and speaking. The interpreter works from one of her/his other languages and which, although not a mother tongue is a language of which he /she has perfect command. In principle, the interpreter's active language is indeed his/her mother tongue, but the emphasis is weighed onto the language in which the interpreter was formally educated and one in which he feels more comfortable to work with ease. Some interpreters work into languages classified as "B", those with which they do not have sufficient proficiency in listening and speaking. Languages classified as "B" constitute the interpreter's second active language. The interpreter may have satisfactory fluency in them but after a long experience of practice. Class "B" language combinations are not suitable for interpreting technical-scientific discourses where lexical accuracy is primer over style.

2.2.4.2. Passive languages

From the AIIC (2004) definition, "passive languages", are those languages in which the interpreter's fluency is weak. Interpreters classify such types of languages as "C" languages, that is to say, languages other than his/ her native language in which the interpreter lacks proficiency.

2.3. Practical challenges in interpreting

This section focuses on the common types of practical difficulties encountered in simultaneous conference interpreting proposed in Gile's effort model. Among them include: inadequate time for interpreters to prepare for conference interpreting and time to read through documents expected to be used in the conference; uncontrolled quality of sound systems which are barely inaudible and often noisy, lack of control over microphones and absence of time to interact between interpreters in the booth, unbalanced work-load between interpreters, variety in types of speeches, speakers with different accents and cultural backgrounds, rapidly read- out textual speeches, themes with cumbersome technical terminologies, unfamiliarity with scientific terminologies and proper names, to name but a few. Under the sub-headings below, a few sub-sections are incorporated, with each providing brief accounts of actual problems facing conference interpreters, while in the end, suggestions concerning the shortcomings ear-marked shall be brought to light (Kurz, I. 2001).

Concerning Daniel Gile's Effort Model (Gile, D. 1995), each component of the model advocates for personal awareness on the part of conference interpreters, and implores them to try and cope with the challenges they encounter in their work. Based on the aforesaid, Gile (1999) asserts that, more often than not, conference interpreters face insurmountable shortcomings that hamper their effective performance. The onus is, therefore, on them to train and adapt to the appropriate skills to enhance their cognitive skills. Accordingly, any practical shortcomings that lead interpreters to non-performance can adversely affect the contextual content of the discourse and unfaithful rendition of interpretation in the target language in the end (Gile, 1999).

2.3.1. Challenges in the interpreters' capacity to memorize

The 'processing capacity in interpreting refers to the "working memory capacity," which is defined as the information stored first and processed later (Hitch, 1980). Techopedia, the Online Dictionary, defines the 'processing capacity as the ability and speed of the processor and the number of operations it can process at a given time. Thus, one can state that 'language processing capacity' amounts to the efforts spent in treating any information contained within a language spoken. Additionally, Gile's theory (1995:170) shows that the sum of the processing capacity in

simultaneous interpreting is equal to the sum of the available capacity. This means that interpreters always work "close" to the processing capacity saturation, which makes them vulnerable to small variations in the available processing capacity for each "interpreting component" (Gile, 1999: 153).

Gile (1995) and Schlesinger (1989) assume that mistakes made by simultaneous conference interpreters are due to their low processing capacity and lack of sufficient extra-linguistic knowledge in certain scientific fields. He reiterates that interpreters prefer to produce everything speakers say instead of conveying only essential messages to the audience. As a result, the latter end up taking the information that only pleases them on the assumption that they lack the necessary extra-linguistic knowledge in respective fields (Gile, 1995).

2.3.2. Working memory capacity versus interpreting efforts

In simultaneous conference interpreting, oral translation of speeches is a complex cognitive task, usually carried out under pressure and within constraints of a limited capacity commonly known as "working memory" (Finardi et al., 2006: 231-260). For improved performance in this regard, much effort is needed. However, human beings are entities with limited capacities to store and process information in their working memories-problem solving, photo-reading and sight-translation (Pöchhacker, 2016: 20). Interpreting speeches is among the most complex operations for a limited human memory system (Baddeley & Logie, 1999). The mental processes involved in performing such complex tasks compete for the limited capacity of the working memory, which is shared between storage of the relevant information and its processing.

2.3.2.1. Capacity of the working memory

In cognitive psychology, many definitions and theories explain the concept of "working memory capacity" (WMC) (Miyake & Shah, 1999). Generally speaking, WMC is defined as a cognitive processing effort in simultaneous interpreting. Baddeley (2000: 418) defines WMC as "a systematic capacity that allows temporary storage and processing information like reading for comprehension, learning and reasoning."

The working memory capacity (WMC), also called a 'working memory operation' is the personal ability to store information in the brain while processing other items at the same time (Baddeley & Hitch, 2000). It is a limited capacity and differs from one person to another. Among some WM span operations are the "reading and listening span" (Daneman & Carpenter, 1980). The Listening

span, on its part, involves hearing the reading of sentences, checks whether they make sense while storing in the brain a final word for recall. Some of the results obtained from psychological research operations reveal that the values obtained from the Working Memory Capacity (WMC) of some fellow human beings through their complex span operations correspond to the level of their cognitive abilities (Wang, 2013a; Timarová, 2012).

2.3.2.2. Working memory capacity versus simultaneous interpreting performance

Besides the Working Memory Capacity (WMC), other factors play important roles in the improved performance of simultaneous interpreting (Wang, 2016). These include, but not limited, to terminological complexities of speakers in given conferences, the speed with which original discourse is rendered, personal skills in interpreting; familiarity with the specific and specialized subject; listening capacity of varied accents by conference speakers; interpreter's psychological and intellectual preparedness for the conference; his level of education and interpreting experience; his capacity to cope with practical challenges in the process of interpreting as well as the interpreter's cautiousness to comply with ethical norms and standards. Thus, conference interpreting is a highly complex cognitive activity that requires interpreting skills obtainable through formal education and training coupled with practical experience (Wang, 2016).

Besides, the quality of interpreting performance is another important tool (Timarová, 2012; Zhang, 2009a). WMC and the simultaneous interpreting performance improve with education, knowledge and years of experience (Christoffels et al., 2003; Tzou et al., 2012; Zhang, 2009a/ 2009b). Professional interpreters are expected to be skilled and strategic. Based on their knowledge and their strong capacity of working memory, they are capable of expanding their work memory even when interpreting. They can structure and adjust their interpreting knowledge both semantically and procedurally (Moser-Mercer, 1997).

As for the span of the Working Memory operations, it is a complex activity that calls for cognitive skills. Simultaneous conference interpreting focuses on specialized knowledge and expertise in the field. During simultaneous interpreting, expert interpreters apply knowledge and skills acquired in specific areas (Liu et al, 2004). This specialized knowledge and skills comprise proficiency in the working languages, the ability to interpret them in cross-cultural aspects, knowledge on themes/topics about which the speech will be made, the listening capacity of the interpreter, interpreting skills, interpreting tactics and strategies, self-monitoring skills, public speaking skills as well as the professional conduct. In a nutshell, successful interpreting includes WMC and rapid processing of information stored in the brain within a short lap of time. It requires interpreters to

avoid the question of overload (Cowan, 2000) and attentional control, which are key factors in avoiding overload (Gile, 1995; Mizumo, 2005).

2.3.3. Challenges related to norms of completeness

The free Online Dictionary by Farlex defines "completeness" as a state of having everything needed to accomplish a given task. In other words, the term "interpreting" becomes particularly complete, when the message communicated virtually has nothing missing in the interpreted sequence of word sentences. The message needs to be accurate and faithfully rendered. Below, Moody (2011:2) describes how an interpreter faithfully ought to make renditions of complete messages:

> "The interpreter understands the message of the source language and translates it into the same message in the target language. The content of the information ought to be identical. Fidelity of the message interpreted is usually equated to the quality of interpreting, analysed by the number of deviations made from the source message (omissions, additions, or substitutions), taking into account the context, speed, register, intent, and emotional effect of the original message, the interpretation should be virtually the same. The source message is sacred.

Pym (2009) agrees, however, with Gile (1999) that the term "completeness" is used in simultaneous interpreting to faithfully render everything that the speaker says incomplete sequences of words. "Completeness" presupposes that if conference interpreters fail to make efforts and complete oral renditions of the interpreted messages, members of the audience will act as if they are listening simultaneously, which is a sign of low-quality performance. Pym also views Gile's assessment of "errors and omissions" as one of the ways of analyzing challenges interpreters encounter in their work. Gile (1999) and Pym (2009) strongly agree that all omissions are errors, but castigate interpreters who leave out messages when interpreting to impress the audience in each rendition with "***tour de force".*** Gile (1992: 189) argues further that an interpretation sequence needs to be faithfully processed and rendered in line with the contextual equivalence in the "message and style" of the source message. He gives informational content a priority and affirms that the form of the target language rendition should be natural and native-like (Scovel, T. 2000).

Seleskovitch (1968) calls for interpreters to apply the concept of "*fidelité absolue*," or what one would translate as "total accuracy." Seleskovitch further argues that "total accuracy" is only achievable by interpreting the contextual meaning (la théorie de sens) rather than "literal

interpretation" of word messages, which justifies the theory that once an interpreter has understood the message in the source language, they can render it, quite accurately, into the target language. With the above-mentioned, Seleskovitch remains zero-tolerant to literal translation, which often discredits the interpreters' reputation for being criticized to reproduce an unfaithful rendition (Seleskovitch, 1968).

2.3.4. Challenge of language accents

The Thesaurus Free online dictionary defines the term 'language accent' as "how a person pronounces words of a language in a distinctive way that shows which country, region, or social class he/she comes from." On the other hand, the "Collins Advanced Dictionary defines accent as the "characteristic mode of pronunciation of a person or group". Besides the challenge relating to the norm "completeness" mentioned above, another serious challenge that interpreters encounter is that of 'language accents'. Interpreters always find it hustle to understand unfamiliar language accents. The latter cause difficulties in understanding what speakers intend to communicate to the audience. According to Gile (1995), such unfamiliar accents require an interpreter to strenuously listen more attentively to analyze what the speaker wants to say and to logically store it in the brain before reproducing it in the target language. Giles's effort model illustrates that any additional effort weighed onto the task such as that of listening to unfamiliar accents, undermines the quality of rendition and subsequently leads to poor performance (AIIC, 2002; Cooper, et al., 1982).

2.3.5. Challenges relating to interpreting figures/numbers in a scientific discourse

Conference interpreters are also faced with difficulties of interpreting numbers, figures and names unfamiliar to them in the target language. Conference interpreters should therefore change their listening strategies to improve their memories to avoid mismatch. Gile's Effort Model (1995, 1999) sheds light on various challenges that interpreters encounter when dealing with numbers, which he views as a result of poor listening capacity, lack of linguistic competence, poor capacity in message processing and working memory. Mead (2015) and Setton (1999) suggest that writing numbers down while interpreting in scientific discourse is strategically commendable, but calls for additional efforts in terms of listening and working memory. When a speaker utters out a number, for instance, it is only understood once expressed, but it increases efforts in the interpreter's listening and the working memory. Thus, interpreting numbers within a scientific discourse activates the interpreter's processing capacity and calls for additional efforts, a potential cause for

low performance as it requires the interpreter to perform several operations, including processing, remembering and translating more information into the target language. Also, the interpreters' strategies should adapt to remedy this lacuna and do away with a mismatch. One of them is to reduce the interpreting lag (language sequence that delays the oral flow while interpreting). For example, interpreters can resort to using a shorter ear-voice span (EVS) technical tactic that enables retention in the short-term memory or working memory (WM). This beefs up the restitution of the input and allows interpreters to stick to the accuracy of the message as close as possible (Gile, 1995)

2.3.6. Challenge of interpreting proper names

Proper names require linguistic "transcoding" rather than "interpreting" (Seleskovitch, 1962). Gile (1995) highlights that proper names always cause problems to conference interpreters, particularly when they are utterly unfamiliar with a specific proper name or its pronunciation in the target language. Proper names are often phonetically unfamiliar to interpreters (Hanaoka, 2002) and require some "coping tactics" because they add efforts to listening and strains the memory efforts of the interpreter. In such situations, interpreters opt to rely on their short-term working memory to store the names and record them in the target language. However, in the absence of orthographical clues such as spelling, the interpreter is prone to mispronouncing the name in the target language (Quini, 1993).

2.3.7. Challenges of unpreparedness

Preparedness in conference interpreting refers to prior informational briefs relating to the client, the purpose of the conference and observance of the professional code of ethics before, during and even after the interpreting session. Preparation and readiness are the typical practice of the interpreting profession (AIIC 2004 / 2006 /2009; Gile, 2002). Preparing for a scientific discourse is necessary for accurate performance, although it is time-consuming (Díaz-Galaz, 2015). However, it is always better and professionally advisable to prepare beforehand and avoid unpredictable incidents in the course of the interpreting session. Will (2007) justifies the need for preparation:

- It bridges the linguistic and extra-linguistic gaps between conference participants and interpreters;
- It allows prior and timely preparation which saves the interpreter from stressful situations while interpreting. It also helps him to anticipate knowledge-based issues in the preparatory phase for improved performance (Stoll, 2009);

- When interpreters have free cognitive capacities during an interpreting assignment, they feel comfortable in controlling the interpreting process more efficiently. Other scholars add that, preparing for an assignment in advance supports interpretation quality by ensuring greater accuracy (Díaz-Galaz, 2015).

Traditionally, simultaneous conference interpreters need to have prior access to specific texts or reference documents of the conference main speakers. When interpreters at a conference can access such texts in advance, they are facilitated to capture key information relating to various topics in a scientific discourse under question and can find out how the information contained in the contextual message looks like (Fantinuoli, 2017).

Once they have the contents well in advance, they can acquaint themselves with the lexical terminologies needed to perform well at the conference. They also get informed of any other businesses relating to the meetings before the anticipated conference, including language combinations used in the relay of the interpreting sessions, the multi-language directions and time expected to be spent in the interpreting turns and timing rates. They get to know, beforehand, the flow volumes for interpreting, the degree of interactivity in the event, the number of speakers and delegates at the conference as well as the languages to be used. If interpreters are informed of all these before the session, they feel a strong sense of ownership of the conference and as such, they perform well (Fantinuoli, 2017).

2.3.8. Challenges in linguistic competence and knowledgeability

Linguistic knowledge is defined as "the knowledge about word meanings and syntactic structures" (Dudschig et al., 2016:45). As for Gile (1995:86), he is of the view that linguistic knowledge is a means of "knowing words, idioms, grammatical, stylistic and pragmatic rules". However, for purposes of this study, linguistic knowledge refers to the "knowledge of the source and target languages" (Gile, 1995:110). Indeed, an interpreter always has a role to play in an interpreting session, he is deployed to perform. Under such situations, his attitude, linguistic competence and skills are very important (Wadensjø, 1998). It is widely believed that good performance at conferences is strongly dependent on good linguistic skills. All in all, however, it is the knowledge of multiple languages and the ability to master their fluency that matters more for the interpreter to perform.

Other competencies needed of an interpreter, include, but not limited, to the cultural knowledge of the people and countries of their origin., knowledge of political, economic, social and ethnic

backgrounds, administrative structures, community life, as well as the sufficient knowledge in the field of arts and literature (Kalina, 1992). All this helps interpreters to serve as good language intermediaries. Thus, it is on this basis that they not only need to be proficient in their working language, but also in the way they understand and use it back in their cultural set-ups (De Jong, 1991). Further, linguistic knowledgeability saves the interpreter from misconceptions derived from the low capacity of listening to unfamiliar culture-oriented accents. It helps him/her to grasp contextual meanings the speaker intends to communicate even before he/she completes the sentence of his/her message. The linguistic knowledge of the speaker conveys accurate messages to the target audience.

