Journal of Siberian Federal University. Humanities & Social Sciences 2 (2014 7) 320-325
~ ~ ~

УДК 81.33

On Entropy in Simultaneous Interpreting

Yaroslav V. Sokolovsky*
Siberian Federal University
79 Svobodny, Krasnoyarsk, 660041, Russia

Received 29.11.2013, received in revised form 09.12.2013, accepted 10.01.2014

The paper dwells upon the concept of entropy in connection with information theory, linguistics and simultaneous interpreting. The linguistics-based mechanism of defining the degree of entropy within simultaneous translation is among the main focal points of the paper. Some examples are analyzed.

Keywords: simultaneous interpreting, translation, entropy, the problem of understanding the message.

> No structure, even an artificial one, enjoys the process of entropy. It is the ultimate fate of everything, and everything resists it.
>
> Philip K. Dick, Galactic Pot-Healer

Introduction

By investigating the role of entropy in simultaneous interpreting modern scholars are trying to reach a number of objectives. The first one is to formulate a definition of the concept of "entropy" in translation studies and linguistics, to present a classification of personal factors of entropy: determined by the speaker (pace of speech, pronunciation norms, lexical norms, grammar norms, etc.) and determined by the interpreter (listening skills, cognitive readiness within the skill of "switching between languages", knowledge of the topic and terminology, etc.).

The second objective is to provide an overview of the available experimental data concerning the factors that provoke additional entropy in the process of interpreting; the review is combined with an attempt to quantitatively measure the degree of importance of the entropy for some of the individual factors. For example, consider such factors as the rate of speech: studies show that for the simultaneous interpreter 100-120 words per minute is the optimal speech rate, and at a rate of speech about 150-200 words per minute the quality of interpreting significantly degrades (Chernov, 2009, 17).

The third objective is to provide an overview of points of view on the possible strategies used by simultaneous interpreters in practice, to overcome the excess entropy. For example, probabilistic forecasting strategy, Stalling strategy, linguistic prediction, etc. (Ilyukhin 2001).

Entropy as a Measure of Understanding

Simultaneous interpreting *per se* is conducted in specific conditions: "unlike translation,

* Corresponding author E-mail address: sokol_rus@mail.ru

interpreting requires attention sharing and involves severe time constraints. Many recurrent interpreting errors may well prove to be the result of either saturation in or improper management of the interpreter`s processing capacity" (Routledge Encyclopedia of Translation Studies, 2001, 41). Despite the fact that simultaneous interpreting can be "artistically subtle in a way science cannot capture" (Steve Jobs` 2005 Stanford Commencement Address), the conference interpreter deals with the problems, which are needed to be treated scientifically. The scholarly approach contributes to putting forward practical guidelines for conference interpreters. Here we intend to discuss the difficulties, which may arise when the interpreter listens through a headset to what is being said in the original language or, in other words, the problem of understanding. We depart from the view that the problem of understanding the message is supposed to be treated as a separate aspect of the linguistic properties of interpretation. The problem of understanding has existed since the beginning of time and traditionally was scrutinized by hermeneutics. Nowadays this area of academic knowledge is being studied by philosophers, psychologists, cyber-experts (who are trying to teach a computer right from wrong) and, certainly, by linguists. Since understanding is an absolutely significant phase (an inseparable part if you will) of the conference interpreter`s work, it has to be put under intensive scrutiny, which may contribute to the development of a theoretical descriptive model of the interpreting.

