**Toward a Translation Ability Testing:**
**Merging Research on Bilingualism and L2 Teaching with Translation Theory**

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**Abstract**

I dati, in parte controintuitivi delle ricerche sul bilinguismo e sulle disfunzioni della traduzione sono di fondamentale rilevanza glottodidattica, ma necessitano di una progressiva integrazione con i dati della traduttologia. Sulla base di una proposta teorica sui processi traduttivi umani (TTP, cfr. Salmon 2006), coerentemente a un modello multidisciplinare del funzionamento (normale) del “cervello interlinguistico”, vengono evidenziate rilevanti connessioni teoriche tra le discipline coinvolte (neuro- /psicolinguistica, glottodidattica, traduttologia) con le possibili applicazioni anche in ambito sperimentale. Secondo la TTP, esistono a livello innato A) una facoltà per la ricodificazione interlinguistica (Translation Device) e B) una predisposizione spontanea alla ricodifica funzionale. Viceversa, la diffusione della traduzione strutturale è da considerarsi l’esito non di una naturale imperizia dei discenti, ma della innaturale, diffusa prassi scolastica del “calco” interlinguistico. Dopo una sintesi critica delle più recenti teorie neurolinguistiche e traduttologiche, vengono presentati tipologia e risultati di un osservatorio di ricerca, atto a 1) indagare la sperimentabilità dei modelli traduttologici; 2) testare i postulati della TTP con bambini bilingui ancora esenti dagli effetti collaterali dell’esercizio forzato al “traduttese”.

**Parole chiave:** cervello interlinguistico, traduzione, lingue
1. The state of art in the neurofunctional study of bilingual and polyglot linguistic competence

1.1. Bilingualism: an up-to-date definition

According to traditional studies, bilingualism is mostly classified as “early coordinated” or “late subordinate”, depending on the age of L2 acquisition (cf. for example Fabbro 1996, 119-120). The definition of “early coordinate” bilingualism means that both languages have been acquired before puberty, even though L2 is often acquired in an extra-familiar environment (frequently after the immigration into a new country). In the “subordinate” bilingualism, the two languages are rather in a hierarchical relation (one is always dominant upon the other).

Nevertheless, such a strict distinction is still a by-product of a monolithic, abstract idea of what a “perfect” linguistic competence should be. Language experts (scientists, L2 teachers, speech therapist etc.) are well aware that languages are acquired in different contexts and for different purposes, and that the level of proficiency of a bi-/multilingual person in each language is functional to its usage. As a consequence, a bilingual has no need to reach the same “perfect” level of competence in each language: “A bilingual is not two monolinguals in one person!” (Grosjean 1989).

A more operative definition of bilingualism could then pertain to a person who uses two or more languages or even dialects in everyday life (Grosjean 1994; Fabbro 2001a). As a matter of fact, this perspective has been shown to be particularly useful in testing and studying linguistic recovery in bilingual and polyglot aphasia. The BAT, Bilingual Aphasia Test (Paradis/Libben 1987; Paradis 2001a, 2001b), provides with objective criteria the assessment of linguistic disorder in bilingual aphasics, in order to detect and classify patient’s linguistic performances and recovery in both languages2.

1.2. Language processing: new perspectives of functional cerebral mapping

Recent neuro-functional brain-imaging research have evidenced the need to provide the functional brain map with new, more complex models. The one-to-one relation between brain areas and cognitive functions, resulting from the traditional neo-cortical investigation, is now successfully integrated with the neural networks system. This model enlightens the role of some subcortical structures (basal ganglia, putamen, thalamus) in the corticocortical connections and in the neuro-functional processing (Alexander/Crutcher 1990; Crosson 1992; Dubois et al. 1995; Lebrun 1997; Destrebecqz et al. 2005).

PET- and fRMI studies on the Parkinson syndrome, which affects specifically the basal ganglia, provided evidence of the relevance of the striatum (basal ganglia and putamen) in some procedural aspects of the language processing (cf. Kent et al. 2000, on the concomitance of disarthria and gestual disorders in the Parkinson syndrome; cf.

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2 Part A accounts for the pre-morbid patient’s linguistic history (50 items). Part B in a systematic, comparative way values linguistic disorder in each language (472 items for each language). Finally part C tests patient’s residual translation abilities from one language into the other and vice versa, and notes and classifies interference (58 items each). BAT is today available in 65 languages for part B, and in 160 language pairs for part C. Dialect, as shows the Friulan/Italian version (Paradis/Fabbro 1993) is considered as any other language.
also Pramstaller/Marsden 1996; Pickett et al. 1998), such as: integrating motor and cognitive sequences (Marsden 1984; Lashley 1951; Graybiel 1995, 1998); sequencing language, i.e. coordinating and selecting linguistic items before verbal production (Partiot et al. 1995; Guillery 1995; Graybiel 1998; Kropotov et al. 1999; Lieberman 2000, 2001; St. Clair et al. 2003); performing specific syntactic tasks as noun/verb agreement (Kotz et al. 2003). Moreover, clinical studies on parkinsonian subjects (Pickett et al. 1998) revealed not only active (in the syntactic production), but also passive problems (in the syntactic comprehension).