Furthermore, simultaneous conference interpreting requires such mental skills as mnemonic efforts, high-capacity mental reflex, ability to work at a high level of concentration, self-motivation, as well as the management of personal stress. In sum, linguistic competence is a cross-cutting interpreting skill that can be useful across a wide range of interpreting modes in linguistic mediations (Kalina, 1998). Again, interpreters should not only be knowledgeable in general ideas of the topic being interpreted but they should also be knowledgeable in specialized language proficiencies such as agriculture, mathematical modelling, banking, climate change, econometrics, epigenetics, metaphysics, geophysics, medicine, data processing and languages, to name but a few.

Even though they may have differences in usage, style, cultural norms and other peculiarities (declarative and knowledge of semantics), skilled interpreters are not only aware of those differences but should also know how to cope with them (procedural knowledge). Kico (2008) argues that interpreting is not only about knowing the grammar of a given foreign language or the use of the dictionary. He notes that experience in interpreting is one of the best remedies for acquiring linguistic and interpreting skills. Simultaneous conference interpreting essentially relies on language as a main channel of communication, coupled with the interpreter's skills and knowledge in current affairs and technical vocabularies in relevant scientific discourse (Miecznikowski, 2001).

2.3.9. Challenges related to extra-linguistic knowledge

Extra-linguistic knowledge is defined as knowledge outside the scope of the linguistic domain. Extra-linguistic knowledge is defined as 'world knowledge' (Gile, 1995). For Setton (1999) non-linguistic knowledge is also known as "encyclopedic knowledge".

Other scholars like Dascal (2003) define extra-linguistic knowledge as the contextual knowledge within meta-linguistic knowledge and that it includes details relating to the 'universe of references.' Looking critically at all the above definitions help to understand that interpreters' need to be versatile and fluent in different working languages. They need to have sufficient knowledge- mobility and useful terminologies in various scientific fields. They need to be able to understand cultural variations without having to assume the role of cultural brokers (Kalina, 1998). They should be acquainted with the knowledge on peoples' lives, history, social development, literature, political matters and so forth. This is because, they work under contextual circumstances that force them to have some extensive cultural knowledge and communication skills which they should use in solving linguistic and cultural problems they encounter in their interpreting profession (Kalina, 1998).

2.3.10. Challenges related to interpreting the scientific terminologies

For interpreters to achieve quality performance, knowledge and understanding of scientific terminologies are paramount. Simultaneous conference interpreters need to know LSP (Language for Special Purposes) and should unfailingly master related terminologies (Velickovic, B. 2015). Before conference interpreting, interpreters need to be given written speeches of the main speakers and related documents, if any. This not only helps them to keep abreast with terminologies, but it also helps them to improve and deliver quality interpreting renditions (Pignataro, 2012:125-140). Besides, perfect command of language combinations, with accurate terminologies is a valuable tool towards improved technical performance. Specialized fields also require specialized languages depending on aspects of the topic, the structural fabric of participants and the theme of the event (Garzone, 2003: 26). This requires a strong and perfect command of language combinations to overcome the challenge of scientific terminologies. Conference interpreters are not lexicologists. They are adept at humanities and always have the aura to learn through continuous learning. . By so doing, they gain knowledge and practical experience which eventually makes them familiar with specific vocabularies and terminologies in their respective fields of work (Velikovic, B. 2015).

2.4. Challenges in assessing the quality of conference interpreting

Professions today dictate quality (Kahane, 2000). In addition, Collins English Dictionary comments that "quality" calls for excellence and stringent compliance to norms and standards "par-excellence". As regards the field of interpretation, however, the concept of quality interpretation is still debatable. According to AIIC (1982, p.1), the concept of quality interpreting remains elusive because no one has ever managed to define it correctly since until today, the field

of global conference interpreting looks forward to the interpreting industry itself, to define the term "quality interpreting" and find out ways of achieving it. For instance, Déjan le Féal (1990:155) articulates the view that by assessing the quality of interpreting, there should be the need to target specific objectives, such that what the interpreters convey from the source languages should accurately bear the same cognitive content as target languages (Déjan Le féal, K. 1990). By definition, therefore, interpreting quality should quench the customers' perceptions. That is to say, it should respond to customer-based satisfaction vis-à-vis the interpreter's performance during conference interpreting sessions. This is why assessing the quality of interpreting should be the monopoly of conference interpreting industries (Mansour Amini1 et al. 2013) to ensure that only qualified interpreters have access to jobs in the market. Besides, customers are often concerned with different satisfaction levels towards the services given by the interpreter. The satisfaction of customers is, most of the time, based on the quality of the service performed.

For this reason, it should be understood that the better the service rendered to the end-users' expectation, the higher the customers' satisfaction will be and the plenty the market for interpreters who performed the service will be (Mansour Amini1 et al. 2013). To this end, AIIC (1995-2019) has set user-oriented quality standards that include the analysis of the users' background variables and profiles, an approach that pave the way towards professionalism.30 However, it is obvious that conference interpreting service providers, including interpreters, interpreting trainers, interpretation users and researchers should focus more on feedback from their customers as a basis for their performance improvement in the market. Based on the aforesaid, Kotler and Armstrong (1994) consider that the most important reason for assessing interpreting quality is to satisfy customers' expectations. In other words, any serious service provider needs to identify, first and foremost, what the customers' expectations are in terms of "quality service" (Kotler and Armstrong, 1994:646).

Elsewhere, Moser-Mercer (1996:44) argues that quality interpreting should be observed in conference interpreting. Conference interpreters should strive to make every effort necessary and communicate clearly to the members of the audience. They should deliver accurate and complete rendition, free of any distortion or deficiency in the source contents or lacking in grasping extra-linguistics information from the source language (Moser-Mercer, B. 1996). Additionally, an interpreter should strive for excellence in conference interpreting performance by faithfully conveying the contextual message given out by the speaker from the source to the target language. Interpreters need to prepare and get ready for the meeting, accurately use prior prepared

equivalent terminologies. They need to comply with the ethical code of conduct governing the profession and provide quality service to the customer as expected. Below is the summarized equation for quality interpretation service as formulated by Kurz (2001). In view of the above, one can deduce that:

Quality = Actual Service – Expected Service

In short, the assessment of quality conference interpreting denotes a technical evaluation process of interpreting that, on the one hand, focuses on listening to the audience satisfaction in a given conference, while on the other, involves the type of quality members of the audiences who receive information from the interpreters against their expectations. In other words, it is the members of the audience that mostly determine the quality of the interpreters' service delivered. In conclusion, it should be understood that the assessment of interpreter quality should not overlook audience expectations or customer satisfaction (Heskett et al, 1990).

2.5. Strategies to address interpreting challenges

To address conference interpreting challenges, interpreters should be informed about existing problems in the field of interpreting. The present research deals with the practical challenges of simultaneous interpreters of the scientific discourse. The facts presented in this study draw on substantive findings from Daniel Gile's effort Model (1995) who identifies different challenges and develops important thresholds for interpreters on how best to overcome them while performing interpreting tasks. According to Gile (1995), there are three possible tactics (solutions) to avert interpreting challenges. They include:

- Comprehension tactics;
- Preventive tactics and
- Reformulation tactics.

- *Comprehension tactics* are used when comprehension problems occur. According to Gile (1995), four basic comprehension tactics should be used. They include: (a) delaying the response, (b) reconstructing the segment with the help of the context (c) using the booth-mate and lastly (d) consulting the documents at hand.
- As for *Preventive tactics*, they refer to strategies used by interpreters to curb fear that is likely to develop and impact on the interpreter's performance in the booth; the fear likely to arise is due to time or processing pressure. These tactics include: taking notes, segmentation,

changing the order of enumerating elements as well as changing the Ear–Voice-Span. EVC reduces interpreter performance and reduces the risk of errors during the rendition. The ear-voice span refers to the time-lag between a word uttered by the source speaker and the corresponding word uttered by the interpreter (Defrancq & Collard, 2018).

- *Reformulation tactics* can also be used by the interpreter to eliminate consequences relating to production or short-term memory. These include (1) omissions (2) insufficient listening and (3) inadequate processing capacity of the source speech (Gile, 1999, 1995/2009, 2011).

The above three strategies raised in Gile's Effort Model justify the three components which are equal to the total capacity required by simultaneous conference interpreters. It is also worth mentioning that there is an equal number of hidden efforts weighed on coordination, and management of the above components leading to the energy consumption of conference interpreters.

Should one of the three effort components need more resources, a portion of the required capacity will be drawn from the others.

To this effect, there is always a cognitive overload whenever the capacity is not enough, either in terms of the individual human efforts or in terms of the cognitive system as a whole. Thus, far beyond Gile's Efforts' Model, there are also other strategies and tactics proposed by other scholars that can be used to solve the challenges of interpreters (Kohn & Kalina, 1996). According to Kalina (1992: 254), "approximation" is one of the strategies that are useful in dealing with complex segments." She argues that the above strategy can be used by conference interpreters to provide partial information from the source discourse until they find a more accurate translation for a better rendition.

Approximation, however, has been critiqued as being counter-productive in the eyes of many interpreting practitioners because it takes more time and consumes the interpreter's working memory (WM) effort. Kalina, S. (1998) also suggests two other strategies related to 'understanding and production'. She contends that there are strategies of "comprehension" which are embedded in the "notion of inference". By inference, it meant that the interpreter receives information from the discourse, and understands it per their background knowledge already possessed. This strategy is what Kalina (1998) refers to this as "semantic segmentation" or "chunking". As regards "production strategies", Kalina shows the importance of the initial statement (transcoding and syntactic information) and that of the final statement (by playing on the chronological gap between the speaker and interpreter or the EVS: Ear-Voice-Span). She

explains how this strategy helps to reduce the memory effort or increase the need for memory efforts to reduce the risk of errors in the reformulation strategy. Kalina (1998) finally proposes "stylistic and presentation" strategies which aim at improving communication (rather than to solve a particular problem), especially when the interpreter strives to control pauses, intonation, flow, prosody and so on. Gambier, quoted by Daniel Gile (2008:72) says that more research is needed on interpreting strategies:

« La littérature sur les stratégies d'interprétation de conférence est certainement limitée, notamment celle relative à l'interprétation simultanée. Cette réalité devrait donner lieu à de nouvelles recherches car les contraintes situationnelles actuelles obligent certainement les interprètes à chercher de nouvelles solutions. »

[Literature on conference interpreting strategies is certainly limited, especially that relating to simultaneous interpretation. This reality should give rise to further research because current situational constraints certainly force interpreters to look for new solutions. **(My translation**)].

Elsewhere in the literature, Seleskovitch (1968) proposes four strategies to adopt when analyzing the original captured speech. They include:

- Using prior knowledge;
- Mobilizing one's points of view to facilitate the work of memory;
- Visualizing the meaning the interpreter hears and;
- Observing the style and proposing related speech.

As for Setton (1999: 50-53), he proposes four strategies to address interpreting challenges:

- Waiting for a while before starting to interpret as this helps to get the equivalence/ inputs;
- Delaying or saving time while avoiding to make the listener uncomfortable;
- Chunking the statement into coherent units and;
- Possessing Anticipating the speaker by predicting from the discourse the next utterance to be presented.

In general, it is very challenging to interpret a scientific discourse simultaneously because it requires multi-dimensional skills. Indeed, it is an artist whose performance dictates the formal training of talented interpreting individuals. In other words, strategies and tactics alone may not provide viable solutions to all the aforesaid practical challenges. They can only contribute to building the technical skills needed in improving interpreters' performance in the interpreting

industry. It is up to the individual interpreters themselves to develop personal skills beyond what the above strategies suggest (Jossey-Bass & Pfeiffer, 1998).

2.6. Linguistic Competences (LC)

Linguistic competence is the knowledge of grammar that permits a listener, like an interpreter or a speaker to use and understand a language. Chomsky N. et al. (1965) used linguistic competence by referring to the inherent linguistic knowledge that enables a person to match sounds and meanings. Linguistic competence functions under idealized conditions, which theoretically remove any obstacles of memory, distraction, emotion and other factors that might cause even an eloquent native speaker to make or fail to notice grammatical mistakes like wrong terms, syntactic errors, omission, misspelling, punctuation mistakes and others (Chomsky, N. (1965).

2.7. Non-linguistic sub-competences (NLC)

The non-linguistic sub-competencies deal with the interpreters' knowledge in matters of professional practice as well as ethical matters (Hlavac, Jim et al. 2017). This knowledge comprises the interpreting knowledge, technological knowledge, thematic knowledge, intercultural knowledge, the strategic and psycho-physiological knowledge that form part of the sub-competences.

2.8. Conclusion

In this chapter, a set of theoretical narratives on the theme of conference simultaneous interpreting has been discussed. In the process, the chapter has delved deep into the works of various authors on the theme of conference interpreting and the commonplace challenges faced by interpreters in the industry, particularly insofar as interpreting the scientific discourse is concerned. In this context, the views and ideas of scholars such as Daniel Gile, Déjan le Féal, Kurz, Setton, Kohn, Kalina and many others, have been reviewed. Based on their works, several challenges and solutions have been highlighted. They include but are not limited to: lack of prior preparedness by interpreters, inadequate extra-linguistic knowledge, terminological complexities, working memory and capacity problems that impact information processing, problems of incomplete renditions, word-equivalence, lexical, syntactic and cultural problems. The chapter ends by showing some practical solutions to improve the quality performance of interpreters.

CHAPTER III: RESEARCH METHODOLOGY

3.0. Introduction

To achieve its intended objectives, this chapter took into account various steps and procedures, including a study design, description of respondents who participated in the study, data collection and analysis, data collection tools comprising questionnaires and interviews, recordings of segments of some of the novice interpreters' renditions, sampling, ethical procedures and techniques used in data analysis.

3.1. Research Design

The researcher used a mixed-method of design that combined both qualitative and quantitative approaches. The study relied mainly on a triangulation of 'survey' and 'case-study designs. It was intended to analyse views, perceptions and ideas of respondents relating to the problem under investigation (Singleton & Straits, 2009). Conversely, case studies focused on a particular phenomenon to understand and solve complex issues (Crowe et al., 2011). The problem under investigation was novice interpreters' poor quality performance while interpreting scientific discourses in Rwanda. Regarding the literature review consulted, Rwandan novice interpreters were used as a case to understand reasons why certain issues, happen and how they happen (Amin, 2005; Anderson, 1993).

For instance, Anderson (1993), confirms that "case studies" enable researchers to delve deeper into specific contextual realities in a given subject matter and help them as well to come up with a better understanding of existing differences between what occurs in a natural set-up and what is supposed to occur in reality. The data collected through interviews, questionnaires and personal observations were then triangulated, with emphasis on thematic and statistical analysis. The thematic analysis conducted was used to assess the respondents 'views, insights and opinions on a case-by-case basis. Quantitative data analysis was used to assist in drawing conclusions based on tangible evidence. Accordingly, themes of greater interest in this study included: linguistic and extra-linguistic challenges in interpreting, causes of poor quality performance, strategies to opted for solving challenges that novice conference interpreters in Rwanda encounter.

3.2. Sampling size selection

Selecting the sample size of respondents to interpret the selected scientific discourses and to answer questionnaire/ interview questions was very crucial. Respondents were Made up of novice and experienced interpreters.

