Towards a cybernetic model of translation

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Abstract. *This paper grounds a model for the translation/interpretation process in a set of formal propositions that treat the text and translator as a "black box" system in which feedback and internal abstractions play a key role in the concretization of the target product. The postulates are a result of applying ideas from systems, communication and control theory, cybernetics, constraints and componential interaction to the process of translation, taking the "propagation" of information as intrinsically required by translation, and asking "Why does translation result in what it does, and not in something else?", and "What constraints operate on the process and product of the act of translating, and what is the nature of their influence?" The inferences made from these are shown to influence our understanding of certain "memes" in the field, ranging from the myth of equivalence to the unit of translation.*

Introduction

While the field of Translation Studies has undergone considerable changes over the past 60 years by virtue of its dynamic, interdisciplinary nature, little seems to have changed regarding the theoretical models representing the structure, entities and relationships involved in the act of translation. The constancy of existing models and the fact that they are still being taught in translation courses and textbooks is a testament to their pedagogical value. It appears, though, that none of them have been aimed at merging causal and process-based approaches and that it is feasible to build on them and address issues of subjectivity and practice.

This paper suggests that it is possible to apply principles from system sciences and cybernetics to a conceptual framework representing the structure and key elements of the translation process, with the dual aim of proposing a unified causal-process model and providing new tools to study it. The model is grounded in a set of formal propositions providing an axiomatic basis to the fundamental concepts of translation.

The presentation of this model begins with the definition of translation:

Translation is a controlled transfer of information—including, but not restricted to meaning—from a source text, producing a target text in another language.

There exist three key notions in this definition. First, that translation is a process of transfer, an action and not an object per se. It is a means of processing information, and included in this information is meaning derived from the source text. The second concept is that translation is a productive act, and it results in the creation of a new object which shares information transferred from the source text. Thirdly, the transfer of information in translation is initiated, powered and controlled by an agent—the translator.

Propositions for a model of the translation process

This model will treat texts and the translator as primitives. A primitive will also be defined for representations of meaning but not meaning itself, as that is beyond the scope of this paper.

In the definition given above, in order for translators to be able to process and transfer the information from the source text, the information must be extracted, interpreted and represented in the mind. In other words, the translator works with mental representations of texts.

The word *text* denotes "a meaningful configuration of language created with the intention of communicating" (De Beaugrande 1980). In this sense, the word *text* could apply to written words, spoken utterances, an opera, or even a piece of music—anything with semiotic content that can be interpreted and represented in the mind.

These presuppositions lead to the first proposition for this model of translation:

Proposition 1: Translation is mediated production.

Translation results in the production of a target text, and yet it is not free creation. One may argue that no text is actually created freely, yet the target text produced in translation is constrained by an existing source text in another language, and whatever interpretation the translator derives from that source. Translation is externally manifested and mediated by translators' interaction with texts, their intervention between source and target texts to allow an addressee to access the content of the source. In other words, "the translation is not created from nothing; it is woven from a semantic pattern taken from another text, but the threads—the linguistic forms, patterns, syntactic sequences—are new." (Neubert 1997: 17)

In order to illuminate the differences between translation and "unconstrained" authorship, let us set aside, for a moment, the act of translating and consider instead the flow of information in a "normal", author-to-reader relationship. The author perceives or selects a fragment of the world, constructing an internal "model" of it in the form of thought, and then proceeds to compress thought into an actual linguistic configuration, producing a text allowing others to access it.

Readers, conversely, consume and interpret the linguistic code contained in the physical text, thus decompressing it into a mental representation intertwined with thought. From then onward, the text expands into the experiential space of the readers, affecting their interaction with the world.

An interesting aspect of this compression and decompression is its "lossiness". No author could claim to be able to absorb, comprehend and subsequently describe the entirety of the world, so the thought of an author is a model, a simplified system representing those perceptions that are relevant or accessible to the author at the time of construction. Compression of informational content happens once again when thought is modeled into actualized linguistic code (see Figure 1). A simple phrase such as "beautiful flower" or even a single word like "pen" could have numerous connections and associations in the mind. Some researchers believe that language is the recourse the mind assumes to prevent overload and bundle concepts into a more manageable package (see Damasio et al. 1992).

On the other hand, the nature of these three domains (text, thought and world) requires that upon "reading", a text is decompressed and expanded into thought, as various components of internal information such as knowledge, experience and attitude are added to the linguistic input. Thought itself evolves further when it is incorporated into the context of the readers' world (Figure 1).