In this respect, the notion of “subcortical cognition” (Wallesch/Papagno 1988; Crosson 1992; Aglioti 1997) is a key-concept in contemporary neuropsychology and neurolinguistics. As observed by Perlman Lorch (2003), the Neural Networks Model somehow recovers the more holistic and less localized view of the linguistic brain representation, already claimed by some 19th century authors.  

Because of their multiple connections with the neocortex, basal ganglia are an important neural knot linked with the frontal lobes. The so called “frontal loop” (Alexander/Crutcher 1990) is yet a crucial element in the neurolinguistic study of the code-switching mechanism: the frontal lobes are thought to control the production of new- and the inhibition of previous actions (Riddernikhof et al. 2004), while the striatum should hold the new programs till the action is achieved (Partiot et al. 1995; Dubois et al. 1995; Abutalebi et al. 2000; Exner et al. 2002; Aldridge/Kent 1998, 2003). Clinical evidence is given that lesions or tumoral damages in the frontal lobes may cause pathological switching (Fabbro et al. 2000). FMRI studies on switching tasks confirm the role of the prefrontal cortex in switching performances (Hernandez et al. 2000, Hernandez et al. 2001). Studies on patients with frontal lobes lesions have however revealed other typical disorders, such as a reduction in general anxiety and verbal disinhibition, with an increasing tendency to a scurrilous speech. A bilingual patient with a tumor in the left frontal lobe, presented in a case-study by Fabbro et al. (2000), showed all these symptoms together with pathological code-switching, but without any aphasic symptom. These results support the hypothesis that the system responsible for the linguistic switching is not dependent upon the language system, but needs to be considered as a part of a larger executive system, deputed to choose between divergent behaviors.

After a long-time searching for a location of a neuro-anatomical switching mechanism (Pötzl 1930; Leischner 1948), the ability of code-switching is now considered as depending upon a more general system, responsible for the control of antagonist tasks, such as, for example, standing up/sitting down, talking/keep silence, speaking L1/L2, speaking a standard/dialectal variety of a language (Fabbro et al. 2000). In Green’s Inhibitory and Control Model (Green 1986, 2004), the “inhibition device” allows the system to select and send information to the working memory, to

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3 The neural subthalamic activity in tasks of sentence production and syllabic repetition has been recorded by Watson/Montgomery (2006). Evidence has been given that, when dealing with sentence production, the neural activity was more organized than with syllabic repetition.

4 Especially by the British neuro-physiologist J.H. Jackson, who criticized the neo-cortically oriented Broca’s and Wernicke’s associationist theory, which became so popular to permeate all the 20th century research (cf. Jackson 1874/1958).

control and merge the contents of the working memory with the task, and finally to inhibit all the possible competitive answers.

This device affords a multilingual brain to control the competition among antagonist schemas and tasks, in order to talk in only one language, or to translate from one language into another (Activation Threshold Hypothesis: Paradis 1993, 2004). The switching mechanism is essentially a “monitor system” (Albert/Obler 1978; Abutalebi et al. 2000), which assigns priorities such as “if one were in France, the tendency would be to interpret incoming data as if they were in French” (Perecman 1984, 213). The introduction of a L2 implies a reset of the priorities: “The bilingual condition may increase the efficiency of inhibitory mechanisms” (Kefi et al. 2004).

Some typical bilingual language disorders can then be explained as ‘alternate antagonism’, for instance, the temporary loss of the ability of switching with access to only one language. This syndrome often occurs with paradoxical translation: the patient is able to translate only into the language that she at that moment cannot spontaneously speak (but not vice versa). These symptoms could be due to a lesion of the Inhibitory and Control (IC) specifier, which may cause either a pathological code-mixing, or difficulties in the switching performance (Abutalebi et al. 2000).

1.3. Leaving the hypothesis of a neuro-functional specificity of linguistic competence in bilingualism

To discuss the hypothesis of a specific anatomical location of a switching mechanism means to deny the idea that each language is stored in a differed brain site. Green’s IC model helps emancipating from the hypothesis of a specific “cip” for bilingualism. Against the traditional claim of a neuro-functional specificity of bilingual competence, i.e. of an inter-hemispheric lateralization of L₁ (left) and L₂/Lₙ (right) processing, evidence is now given that languages are represented in the same areas in early bilinguals (Hernandez et al. 2000; Hernandez et al. 2001; Paradis 2000; Fabbro 2001b; Perani/Abutalebi 2005; Reiterer et al. 2005). But it is the level of proficiency, rather than the age of acquisition, the key-feature in mapping the neural systems involved in L₂ learning. The inter-hemispheric lateralization is thus relative to L₂ proficiency (Kim et al. 1997; Perani et al. 1998; Klein 2003; Green 2004; Mechelli et al. 2004): the higher the competence, the more the neural systems for L₁ and L₂ processing tend to overlap, and the L₂ working profiles are similar to those of native speakers (cf. Green’s “Convergence Hypothesis” 2004 and Paradis 2004).6

Consequently, the question is not when, but how L₂ competence has been formed: a topic of contemporary language acquisition theories7 is the problem of the functional split between procedural (implicit) and declarative (explicit) memory and the role it plays in lexicon and rules learning.