3.3. Data Collection Procedures

As for data collection procedures, the researcher took greater consideration of the objectives and research questions. However, the researcher found it worthwhile to use several research instruments including semi-structured questionnaires, interviews, personal observations, video recordings and discourse transcription. In light of the aforesaid, the researcher designed questionnaires, interview guides that comprised open-ended and closed questions. During the data collection process, he also recorded interpreted renditions to capture the *in-situ* interpreting of actual novice interpreters in their natural states and conditions as they were performing in the conferences.

3.3.1. Summary of data collection Procedures

The activity sequence below was adhered to while collecting the data:

i. Extensive desktop review with particular focus on challenges relating to conference interpreting-related challenges, their causes and way forward;
ii. Formulating questionnaires and interview guides following the study objectives and research questions
iii. Organizing simulated conference interpreting sessions
iv. Launching an interpreting exercise and recording the practical performance of Rwanda's novice interpreters;
v. Transcribing the interpreted data for analysis;
vi. Analyzing and interpreting results;

3.3.2. Desktop review

During the process of literature review, I extensively consulted different online documents and written books which enabled me to delve deep into the investigation of various challenges related to interpreting scientific discourses. Some of the reviewed publications included works of famous authors Gile, (1995), Okamura (2006), Fantinuoli (2017), Minhua Liu (2009) and Veličković (2015).

With a careful review of the above publications, I was able to understand the practical challenges of interpreting not only in Africa but also in Europe and America and at the international level. Gile's interpreting model (Gile, 1995) provided the researcher with what to focus on and what to consider in improving the quality performance. I further concentrated on the linguistic and non-linguistic challenges, workload capacity issues, causes of poor performance, and strategies for the way forward.

3.4. Sampling

Based on the fewer number of conference interpreters in Rwanda, I deemed it more convenient to use both local and foreign interpreters. Accordingly, the number of interpreters in Rwanda, both novices and experienced, were not exceeding twenty (20) in number. I, therefore, found it important to equally include foreign interpreters in my research sample size to broaden it for the convenience of the research. Thus, I proceeded and classified the respondents according to four (4) categories below:

1. Novice interpreters
2. Semi-experienced interpreters
3. Experienced local interpreters
4. Experienced foreign interpreters

I included some foreign interpreters who sometimes come to Rwanda to interpret in international conferences. I also added International interpreting cohorts to serve as a control variable. This helped me to make a comparison between the quality of renditions by the novice interpreters compared to the more professional ones. I further combined semi-experienced and novice interpreters under one cohort of twelve (12) interpreters. Additionally, I consulted a sample of twenty-three (23) experienced interpreters as a matter of 'purposive sampling' to reach a total sum of thirty-five (35) respondents that represent the actual sample size used in the present study. "Purposive sampling" was also used as a means of selecting experienced and novice interpreters from the available pool of interpreters performing in Rwanda and elsewhere based on the researcher experience as a conference interpreter in Rwanda for years now. By selecting the said sample, I also took into account the interpreters' gender, age, level of education, professional background and experience. By so doing, I opted to take into account these parameters while

adopting the opinion expressed by Welman and Kruger (1999) when selecting the samples. Below is a summarised list y of respondents and on how they were sampled.

Table 1: Selected respondents and Sampling techniques used

Nature of respondents	Sampling techniques	Data collection tools used	Number
Novice interpreters in Rwanda	Purposive:	Semi-structured interviews, questionnaires, direct observations, interpreting *in-situ* simulation, discourse transcription, group discussion	12
Seasoned Foreign-interpreters	Purposive :	Questionnaires	10
Locally based Semi-experienced interpreters	Purposive:	Semi-structured interviews, questionnaires, direct observations, interpreting *in-situ* simulation, discourse transcription, group discussion	8
Seasoned Foreign-novice Interpreters	Purposive	Questionnaires	5
Total			35

***Source*: Primary data**

In the tables below, shows details of the respondents who participated in the study are summarized. The tables show gender, age, qualification and experience of each interpreter.

Table 2. Experienced interpreters (sex, age, qualification, and years of experience).

N°	Name of the Respondents	Gender	Birthdate	Age	Qualification	Years of Experience
1	EXI-1	M	1964	56	BA-FRENCH	23
2	EXI-2	M	1971	49	BA-ENGLISH	21
3	EXI-3	M	1965	55	BA-ENGLISH	10
4	EXI-4	F	1972	48	BA-ENGLISH	20
5	EXI-5	M	1980	40	BA-ENGLISH	12
6	EXI-6	M	1970	50	MSC / MPH	21
7	EXI-7	M	1968	52	BA-ENGLISH	20
8	EXI-8	M	1954	66	MA-EDUCATION	27
9	EXI-9	M	1967	53	MA-FRENCH	16
10	EXI-10	M	1959	61	MA-FRENCH	25
11	EXI-11	F	1960	60	MA-TRANS/MBA	30
12	EXI-12	M	1964	56	MSc	21
13	EXI-13	M	1980	40	BA-FRENCH	10
14	EXI-14	M	1952	68	MA-TRANSLATION +	35
15	EXI-15	M	1979	41	BA-FRENCH	10
16	EXI-16	M	1981	39	MA-JOURNALISM	10
17	EXI-17	M	1980	40	MA-FRENCH	10
18	EXI-18	F	1980	40	MA-TRANSLATION +	12
19	EXI-19	F	1982	38	MA-TRANSLATION	10
20	EXI-20	F	1976	44	BA FRENCH	10

Source: Field data

N°	Names of the Respondents	Gender	Birthdate	Age	Qualification	Years of Experience
1	NOI-1	M	1980	40	BA-ENGLISH	4
2	NOI-2	M	1971	49	BA-MA-ENGLISH	4
3	NOI-3	M	1980	40	BA-SS-MA-FRENCH	2
4	NOI-4	M	1980	40	BA-ENGLISH	2
5	NOI-5	M	1982	38	BA-ENGLISH+MA-TRANSLATION	4
6	NOI-6	M	1986	34	BA-COMMUNICATION	4
7	NOI-7	M	1984	36	BA-ENGLISH	6
8	NOI-8	M	1979	41	BA-LAW	4
9	NOI-9	M	1982	38	BA-ENGLISH+MA-TRANSLATION	4
10	NOI-10	M	1982	38	BA-ENGLISH	4
11	NOI-11	M	1980	40	BA-LAW	2
12	NOI-12	M	1963	57	BA-ENGLISH	1
13	NOI-13	M	1983	37	BA-ENGLISH	4
14	NOI-14	M	1972	38	BA-ENGLISH	1
15	NOI-15	M	1979	41	BA-FRENCH	8

Table 3. Novice interpreters (Sex, Age, qualification and years of experience).

Source: Field data

3.5. Data collection Instruments

The following research tools were used in the data collection process. They included questionnaires, interview guides, audio and video phone recordings, personal observation and notes.

3.5.1. Questionnaires

I prepared similar questionnaires for each category of the above-mentioned interpreters. I also designed questionnaires to collect both linguistic and non-linguistic data, their challenges, their causes for poor performance and proposed solutions. Thus, I obtained additional data using the said questionnaires focusing on their working language combinations, capacities for their working memory, their views on the quality of sound equipment used and on conference speakers' accents,

audibility, interpreting strategies, tactics, knowledge on scientific subjects and prior preparation for particular interpreting assignments.

3.5.2. Interviews

As regards the interview tools, I posed questions to locally-based respondents both the experience and novices. During the interviews, challenges in the field of interpreting and causes of poor quality renditions and related solutions were greatly over-emphasized.

3.5.3. Recordings and Transcriptions

As a result of the ongoing Covid 19 pandemic, I found it rather difficult to record all thirty-five (35) interpreters as earlier anticipated. However, I managed to record ten (10) from the intended category of the interpreters as clearly shown under table one (1) above. Besides questionnaires and oral interviews, I also recorded renditions of novice interpreters of scientific discourses from English and into French and the other way round and transcribed them for final analysis. As a result, I collected the data using the following chronological pattern:

1) I prepared and organized conference interpretation sessions, taking into account basic required rules and ethics;
2) I installed two (2) soundproofs interpreting booths for a pair of interpreters per session, one in English and another in French;
3) I properly connected cables for sound transmission and provided each interpreter with a microphone, a table microphone and an interpreting console;
4) I took videos of the selected scientific discourse that were identified, gave brief instructions to the assigned interpreters whom I had divided into two groups of five (5) interpreters each;
5) I then proceeded with recordings. The first recording, however, was intended to interpret the discourse from English into French and then vice-versa, both all the interpreters, experienced and novice alike;
6) In the first slot, 5 experienced conference interpreters listened to the source language through their headphones and began interpreting from English into French and vice-versa, while I was recording their renditions using a Sound Recorder Android (HiosV5.5.0 / Techno Camon 12 Pro, Model CC9).
7) I did the same for the Novices and recorded their renditions using the above application.
8) Lastly, members of the two groups came together, listened to the source languages and I recorded their renditions using the same software application.

9) At the end, I checked through the recorded renditions with career interpreters and brainstormed on various practical challenges we encountered during interpreting and came up with real challenges they face.

10) As soon as we agreed on the challenges, they agreed that I transcribe everything (see the transcription in the appendix) while complying with the principle of confidentiality and non-disclosure (Bourke et al. 2008).

3.5.4. Observation

By way of observation as a data collection tool, I managed to personally observe several things: First, the difference between the performance of novice and experienced interpreters. I also observed how their preparatory strategies were prior arranged, their delays and hesitations that caused speech gaps in the course of the interpreting, their linguistic challenges and how they finally managed to manipulate their interpreting tools. Further, observed were also their note-taking styles, their fluency and speed, the quality of their renditions and how they cope with different language accents, just to mention but a few.

3.6. Validity and reliability of research tools

To ensure that the tools I used were valid and reliable, I deliberately developed a set of questionnaires that I shared with my research supervisors and fellow interpreters. I asked them to examine each item very carefully to see whether the questionnaires matched the objectives of the study. In other words, I wanted to see whether all the questionnaires were valid or, whether they matched what they were supposed to measure (Bond, 2003). All the suggestions made by the above parties were used to modify my tools and this strengthened the tools' content validity. As for the case of reliability, before organizing the final practical interpreting session and making final recordings and transcriptions, I organized a pre-test of my instruments before a small group of interpreters. I did this to test the reliability of my instruments as to whether the answers given to me were consistent with my hypothesis after several rounds of attempts (Creswell, 2005).

3.7. Data analysis

The data collected were analysed according to their nature and type. I used a mixed design that enabled me to generate data of two types, that is to say, the qualitative and quantitative data. The data obtained from views, opinions, comments, personal perceptions, statements, lexical, phonological, terminological and semantic data were analysed using a content/thematic approach.

On the other hand, all the quantitative data collected was analysed using statistical figures, percentage scores and counts of frequency.

To triangulate and consolidate the analyses made, I resorted to all-embracing inductive/ deductive methods according to which conclusions are arrived at through reasoning and based on the statistics obtained. The deductive method (qualitative) helped to arrive at logical conclusions based on-premises or statements. In other words, it is a "top-down" process that usually describes rational steps involved, that is moving from specific to general observations. In contrast, the inductive method (quantitative) uses numbers to arrive at conclusions. It works from particular observations to broader generalizations and theories (Trochim, 2006; Creswell and Clark, 2007). Overall, the data collected contained the interpreters' views, insights and opinions on several challenges they encounter and on interpreting strategies.

3.8. Ethical considerations

In the course of the data collection process, I strived to uphold the interpreter's professional code of conduct and research ethics, norms and standards. In other words, I reported the data obtained with integrity and honesty. I ensured that I abided by international norms and standards in conference interpreting as recommended by different international associations of conference interpreters. I kept the data given to me as confidential and as possible and I did not disclose anywhere the names of respondents who shared their data with me.

3.9. Limitations of the study

The period of conducting my research coincided with the Covid-19 pandemic. This was devastating on my part as it prompted conference organizers in Rwanda, local and international alike to cancel the would-be conferences completely or postpone them to r later dates. This impacted the methodology I was to use in the course of the data collection process and as a result. I resorted to contacting some respondents physically and interviewed them right in their homes and online for those who were far and distant. There were also incredibly prolonged periods of lock-downs during which many preventive measures were imposed and enforced. I was, therefore, unable to use the main Library at Huye Campus which is more resourceful in interpreting literature than any other place in the country. Besides, it was utterly impossible for me to contact my supervisor physically for regular consultations. Thirdly, the distance between me and the team of interpreters who normally rove for interpreting work in many countries across the continent became untenable. I had expected most of them to be part of my respondents, but as the old adage

has it that “if wishes were horses, then beggars would be riding”. This being the case, my dream never came true but instead, it turned out that we kept on being perpetually locked up in homes not knowing when life would return to normal and my research became extremely costly in terms of time and money. Nevertheless, I tried my level best to use e-mail, zoom conferencing, telephone calls, but also found it equally as expensive as the former and often unreliable.

3.10. Conclusion

As a conclusion, I should say that the methods and procedures I used in the process of data collection as here-above described include the formulation of the study design to be used, a list of respondents consulted, research tools, procedures of data collection processes and analysis as well as validity and reliability of research instruments. It also includes a detailed description of major challenges I faced during the data collection process and how I overcame them.

CHAPTER FOUR: DATA PRESEANTATION, ANALYSIS, DISCUSSION AND INTERPRETATION

4.0 Introduction

This chapter presents the findings generated by questionnaires, face-to-face interviews held with responding interpreters as well as observations of in-situ interpreting sessions of scientific conferences by novice interpreters in Rwanda. In this chapter, the challenges of Rwanda's novice interpreters, and causes for poor performance are highlighted and analysed. Solutions are also proposed. Subsequently, conclusions and recommendations are made.

To investigate the practical challenges faced by novice conference interpreters in/ of scientific discourses in Rwanda, different types of data were collected using four research instruments as shown below:

- Recoding/transcribing interpreter renditions to assess the quality of their performance
- Interviews to generate respondents' views and ideas
- Questionnaires to generate the quantitative data
- Observation of interpreters' behavior and actions

The renditions were delivered by three groups of interpreters (novice, semi-experienced and experienced interpreters). Experienced interpreters participated in this study to serve as a control group that enabled the researcher to compare their renditions with novice ones and to draw cogent conclusions. The languages assessed were English and French. All interpreters were advised to render into their 'A or B language', which were either French or English. Conclusions were drawn based on a 5-minute audio/video recording made from previous scientific conferences locally organized in Rwanda which were interpreted by the respondents. The data obtained was transcribed in written form by the researcher. The interpreters' actions and behaviour in the booth were also carefully observed to conclude how they use interpreting equipment and how they cope with linguistic and non-linguistic challenges. All these activities helped the researcher to analyse various types of challenges faced by interpreters on the use of interpreting equipment/materials, hesitations, linguistic and non-linguistic challenges, use of online and/or hardcopy dictionaries and so forth. The interview data were later compiled to generate the interpreters' views and ideas on the exact causes of their specific problems (qualitative data). Qualitative data was analysed based on content/thematic analysis while quantitative data was analysed by using figures, statistics and percentage counts. Conclusions were drawn based on the data obtained from various instruments which were is compared with the data in secondary sources through discussions on findings.

4.1. Study findings and analyses

4.1.1. Respondents' general characteristics

According to the data collected, it was found that conference interpreting in Rwanda is male-dominated even though a few female interpreters exist. Figures collected from the field show that 95% of novice interpreters in Rwanda are males and 5% are females and their average combined range between thirty (30) and sixty-five (65) years age-bracket, while most of them are university graduates with either a bachelor degree and/or above either in languages or language-related disciplines or in others in different subjects (1%).