The cognitive approach to translation and interpreting with the reference to the subject of this paper we shall discuss later. First, we need to define the very concept of entropy in science, linguistics and translation studies. One of the ways to tackle the problem of understanding is building up the entropic descriptive model. The notion of entropy historically was applied in thermodynamics. The term was initially used by the German physicist Rudolf Clausius, and later it was developed by Ludwig Boltzmann, Josiah Willard Gibbs, and James Clerk Maxwell – scientists who gave entropy its statistical basis (Second Law of Thermodynamics and Entropy). From this part of physics we know that entropy is often defined as "a measure of the "disorder" of a system" (What is entropy, Energy Concepts Primer, Solar Energy Association) or, giving it a more concrete definition is "a thermodynamic quantity representing the unavailability of a system's thermal energy for conversion into mechanical work, often interpreted as the degree of disorder or randomness in the system: *the second law of thermodynamics says that entropy always increases with time (Oxford Dictionaries). The idea of entropy has become an ubiquitous and universal approach to many scientific problems (e.g. Nature journal[1] by now has published over 4700 articles which contain the term "entropy" in their headings. We believe that the journal can serve as a benchmark of productivity for scientific terms).* We can trace direct analogies between the application of entropy concept in natural sciences and social sciences and humanities (e.g. translation studies): as the level of entropy grows inside the message received by the interpreter through his (her) headset the understanding linkages between the concepts will weaken just like "replicated *Escherichia coli* daughter strands will spontaneously demix as a result of entropic forces, despite their strong confinement within the cell" – a biological type of entropy driven process (Jun, Wright, 2010).

We believe that one of the most fruitful ways to view the problem of understanding the message departs from the standpoint that it belongs to the domain of information theory (Shannon 1963). One of the main points of this theory states that the information transmitted by a certain communication channel is always characterized

by a certain amount of entropy, which is defined as "the value of the uncertainty of information" (Kolmogorov 1987, 35). The higher the entropy value, the higher the percentage of information loss. Entropy as a measure of information uncertainty is a category defined by a number of factors affecting its magnitude. The factors can be divided into external (technical) and internal (personal). T.A. Kazakova, relying on the definition of information offered by Wiener, notes that "the content (meaning) of the text" in the information approach can be represented as "a structure to be reconstructed, in particular in the process of translation", meanwhile the concept of information in translation is defined as "a more or less distinct (informational) image of the original text in the perception of the interpreter (translator)" (Kazakova 198-199). In addition to that it is necessary to point out that entropy as a phenomenon hinders the process of reconstruction, conducted by interpreters (translators). Initially it occurs at the stage of "decoding" the image of the source text, and we face "secondary" entropy at the stage of "coding" the image of text to be interpreted (translated). Another significant feature of entropy in connection with simultaneous interpreting is its anisotropy, i.e. since in simultaneous interpreting the interpreter quite often speaks one language more fluently than the other the information channel is anisotropic.

One way to reduce entropy in the interpreting process (in particular – simultaneous interpreting) is to use the mechanism of probabilistic forecasting. One of the most respected and recognized Russian researchers of simultaneous interpreting, G.V. Chernov indicates that the mechanism of probabilistic forecasting relies upon "the fundamental methodological concept of anticipatory reflection of reality, events of the outside world in the living protoplasm, which was put forward by the scholars of the Soviet school of physiology, and is defined as "the basic form of adjustment of living matter to the space-time structure of the inorganic world, where consistency and reproducibility are key timing parameters" [2] (Chernov, 2009, 56). G.V. Chernov insists that "along with the process of auditory speech perception the interpreter`s brain proposes hypotheses about variants of particular semantic or verbal development or completion of the speaker's intentions" (ibid.). In this case the term "redundancy", as was noted by G.V. Chernov, "appeared in the theory of information and was associated with the name of its creator C. Shannon, now widely penetrated in linguistics, psychology and related disciplines" (ibid.).

If the interpreter failed to understand (failed to hear out or to comprehend) what was said by the speaker, the interpreter may fall into the trap of "completing (virtually making up) the message", arranged by his (her) own consciousness. Within the psychological framework "understanding" is "stability, certainty", and in this context simultaneous interpreting is a very vivid illustration of the fact that human "mental organization continuously strives for stability, however at the same time this stability is consistently violated by the same mental organization. So if something happens (with us, or in us, in particular) , which disrupts the stability of the virtual mental well being, it triggers primitive defense mechanisms designed to restore the disturbed balance with the help of "white spots". For this purpose we use explanations, starting with elementary naming (labeling) and ending with coherent theories (compilations of meanings). Moreover, the explanation – a simple one (labeling) and a complex one (theory) – can be absolutely ridiculous, based on nothing but absurd, yet for the sake of stability, for the sake of feeling of certainty , we agree with it without batting an eye (Kurpatov 2001).