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6 “When a L₂ is learned formally and mainly used at school, it apparently tends to be more widely represented in the cerebral cortex than the first language (L₁), whereas if it is acquired informally, as usually happens with the L₁, it is more likely to involve subcortical structures (basal ganglia and cerebellum)” (Fabbro 2001b).

7 Cf. for example the Dual-Mechanism Model and the innatist theories (Chomsky 1995; Pinker 1994); the connectionist framework of the Single-Mechanism Model (Bates/MacWhinney 1989; MacDonald et al. 1994); the Declarative/Procedural Model (Ullman et al. 1997; Ullman 2001; Ullman/Pierpoint 2005); the Shallow Structure Hypothesis (Clahsen/Felser 2006), the MUC (Memory Unification Control)-Model Theory (Hagoort 2006). See also Paradis (1994, 1997, 2004).
Leading studies on specific pathologies of bilingual aphasia showed the role of the subcortical structures in procedural acquisition processes\(^8\), compared to the metalinguistic learning (cf. Fabbro/Paradis 1995, Fabbro et al. 1997). Bilingual subjects with Parkinson syndrome show a greater deterioration at the morpho-syntactic level in L\(_1\) rather than in the L\(_2\) (Zanini et al. 2004). This fact provides evidence that procedural memory is involved more in L\(_1\) than in L\(_2\) grammar brain representation. Hence, in the paradoxical phenomena of differential recovery of bilingual patients’ languages, a reduction in the implicit competence may explain the better recovery of L\(_2\) (Aglioti/Fabbro 1993; Fabbro/Paradis 1995). The disease damages the competence in both languages, but patients can resort to the wider explicit memory by which L\(_2\) was stocked (Paradis 1994).

On the contrary, the loss of L\(_2\) against a better preserving of L\(_1\) is typical of amnestic and Alzheimer patients (Obler 1999). Alzheimer is indeed known to be a degenerative disease of the neo-cortex marked by the loss of the declarative memory. According to a study on a group of Japanese-Portuguese bilingual subjects with a diagnosed Alzheimer (Meguro et al. 2003), the main difficulties were found with the Japanese kanji (ideographic signs) and the Portuguese’s irregular words, not with the kana and the (morphologically) regular Portuguese words. That was because kanji and irregular Portuguese words do not have a one-to-one relation between grapheme and phoneme. For these patients the features related to the declarative memory were selectively or considerably more damaged than those resulting from rules more procedurally (automatically) assimilated (cf. also Sasanuma 1975).

Moreover, studies on bilingual aphasia (Fabbro/Paradis 1995; Fabbro 1999) and neuroimaging studies (Dehaene et al. 1997; Weber-Fox et al. 1996) confirm that the declarative learning of a L\(_2\) grammar and the lexico-semantic level of both L\(_1\) e L\(_2\) are mainly supported by the temporal neocortex and the parieto-temporal areas. All these data stress the importance of both implicit acquisition and explicit learning in every language fixing process.

1.4. Translation disorders in ‘bilingual’ and ‘polyglot’ aphasia

Since at least the 19\(^{th}\) century, bilingual and polyglot aphasia’s clinical studies have provided a rich literature\(^9\) on certain pathological translation disorders, summarized in the following list:

- *impossibility to translate*: both from L\(_1\) into L\(_2\), and from L\(_2\) into L\(_1\);
- *spontaneous/incoercible translation*: impulse to translate everything the patient or her interlocutors say;

\(^8\) Basal ganglia are known to be related to implicit memory learning (forming specific stimulus-reply connections, but also more complex processes such as visuo-motory abilities or rules/categories learning). In any case, studies on the implicit learning of motory sequences (cf. for example Exner et al. 2002) assert that implicit learning is more likely to be the effect of the cooperation of a network of cortical and subcortical structures, where basal ganglia would only be responsible for the adaptation to the necessary requisites of a task, while the learning of specific associations of stimuli would be rather due to the premotor frontal cortex areas and to the cerebellum (see above).

- translation without comprehension: the patient does not understand what she is asked to translate, though she correctly performs it;

- paradoxical translation: the patient is able to translate only into the language that she cannot speak spontaneously at that moment (not vice versa).\(^{10}\)

Such disorders seem to support the hypothesis that different bilingual abilities are processed by a network of neuro-functional components. The damage of one of them may not necessarily involve the damage of all the system\(^ {11}\). Moreover, recent data from neuro-imaging research on translation and switching processes\(^ {12}\) seem to confirm even at the cerebral representation level (cortical and subcortical) the differences between switching and translation processes.