Besides, few interpreters had a science background (15%) but the rest were high school leavers (non-graduates) who, after completing their high schools and/or tertiary institutions, join the interpreting profession because after trying it they found they were gifted in doing it. Upon gaining experience, the said group subsequently became good conference interpreters. With the inception of the Bachelors and Master's degrees' programs in Translation and Interpretation at the University of Rwanda in 2015, some new interpreters who had then joined the interpreting profession but had had their performance still low got enrolled and are now professional interpreters but now try hard to earn experience.

4.2. Analysis of data based on research questions

4.2.1. Research Question 1

- **What are the practical challenges faced by novice interpreters in Rwanda while interpreting scientific discourses?**

To properly answer the above question, I particularly based myself on the data collected. Accordingly, the challenges Rwanda's novice interpreters' encounter can be grouped into two categories: the linguistic and non-linguistic challenges. For purposes of quality control below is the data collected from recordings of novice interpreters compared to experienced interpreters. Their linguistic challenges were identified, discussed and analysed.

4.2.1.1. Linguistic challenges (LC)

The study found out that the linguistic challenges identified; include linguistic related errors such as the omission of words, incomplete sentences that alter the original message of the speaker, generalization, extravagance and substitutions of words. Omission of words, for instance, is characterized by wrong phraseology, clauses, portioned sentences with incomplete ideas of the

discourse interpreted. Other errors discovered in the study relate particularly to wrong or incorrect grammar and lexis which lead to utter distortion of meanings as a result.

1. Data on grammatical errors, gaps and repetitions

While interpreting, grammatical errors are commonplace in the use of tenses, verbs, nouns, conjunctions, clauses, pronouns, prepositions, adjectives and nouns (Gatitu, 2009), some of these grammatical errors were glaring in the corpus below:

Sequence A [French to English] Conference Speaker:

> Même s'il [est expliqué] (2) qu'elle a joué un rôle important et qu'elle a [sans doute] (2) conduit à la machinerie moléculaire [en partie] (2), [donc simplement] (2) des tout petits concepts. Si je dessine. Est-ce que quelqu'un [aurait](1) un bambou [ou](1) un roseau ? (Total omitted words 10)

Novice Interpreter:

> *Even though* ***[that]*** *we say* ***[that]*** *it plays a major role* and that has **[….]** brought **[us]** to the *molecular machine* ***[machines]*** **[…].** Now, **[…] [these] [are]** few concepts. If I draw. **[All right].** Does somebody **[…]** have **[maybe]** a stick **[…]** a bamboo stick **[that] [I can use]**? **[Well] [we are going to do] [without.]**

Experienced Interpreter (Control variable):

> Even though it is explained that it has played an important role and has probably led to molecular machinery in part, and, therefore, **[to]** very small concepts. If I draw. Does anyone **[would have]** a bamboo stick or a **wood-made cane**?

According to the corpus above, even though the novice interpreter tried to listen carefully to the speaker, he only managed to produce thirty-one (31) words instead of forty-one (41) and, as such, he/ she omitted almost (24.3%) of the words contained in the speaker's message. That is to say, that in the first line alone, the novice interpreter went off-track and made repetitions and additions such as ***''us", "machine … machines" "that…. that"*** and by so doing**,** substituting the sentence. When he/she interpreted into English the sentence which stated that: "***Même s'il est expliqué qu'elle a joué un rôle important…"*** he said that: ***"even though that we say that it plays a major role"*** the rendition earnestly contained serious grammatical deficiencies. Further, he also made several hesitations and failed to present the correct syntax of the adjectival phrase "***machinerie moléculaire"*** and erroneously said: ***molecular machine…machines*** and by so saying, he unnecessarily added the word "**all right**", which did not appear in the speaker's presentation. Under such circumstances, Gile (2011) contends that any additions in the speaker's

words automatically distorts the grammar and original meanings of the speaker's source language. The novice interpreter's rendition, therefore, changed the speaker's original meaning as originally given in the source language.

Based on the aforesaid, therefore, I should dare say, that novice interpreters encounter challenges of grammar due to problem relating to "short-term working memory "that renders it impossible for them to effectively process information (Siti et al., 2018) which is only attainable through practical experience (Moser-Mercer, 1997). Further, based on the earlier literature review consulted, such crass omissions and distortions particularly accrues to lack of specialization in scientific subjects and a lacuna in interpreting scientific discourses and, therefore, serious cause for deficiencies in interpreting scientific discourses (Chomsky, N. 2006; Nishad, A. et al., 2019). This said, several novice interpreters in Rwanda find themselves in the interpreting booths without prior practice nor experience.

Conference Speaker :

> Bien sûr, **j'ai été [très touché par]** [3] tous les **discours,** les **compliments** et **[remerciements]**[1] [que j'ai reçus pendant cette cérémonie][6] et je voudrais bien sûr remercier tous les gens qui ont des effets aussi gentils. [Je ne joue pas à la comédie] [7], je fais juste 2 ou 3 ou juste un tout petit commentaire. [**Je ne joue pas à la belote, mais je pourrais sans doute revoir les cartes]** [15]. (total words omitted 31)

Novice Interpreter:

> **Well,** well of course**, I've been in touch** with all the c**ompliments**, all the speeches **[…] [….] […] […]** during the ceremony, and I would like **[…]** to thank all the people who **have said so nice words** towards me. [Well. Well], I'm just going to give you a couple of comments, though, [of course], **you're going to go to go back to that and see what it is all about.**

Experienced interpreter (control variable):

> Of course, I have been **[very deeply touched by]** all the **speeches**, **compliments** and of course **[thanks]** [that I received during this occasion**]** and I would of course like to thank all the people who have made such a kind impact. [I'm not acting], I'm just making 2 or 3 or just a very small comment. **[I'm not gaming, but I could probably review the cards].**

Based on the above sequence, the novice interpreter in accurately renders unfaithful the French expression "***j'ai été très touché par tous les discours"***, and renders it saying that "***I've been in touch with all the compliments", and*** omits words such as **[*remerciements*]** in the source language (SL) **text.** He made a grammatical mistake saying that "**people who have said so nice words"** and by so saying he utterly distorts the rendition of French expression which states that

"***Je ne joue pas à la belote, mais je pourrais sans doute revoir les cartes"*** *by* saying ***"you are going to go to go back to that and see what it is all about"***. All these language mistakes attest to the fact that novice interpreters still have a big problem of using wrong syntaxes and prepositions and as such distort original meanings.

Conference Speaker :

> Et Marlène **[venait de poser la question de savoir]** (7) si c'est accepté dans notre laboratoire, Marlène, **[faut quand même vous le dire]** (5), elle était **majeure** depuis qu'elle était toute petite. Dans toutes les classes, donc, la question n'est pas vraiment posée. Maintenant, on passe à autre chose. Trop sérieuses, **[j'espère]**(1). C'est à peu près **[à]** (1) la conférence que j'ai faite le 8 décembre. **[Ce que l'on appelle la conférence Nobel]** (8) ou Nobel Lecture. (Total number of words omitted 24)

Novice Interpreter:

> Now, Marilyn [….] **[**you] [also] [know] whether [you] [can] [be] accepted in a laboratory**. Marilyn, […], was a major in all the classes [ever]** since she was young. So the question is not really posed here. So, let us move to [something more serious]. **[…]** So it's almost [in] the conference that I presented on the 8th of December, […] [that is] the Nobel lecture**.**

Experience Interpreter (control variable):

> And…And Marlène [had just asked] whether it's accepted in our laboratory, Marlène, [I have to tell you], **she was of adult age** heee..... **always the best** since she was very young. In all classes, therefore, the question has no reason to be. is not really asked. Now we're on to something else. Too serious, **[**I hope]. That was about [at] the presentation I gave on 8 December. The [so-called Nobel Conference] or Nobel Lecture.

In the above corpus, the novice interpreter uses incomplete sentences twice at the beginning and distorts the meaning . This includes: ***Now, Marilyn [….] [you] [also]; Marilyn, […], was a major in all the classes*** instead of ***he is the best; [you] [can] [be]; accepted*** instead of ***whether it's accepted in our laboratory.*** The above data shows that the unfaithful renditions are caused by linguistic errors which in the literature reviewed lead to ambiguities vagueness and muddles mix-ups in the interpreter output, which is described as very dangerous by (Falbo, 2002). However, compared to the rendition of the experienced interpreter, there is a relatively free flow of words and meaning. The experienced interpreter uses a processing strategy that acquired through experience. For example, he interpreted "***elle était majeure***" with **"s*he was of adult age*".** According to Kalina (1992), he actually uses a strategy of 'repairing' his sentences that helps him to compensate words to achieve cohesive/ coherent utterings that are devoid of grammatical errors. In other words, one of the techniques that experienced interpreters use is to

repair their utterances with gap-fillers (Chan and Kang, 2008).

2). Data on lexical errors

Knowledge and use of Vocabularies in any interpreting sequence is crucial (Caro, 2017). It constitutes one of the most important requirements of language competence needed of any good interpreter (Read & Chapelle, 2001). However, in the case of Rwanda, most of the novice interpreters i encountered lacked mastery in the field as clearly illustrated by the corpus below:

Sequence B [English to French]

Conference Speaker:

> [So, ten years ago] (4) the **[National](1) Academy of Sciences** [has](1) published a [**report**](1) [entitled **forensic science** in the United States, a path forward](10). [The primary] (1) conclusion [of that **report** wasfrankly quite shocking](7) [that] (1) several of the common forensic tools [commonly used] (2) [had little to know] (4) scientific basis. [For decades] (2), juries and [**judges**] (1) were told that [**a fingerprint**] (2) [**or tool mark** found] (4) at the scene crime [matched a known source to the exclusion of all others]. (10) (Total words omitted 51)

Novice Interpreter :

> [……blank spot…] Les **académies de sciences** [ont] publié [une]. **[Une étude],** [et donc **le] rapport,** […] [a comme] conclusion. [Comme quoi que] plusieurs outils de **médecine [médico] légale** [ont été] utilisés sans base scientifique. **[….] Les juristes** [nous ont dit] que les preuves **[…]** au lieu du crime [sont très importantes pour nous].

Experienced Interpreter (control variable) :

> [Ainsi, il y a dix ans], **l'Académie des sciences [nationale]** [a] publié **[un rapport]** [intitulé **Forensic science** in the United States**, a path forward].** La conclusion [principale] [de ce **rapport** était franchement assez choquante] [que] plusieurs **des outils médico-légaux** utilisés couramment [avaient peu de connaissances] de base scientifique**.** [Pendant plusieurs décennies], les jurys et les juges ont appris qu'**[une empreinte digitale]** [ou une marque d'outil trouvée] sur le lieu du crime [correspondait à une source connue à l'exclusion de toute autre].

The novice interpreter goes ahead to unfaithfully render several terminologies as follows*:*

Table 4. Terminologies rendered unfaithfully by novice Interpreters

Terminology in English	**Translation in French**
Forensic science	Un-rendered
National Academy of Sciences	Les académies de sciences
forensic tools	outils de médecine [médico] légale
juries and judges	Juristes
Fingerprint	les preuves/les marques de trace
Report	etude/rapport

***Source*: Primary data**

It is, therefore, evident that novice interpreters often use wrong vocabularies and sometimes hesitate and use wrong vocabularies before changing and use the correct ones. They do not have immediate equivalence owing to poor listening and processing skills. Undoubtedly, they have no working memory capacity to do it. Novice interpreters start with a prolonged blank space that affects their subsequent renditions which ultimately affect their Ear-Voice Span (EVS).

Conference Speaker:

> [Following] (1) the Academy's report [and findings] (1), [this **statement**] (2) could now be challenged in courts [but it remains to be seen how courts would actually be affected by the academy's conclusions or how] (17) the scientific community responds [to the implicit] (3) challenge [they set forth] (3). (total omitted words 27)

Novice Interpreter :

> [**Et après donc],** le rapport de cette académie […], […] [c'est évident]. **Ces preuves** peuvent être **remises en question, remises en question** dans **une cour de justice. [Alors non]. En tant que communauté scientifique, nous devons faire et répondre à ce défi.**

Experienced Interpreter (control variable):

> **[Suite]** au rapport **[et aux conclusions]** de l'Association académique, **[ces propos]** pourraient maintenant être contestés devant les cours et tribunaux **[mais il reste à voir comment ces institutions judiciaires seraient réellement affectées par les conclusions de l'Association académique et on verra comment]** la communauté scientifique va répondre **[au challenge] [qu'elle présente].**

In the above corpus, the novice interpreter starts with a serious gap that disorients his Ear-Voice-Span (EVS). The disorientation created by the gap leads him to futile attempts of using the kind of chunking strategy which ends-up being unsuccessful because of lack of accurate terminology.

Apparently, in the interpretation he rendered renders he added twenty-seven (27) extra words in the Target Language (TL) vis-à-vis the original Source Language (SL) text which has forty-nine (49) words. During the course of interpretation, he tried to reformulate most of his statements in the SL text and wrongly rendered the term ***statements*** for the French word "***preuves"*** *and* repeated the term French word "***remises en question … remise en question"*** which qualifies him to be lacking in confidence or consistence**.** He omits the term **implicit** for lack of equivalence and contradicts himself by saying "***alors non*** "to mean he disapproves his own rendition. Overall, the novice interpreter's final rendition is syntactically and semantically deficient as it is difficult to grasp what he wanted to say. Indeed, he seems to be grossly suffering from lack of listening skills, the main cause of cognitive overload of the working memory capacity (WMC) that affects novice interpreter's final performances**.** Gile (2011) says that if an interpreter fails to capture key information in the process of interpreting, he overloads his MC and produces a deficient rendition as a result.

Sequence C [French to English]

Conference Speaker:

> **[**C'est maintenant le grand moment] [(4)]. Le moment tant attendu [où nous pouvons écouter directement Jean-Pierre Sauvage] [(8)], prix Nobel de chimie 2016, [je me plais à le répéter] [(6)] pour le prix Nobel, pour le design et [la synthèse] [(2)] de machines moléculaires. (total omission 20 words)

Novice Interpreter:

> [All right], now is the time**,** the time we have been expecting **[….]** we want to listen to Jean Pierre**,** the **Nobel Prize of Chemistry** in 2016**. […..]** For the Nobel Prize, for the design and **[….]-the molecular machinery.**

Experienced Interpreter (control variable)

> **[This is now the most exciting moment]**. The highly anticipated moment **[when we can listen to Jean-Pierre Sauvage, face to face]**, he was the chemistry scientist who was awarded the 2016 Nobel Prize in Chemistry, **[I would like to say it again]** for the Nobel Prize, for the design and **[synthesis]** of **molecular machines**.

Although the total number of words contained in the ST is 40, the novice interpreter rendered it with 23 words (57.5%) in TT language. In other words, the rendition of the above segment suffers from gross omissions of very important semantic items, of course not to mention several hesitations. Further, in his rendition, the novice interpreter does not render the term "***synthesis"*** at all. He omits the word "**winner"** in his rendition of the expression "***Nobel Prize winner"***. He simply says "***the Nobel Prize of Chemistry".*** Instead of the expression **"*machines moléculaires*** as ***molecular machines",*** he erroneously says **"*molecular machinery".*** He also seems to have serious problems with rendering proper names. Instead of "***Jean-Pierre Sauvage",*** he simply

mentions the first name **"*Pierre*".**

In the light of the aforesaid, Hanaoka (2002) cautions that interpreting proper names adds an extra effort onto listening and strains memory efforts of the interpreter and advises him/her to adopt "coping tactics" to overcome the challenge.