Metaphor as a Basis for Probabilistic Forecasting

Despite the fact that linguistic methodology for defining a measure of entropy is still under development, we may try to conduct the most basic analysis of the semantic factors that may act as complications for understanding the message. Absence of presence of the metaphor may serve as one of such factors. E.g. medical terms, most of which are metaphors in its structure, are easy to understand, hence the interpreter may guess their meaning (applying heuristics as a mechanism for defining the meaning), provided that the interpreter is able to reconstruct the metaphorical link between the term and the "default semantics" of the parts, which the term consists of. The following medical terms require special knowledge in the corresponding domain of medical science in order to be interpreted correctly from English into Russian[3]. We have divided them into two groups:

Group A (possible to guess)

- **weaning period** – a period for stopping the respiratory support of a patient and transferring the patient to spontaneous breathing (Russian: период отмены респираторной поддержки). There is a clear semantic analogy between "weaning the child" and "weaning the patient".
- **alveolar recruitment** – re-opening of previously gasless (collapsed) lung units (Russian: вовлечение в работу максимального числа альвеол; альвеолярный рекрутинг). There is a clear semantic analogy between "alveolar recruitment" and "recruitment of employees".
- **pulmonary compliance (or lung compliance)** – the ability of lungs to expand (Russian: растяжимость лёгочной ткани, комплаенс). There is a clear semantic analogy between "lung compliance" and "spring compliance".
- **tidal volume** – the volume of air moved into or out of the lungs during quiet breathing (Russian: дыхательный объём). There is a clear analogy between "tidal volume" and "tidal wave" or "tidal waters".
- **stress and strain of lungs** – the primary determinants of ventilator-induced *lung* injury (Russian: лёгочное напряжение и нагрузка)[4]. There is a clear semantic analogy between "stress and strain of lungs" and "physical stress" and "physical strain".
- **anesthetization** – blocking of sensations with the help of special medications (Russian: анестезирование); This example stands aside, since there is no evident metaphor to comprehend, but there is a clear phonetic analogy between English and Russian.

Despite the metaphorical link that seems to be "evident", in some cases the "guessing strategy" can be misleading. For example in the Russian medical term "остаточная кураризация" the word "кураризация" can be mistakenly understood as a loan word, i.e. a derivative from the English verb "to cure" + "-ization" (a *suffix* denoting the act, process, or result of doing something), whereas this term has nothing to do with "curerization" (which in this case turns out to be a "made-up word"), but originates from the word "curare" (Russian: курарe) i.e. a metaphor for muscle relaxant, therefore the whole term should in fact be interpreted as "residual muscle relaxation".

Group B (difficult / impossible to guess)

The following terms are impossible to guess, hence they are abbreviations and do not convey any evident metaphorical meaning:

- **ECMO** (extracorporeal membrane oxygenation) – (Russian: экстракорпоральная мембранная оксигенизация).
- ARDS (acute respiratory distress syndrome) – (Russian: острый респираторный дистресс-синдром).
- Lungs FRC (functional residual capacity) – (Russian: функциональная остаточная емкость лёгких).

Conclusion

It is evident that the application of the concept of entropy to translation studies has become ripe for discussion. When it comes to the analysis of simultaneous interpreting along with focusing on the properties of communication, we need to bear in mind that this field of research goes far beyond communication only. We believe that for better understanding of this issue we need to make a confession that the use of language cannot be reduced to mere communication: "A fundamental dogma, which almost never questioned, which is certainly false is that language is just a system of communication. There is every reason to believe that it`s not true. In fact again obvious reasons if you just introspect…almost all use of language, like 99 percent of it, is internal. You can`t go a minute without talking to yourself" (Chomsky).