The pathological processes involving translation disorders allow to assume the existence and the importance of automatic mechanisms in the translation procedures. The forming and rising of these automatisms seem to depend not only on one’s bilingual competence, but mainly on the switching practice.

2. Merging the fields

2.1. Interdisciplinary gaps

As shown in the previous part 1. of the paper, the questions related to bilingualism and switching should be investigated referring to the phenomenon of inter-linguistic translation. Nevertheless, if most of the main studies on bilingualism pay attention to translation disorders, they often treat translation with no mention to it’s disciplinary and multidisciplinary complexity, i.e. avoiding to take into account the scientific contributions by the field of Translatology.\(^ {13}\) In other words, they lack to consider the connection to a complex theoretical model of general human translation processes (which should include standard translation activities). Moreover, the research on bilingualism often disregards the pragmatic level of natural language communication. This fact is also due a) to the difficulty in thinking out experimental frameworks for testing pragmatic proficiency (not disorders) and b) to the theoretical complexity of pragmatics itself.\(^ {14}\)

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10 See above.
11 As a pioneering idea Paradis (1984) assumed the translation process to be the result of a series of neuro-functional components independent one from each another: one component to translate from language A into language B, one component to translate from language B into language A, one component responsible for the comprehension of languages A and B (passive ability), and finally one component for the expression in languages A and B (active ability).
12 Translation and switching tasks monitored by PET (Price et al. 1999) in a group of German (L\(_1\))-English (L\(_2\)) bilinguals have shown to activate at least partially different areas. The translation tasks activated the anterior cingulate and the basal ganglia, and areas related to articulation (insula, cerebellum, SMA). The switching tasks activated Broca’s area and supramarginal gyri (in the phonological recoding). Similar results have been found by Lehtonen et al. (2005).
13 The birth of this science can be associated to the invention of the first “translation machine” by the Russian engineer Petr Trojanskij in the first Thirties of the 20th Century (Cf. Salmon 2003b, 99-122).
14 But it is namely pragmatics the very level at which humans are normally able to better understand each other and no one of the single language capabilities (as phonology, morphology, syntax or lexicon) can alone guarantee a standard linguistic communication.
An analogue kind of epistemological gaps, on the other side, can be revealed in main studies investigating Second Language Learning\textsuperscript{15}, where translation is frequently mentioned apart from a consistent theoretical guideline, including a key-definition of which processes are considered to be “translation”: L2 research, also when it excellently analyses the role of neurolinguistics in L2 teaching (cf. for instance Danesi 1988, Cardona 2001, Fabbro 2004), tend to ignore the potential role of a scientifically founded translation training in reinforcing memory strategies and capabilities.

Finally, even if it is unquestionable that translation processes cannot be studied without a strict connection to the research on bilingualism and switching, in the very field of Translatology poor references are normally given by scholars to clearly inform the addressees of terms, definitions and neuro-research results, which could on it’s turn directly involve a “revolution” in L2 teaching (cf. Salmon 2003a; 2003b, 232-243, 2004). The origin of the epistemological problems of Translation Studies is thus, on the one hand, the incredible breadth of scientific branches and topics involved, and on the other, the “dissection” between humanities and science in approaching the “main object” (translation).

In this paper is claimed that only a deeper understanding of both standard and pathological translation processes can a) help the overall understanding of human bilingual mental activity and consequently 2) play a basic role in L2 Teaching/Learning.

Despite the astonishing amount of data involved in translation processes research, this field can actually be useful at the epistemological, theoretical and experimental level to all the linguistic research. Early or late, no linguistic theory will be considered complete and really applicable to an intelligent system (of any kind) if not supported by the consistence with a Translation Theory. Especially a solid theory of L2 teaching has to be based on a model of how the mind processes the bilingual data when kept separate, switched or converted, i.e. of how a standard mind “links” the units of a L1 to the units of a L2 and consequently of why a given damage can cause certain dysfunctions. Only with this “merging operation” translation training could become a pedagogical key-method to reinforce both the proficiency of the known languages and the performance of inter-linguistic switching (increasing speed in the passage from one to another language without mixing the codes).

2.2. A Theoretical Proposal of Human Translation Processes (TTP)

The TTP (cf. Salmon 2006) is a theoretical model on how the main translation processes probably occur in a standard bilingual mind. The model supplies a definition of the bilingualism needed for a effective translation and consistent to the definition of translation itself.

Translation is defined in a strict functional way in a framework of a stimulus-response mechanism, where the text is intended as a trigger of a psycho-cognitive reaction. To translate means thus to recode a text T into a text T1 so, that T1 functions

\textsuperscript{15} The term “learning” is here used in a broad sense to intend all the scientific works on L2 teaching, not developing the well known opposition learning/acquisition, which will be considered further in connection with the implicit/explicit kind of L2 data-processing by students.
for most of the target addressees more or less as T functioned for most of the source audience. Consequently bilingualism in translation is the ability of the translator to “do” with language A the same she can do with language B (having the same problems of subjective perception/interpretation). Hence, as claimed by theories on different topics, it is not the structure, but the function which actually determines the equivalence in replicating information (cf. Aunger 2002, 136-158).