3). Data on omitted words

Omission of words takes place when concepts, ideas or thoughts expressed in the SL are missing and not reported in the TL (Setton, 2002). The following corpuses show the message omitted by the interpreters under investigation:

Sequence D [English to French]

Conference Speaker:

> **[**Good morning every one] (4). Welcome to **AAAS** [and] (2) to today's [conference](1). My name is Jessica Whyndham [and]. (1) I direct the ***Triple AS Scientific responsibility, [Human Rights and Law](4) Program***. [There may be] (3) ***some of you [in the audience who aren't familiar with AAAS***] (8), [***we're a hundred and] (5) seventy-one years old***. [Hmm…]
>
> (1) "[I know, we look good for our age and with ***the world largest multidisciplinary scientific] (16) membership organization*** [and with the publication of a science] (6) magazine [and the science family of journals which includes multiple journals] (10) ...[eeh](1)..[***science robotics, science translational](4) medicine [science advances*** which is an **open access journal**](8)"

Novice Interpreter :

> [..**….]**Bienvenue à ***triple A[…] à cette conférence***. Je m'appelle Jessica Windham**, j'ai dirigé** la ***responsabilité scientifique de triple AS*** […] **par rapport à ce programme […]. et /pour** ***certains/ d'entre vous […] pourraient connaître cela.*** Nous sommes ***une organisation vieille de soixante-onze ans.…*** **/tri…/ /triple A/,** /C'est une organisation faite de membres/**.** /Nous avons/…, nous publions des magazines, des **revues de** médecine **/médico légale** et nous/….

Experience Interpreter (control variable):

> [Bonjour à tous]. Bienvenue à **l'AAAS** [et] à la [conférence] d'aujourd'hui. Je m'appelle Jessica whyndham [et] je dirige le programme Triple AS sur la responsabilité scientifique, [**Droits de l'homme et Affaires juridiques**]. [Il y a peut-être] **certains d'entre vous [dans le public qui ne connaissent pas l'AAAS]**, [nous avons **cent] soixante et onze ans.** [...] " [Je m'imagine, que nous sommes en forme pour notre âge et avec l'une des plus **grandes organisations scientifiques multidisciplinaires** au monde] [et nous publication notre revue sur la Science] [et la famille des revues scientifiques qui comprend plusieurs journaux et magazines] ...[eeh]. [**Science Robotique, science translationnelle] médecine [science avancée**s qui est une revue scientifique gratuite] ».

Based on the above corpuses, the rendition contains serious omissions because the source Language (SL) text comprises ninety-seven (97) words while the target language (TL) text has 66 words. In other words, huge chunks of the information were left out or unfaithfully rendered. For example, he referred to **AAAS** conference as ***triple A*** after making hesitation. He also uses past tense (**j'ai dirigé instead of "je dirige")** and distorts the meaning of the rendition. He says that some people do not know "AAAS ***certains/ d'entre vous […] pourraient connaître cela"*** whereas the speaker actually said the opposite "***some of you [in the audience who aren't familiar with AAAS"***. Further, he wrongly reports the age of the association by saying that it is seventy-one (71) years instead of one hundred seventy-one (171). All these linguistic challenges constitute a clear testimony of how novice interpreters' performance is impacted by poor listening skills and chunking strategies which overloads his WM.

A. Interview data

Based on the data generated from interviews held with interpreters, a mention on their linguistic challenges was made, while interpreting scientific discourse. Below is what they answered:

NOI-2 "Interpreting a scientific discourse is always a frustrating exercise for most simultaneous conference interpreters because most of us have a language and not a scientific background. We did not study science subjects at university level."

NOI-1 "In the recorded speeches I have just interpreted, there is a high level of technical vocabularies and specific terminologies which I don't understand. I therefore give approximations."

NOI-3 "Frankly speaking, interpreting the scientific discourse is a very difficult experience for novice interpreters because we actually lack scientific-related documentation such as glossaries of scientific terms."

NOI-5 "Speakers who make scientific presentations are qualified scientists. They know exactly the subject matter and theories they are talking about. They are very familiar with scientific themes while using their own scientific language. Even the audience is from the scientific background. But for novice interpreters, we are not from the same level of knowledge and are ill-prepared to cope with such scientific environment. We sometimes get lost while interpreting scientific matters."

NOI-4 "We also find difficulties in coping with accurate abbreviations of scientific Acronyms and symbols because these cause many problems to us."

NOI-6 "Many novice interpreters are unfamiliar with the speakers' different accents. Speakers with such accents speak very fast and don't care about interpreters in the booth."

NOI-7 "It is very difficult to translate scientific terminology in Kinyarwanda because many scientific terminologies has no equivalents in Kinyarwanda. Even, when we interpret in English or French, these are not our L1."

The above qualitative data justifies the view that language-specific challenges constitute a big problem for Rwanda's novice interpreters. The data also shows that these challenges include but not limited to: (1) belonging to a non-scientific background, (2) unfamiliar technical terminologies y, (3) lack of glossaries of scientific terms, (4) problems of unfamiliar scientific acronyms (5) different accents of speakers who (6) tend to speak very fast. If we compare the data from the field with the literature reviewed, we find that the PACTE model established by the research group in the European Union on interpretation, has set a hierarchy of sub-competencies that are interdependent and hierarchical and can compensate for one another (Zinukova, 2016). These are competences which must be possessed by all good interpreters. They include:

- The bilingual sub-competence
- The extra-linguistic sub-competence
- The knowledge about translation sub-competence
- The instrumental sub-competence,
- The strategic sub-competence
- The psycho-physiological sub-competences

The PACTE model assumes that in acquiring interpreting competence (IC), bilingual competence is not an issue as such, but it is the strength necessary for a good interpreter (Zinukova, 2016). Interpreters also need to acquire a set of other competences in the model for them to perform competently, a fact that Bogucki & Deckert (2016) asserts:

> "predominantly procedural knowledge needed to communicate in two languages. It includes the specific feature of interference control when alternating between the two languages. It is made up of pragmatic, socio linguistic, textual, grammatical and lexical knowledge in the two languages."

In other words, as evidenced by the available data in the above corpuses, one can dare conclude that many novice interpreters in Rwanda still lack proper application and coordination PACTE competence-based model which encourages the language learner to reflect on the use of target language (Donato and Adair-Hauck, 1992) . The study equally revealed similar aspects of linguistic challenges as those identified by other researchers. For example, Tryuk (2007:99-121)

identified challenges related to "production speed, pronunciation, information density measured in the level of redundancy, non-verbal elements of communication and similar others.
Another serious challenge facing novice interpreters in Rwanda is that when they interpret in scientific conferences, they are required to do it into French or English, whereas neither of the two languages belong to their language A. According to Jankowski (2016) 'interpreting directionality' is an important factor influencing the performance of interpreters as it strongly shapes their emotional attitudes. Based on the above study, many novice interpreters complained that directionality towards their A-B mode causes problems relating to source text delivery speed (Bogucki & Deckert, 2016 and that such problems are caused by limitations in vocabularies that make their mental processing too demanding, thus, leading to a detrimental effect of A-B interpreting. It is, therefore, clear that if one is interpreting towards his/her B or C languages, his/her performance is likely to be affected as in the case of novice interpreters in Rwanda.

Accordingly, the European Union institutions advice demand interpreters to strictly render their interpretation towards their A mode as underscored in "Jankowski's (2016)" citation below:

> "*It is all the more interesting how steadfast European Union institutions are in their insistence on the B-A mode of interpreting."* (Jankowski, 2016).

As for difficulties encountered in technical terminologies common with Rwanda's novice interpreters, scholars like Gile (1995) have it that the technicality of speeches remain a set-back for novice interpreters 'ability to grasp what has been said and negatively impacts on interpretability. However, some have argued that interpreting scientific discourses is not all about interpreting specialized terminologies alone, but the contextual mind as well, arguing that special syntaxes with high numbers of grammatical metaphors can also be counterweighed by the interpreter's power of textual analysis (Halliday and Martin, 1993).

Another common feature identified in the course of my literature review relates to technical vocabularies are the degree of abstractness and figurativeness glaring in specialized discourses (Caplan, 2002). Novice interpreters tend to use additional capacity in processing at cognitive level because concrete words are translated more quickly and more accurately than abstract words as alluded in (Groot, 1997:37). Besides, Tryk (2007:102) adds that majority of metaphors used in the original speeches are lost as a result of the interpreters' tendency to omit them. As regards speakers' speed in presentation, also known as 'presentation rate' which has been proved detrimental in in terms of interpreting error rate (AIIC, 2002:29). Speed of conference speakers is feared by many interpreting practitioners because it burdens their memory load.

B. Questionnaire data

Based on the available quantitative data fetched from questionnaires, novice interpreters in Rwanda were asked a question relating to most frequent linguistic challenges they face when interpreting in scientific conferences and questions and answers given are summarized in table one (1) below:

Question 1: Identify the type of linguistic challenges you most frequently face when interpreting in a scientific conference.

Figure 2: Data on linguistic challenges by novice interpreters

Type of challenge (LC)	**Frequency**	**Percentage**
Grammatical errors (GE)	2	16.6 %
Errors of syntax (ES)	1	8.3%
Errors related to terminology and scientific vocabulary (ESV)	3	25%
rrors related word-omissions and incomplete sentences (EO & IS)	4	33.3%
Difference accents of conference speakers (DAS)	2	16.6%
Total	12	99.8%

***Source*: Primary data**

According to the table above, most of the novice interpreters in Rwanda (25%) assert that they encounter difficulties in interpreting scientific terminologies. 33.3% of them also contend they are usually caught-up in a situation where they are forced to omit words and render incomplete sentences as a result. Others openly explained that they are fraught t with grammatical errors, while 16.6% of them lamented they have serious syntaxical (8.3%) and language accent problems and errors (16.6%), all forcing them into giving false equivalence of SL into the TL texts as a result "Sinclair, M. 1992, Blass, R. 1990". Further, the problem of omissions, generalizations, intrusions, additions, and substitutions and many others which are unjustifiable and unacceptable in interpreting (Falbo, 2002: 121-122) lead to errors and distortions of meanings (Gile, D. 2011:209).

As discussed in earlier interviews held and on the data collected, it can be deduced that lexical problems are well commonplace among novice interpreters in Rwanda due to their educational backgrounds. Some belong to liberal arts and others are simply graduates from various tertiary

institutions. All these find it very difficult to grasp the accents of some of the speakers who come from other countries different from theirs. It requires them to do a lot of exercises to be able to familiarize themselves with pronunciations. Another question asked in the questionnaire was:

Question 2: Did you take science subjects in your undergraduate degree courses or trainings?

Figure 3. Data on Scientific Education

Category of interpreters	Frequency	Percentage
Yes	1	8.33
No	11	91.66
Total	12	99.9%

Source: Primary data

The data presented in the above table shows that most of novice interpreters in Rwanda did not study science subjects tthe reason why they face serious mental load (WMC) problems in terms of processing. By inference, there is therefore, dire for them to train intensively if they have to catch up with the necessary basics of skills such as listening, work memory and logical co-ordination of ideas. They have to try and learn syntax and grammar and become more knowledgeable and linguistically competent. They need, above all, to have other interpreting sub-competence skills earlier mentioned to surpass the existing linguistic challenges that face them (Gile, D. 2011).

4.2.1.2. Non-Linguistic Challenges

A. Interview data:

In the course of interviewing Novice interpreters (NOI) I obtained information by asking them questions relating to their non-linguistic challenges they face while interpreting the scientific discourses and below is what they responded:

> **NOI-1:** "I was interrupted and upset by disharmonized channels of languages from conference booths. The transmission systems were not properly installed and checked by technicians before the conference started. There was a sound mismatch from the microphone that led to noise interferences."
>
> **NOI-2:** "I was affected by lack of adequate lighting and the booth didn't have total soundproof in. Later on, I became nervous and this affected my performance and I strayed."

NOI-3: "I lacked concentration because of the mental distraction. I went off track and became dumb silent. My attention was divided and untenable and I fail to grasp what the speaker was saying."

NOI-4: "I could not put myself in the same emotional frequency with the speaker and the audience. I was assigned to a remote simultaneous interpreting, and could neither see the speakers nor the audience. I therefore couldn't follow signs expressed by the body language of the speakers."

NOI-5: "The meeting was hectic and I lost courage and determination, because of my poor cognitive level that couldn't cope with the high level science-related topics. I am not from a scientific background."

NOI-8: **"**I was ill-prepared for the conference because the time given to prior preparation of the conference was not enough for me to cope with terminology and technical vocabulary, and interpreting scientific acronyms and symbols. I didn't receive any related documents of speakers in advance to help me prepare for the scientific conference."

The above data justifies the view that non-linguistic challenges practically pose a plethora of challenges to Rwanda's novice interpreters. These challenges range from (1) poor technical installations in conference set-ups and interpreting booths, (2) poor sound system and equipment, (3) lack of prior preparation for the conference, (4) absence of documentations or written presentations given to interpreters in advance, to (5) mental distraction leading to a divided attention..., and many others. All these non-linguistic challenges lead to the problem of overloading the working memory capacity (WMC) of the interpreter.

The above challenges are quite similar to what some other scholars have already found out elsewhere. While investing into the impact of the interpreters' work environment such as lightning, temperature, humidity and air quality in the booth with regard to the quality of interpreting (Kurz, 1981, 1983a, 1983b; Kurz and Kolmer, 1984), found-out that many interpreting mobile booths are of poor quality and affect interpreters' performance as a result. In fact, the International Association of Conference Interpreters (AIIC) was recently tasked to assess environment related problems facing interpreters and asked to recommend appropriate measure on how best to improve interpreting booths based on the ISO standards. In the course of my research work, I realized that the state of interpreting equipment tremendously affected the flow of communication between the interpreter, speakers and finally the audience (Sperling, 2011) because it results in sound mismatch that consequently affects interpreters' performance (Fantinuoli, 2018).

Moreover, many interpreters are equally affected by psycho-physiological factors when both sound and lighting system in the booth are poor. Other studies point to conference speakers'

accents that impact negatively on the SI quality (AIIC 2002; Albl-Mikasa 2010) and reduce the accuracy of renditions (Chang 2005; Buss 1988; 1989). That is why, it is important for interpreters to get prepared in advance (Longley 1989) and keep abreast with conference equipment to avoid disorientation (Roland 1982). As regards the issue of prior preparations for conferences the fact found out that time need always be given to interpreters for purposes of prior preparations as it allows them to read through conference documents like speeches.

They should also be allowed time to interact within the booth, with the audience as well as conference organizers to allow them reduce their cognitive overload (Stoll, 2009). In fact, preparing for a conference is crucial for any interpreting assignment, especially when the subject is scientific and highly specialized (Gile, 2009 et al.) In all, prior preparations on the part of interpreters allows them to get ready for the assignment and to properly plan for the interpreting exercise (Fantinuoli, 2017).

A. Questionnaire data

In the data generated by questionnaires, novice interpreters were asked to state the most frequent non-linguistic challenges they face when interpreting in scientific conferences.