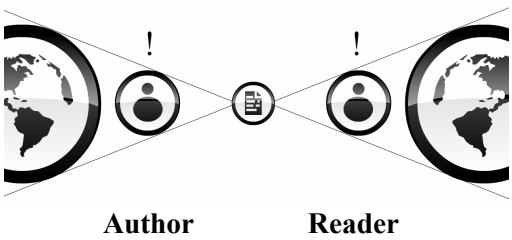

Figure 1. Amount and flow of information from author to reader

Information flows from the world of the author to the macrocosmos of the reader when the text is read.

For this actually to take place, a number of conditions should be met, but the one that concerns us most at this juncture is that the text, the physical embodiment of the author's thought, is coded and compressed into a linguistic matrix that is accessible to the reader. If not, the communicative channel is, to all intents and purposes, broken. This brings us to the role of the translator and to the second proposition:

Proposition 2: Translation is mediated through three separate but interconnected constructs: 1) the translator, 2) language, and 3) the target text.

The translator or interpreter enters the communicative channel as a mediator (and as will be discussed later, a controller) when the source text is not approachable by the reader, because the source language is not the same as the required target language.

The translator creates the target text as a proxy for the source text, constraining its semantic content, while using another language—that of the target recipient—, thus "mending" the broken communicative channel by patching it up with a new textual tract.

This requires the translator to adopt a dual position, to bifurcate, effectively adding not one, but *two* intermediary agents and a text. The first mediator is the Translator/Reader—a surrogate recipient of the source text. The other is the Translator/Author, responsible for creating the target text. Psycholinguistically, these two roles are quite different from their counterparts in "normal" author-reader relationships, for they occur in a single mental space i.e. that of the translator's mind, where dialog can occur. This will be discussed in further detail later.

Proposition 3: The translator assumes two distinct roles in the process of translation: Translator/Reader and Translator/Author. The Translator/Reader is involved with interpreting information from the text, while the Translator/Writer is primarily associated with instantiating that information.

Production of the target text is the result of a cybernetic dialog between these two agents, recursively passing, modifying and balancing information in the translator's mind, with the aim of attaining semantic homeostasis, a compromise between the inevitable reduction and addition of information to what has been obtained from the source text.

Abstraction

We can now view the nature of the translator's position and how it affects the flow of information from the source text to the target text. Translators are not only recipients of meaning, but comprehend it well enough to be able to restate it in another linguistic code. In order to do so, a translator builds two textual abstractions or models, one for the source text and another for the target text.

The reason I have termed these models "abstractions" is that although they may contain linguistic information, the dependency of the text content on natural language is severed, and the linguistic form in the co-text takes on a componential role rather than a vehicular one, i.e. the mental representation is internally formed in the mind without being constrained to linguistic code. It appears that the mental representation of the text is arranged into an

integrated structure in the mind which maintains a dynamic, interactive and plastic connection between its elements.

The structure, form and components of these abstractions differ depending on the text (linguistic, contextual and paratextual factors) and various internal and external parameters related to the translator, a number of which will be studied later. Each abstraction contains a number of subsystems containing interacting objects and relations, a number of which are tentatively presented in Figure 2.