According to the TTP, functional (f-) equivalence is the aim of the translation process: the translator’s mind splits source text in a set of minimal units, translatable only as a formulaic whole (i.e. at “their lowest level of composition”: Wray 2002, 4). To recode a unit into the target language means to find (on the basis of a consistent project) the unit a native would have used to express the same output in the same context (what’s your name?↔come ti chiami?↔kak tebja zovut?↔wie heisst Du? etc.). A one-to-one f-equivalent is easily available to a proficient bilingual for the overwhelming majority of units. The translator can implicitly evaluate the grade of equivalence between L1/L2 units thanks to a mental mechanism (the so called “internal ear”) which checks in the mental corpora the “candidate” units, comparing them with the contextual wh-factors. The leading parameter, allowing the internal ear “stop computing” (giving the “ok” when the found target unit “sounds good”) is the functional markedness, a concept deeply different from the common linguistic definition (based on infrequent occurrences). f-markedness is indeed a syncretic macro-parameter joining all the linguistic factors co-acting in an utterance (lexicon, morpho-syntact, phonetics, prosody, intonation, formulaicity etc.).

Synthetically, a L1 translation unit triggers in the translator’s mind the implicit or semi-explicit pre-activation of a set of L2 units, “candidates” for f-equivalence. These candidates are not synonyms, but quasi-synonyms: they express “the same ± something else” (X+Y). The X is the “meaning”, intended as the network of perceptive, psycho-emotional, cognitive data stored in someone’s memory in connection to a linguistic unit, able to retrieve all the network when triggered by a perceptive input. The additional Y concerns the vertical (hierarchical) and horizontal (affective) relationship between the sender and the recipient at that moment. The Y is often acting at the subliminal (or implicit, or unconscious) level: a speaker can become aware of Y only if especially reflecting on it (psycho-analysis is the best known way to convert implicit in explicit data in somebody’s mind).

The combinatorial computational ability of the linguistic device can in few millisecond establish implicitly the X and the Y, and react to the selected heuristic inference. In translating, after implicitly evaluating the f-markedness of the source unit (input), the Translation Device checks each of the L2 candidates in order to select an output (the target unit): the translator’s internal ear chooses one and only one f-equivalent. In the decision making process all the linguistic levels (from syntax to...
intonation) and the extra-linguistic data are implicitly considered and compared. Consequently what is f-marked (not expectable in that context by that sender), or unmarked (expectable) emerges in communicants’ mind heuristically during the communication process. The ability to evaluate f-markedness by intuition is typical of all human communication and requires to process simultaneously (in milliseconds) all the data (linguistic and extra-linguistic) related to a unique situational context.

The proficiency of the internal ear strictly depends upon the richness of the data base stored in memory and on the training in recalling inter-linguistic correspondences, i.e. in switching from one to the other linguistic code. Translation is indeed one of the abilities a bilingual mind if especially trained can perform. But if it is trained to act at the level of structure, not function, the result will be the “translationese” (the odd unnatural pseudo-language which characterizes pseudo-translations). In L2 classes pseudo-translations often become the main goal of L2 teachers and they cause a real damage to the Translation Device of the potential translators.

In summary, bilingualism is one of the necessary, but not sufficient conditions in an efficient translation process. This fact is already universally accepted by the scholars, but it generates an intuitive, false corollary, which prevails not only in the common sense, but also among translation teachers: a subject has first to become a proficient bilingual and then to be “taught” how to translate. Empirical data, suggests on the contrary a counterintuitive fact: a training in functional translation reinforces bilingualism also when it is at the very first steps of its formation in the students’ mind. In other words, translating a student become a better bilingual. Of course, this statement can be claimed just if translation is intended not at the narrow, structural level, but at the higher level of its pragmatic complexity, i.e. as the whole set of processes occurring in somebody’s brain when an L1 input is worked up into a L2 output so, that the input and the output can be reasonably thought as f-equivalent.

If a L2 student links in a memory network (by a Hebbian reinforce) each L2 unit with the f-equivalent L1 unit, in the implicit translation process the link will be more automatically available with less computational effort. The students indeed are formed in L2 by way of the linkage of L1 units with L2 f-synonyms. As L2 data-base grows up in the mental hypertext of the student (an hyper L1/L2 neuro-network), all new L2 linguistic units, thanks to the link to L1 correspondent units, are automatically linked also to all the encyclopaedic tools already aroused by L1 inputs. In L2 teaching, this fact means that the more the so called “communicative” methods are reinforced through the L1/L2 translation, the more they are effective.