[1] According to the statistics of the official web-site, Available at http://www.nature.com/ (accessed 17 November, 2013)

[2] This definition belongs to academician P.K. Anokhin. For more details about the Soviet physiological school in connection with this definition, see (Chernov, 2009, 55)

[3] The following medical terms were a part of the glossary of terms to be interpreted from English into Russian for the IV International Congress for Respiratory Support, which was held in Krasnoyarsk (Russia), September 14-17, 2013. Me and my colleague, Professor Veronica A. Razumovskaya were providing simultaneous interpreting for the event.

[4] Doctors – participants of the Congress noted that terminologically it was difficult to find precise equivalents in Russian for the given pair of English terms.

References

1. Chernov, G.V. *Teoria i praktika sinhronnogo perevoda* [Theory and practice of simultaneous translating], Moscow, Publishing House "LIBROKOM", 2009, 208 p.

2. Chomsky, N., Language and Other Cognitive Processes (video lecture, 00:24-00:25 min), Available at: http://www.youtube.com/watch?v=6i_W6Afed2k (accessed 8 October 2013).

3. Ilyukhin, V.M. *Strategii v sinkhronnom perevode* [Strategies in simultaneous translation. Dissertation for the degree of Candidate of Philology, 10.02.20], Moscow, 2001. 223 p.

4. Jun, S., Wright, A. Entropy as the driver of chromosome segregation (2010) *Nature Reviews Microbiology* 8, pp. 600-607 doi:10.1038/nrmicro2391

5. Kazakova, T.A. *Perevod kak pererabotka informatsii* [Translation as information processing], *11 Fodorovskiye chteniya. Universitetskoye perevodovedeniye* [Fedorov Readings XI, University Translation Studies], Saint-Petersburg. Pp. 197-201.

6. Kolmogorov, A.N. *Teoriya informatsii i teoriya algoritmov* [Information theory and theory of algorithms], Moscow, Nauka (Science), 1987. 304 p.

7. Kurpatov, A.V., Language is what we have not learned to use [Yazyk – to, chem mi ne nauchilis pol`zovat'sya] *Real'nost' i Sub`yekt* (Reality and Subject), 2001, № 1. Pp. 91-94

8. Oxford Dictionaries, Entropy, Available at: http://www.oxforddictionaries.com/definition/english/entropy (accessed 18 November 2013).

9. Routledge Encyclopedia of Translation Studies, London and New-York, Routledge, 2001, 655 p.

10. Second Law of Thermodynamics and Entropy (Lecture 24). Yale University Open Courses. Available at: http://oyc.yale.edu/physics/phys-200/lecture-24 (accessed 8 October 2013).

11. Shannon, C. *Raboty po teorii informatsii i kibernetike* [*Works on information theory and cybernetics]*, Moscow, Foreign Literature Publishing, 1963, 832 p.

12. Steve Jobs' 2005 Stanford Commencement Address (video), Available at: http://www.youtube.com/watch?v=Hd_ptbiPoXM (accessed 20 September 2013).

13. What is entropy, Energy Concepts Primer, Solar Energy Association, Available at: http://www.nmsea.org/Curriculum/Primer/what_is_entropy.htm (accessed 7 November 2013).

К вопросу об энтропии в синхронном переводе

Я.В. Соколовский
Сибирский федеральный университет
Россия, 660041, Красноярск, пр. Свободный, 79

Рассматривается понятие энтропии во взаимосвязи с теорией информации, лингвистикой и синхронным переводом. Лингвистически обоснованный механизм определения степени энтропии в рамках синхронного перевода является одной из основных подтем для обсуждения в рамках данной статьи. Автором приводятся результаты анализа некоторых примеров.

Ключевые слова: синхронный перевод, энтропия, проблема понимания сообщения.