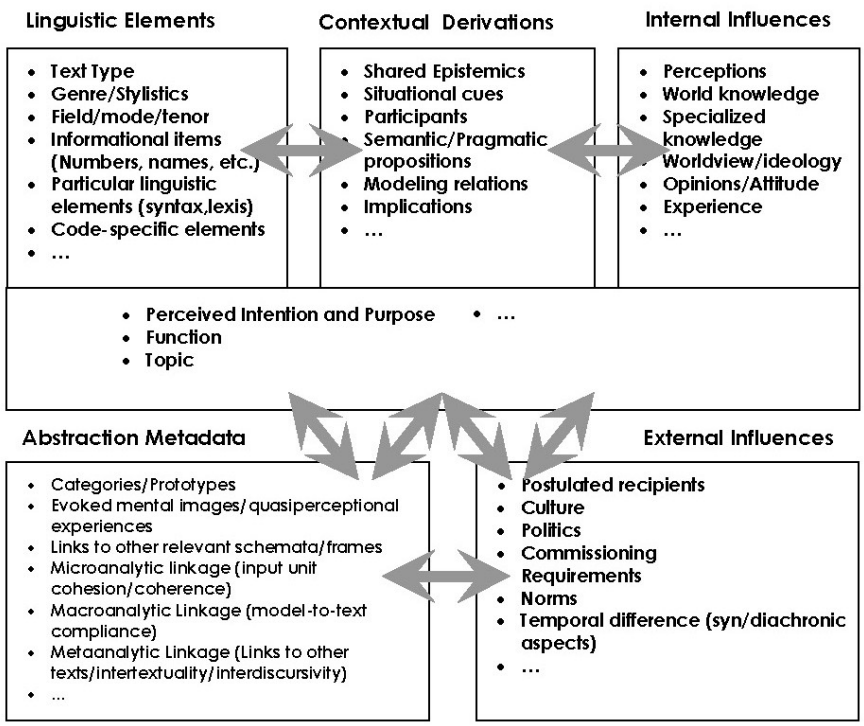

Figure 2. A tentative model of a textual abstraction

As can be seen, the abstraction is also a system, a dynamic, evolving product of a specific internal translation of the text into an internal representation. The structure proposed above may contain more or less subsystems and elements, depending on the translator or the specific kind of text at hand.

The ALICE Model

The categories of informational factors from the text are summarily expounded as follows:

- Linguistic elements are derived from the actual, physical text itself; factors such as text type, genre/stylistics, field/mode/tenor, informational items (numbers, names, etc.), particular linguistic elements (syntax, lexis) and code-specific elements fall into this group.
- Context derivations are elements which originate from the situation in which the text occurs, such as participants, location, time, reason, manner, circumstances, relations, and other metalinguistic textual cues.
- Internal influences are extremely idiosyncratic and personal factors which are mostly psychological and behavioral. They can be attributed to conscious education, training and subconscious conditioning.
- External influences are mostly sociological constraints which are usually more consciously perceived by the translator
- Abstraction metadata which involved in low-level organizing constraints:
  - Categories/Prototypes—these are the prototypical representations of concepts, for instance the prototype image for "bird" is usually a sparrow or pigeon, not a vulture.
  - Evoked mental images/quasiperceptional experiences—these are the instantiations of the nonverbal coding schemata for meaning.
  - Links to other relevant schemata/frames—these are links to other schemes and frames which may be related to the currently active one.
  - The translational *Gestalt*, which is made up of three links (microanalytic, macroanalytic and metaanalytic). It acts as a monitor to the integrity and consonance of the perception/instantiation of the abstraction by monitoring the coherence and cohesion of the mental abstraction, the conformance of the abstraction to the actual text, and existence of links to other texts respectively.

Upon commencement of the act of translation, the target text itself is, *ab initio*, non-existent, but the translator has a predictive conceptual abstraction of the text to be created from the source text, which contains the translator's expectation of how the various features and components of the target text system will stand together.

This has very important repercussions on what "equivalence" means. As the context of translation, the source text and the target text differ, the abstractions of the two texts are also subject to a great number of factors which can vary greatly from person to person. Therefore one could say that translation occurs with the goal of equivalence which is defined internally by the translator based on various parameters, some of which may not even be conscious.

The first step in the act of translation—carried out by the Translator/Reader—is that of abstraction, the linkage of the source and target texts

to two internal schematic models which exist only in the mind of the translator and consequently, the structures of which are unique in every individual translator.

The ST textual abstraction subsumes the translator's interpretation of the source text, i.e. the projection of the information from the source text onto the translator's psyche, resulting in the sublimation of linguistic activity into idiomorphic thought. The existence of this phase has been confirmed by various scholars (for instance Bartlett 1932; Bransford & Franks 1971; Rayner & Pollatsek 1989). However, the entire ST textual abstraction and its counterpart TT predictive abstraction are not formed instantaneously and as a complete whole. They are products of a recursive linkage of smaller parts.

The relation between the text and its abstraction, as can be inferred from the existence of the macroanalytic linkage, is a circular one which results in the dynamic evolution of the abstraction as the mental representation of the text. It suggests that the text is projected by a recursive procedure which divides the text into textual units which are processed and linked into the abstraction structure in the form of conceptual units (and conversely, the recoding of the resulting target text abstraction into a linguistic form is also done incrementally and in units).

I propose that while the textual units are subdivisions of the original physical text, the conceptual units are structurally similar to the general abstraction, and are linked together in such a way as to ensure cohesion and also facilitate operation for the translator.