2.3. More on the crucial concept of f-equivalence

When somebody utters “I’m tired”, she triggers an X, but the intonation in namely that context can (or not) add an Y even more important or even in clear contradiction with the X (“You know I’m not tired, I’m just angry with you”, or “why do you ask me, you perfectly now it!” or “It’s a pity that I’m tired, sorry for that!” etc.).

Better to be reminded, only part of the communicated information is processed at the conscious level by both the sender and the recipient. Most of the everyday communication process occurs at a subliminal (implicit) level. This fact can involve also unconscious language switching and interference (cf. Amati Mehler et al. 2003).

Figuratively: the ability to swim is a necessary, not sufficient condition to play water polo, but in playing water polo the swimming ability gets reinforced.
The concept of f-equivalence is the main merging point of the theoretical model: bilingualism and L2 proficiency are necessarily involved in evaluating whether a subject is able “to do” with L2 the same she is able to do with her L1. The concept of sameness is hence a crucial parameter not in defining the asymmetries among different languages’ performance, but also in testing translation as an educational tool. Translation is indeed an optimal “gymnasium” to give students a deeper feeling of how their linguistic mind works: they can test the context-related use of words and the language formulaicity (cf. Wray 2002). Also doing a very simple kind of training, they can test themselves, as early bilingual children do, both in automatically uttering f-equivalences and in arguing explicitly what is working well or not.

Asking an Italian student to translate Ital. casa into English, she usually answers house (in Italy everybody can check this claim empirically in an English classroom). A proficient bilingual should answer: “it depends”, the only possible answer for an isolated lexeme. The concept of f-equivalence is not applicable when a context is not available. Nobody can value whether the binomial casa/house is actually “right or wrong”: it depends upon the unit (very seldom an isolated lexeme can be a unit). Thus, no equivalence of any kind between house and casa is ascertainable till L1/L2 words are compared in context-related utterances. This statement is true for all the lexical items of each natural language when isolated from their living (pragmatic) context. Only having in input a “living context” (enough data to process words), the f-equivalence of a lexical L1/L2 binomial can be tested.

A trivial case like the casa/house example can already provide an important educational information: each time our students are provoked to perform a word-to-word translation (better to say a “pseudo-translation”), their brain is forced to a decision making process lacking the needed data for a regular problem solving operation. Consequently the functioning of the Translation device is inhibited.

It is known that even early bilinguals can radically lack the ability to process inter-linguistic f-equivalence. Mostly it is just because they are not trained to use translation in everyday life (or because they are in that standard teenage phase when they reject the language not used in the country they live). But there is a possibility, empirically suggested in observing pre-scholar bilinguals, that namely a distort language teaching can cause or stimulate a inhibition of the natural predisposition of early bilinguals to f-equivalent translation.

In other words: if well trained in everyday-translation, humans do probably translate spontaneously better, than after years of L2 courses at school, where they are taught to use the non-existent language of structural calque (translationese). Whether this is true or not, this question can be answered to only if further research on language

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22 House can just in some cases be equivalent to casa (and properly translated by that lexeme). In the Ital. “Non ho soldi perché ho comprato una casa” (I’ve no money, because I bought a X”, casa almost certainly means flat, not house! And “vedrai una grande casa rossa a molti piani” will be in English “you’ll see a many-storied red building”. Till the translator cannot heard/read the context, she cannot decide what casa will be in English (and she also can decide to differently translate for an American or a British audience). This fact gives a first explanation, why bilingual dictionaries are very distant in their form, concept and usefulness from the real, immeasurable mental dictionary a bilingual human deals with.
(origin, teaching, acquisition, translation etc.) will suspend any “off limits”, i.e. all the data on linguistic brain activities will be considered useful for theory and testing.

3. Looking for empirical evidence

3.1. Testing the model

In translation research the problem of empirical testing is actually hard and the reason is first of all of an epistemological kind. In the experiments on bilingualism the aim to find “general laws” is a priori endangered by the differences in the level and typology of bilingualism of tested subjects. In testing translation competence more troubles emerge: suppose a classical experiment on back-translation (L1→L2→L1) is held with humans, in order to check whether or not a L2 text converted from a L1 text can be re-converted into exactly the starting L1 source-text. Yet, if the L2→L1 translator is the same person who performed L1→L2 passage, she can clearly be influenced by the previous translation process (remembering the source-text), but if the translator is not the same, the difference in translation proficiency between the two actors can deeply invalidate a generalised statement. In this case, also the fuzzy “more or less” component should be measured by difficult to be found “fixed parameters”. The use of neuro-imaging is also difficult in such a complex kind of operation (translation processes) because it involves a lot of brain areas. It is also possible that surface inter-language asymmetries can invalidate the task of finding similarities in human translation deep processes: it is well known how a translator from German tends to infer a (final) verb before having heard/read it (the so called “anticipation”), while with two typologically very similar languages less or no structural re-coding is needed. Finally, to organize a control group is extremely difficult, because the same experimental condition can be guaranteed only in non-spontaneous communication. It is clear that by now the main problem in testing is a meta-problem: how to test the way a testing method can be scientifically available?