The findings obtained are presented in the table below after stating the question posed to the participants:

Type of challenges (NLC)	**Frequency**	**Percentage**
Lack of preparation prior to interpreting (IPT)	3	25%
Speakers' high speed and strong verbal accents (FSR/SVA)	2	16.6 %
Poor background of Lack of scientific education	3	25 %
Poor states of simultaneous interpreting equipments.	2	16.6 %
Hyperactivity of the Working Memory	2	16.6%

- **Question: What do you think are the non-linguistic challenges you face mostly when interpreting in a scientific conference?**

Figure 4: Data on non-linguistic challenges by novice interpreters

Poor visibility of the conference speakers' body language.	0	0 %
Total	12	99.8%

Source: Primary data

According to the above, 25% of the novice interpreters in Rwanda complained of not being given enough time to prepare before the conferences starts. 25% others whined lack of scientific education in their earlier training, while 16.6% said they were unable to cope with the fast speed rate some of the conference speakers from foreign countries use, especially those who speak in an American accent. Others complained of poor quality interpreting equipment (16.6%), while 16.6% of all the interviewed novice interpreters expressed much concern on the issue of stress and cognitive load that affect their working memory.

Based on the aforesaid, PACTE classifies non-linguistic sub-competences as follows:

- The interpreting knowledge sub-competence,
- The technological competence, thematic sub-competence,
- The intercultural sub-competence,
- The strategic sub-competence
- The psycho-physiological sub-competences.

In light of the above 'Interpreter knowledge competence' deals particularly with interpreters' knowledge in matters of professional practice as well as ethical matters (Hlavac, Jim et al. 2017). For Rwanda, there is a need for a national association of interpreters in the country with a legal status to oversee not only the implementation of the code of ethics for interpreters but also their performance. Most of interpreting industries in Rwanda are driven by mere economic survival and often seek to hire novice interpreters at cheaper price and at the cost of quality standards of interpreters. Further, regarding the technological sub-competence, PACTE shows that it aims at developing specialist knowledge in interpreter to develop a spirit of curiosity in searching for reliable information so that he can attain a high level of problem-solving in the field of interpreting (Gerd, W. (2008); Zinukova. 2016). Thus, unlike the European interpreting agencies which encourage interpreters to specialize in special fields of academic disciplines (court interpreting, medical or scientific interpreting, etc.) most Rwandan interpreters are not specialized in any field but are mere '***jacks of all trades and masters of none!'***.

As regards 'thematic sub-competence', PACTE further indicates that interpreters need to have procedural knowledge on how they should use respective documentations such as ICT interpreting tools, books, encyclopedia, dictionaries and texts used in interpreting (Fantinuoli, Claudio. (2018). surprisingly, we have not yet reached the stage of compiling a terminological data-base in the field of translation for use in the future. Each interpreter struggles on his/her own and ends up performing badly. Further, PACTE's 'intercultural sub-competence' refers to socio-linguistic and textual factors like the cultural knowledge of interpreters in their vernacular (mother-tongue), foreign languages, encyclopedic knowledge and knowledge of the interpreter's specialized subject-matter (Kautz, 2000, p. 430-4). This area of sub-competence is also poorly catered for in Rwanda.

As for PACTE's 'strategic sub-competence' which deals with procedural and problem-solving skills, efficiency and improved performance as it does away with the interpreters' challenges (Xiangdong, Li. 2015; Wotjak, G. 2008), you find that this competence also scores poorly among novice interpreters and, therefore, there is a need for strengthening. Lastly, PACTE's 'psycho-physiological sub-competences' that relate to the ability of the interpreter to use their psychomotor mechanisms for purposes of creativity, logical reasoning, analysis and synthesis (Zinukova. 2016:20) is a competence that can be developed if interpreters do a lot of reading, travel to foreign countries, participate in seminars and so forth. It is this sub-competence that is capable of helping them cope with challenges of intellectual curiosity challenges, perseverance, rigor, innovation and critical thinking. All this calms down stress and relieves WMC overloads for quality rendition. To acquire this level of skills, Rwanda's novice interpreters need time to experience their career to the level.

In nutshell, it should be argued that the needed sub-competences for becoming better interpreters are both lingusitc and nonlinguistic. However, judging from the classifications given PACTE group point of view, it is evident that non-linguistic components overweigh linguistic one (source), a fact that justifies the view that linguistic sub-components are necessary but not indispensable (Godinez, C. J. et al. 2019) in interpreting. Thus, it would be erraneous to think that linguistic or bilingual sub-competences automatically qualifies someone to be an interpreter and very few conference interpreters of scientific conferences in the developing countries (like Rwanda) qualify to be called conference interpreters by dent of their bilingualism (Kalina, 2000).

4.2.2. Research Question 2

Most of the novice interpreters (NOI) answered questions and expressed their views on the causes of poor performance in interpreting in scientific conference. Below, is the question posed to them and the answers they gave to it:

- What are the main causes of these poor performance by novice interpreters?

NOI-1: "Conference organizers don't give us any information or documents before the conference takes place. This leads to our poor performance."

NOI-2: "My poor performance is associated with my training background. Since my school days, I never liked such science subjects like: Chemistry, physics, biology and maths. But later, I found myself becoming a conference interpreter. I also have a serious problem of accurately interpreting scientific terminologies."

NOI-3: "My insufficient knowledge in general knowledge and the lack of a spirit of openness to the world of science affects my interpreter performance."

NOI-4: "Poor interpreting equipment causes poor interpreter performance. The equipment used by interpreting agencies in Rwanda is very old and second-hand. I always expect to have technical problems during the conference."

NOI-5: "The technicians who install simultaneous interpretation equipment in Rwanda sometimes do their technical installations poorly and this affects our performance."

NOI-6: "A poor reading culture and oral expression in foreign languages, either in French or in English affects our performance."

NOI-7: **"** Lack of someone experienced to mentor us novice interpreters in Rwanda causes our poor performances."

NOI-8: **"**I'm a linguist, but not a scientist that is why my renditions ins scientific conferences are poor."

Based on the above, respondents raised several causes for their poor performance, including among them: Inaccessibility to speakers' documents prior to the start of the conference; non-scientific backgrounds on the part of interpreters, inadequate knowledge on current affairs, poor quality equipment, installations and unskilled technicians. Indeed, these findings are just similar to what other researchers found. Díaz-Galaz (2015) for instance, alluded to the provision of conference-related documents prior to the start of the conference. He is of the strong view that interpreters need to have

access to conference materials before-hand so as to be able to get familiarized with terms, names, numbers and concepts and grasp the big picture of the conference theme. Kalina, (2015) on her part, strongly castigates impromptu presentations of scientific discourses and technical subjects. He argues that presentations without having the necessary materials at hand are contrary to interpreting code of ethical conduct. It is, therefore, advisable for conference organizers to know what interpreters need and provide it in advance (Chacon, 2013). The challenge relating to poor quality of equipment that results in poor performance was also buttressed by other researchers. For instance, Fantinuoli (2018) argues that interpreters cannot perform if equipment they use do not properly function. He points a figure to such equipment as sound-proofed booths, interpreters' consoles, microphones, headphones, sound receivers and transmitters need to be. Fantinuoli underscores that fact the technicians to operating them must equally be skilled and experienced.

They need to have been prior trained to do the job or must receive regular refresher courses on specialized programs of sound management systems (Gile, 1992; Harris 1997). They should be able to promptly intervene and rectify all equipment-related technical concerns, including, among others, interferences, glitches, sound-chocks, noise, distraction, high temperature and many more. Indeed, poorly trained technicians affect interpreters' output. As for findings relating to lack of appropriate scientific terminologies as a cause of poor interpreter performance, Gile (2009) and Will (2007) argues that interpreters should be equipped with overall thematic knowledge including terminologies and specialized technical glossaries (Picht & Mayer, 2009). Unfortunately, novice interpreters in Rwanda lack the basic knowledge in scientific disciplines (Zulkarnaen, Zulkarnaen & al. 2018).

There is, therefore, for them to be innovative and to read, extensively, specific books particularly on the world of science (Zinukova, N. 2016). They ought to have sufficient exposure to sciences and science subjects obtainable through training and should be continuously refreshed and intellectually updated.

B. Questionnaire data

Novice interpreters were asked about causative factors affecting poor interpreting performance and the following are summarized findings:

Question: What are the main causes of poor performance of interpreting in science conferences?

Figure 5. Data on the main causes of the challenges

Type of challenges	Frequency	Percentage
Non-mastery of scientific Terminologies	6	17.1 %
Absence of interpreters' Education	5	14.5 %
Poor Quality of simultaneous Interpreting Equipments (SIE)	6	17.1 %
Conference-related documents are not given to the interpreters early enough prior the meeting	6	17.1 %
Lack of experience in Interpreting Scientific Discourse	4	11.4%
Lack of Interpreting Skills and competences	5	14.2 %
Incompatibility Scientific Language	3	8.5 %
Total	35	99.9%

Source: Primary data

Based on the table above, most novice interpreters in Rwanda (17.1%) say their main challenge is Non-mastery of scientific terminologies.

Others said that organisers do not provide them with conference-related documents early enough before the conference (17.1 %). Others (17.1 %) point a fingure to poor quality of Simultaneous Interpreting Equipment (SIE), while others (14.2%) complain of serious lack of language interpreting competences and others complain of lack of personal flair such as intuition, attention, concentration, and traits. Effective communication through working languages, the appropriate use of the techniques of translation and interpretation and proper use of ITC and so on (Kornakov, P. (2000). Yet, 14.5% of the respondents insisted on of academic training or education in simultaneous conference interpreting and few others (11.4 %) said that they had no prior experience in scientific conference Interpreting. It was only (8.5%) of all the respondents who mentioned that times inability to cope with the scientific language caused them to perform poorly. In all, causes of interpreters' poor performance in Rwanda is mainly due to linguistic and non-linguistic factors.

4.2.3. Research Questions 3

- **What should be done to solve the problems faced in interpreting the scientific discourse?**

A. Interview data:

The respondents expressed their views, opinions and attitudes on how to solve the problems faced by Rwanda's novice interpreters. Below, are the data fetched by interviews:

> **NOI-7:** *"*One of the solutions is to provide interpreters with the information on the subjects of the meeting prior to the conference. This helps to prepare glossaries, and if need be, have time to look for more information through the internet,

because some of those scientific technical concepts need to be searched for!"

NOI-6: "It is imperative for interpreters to be trained in interpreting. This helps them to get appropriate knowledge and skills required for interpreting practice to attain excellency in practical performance."

NOI-1: "I can build my capacity in scientific terminologies through constant and extensive reading and learning. I would also like to be mentored by those who already have expertise in the field."

NOI-3: "…I would like to strongly emphasize that all the interpreters concerned by science-related disciplines should be equipped with interpreting competence, practical expertise and experience."

NOI-2: "In my view, I suggest that modern high-tech simultaneous interpreting equipment, that meet international standards should be used."

NOI-5: "Enough preparations for interpreters to get ready for the meeting. This is one of the appropriate strategies to cope with the vocabularies and can enable interpreters to check for new words and terminologies."

NOI-4: "Training is the cornerstone for excellent performance e. It is better for me to be specialized in specific domains, such as scientific disciplines. Training in special technical courses that can lead to better performance as a conference interpreter."

NOI-8: "In addition, having postgraduate training in interpretation in interpreting schools is good but not enough. Interpreters need experience acquired through continuous learning and on-job trainings."

NOI-10: "Regular practice in the interpreting for mastery is paramount. The solution calls for interpreting profession because it is the only way forward ."

In light of the above all respondents suggested that improving novice interpreters 'performance in Rwanda can surely become "a dream come true" if only the organizers are able provide conference documentation to interpreters before the conferences begin and if they are well prepared psychologically beforehand. According to respondents, 'mentorship' of novice interpreters remains *sine qua non* and should always remain supervised by career interpreters. They also underscored the need for extensive reading of scientific articles published in scientific journals in different science disciplines and trainings in the field of science-related subjects, a fact corroborated by Sanger and ***Ziyatdinova*** (2013) who argues that scientific conference interpreting is very challenging and demanding because it involves manipulation of many things at the same time. It involves having specialized knowledge in scientific terminologies acquired through academic training (either in translation, interpreting or continuous technical training in various scientific disciplines). It involves prior preparation for scientific meetings. Interpreters, therefore, need to be knowledgeable in using interpreting equipment and always striving to practice for expertise. Daniel Giles (1985) is of the view that

novice interpreters must think out of the box, they must become innovative and critical thinkers if they need to perform.

B. Questionnaire data

- What should be done to solve problems faced by novice interpreters in interpreting scientific discourse?

As for this question, participants proposed few interesting answers as summarised in the table below:

Figure 6. Data on challenges and solutions:

Category of Interpreters	Solutions	Frequency	Percentage
Novice and experienced	Training in T &I plus training in various scientific disciplines	15	50
Novice and Experienced	Prior preparation before the conference with documentation	10	37.5 %
Novice and Experienced	Experience and mentorship: continuous learning and apprenticeship for excellency	8	25%
Novice and Experienced	Ability to use and handle interpreting equipment	2	12.5%
Total		35	100%

Source Primary data

As the table above illustrates, solutions to improving interpreters' performance are hereby proposed. 50% of the respodents advocated for constant in-house and refresher training courses and seminars to update interpreters with scientific knowledge. 37.5% proposed that conference organisers give time to interpreters to prepare for the conference, send them all conference related documentations in advance for prior acquaitance. 25 % suggested that novice interpreters

be mentored by their presdicessors for onjob training and 12.5% suggested they needed basic skills in manipulating interpreting equipment. In all, it is important to note that all novice interpreters consider implementing all the above suggestions worthwhile.

4.3. Conclusion

In this chapter, the researcher carried out a study on practical challenges faced by novice conference interpreters in Rwanda, their causes for their poor quality performance and suggests way forward. The study further conducted a qualitative and quantitative data collection and finally processed and analyzed it. The analysis and discussions held on findings were a result of ***in-situ*** interpreting assignments given to cohorts of a set of selected novice interpreters in Rwanda and it is on the basis of their views and ideas that causes for their poor quality performance were identified and suggestions for improvement proposed.

CHAPTER FIVE: SUMMARY OF FINDINGS, CONCLUSION AND RECOMMENDATIONS

5.0 Introduction

Upon presentation and analysis of the data under the research objectives, below is the summary of findings, conclusions and recommendations.

5.1. Summary of findings

Major challenges Novice interpreters face in Rwanda face are mainly **linguistic and non-linguistic.** These include:

5.1.1. Linguistic Challenges (LC)

- Novice interpreters in Rwanda are ignorant of specialized terminologies and lack specific referential like compendia, encyclopaedia and specialized dictionaries for specific particular subjects;
- Their renditions suffer from gross word omissions, incomplete sentences, generalizations, superfluities and substitutes;
- Their renditions suffer from grammatical, lexical and syntactical errors;
- Many of them are devoid of adequate linguistic knowledge and skills;
- They are insufficiently resourced in the use of lexical equivalences and specialized terms;

- They lack familiarity with interpreting numbers, figures and acronyms.

5.1.2. Non-Linguistic Challenges (NLC)

- Novice interpreters are not given adequate time to prepare before conferences begin;
- Their working environment like conference rooms and booths are poorly installed with no soundproof;
- They don't have a scientific background in their initial training. Most of them belong to the background of arts and humanities;
- Rwanda's novice interpreters are not given enough time to prepare for the conference to be able to go through conference documentations and main written speeches;

5.2. Causes of poor interpreters' performance

- Lack of language and non-language related competencies;
- lack specialized terminologies which pose serious problems when interpreting in scientific conferences;
- Absence of ample time to read conference documentation before the conference starts;
- Lack terminology databases for interpreters;
- Lack of adequate general knowledge in scientific and related other disciplines.

5.3. Solutions

- Need to enhance training through refresher courses, and seminars on interpreting Need to be monitored by seasoned interpreters;
- They should conduct an extensive reading of scientific articles in international peer-reviewed journals;
- They should always ask conference organizers to give them conference documentation
- beforehand.