An assertion I wish to make is that the size and structure of the textual unit is entirely dependent on the translator and the text. It conforms to the translator's idiosyncratic standards for adequacy of transition and operability.

The translator builds up the textual unit until they deem it adequate (i.e. meaningful and complete—note the subjectivity of both terms) for transition into (or from) the abstraction. This may begin at the morphemic level and progress up to the level of a clause, sentence, paragraph or even entire text, unless such a selection conflicts with the operability of the unit.

The operability of the textual unit constitutes textual aspects including but not limited to:

- legibility/audibility,
- fluency,
- physical medium (texts which are written, spoken, performed, etc.),
- genre/discourse conventions,
- linguistic parameters;

and processing considerations for the translator such as:

- memory (especially working memory),
- attentional resources or hindrances (e.g. the ability of the translator to concentrate on the task at hand at the time, fatigue, stress, interest in the subject, etc.),
- perceived difficulty,
- informational density,
- existence of linguistic/cultural lacunae,
- voids in world or domain-specific knowledge.

It may well occur that for a single translator this unit changes not only from text to text, but also from segment to segment within an individual text.

The translator/interpreter usually attempts to strike a balance between the two criteria of operability and adequacy; optimal operability would occur at the morpheme level, but that selection would not necessarily entail maximum adequacy. On the other hand, optimal adequacy would exist at the level of text, whereas such a unit would probably exert inordinate or even impossible amounts of effort and processing burden on the translator.

Projection or ST interpretation

Subsequent to abstraction, which can be seen as creating the necessary mental structures for the act of translation to take place, the text should be projected into those structures, i.e. interpreted by the Translator/Reader. The projection process can be described as follows:

1. A textual unit is received from the physical ST by the translator-reader. The length of the unit is adjusted so it conforms to the estimated operability and adequacy parameters of the translator.
2. The reception activates the emergence and/or possible reconfiguration of a corresponding conceptual unit in the ST abstraction. It may happen that the translator senses a mismatch, deficiency or error in the structure and content of conceptual unit if the textual unit was adequate but not operable (e.g. the unit was too long to be kept in working memory, or the translator/interpreter underwent a temporary lapse of attention and missed something). This requires the reselection of the unit by returning to step 1.
3. The new/modified conceptual unit is incorporated into the whole abstraction structure by linking to previously existent units and adding its contribution to the relevant abstraction subsystem. The translator maintains the internal coherence and cohesion of the abstraction through the microanalytic link, which connects the analogous subsystems of the various conceptual units together.

4. The entire ST abstraction is reconfigured to compensate for the addition/modification of the new conceptual unit and the macroanalytic link between the physical text and the abstraction is checked and updated to confirm the conformance of the ST abstraction to the physical ST.
5. Metaanalytic links based on text abstraction fragments consciously or subconsciously recalled from other texts (intertextually) may be formed and more information may be added which could result in further reconfiguration in the abstraction. The most important "other text" which has an intertextual connection to the abstraction at hand is the target text (see Farahzad 2004).
6. The next textual unit is called for input, and the cycle begins again from step 1, until the translator concludes that the reception of the text is over.

Components of the translational *Gestalt* previously mentioned in the abstraction metadata act as a monitor to check the integrity and wholeness of the abstraction at various levels. This may happen to any of the conscious or subconscious parameters of the abstraction, resulting in corrective strategies or inadvertent misinterpretation (for a comprehensive overview of *Gestalt* theory in translation, see Farahzad 1999).

Coupling

The source and predictive target abstractions come together in the translator's mind, occupying what Maturana (1978: 36) terms a *consensual domain*. This occurs when "two structurally plastic composite unities interact with each other and thus operate as selectors of their individual paths of structural change, (and) a reciprocal structural coupling takes place. As a result the changes of state of one system trigger the changes of state of the other recursively, and a domain of coordinated conduct is established between the two mutually adapted systems." (Maturana, ibid.)

During the course of structural coupling, each participating system is, with respect to the other(s), a source (and a target) of perturbations. In other words the participating systems reciprocally serve as sources of compensable perturbations for each other. These are "compensable" in the sense that there is a range of "compensation" bounded by the limit beyond which each system ceases to be a functional whole and each iteration of the reciprocal interaction is affected by the one(s) before. The structurally coupled systems "will have an interlocked history of structural transformations, selecting each other's trajectories" (Varela 1979: 48).