3.2. The workshop

At this first purpose two workshops were organized in order to observe bilingual abilities in 6-8 aged primary school children. Our assumption was that translation ability does not arise from rules-knowledge, but from a procedural competence involving the knowledge of the relation among language/context/usage situation. So the workshops were intended to stress the pragmatics of bilingualism (i.e. subjects’ linguistic behaviour in real situations). The children age was hence selected to be sure the subjects of the experiment were not influenced by explicit meta-linguistic school knowledge.

The main problem was how to measure bilingualism with reference to the degree of subjects’ knowledge of f-equivalents in their two languages. The hypothesis was: the more automatic the translation mechanism, the higher the f-equivalence.

For that reason, kids have never been asked to explicitly apply to grammatical rules. On the contrary, their spontaneous translation behaviour has been observed, only asking them to play in stimulus/response tasks. Such spontaneity is thought to decrease with scholastic formal linguistic education. To test this assumption, a workshop with a control group (students of school level) will be organized. New data
will be then compared, in order to stress meaningful differences in translation behaviour of each age group.

3.2.1. The Workshop at the German School

The first survey was carried out in the German School of Genoa. The study was conducted in a first level class with a group of twelve children. Most of them were German/Italian bilingual, but some of the Italian monolingual children, who study German only at school, were also present. The wealthy socio-cultural background of the families of these children must also be taken into consideration in our study. The workshop included a 45-minute play session (previously subjected to parental approval) in the presence of the students’ teacher and within the classroom setting.

The native German children were asked to relay to their schoolmates what was previously said to them in their L1 (according to a set of tasks and games properly prearranged). The original idea was to read and translate fairytales and children stories, but afterward this option of well structured tasks was abandoned in order to enhance spontaneity. The choice of the material was oriented toward the use of everyday language in well known, informal circumstances so that the linguistic expressions might be easily retrieved. The class teacher was the only one who spoke German and the students had to make us understand in Italian what she had said. We were presented as persons who wished to learn German, with a knowledge of only a few German words and utterances. The fact children regarded us as deficient in the linguistic German competence gave them an important cooperative role.

After a short introduction, the children were provided with the reading of the following rhyme:

\[
\begin{align*}
\text{a)} & \quad \text{Ich} \quad \text{bau}, \quad \text{ich} \quad \text{bau} \\
\text{Ich Bau} & \quad \text{mir} \quad \text{ein} \quad \text{Haus.} \\
\text{Schaue} & \quad \text{zum} \quad \text{großes} \quad \text{Haus} \\
\text{Ich} & \quad \text{bau} \quad \text{ich} \quad \text{baun Haus.} \\
\text{Ich bau mir ein Haus.}
\end{align*}
\]

Children were asked, in turn, to translate it. An interesting point was to note that one of the German/Italian bilingual children tried to maintain the same rhythmic and musical intonation of the source text:

\[
\begin{align*}
\text{b)} & \quad \text{Io costruisco, io costruisco,} \quad (\text{I build, I build,}) \\
\text{io mi costruisco una casa} & \quad (\text{I build a house for me})
\end{align*}
\]

This child was able to evaluate the difference between \textit{Ich bau} and \textit{Ich bau mir}, and consequently the necessity of pointing it out in his translation. The constant repetition of the I-subject, perceived as redundant for an Italian native speaker, seems to have been essential for the German child, in order to make the distinction from the object pronoun which was to come. Conversely, in front of the sentence:

\[
\begin{align*}
\text{c)} & \quad \text{Schaue zum Fenster hinaus}
\end{align*}
\]
he perceived the adverb *hinaus* as redundant and so not necessary in his translation process. The translation was:

\[ c') \text{Guardo dalla finestra} \quad (I \text{ look from the window}) \]

An Italian child, trying to analyse the phrase in order to translate it with a calque, maintained the adverb (*hinaus*) and corrected his German-speaking classmate:

\[ c'') \text{Guardo \textit{fuori} dalla finestra.} \quad (I \text{ look out of the window}) \]

The next task was to recite, mime or translate the following text:

\[
\begin{align*}
d) \quad \text{Hausspruch} \\
\text{In meinem Haus,} & \quad \text{Nella mia casa, (In my house)} \\
da \text{wohne ich,} & \quad \text{io abito (I live)} \\
da \text{schlaf ich,} & \quad \text{da tráume ich.} \\
da \text{esse ich.} & \quad \text{da weine ich,} \\
\text{Und wenn du willst,} & \quad \text{Und wenn ich will,} \\
dann öffne ich & \quad \text{dann schließe ich} \\
die Tür & \quad \text{die Tür} \\
und lass dich ein. & \quad \text{und bin allein.} \\
\quad & \quad \text{(Gina Ruck-Pauquèt)}
\end{align*}
\]

It is worth mentioning that the translation of the first two lines were performed by a German kid as:

\[
\begin{align*}
\text{In meinem Haus,} & \quad \text{Nella mia casa,} \quad \text{(In my house)} \\
da \text{wohne ich,} & \quad \text{io abito (I live)} \\
\end{align*}
\]

In this case, the German deictic “*da*” was omitted, as a functional translation requires.