5.4. Conclusion

Conference interpreting is a challenging profession to undertake and it is even more cumbersomely challenging when it comes to conference interpreting of scientific discourses, particularly, for nonstarters like novice interpreters. There is, therefore, a need for the latter to

undergo intensive training in the profession, not only for the sake of obtaining the necessary knowledge but also, for having access to in-depth field practical skills and apprenticeship in the field of interpreting. Besides, based on the findings of the present research, it is quite evident that novice interpreters in Rwanda naturally encounter many indomitable challenges which include but not limited to linguistic challenges like grammatical and syntactical errors that can be eliminated through proper education. Findings further underscore several non-linguistic challenges which particularly concern preparatory procedures to conference interpreting, such as the interpreter's mental prowess concerning short-term work memory, speakers' accents, the quality of equipment used in conferences and personal preparation on the part of interpreters, just to mention but a few. In light of the above, therefore, I remain faithful to the view that all the aforementioned challenges currently facing novice in Rwanda can only be counterweighed through training in languages and in skills of conferences interpreting to scale up their competencies in this noble discipline.

Besides intensive training, there is also a need for novice interpreters to make necessary preparations before taking up conference interpreting assignments, notwithstanding the use of quality equipment as well as setting themselves in thoroughly stable mental states. In all, education and training, language proficiency, quality types of equipment, stable mental states for novice interpreters, are all sine qua non-mainstays for improved performance of Rwandan Novice Conference interpreters in/of scientific discourses.

5.5. Recommendations

The study recommends all the stakeholders the following:

- **To the University of Rwanda:**

The University of Rwanda needs to try its level best and instil a culture of professional flexibility
that allows its graduates to cross freely
from one employment type to another. Interpreting
as a profession, is Certainly a cross-cutting profession and science students both at
Bachelor's and Master's levels need to seriously pursue interpreting as a career profession to scale up their future scope of employability, the latter need to build their practical capacities and skills that would allow them easy flexibility of changing employments based on time.

- **To translation/interpretation agencies:**

There is a dire need for the presence of a regulatory body at the national level to establish and oversee the professional code of ethical conduct for professional interpreters, one that should superintend and enforce interpreters' thresholds required for their professional practice.

- **To Novice Interpreters**

Novice interpreters need to vie for specialization in different professional fields such as medical, technical and scientific, legal and court interpreting- you name it. This will enable them to be more familiar with specialized language vocabularies and terminologies specific to the field in which they are assigned to interpret. Indeed, there is a need for them to improve their knowledge in the field of information technology (IT) as well as in the technical use of IT tools. There equally need for them to have access to such IT tools as online translation dictionaries, computer-aided technologies and translation software machines.

5.6. Recommendations to future researchers

Based on the research findings, I wish to draw the following recommendations for future studies: To conduct similar research studies in a spectrum, whereby various performance variables to interpreting like compliance with the code of ethical conduct are taken into account, placing particular emphasis on "the analytical integration and science-based specialization of scientific conference interpreting in Rwanda."

Then, explore "the Promotion of the Court interpreting in Rwanda: challenges and opportunities." Finally, I wish to recommend that a qualitative study be conducted on the "socio-cultural challenges of the Community interpreting in Rwanda".

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APPENDICES

RESEARCH QUESTIONNAIRE

Dear colleague;

Hope, I will find you well!

As you may know, I am currently pursuing a Master's degree course at the University of Rwanda (UR), in the College of Arts and Social Studies (CASS). In order for the university to award me the said degree at the end of the course, I am obligated to have successfully conducted and defended a research thesis to the satisfaction of the members of the University Board concerned. However, in order for me to vindicate my personal observation and hypothesis, i opted to conduct the said research on causative factors of practical challenges facing locally based simultaneous Novice conference interpreters in their mundane work and, there-after, tout for solutions. I also decided that throughout my research thesis, particular emphasis be placed on the famous *"Daniel Gile Efforts' Model"*. Your voluntary contribution will be highly appreciated.

Based on the aforesaid, allow me to place greater emphasis on the following: :

1. How practical challenges in simultaneous conference interpreting lower the quality of interpreters' performance? (English into French or the vice versa);
2. What inputs or information do you consider paramount in the present research process;
3. Kindly tick or circle the answer you consider most appropriate of all others in the multiple questions;
4. On the list, some are open questions and others are not, therefore, based on the substance of the content, I shall be pleased if you made your personal comments, giving detailed explanations in support of the views you put forward.
5. Besides, be rest assured that your contributions remain confidential and undisclosed to whomsoever(names, personal contacts);

NB: We look forward to receiving your valuable contributions and we remain hopeful that your views and suggestions will serve to improve locally-based simultaneous Novice conference interpreters of scientific discourses.

PERSONAL IDENTIFICATION

a. Names (optional):

b. Gender: Male____/ Female____

c. Age

- (Less than 35): ……;
- (35-45): …….;
- (45-65) …….;
- (65 and more) ……;

d. Nationality…….……

e. Years of experience in the field of Conference Interpreting: .....

f. Field(s) and Level(s) of education ……..

g. Any additional training or specialization: …….....……
Language proficiency:

A:……... ; B:…….....……

C:…….. ……..… : D:…….....……..……..

h. What is your most frequent working language combination?

I……...

II……..

III…….

IV…….

SPECIFIC QUESTIONS

1. What do you understand by the term "Practical Challenges" in interpreting scientific discourses?
2. What do you particularly think are "practical challenges" faced by the conference interpreters in Rwanda when interpreting in scientific discourses?
3. In your view:
    a. List down what you think are likely challenges:
    b. Explain what you consider as causative factors to challenges listed above?
4. How do you think the above practical challenges should be solved?
5. Have you ever participated in the rendition of simultaneous interpretation in any scientific discourse or related conferences/meetings? - If " yes ."
    i. What was your language combination and what kind of attitude did you have? (specify);
    ii. If the answer is NO, kindly specify how often conference interpreters render their interpretation from English to French or the vice versa and what they do to overcome the practical challenges?

        1. Very often… .....,
        2. Often……,
        3. Slightly rare…...
        4. Rarely……, (try to be specific in your answer).

INTERPRETING PERFORMANCE

6. When conference interpreters are classified on the basis of experience, which category is likely to be more affected?

    1. Gender:

    a) Men……,
    b). Women……,

    2. Age:

    a) Young adults (Less than 35) .....,
    b) Middle-aged adults (35-50) ..... ,
    c) Old adults (60-80) ….....

3. Level of education:

a) Undergraduate… .....;
b) BA degree. .....;
c) MA degree. .....;
d) PhD degree. .....;
e) Others:…….....…..

4. Profession:

a) Consultants;
b) Civil servants;
c) Teachers;
d) Journalists or Communication specialists;
e) specialized scientists;
f) Language practitioner;
g) Others… ...., (specify)

……

7. What are the causes of challenges of interpreting in scientific conferences?

1. Lack of appropriate terminologies;
2. Lack of preparedness prior to interpreting in a conference;
3. Poor technical performance;
4. Poor listening capacity;
5. Poor Memory processing;
6. Lack of Concentration;
7. Main speakers' accents;
8. Speed with which speakers' present the source language;
9. Cultural contexts of participants;
10. Unfamiliarity with theme of the conference/meeting;
11. Poor linguistic and extra-linguistic skills;
12. Lack of Scientific training;
13. Lack of experience in interpreting scientific discourses;
14. Cognitive performance between the speaker and listeners;
15. Lack of linguistic competence;
16. Overconfidence;
17. Any other (specify)……

8. What other typical practical challenges that ordinarily affect conference interpreters' performance (experienced and Novices) when interpreting scientific discourses? How do you think the said challenges should be solved?

9. What kinds of tools are necessary for enhancing conference interpreters' performance in interpreting scientific discourses?

10. What do such terms as quality rendition and faithful interpreting mean to you?

11. Kindly explain your answer and justify how the tools aforesaid can be useful, and to what extent?

12. Once you have been assigned to interpret in a scientific conference? How do you psychologically feel?

- Kindly elaborate your answer placing emphasis on technical confidence and emotional state of being/ feeling.

13. When interpreting in a scientific conference through relay, how do you rate your performance?

Criteria	**< 30%**	**30%-40%**	**40%-50%**	**50%-60%**	**60%-70%**	**70%-80%**	**80%-90%**	**> 90%**
Completeness								
Language Fluency								
Grammar								
Ear Voice Span								
Technical Vocabulary								
Appropriate Terminology								
Language Accent								
Contextual clarity								
Omissions								
Additions								
Linguistic Skills								
Self-confidence								
Memory Concentration								
Logical Cohesion								
Listening Capacity								
Scientific knowledge								
Cognitive Knowledge Mobility / Encyclopedic knowledge								
Level of Stress								
Emotional capacity								
Language Equivalence								
Documents of the meeting								
Preparation prior to the meeting								

Quality of the sound equipments								
Timing for interpreting delivery								

14. When rendering your interpretation from English into French or the vice versa, do you face any problems when the speaker uses any of the following:

NB* "X" denotes "YES"

a. Specialized languages full of highly technical vocabularies in the Source Language (SL)?
b. Scientific Terminologies?
c. Proper names?
d. Mathematical formulae and numbers?
e. Extra-linguistic knowledge and language mixtures?
f. Scientific abbreviations?
g. Unclear language accent or Voice-mouthing of words?
h. Idiomatic expressions?
i. Any other use? (Specify)

15. As an interpreter assigned to a scientific conference, what do you think is the most important thing to consider and observe if you need to attain quality performance?

16. What do you think conference interpreters need to do or need not to do to avoid any practical challenges in the course of interpreting scientific discourses?

Dos;

Don'ts:

17. Can "language accent" used by speakers during their presentations in a conference likely to affect the quality of your interpreting performance?

a. If the answer is "YES'', to what extent?

1. Listening capacity:

a) slightly bad…….
b) bad……
c) very bad……..
d) extremely bad……X…….

2. Cognitive Memory storage:

a) slightly bad…….
b) bad……
c) very bad……X……..
d) extremely bad…….

3. Memory Processing Capacity:

a) slightly bad…….
b) bad……
c) very bad……X……..
d) extremely bad…….

4. Completeness:

a) slightly bad…….
b) bad……
c) very bad……X……..
d) extremely bad…….

5. Production Capacity:

a) slightly bad…….
b) bad……
c) very bad……X……..
d) extremely bad…….

b. If the answer is NO! What are the strategies and tactics can you use to remodify the situation?

.....
.....
.....
.....
.....
.....

18. Which of the following strategies and performance techniques do you usually apply for faithful rendition of conference interpreting?

a). Anticipation,
b). compression,
c). addition,

d). changing order,
e). reformulation and repair,
f). inference,
g). Giving general ideas,
h). coping tactics,
I). Word-by-word,
j). any other type (specify);

19. What other additional strengths in your career as a simultaneous conference interpreter can you state to be strong indicators through which your performance in scientific discourse interpreting can be gauged?

20. If you wished to improve interpreters' performance, what would you recommend them to do?

SOURCES OF THE INTERPRETING SIMULATION TEST AND PERFOMANCE ASSESSMENT OF NOVICE CONFERENCE INTERPRETERS IN RWANDA

RESEARCH SUBJECT: "Practical Challenges, Needs and Aspirations for Rwanda's Novice Simultaneous Conference Interpreters: "***Case Study of Scientific Conferences***".

Interpreting simulation session: 1st Sequence

5 scientific Video abstracts are selected to be interpreted from English into French by five (5) Professional / semi-experienced conference interpreters. Each interpreting segment lasted five (5) minutes.

I. Discourse on Biology studies in relation with Human Rights and Law

Title: Forensic Conference 2019:

"The importance of Forensic Science and its place in the Scientific Enterprise." By Jessica Whyndham, Deborah Runkle, and Thomas Albright. Salk Institute of Biological Studies. https: www.AAAS.org. / *Scientific Responsibility Human Rights & Law*.

Source : https://www.youtube.com/watch?v=2bcG98ZY8U4

An update on strengthening Forensic Science in the United States: A decade of development. November 12, 2019.

Interpreting requirements: Language combination: English to French

Timing: 5 min

II. Discourse on Glacial Geology.

Title: Glacial History of the wood – Pawcatuck watershed.

Source : https://www.youtube.com/watch?v=Np1u-iiLQnE

Wood Pawcatuck Watershed Assn: Presentation to the Wood-Pawcatuck Wild and Scenic Rivers Study Committee on the Glacial Geology of the Watershed. Geology presentation

By: Bryan A. Oakley - Eastern Connecticut State University – Sep. 16, 2016.

Interpreting requirements: Language combination: English to French

Timing: Five (5) min

III. Discourse on Medical Neuroscience

Title: Epilepsy and Psychiatric comorbidities.

By Dr. Hind KETTANI. Specialist in Neurology and Epilepsy.

Pioneer Neuroscience Advent Health. November 13, 2020.

Source : https://www.youtube.com/watch?v=UlCw6ddXTNY

2nd Annual Seizure Smart Symposium – Presented by SK Life Science / Dr. Hindi Kettani – A subsidiary of SK biopharmaceuticals – Advent Health – Epilepsy Society of Florida.

Interpreting requirements: Language combination: English to French.

Timing: 5 min

IV. Discourse on Geology.

Title: Introduction to Geology

Source : https://www.youtube.com/watch?v=rRFphdMIIvI

Walter Alvarez introduces geology and discusses how the physical features of Earth can tell us about its history. – Introduction to Geology | Big History Project.

Presented by: Walter Alvarez. OER Project – May 20, 2014

Interpreting requirements: Language combination: English to French

Timing: Six (6) min:43 sec

V. Discourse on Neuro-Electronics and Physiology.

Title: "THE POTENTIAL DANGER OF MICROCHIPS "

Source : https://www.youtube.com/watch?v=VDgfwD9o83w

By the Geology Scientist: Gregg Braden | London Real - Mar 9, 2019

Gregg Braden is an New York Times best-selling author, researcher, educator, and lecturer. He is known as a pioneer in bridging modern science, ancient wisdom, and human potential. He has been invited to speak in front of The United Nations, Fortune 500 companies, and the U. S. military. His books include: The God Code,

The Divine Matrix, Fractal Time, Deep Truth, Human by Design, and his latest, The New Human Story. Watch the FULL EPISODE here: https://londonreal.tv/e/ gregg-braden-2/

Interpreting requirements: Language combination: English to French

Timing: 5.56 minutes.

Interpreting simulation session: 2nd Sequence

5 scientific Video abstracts are selected to be interpreted from French into English by 5 experienced conference interpreters. Each interpreting segment will last for 5 minutes each.

VI. Discourse on Mathematics: Équation différentielle.

Title: Qu'est-ce qu'une équation différentielle ?

Nov 14, 2014

Source : https://www.youtube.com/watch?v=WViu5SiMyeE

http://fr.khanacademy.org

KhanAcademyFrancophone.

Interpreting requirements: Language combination: French to English

Timing: 5 min

VII. Discourse on Molecular Chemistry

Title: Présentation scientifique de Jean-Pierre Sauvage, prix Nobel de chimie

Source : https://www.youtube.com/watch?v=l4O2G-nznJ0

From Chemical Topology to Molecular Machine. Jan 6, 2017.

Université de Strasbourg

Interpreting requirements: Language combination: French to English

Timing: 5 min

VIII. Discourse on the Natural Environment Complexity

Title: Le scientifique et la complexité de la Nature | Speech made by Louis GELI |

TEDxNarbonne.