In the consensual domain of the translator's mind, which is the background for the communication between the Translator/Reader and the Translator/Writer, the source and target abstractions are different, yet similar

to the extent that they are both mental representations of texts and both share the same domain and structure. In order for meaning to be stabilized, they must mesh together and balance out their differences. This introduces mutual perturbations into their respective structures, i.e. the expected characteristics in the target text (which are predicted and contained in the TT abstraction) affect the translator's perception of the source text, and the information from the source text naturally configures the information which exists in the target text.

Structural coupling, then, is the process through which structurally determined transformations in each of two or more systemic unities induce (for each) a trajectory of reciprocally-triggered change. However, this does not occur in a vacuum and without controlling interaction.

Maturana (1978: 48) mentions that the existence of a structurally plastic nervous system in animals allows a mapping of all the interactions of the organism and its nervous system, as well as of most (if not all) of its internal processes, in a single phenomenic domain. All the interactions and all the changes of state of the organism (including its nervous system) that perturb the nervous system, regardless of how they arise, necessarily map in the same domain of relations of relative neuronal activities. The result of this is the ontogenic recursive structural coupling of the structurally plastic nervous system to its own changing structure through a process in which the sequence of structural changes is determined by the sequence of structural perturbations generated either by these same structural changes, or by the interactions of the organism in its medium.

The translator is likewise constantly and recursively constructing, modifying and replacing sections of the consensual domain between the source and target representation, most possibly a result of neuronal construct reconfiguration in certain sections of the brain which are related to bilingual processing and translation (see Bear et al. 2001; Andrew 2001; Wei 2002). The source text is abstracted from linguistic form; its meaning is epigenetically brought to consensus with the target-text abstraction; and then the actualization of the target text is brought about.

Solidification or TT actualization

After the source text is recursively abstracted from its textual form and its meaning is transferred to the consensual domain with the target text abstraction, and upon the structural coupling of the two abstractions, what remains is a balanced core of information which conforms to the requirements and constraints of both systems. This core is then recoded into textual form in the target language (possibly in an inverse mechanism to what was described in the projection phase), resulting in the target text; i.e. the mental, non-linguistic finalized target text abstraction is "solidified" into linguistic form.

The translational system

The aforementioned elements form a system which consists of the translator (in fact the physiological and psychological constructs of the translator involved in translation) and the textual constructs. The following characteristics can be attributed to this system:

- Morphogenesis—the capability of maintaining its continuity and integrity by changing essential aspects of its structure or organization or self-configuration (from Von Bertalanffy 1950).
- Self-regulation: the system actively controls the course of its internal transformations, typically with respect to one or more parameters. In other words it is homeostatic.
- Self-organization: it not only regulates or adapts its behavior but also creates its own organization, which is structure with function. Structure means that the components of the system are arranged in a particular order. It requires both connections that integrate the parts into a whole, and separations that differentiate subsystems, so as to avoid interference. Function means that this structure fulfils a purpose. In this system, the structure of the abstractions is dynamically configured by the Translator-Reader and Translator-Writer in order to counteract perturbations that occur in the process of transferring meaning.

The nature of the control exerted by the translator as a controller of information flow requires negative feedback and consequently the entire translational system is cybernetic. Such systems are described by Vallee as follows: "They are dynamical systems that possess input, state and output, and consequently an evolution equation. Such a system is cybernetic if it is possible to distinguish an observational sequence (of the inputs), followed by a decisional sequence leading to the effectors organs (related to outputs), being well understood that the observational sequence allows the system to observe its environment and itself. In this way a basic feedback loop is installed which calls upon various communication modes (transmission of perceptions and decisions) which justifies the cybernetic qualification" (Vallee 1995: 26).

Translators act as controllers and decision makers using feedback to monitor and constantly minimize deviations from what they perceive to be the information derived from the source text while it is transferred to the target text. The stable, homeostatic state the translation system aims for is the conceptual goal of "equivalence". However equivalence in this regard is internally defined, as a "goal state" by the translator—a state where information is optimally transferred from source to target text not necessarily according to solely externally defined criteria, but based upon the translator's internalized and idiosyncratic constraints. Indeed, these constraints can

affect the abstraction and interpretation phases by influencing the selection of dominant variables from the source text to be expressed in the target text.

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