In the next phase of our experience, some of the children were interviewed and asked to translate some sentences into German. The first case was in discussing food and lexemes like *colazione* (*breakfast*), *pranzo* (*lunch*) and *merenda* (*snack*) in German. Most of the children were not able to translate the word *merenda* with the German word *Zwischenmahlzeit*, using *Frühstück*, “*breakfast*”, instead. The probable reason is that *Zwischenmahlzeit* is not commonly used in German and the word was
hardly used within the familiar context (it is even more possible the use of It. “merenda” by a German mother living in Genoa among Italians). Another explanation is that what is eaten/drank as Frühstück matches also with what is eaten as school-snack during the morning break (merenda). The next question was consequential:

If Frühstück is merenda, then at what time you’ll have Mittagessen?

:e) Mittag is one o’clock - said one of the children.

Once again the bilingual child implicitly and spontaneously chose to privilege the pragmatic communication rather than the literal (Mittag is 12 pm).

When the bell rang, one of the children was asked how she would say, “adesso è suonata la campanella” (the bell rang now) in German. She replied:

:f) Die Glocke klingelte

and interestingly enough, her Italian classmate, noting that the translation was not precise enough, because it was lacking the adverb “now”, commented:

:f') “Ma se vuoi dire adesso devi dire jetzt”

(But if you want to say ‘now’ you have to say ‘jetzt’)

For the children, who did not have the same experience of the pragmatic German context as the native speaker, a literal and more “grammatically correct” translation revealed a higher explicit competence.

The third case was perhaps the most interesting. Two 6 years old kids were asked to translate into Italian the idiom:

:g) “Du bist an der Reihe”

(It’s your turn)

Both children had Italian fathers, one had a German, the other a Swiss mother. They did not perform the task in the same way. The child whose mother was Swiss provided a word-to-word translation (which makes in Italian no sense):

:g’) “Sei sulla riga”

(*You are on the line)

On the contrary, the second child translated it functionally as:

:g’’) “ma no! vuol dire ‘tocca a te!’”

(No! It means ‘it’s your turn’!)
Their teacher informed us that the given idiom is commonly used in Germany, but not in Switzerland. Consequently the calque appears to be used by the first child as the only possible solution for an unknown formulaic input, which probably was not completely understood.

3.2.2. The Workshop at the ‘Daneo’ Primary School

The second study was held at the Daneo Primary School, where we met with other bilingual children in third- and first grade. The multilingual reality of this school is outstanding: English, German, Russian, Albanian, Arabic, and Spanish speaking children are in the same class, where English and French are regularly taught as foreign languages since first-grade.

The experience with the third-grade took place during the students’ English class. The entire hour was English-oriented, the teacher reading the children passages from *The Wizard of Oz*. During the reading, the teacher asked the children to translate a sentence just read from the tale in their L1, as for example:

\[ h) \text{ “Can you please give me a heart?”} \]

Interestingly enough, not all the children could perform the task. Compared to a Spanish girl, who translated functionally:

\[ h’) \text{ “¿Por favor, me puedes dar un corazon?”} \]

an Albanian boy was not able to perform the task initially, so that his classmates asked him:

\[ i) \text{ “Non sai la tua lingua?” (Don’t you know your own language?)} \]

At the beginning, we thought it could be due to a sort of shyness, also possible, of course (this boy was said by his teachers to be very good at language study). But the difficulty of this Albanian child could be compared to an analogous resistance to translate into his L1 of a first-grader Russian child.

The organization of the workshop with the first-graders was different. The children were asked by their teachers to wander around the classroom with their eyes closed following the music which was provided, and then to express their thoughts and feelings, in their mother tongue and in Italian. The Russian boy had no problem to tell spontaneously in Russian his thoughts and feelings, but when explicitly asked to translate something from Italian into Russian, he was unable to do it. He gave us the following explanation:

\[ l) \text{ “Prendo l’areo, volo sulle montagne, attraverso il mare, parlo russo”} \]

(I’ll take the plane, fly over the mountains, go over the sea, I’ll speak Russian)
He speaks Italian in Italy, but Russian only in his native land.

3.3. Results and conclusions

The empirical data of the study suggest:

- children translation ability is not consistent with bilingual proficiency;
- a functional translation is based on the knowledge of the pragmatic equivalence of two ‘language units’ (cf. examples $g$, $g'$, $g''$);
- translation and switching are different mechanisms: in untrained subjects the switching ability can often occur without the translation ability (cf. examples $i$, $l$);

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References


Danesi M., 1998, Il cervello in aula: neurolinguistica e didattica delle lingue, Perugia, Guerra

–, 1988, Neurolinguistica e glottodidattica, Padova, Liviana Editrice.