Source: https://www.youtube.com/watch?v=GJ12mYGdTR8

Interpreting requirements: Language combination: French to English

Timing: 5 min

IX. Discourse on Psychological detection of Body language

Title: Le langage corporel et la communication non verbale

| Presented by Christian Martineau | TEDxHECMontréal

Source: https://www.youtube.com/watch?v=Fe-sjQ9EIfE

Le langage corporel et la communication non verbale sont au centre de ses études. Il nous propose d'ailleurs une meilleure compréhension du mensonge à travers le non verbal.

Interpreting requirements: Language combination: French to English

Timing: 5 min

X. Discourse on Psychological detection of Body language

Title: LA DINANDERIE : L'ORFEVERIE DU CUIVRE

Février 4, 2019 - 5 Minutes.50 Secondes.

Presented by Météo à la carte

https://www.france.tv/france-3/meteo-...

Source : https://www.youtube.com/watch?v=wiHcoZBJV-8

Portrait d'Alain, dinandier dans le Périgord. C'est l'un des derniers de France.

Il fabrique des articles de cuisine en cuivre ou il restaure ceux qui ont été altérés par l'humidité. Cuivre, marteau, feu... le temps s'est arrêté dans son atelier. PLUS D'INFOS

Interpreting requirements: Language combination: French to English

Timing: 5 min

Transcription of the recorded discourse n°1 given to novice interpreters in Rwanda for their quality performance assessment:

Source Language (SL): English

Opening discourse:

[Starting time: 0 minute].

Good morning everyone. Welcome to AAAS (triple AS) and to today's conference. My name is Jessica whyndham and I direct the Triple AS Scientific responsibility, Human Rights and Law Program. There may be some of you in the audience who aren't familiar with AAAS, we're a hundred and seventy-one years old. Hmm… I know, we are look good for our age and with the world largest multidisciplinary scientific membership organization and with the publisher of science magazine and the science family of journals which includes multiple journals...eeh..science robotics, science translational medicine science advances which is an open access journal and we're also home to multiple programs and centers, including the scientific responsibility, human rights law program, the Centre for Public Engagement and the Centre for Scientific evidence in public issues. This conference today is a partnership among AAAS , NIST, the National Institute of Standards and Technology and the Innocence project in collaboration with the National Academy of Science Engineering and medicine.

So, ten years ago the National Academy of Sciences has published report entitled forensic science in the United States, a path forward. The primary conclusion of that report was frankly quite shocking that several of the common forensic tools commonly used had little to know scientific basis. For decades, juries and judges were told that a fingerprint or tool mark found at the scene crime matched a known source to the exclusion of all others.

Following the Academy's report and findings, this statement could now be challenged in courts but it remains to be seen how courts would actually be affected by the academy's conclusions or how the scientific community respond to the implicit challenge they set forth.

This conference is being held to coincide with the 10th anniversary of that report. As you'll hear today, there has been a lot of activity…in the…in the subsequent years and some of it is ongoing. Laboratories have adopted strict practices, funding agencies have supported studies in the forensic fields, and an understanding that human factors can affect the results of forensic examination has become widely accepted.

Among the efforts inspired by the National Academy's report was too in-depth analysis of triple AS. One addressed fire examination and the other latent fingerprint analysis. The report generated a lot of attention and just recently, very recently, Interpol said of the fingerprint report that have provided quite excellent review of the subject and was quote a "must read ".

So, with that, I'd like to turn to my colleague Deborah Runkle. Deborah's a senior program associate. At triple AS, and manages the association, science and law activities including those on forensics. Deborah will now introduce our keynote speaker, thank you.

Deborah Runkle brief speech:

Good morning. Thank you all for coming. They said this event has been well anticipated, and we had a very good response. There are many people who are watching this on the webcast, which by the way will be archived after the meeting, you colleagues who couldn't come we'll be able to see it. I'm here to introduce the first of our two keynote speakers of today. The other will speak after lunch. eeeh…our speaker, I've gonna give a brief introduction, because you have a bios in your program, so I don't want (wanna) take up a lot of time with introductions.

Eeeh...the first of our two keynote speakers is Tom Albright. Eeeeh,...Tom is Professor and Comrad T crab cribs Chair at the Salk institute for Biological studies. He is a member of human factors resources committee of the NIST organization of scientific area committees for Forensic science.

Keynote speech coupled with Presentation:

Presentation title:

"An update on strengthening Forensic Science in the United States: A Decade of Development. Tuesday, November 12, 2019".

Thank you Deborah. Good morning.

Eeeh…,…I am deeply honored here to celebrate the 10th anniversary of this report from the National Academy.

I should say, at the outset that I was not involved in this report. Eeeh.., I wish I could say that I was,..I was at the time a basic scientist as I am today, studying the brain basis of visual perception and memory. I think it will be fair to say that at the time the report came out I was a Forensic science hobbyist and the sense that it is with a long-standing interest in visual perception and memory I thought deeply about the kinds of problems that forensic scientists face on a routine basis. And I come, I come...- more or less with the same conclusions that the National Academy Committee had in this report and that's what I want to talk to you about today as soon as my slides come up. I'm gonna give you what I call human information processing approach to forensic science, which really is a sort of …summary of where we've come from…

[Ending time: 5.23 minutes.]

Randomly-selected rendition captured from Rwanda Novice interpreter:

[English (SL) to French (TL)].

Bienvenue à triplait à cette conférence Je m'appelle Jessica Windham, j'ai dirigé la responsabilité scientifique de très près par rapport à ce programme et pour certains d'entre vous pourraient connaître cela. Nous sommes une organisation vieille de soixante-onze ans tri triple A, s, p. C'est une organisation faite de membres. Nous avons, nous publions des magazines, des revues de médecine médico légale et nous. Et nous nous accueillerons plusieurs programmes plus récents, dont la responsabilité juridique sur les droits, L'homme et le Centre pour l'engagement public. Le Centre pour les preuves scientifiques dans des affaires publiques. Cette conférence, aujourd'hui, porte sur le partenariat de trois à S et l'Institut national des normes et de la technologie, en collaboration avec le Centre d'ingénierie de la science médico légale et. Les académies de sciences

ont publié une étude, et donc le rapport, a comme conclusion. Comme quoi que plusieurs outils de médecine médico légale ont été utilisés sans base scientifique. Les juristes nous ont dit que les preuves au lieu du crime sont très importantes pour nous.
Et après donc, le rapport de cette académie, c'est évident. Ces preuves peuvent être remises en question, remises en question dans une cour de justice. Alors non. En tant que communauté scientifique, nous devons faire et répondre à ce défi.
Cette conférence est tenue et elle coïncide avec le dixième anniversaire de ce rapport. Et vous êtes ici et il y a beaucoup d'activités depuis plusieurs années et certaines activités sont toujours en cours. Il y a des agences et des agences de financement qui ont soutenu cette étude et nous voulons voir les facteurs humains qui peuvent influencer, n'est-ce pas ? Les preuves.
Et parmi les efforts, donc issus de ce rapport de l'Académie, il y a là à notre organisation du triple A et ça. Le rapport a généré beaucoup d'attention et récemment, très récemment, comme l'a dit le rapport sur les empreintes, il y a une revue importante.
Alors avec cela, je voudrais me tourner à mon collègue Déborah qui est, n'est-ce pas, responsable ? Une responsable dans les activités dans notre organisation. Déborah Et vous allez donc présenter notre présentateur principal.
Merci à vous tous d'être venus. Nous avons une bonne réponse que nous attendions et beaucoup de gens sont en train de suivre cette conférence, n'est-ce pas en ligne ? Et je pense que ceux qui n'ont pas pu venir pourront suivre, n'est-ce pas ce que nous avons dit ici ? Alors je voudrais vous présenter notre intervenant principal, notre intervenant. Je vais le présenter très brièvement parce que vous avez des billets au entrer dans votre programme. Je ne vais pas prendre trop de votre temps.
Le nôtre, le premier des deux intervenants, c'est Tom. Tom est professeur. Et président de l'Institut et des membres du Comité sur les ressources humaines de notre organisation. Tom.

Keynote speech coupled with Presentation:
Presentation title:
“An update on strengthening Forensic Science in the United States: A Decade of Development. Tuesday, November 12, 2019”.

Merci Déborah, bonjour Josu, j'ai l'honneur d'être ici pour le dixième anniversaire de ce rapport de l'Académie. Alors je n'ai pas été impliqué dans ce rapport. J'aurais bien voulu. J'aurais bien voulu vous dire que j'ai été membre de ce comité, mais je n'avais pas fait partie de ce comité. Alors je crois qu'il est plus juste de dire que lorsque le rapport a été publié, j'étais responsable. Donc je travaillais sur la recherche en matière de médecine médico légale. Je suis arrivé à la même

conclusion que le comité qui a produit ce rapport, alors c'est ce dont je vous parle aujourd'hui et j'espère que mes diapos vont venir. Je vais vous donner ce que j'appelle un processus ou une approche de la science médico légale sur le plan humain. Et pour montrer…

…combien, d'où nous venons et pour vous parler des points que nous parlons, n'est-ce pas pour ? N'est-ce pas là la médecine médico légale ? Alors maintenant, je vais commencer par cet énoncé qui est tout à fait évident et. Ce que le pointeur marche très bien. Alors là, je vais commencer par ce qui est évident. La plupart des décisions de la médecine médico légale sont basées sur des informations sensorielles. Très bien, merci. Alors, il y a donc une méthodologie qu'on utilise et qu'on utilise en médecine médico légale, et donc je vais commencer avec. N'est-ce pas cette prémisse que les causes fondamentales de la vérité ou de l'erreur de la médecine médico légale sont liées ? N'est-ce pas aux caractéristiques des observateurs humains la sensibilité et la capacité de stockage et ainsi de suite ? Alors, je vais vous dire que. La communauté scientifique a beaucoup parlé de ces points. Il y a. Différents problèmes auxquels sont confrontés les experts de la médecine médico légale, par exemple sur. Il y a donc des problèmes de comparaison que vous devez réseau chaque jour. Par exemple, vous avez des bagages, vous avez dans beaucoup de valises qui se ressemblent et ou alors quand vous allez dans une bibliothèque.

TRANSCRIPTION OF WHAT COULD BE EXPECTED AS NORMAL DELIVERY - Obtained from a randomly-selected Experienced Interpreter.

<u>Discours d'ouverture :</u>

Début de la séquence : [0 minute].

Bonjour à tous. Bienvenue à l'AAAS (triple AS) et à la conférence d'aujourd'hui. Je m'appelle Jessica whyndham et je dirige le programme de responsabilité scientifique, de droits de l'homme et de droit de la Triple AS. Certains d'entre vous dans le public ne connaissent peut-être pas l'AAAS, nous avons cent soixante et onze ans. Hmm... Je sais, nous avons l'air bien pour notre âge et avec la plus grande organisation scientifique multidisciplinaire au monde, ainsi qu'avec l'éditeur du magazine scientifique et la famille des revues scientifiques qui comprend de multiples revues...eeh..science robotique, science médecine translationnelle, science avancées qui est une revue en libre accès et nous abritons également de multiples programmes et centres, y compris la responsabilité scientifique, le programme des droits de l'homme et du droit, le Centre pour l'engagement du public et le Centre pour les preuves scientifiques dans les questions publiques...

Cette conférence est un partenariat entre l'AAAS, le NIST, le National Institute of Standards and Technology et le projet Innocence en collaboration avec la National Academy of Science

Engineering and medicine.

Ainsi, il y a dix ans, la National Academy of Sciences a publié un rapport intitulé Forensic science in the United States, a path forward. La principale conclusion de ce rapport était franchement assez choquante : plusieurs des outils médico-légaux couramment utilisés avaient peu de fondement scientifique. Pendant des décennies, les jurys et les juges ont appris qu'une empreinte digitale ou une marque d'outil trouvée sur la scène de crime correspondait à une source connue, à l'exclusion de toute autre.

Suite au rapport et aux conclusions de l'Académie, ces déclarations pourraient maintenant être contestées devant les tribunaux, mais il reste à voir comment les tribunaux seraient réellement affectés par les conclusions de l'Académie ou comment la communauté scientifique répondra au défi implicite qu'elles posent.

Cette conférence est organisée pour coïncider avec le 10e anniversaire de ce rapport. Comme vous l'entendrez aujourd'hui, il y a eu beaucoup d'activités... dans les années qui ont suivi et certaines d'entre elles sont en cours. Les laboratoires ont adopté des pratiques strictes, les organismes de financement ont soutenu des études dans le domaine de la médecine légale, et il est désormais largement admis que les facteurs humains peuvent affecter les résultats des examens médico-légaux.

Parmi les efforts inspirés par le rapport de la National Academy, on peut citer l'analyse trop approfondie de la triple AS. L'une portait sur l'examen des incendies et l'autre sur l'analyse des empreintes digitales latentes. Le rapport a suscité beaucoup d'attention et tout récemment, très récemment, Interpol a dit du rapport sur les empreintes digitales qu'il avait fourni un excellent examen du sujet et a été cité comme un "must read".

Sur ce, je voudrais me tourner vers ma collègue Deborah Runkle. Deborah est une associée de programme senior... à triple AS et... elle gère les activités de l'association, de la science et du droit, y compris celles relatives à la criminalistique. Deborah va maintenant présenter notre orateur principal, merci.

Introduction brève de Deborah Runkle:

Bonjour. Merci à tous d'être venus. Ils ont dit que cet événement a été bien anticipé, et nous avons eu une très bonne réponse. Il y a beaucoup de gens qui regardent cette émission sur le webcast, qui sera d'ailleurs archivée après la réunion, vous collègues qui n'ont pas pu venir nous pourrons la

voir. Je suis ici pour vous présenter le premier de nos deux orateurs principaux d'aujourd'hui. L'autre parlera après le déjeuner. eeeh...notre orateur, je vais faire une brève introduction, parce que vous avez une biographie dans votre programme, donc je ne veux pas (vouloir) prendre beaucoup de temps avec les introductions.

Eeeh...le premier de nos deux orateurs principaux est Tom Albright. Eeeeh,...Tom est professeur et titulaire de la chaire Comrad T sur les cages à crabes à l'institut Salk pour les études biologiques. Il est membre du comité des ressources en facteurs humains de l'organisation NIST des comités de zone scientifique pour la science médico-légale.

Discours d'ouverture couplé à la présentation :

Titre de la présentation :

"Une mise à jour sur le renforcement des sciences médico-légales aux États-Unis : Une décennie de développement. Mardi 12 novembre 2019".

Merci Deborah. Bonjour.

Eeeh...,...Je suis profondément honoré de célébrer ici le 10e anniversaire de ce rapport de l'Académie nationale.

Je dois dire, d'emblée, que je n'ai pas participé à ce rapport. Eeeh..., j'aimerais pouvoir dire que j'étais,… J'étais à l'époque un scientifique de base comme je le suis aujourd'hui, étudiant les bases cérébrales de la perception visuelle et de la mémoire. Je pense qu'il est juste de dire qu'à l'époque où le rapport a été publié, j'étais un passionné de sciences médico-légales et le sentiment que c'est avec un intérêt de longue date pour la perception visuelle et la mémoire que j'ai réfléchi profondément aux types de problèmes auxquels les scientifiques médico-légaux sont confrontés de façon routinière. Et j'arrive, j'arrive... plus ou moins avec les mêmes conclusions que le Comité de l'Académie nationale avait dans ce rapport et c'est de cela que je veux vous parler aujourd'hui dès que mes diapositives sortiront. Je vais vous donner ce que j'appelle l'approche du traitement de l'information humaine en criminalistique, qui est en fait une sorte de ...résumé de nos origines...

[Fin de la séquence : 5,23 minutes.]