

translate" philosophy is that it will lead to greater success at language learning.

The University of Minnesota mini-survey on the language of thought asked students whether they were admonished by their teachers to think through the LT in their language learning experiences. Fifty percent of the respondents in the mini-survey indicated that they were:

English-L1 trilingual: I was taught early on to do this--at first it took more conscious effort, but now it sometimes "just happens."

English-L1 trilingual: The teachers always encouraged us to stop translating and start thinking in the L2.

Chinese-L1 bilingual: She pushed to think in the L2. I remember feeling saturated by all of the pushing she did in the L2.

Turkish-L1 trilingual: Often. My first German teacher encouraged us to think in German and to avoid translating into our native languages.

Japanese-L1 trilingual: I went to a school of English in Japan, where English was the only means of communication. "Think in English" was the school's motto or philosophy.

Hungarian-L1 trilingual: I have always been encouraged to try to think in the foreign language I'm learning, but I've found that it's much easier to do at a higher proficiency level than at lower levels.

When asked whether they themselves made an effort to think extensively through the target language, 82% (14) indicated that they did. As to the results it produced, most indicated benefits. The first set of responses referred directly to situations of submersion in a context where the language was spoken natively:

English-L1 trilingual: Living over there [in France] for 4+ years with few "English" contacts made that quite easy.

English-L1 bilingual: Yes--I consciously pushed myself to think in my L2 while I lived in China. The results were quite good, especially since I did a lot of communicating with other L2 learners in Chinese. The more we practiced the language and thinking in the language, the better our communicative competence and linguistic competence.

English-L1 trilingual: Yes, [the results of submersion were] pretty successful. After a year of living in Mexico, I seldom had to think of a word in English before putting my thoughts into Spanish.

English-L1 quadrilingual: During a time living in France I took a course in speed-reading. Since what I was reading was French, I eventually got to the point where I really read in French--despite lack of oral practice. I continue to read French fast and always in French.

Japanese-L1 bilingual: I tried to think in English when I was studying the language in Japan. But it just didn't work. (I can do it quite easily now [after coming to the U.S. to study].) I think one needs to immerse in the LT culture for some time before she becomes able to think in the LT.

Turkish-L1 trilingual [living in the U.S. for some years]: Not as much in German [L2]. I seldom think in Turkish now. I am much more at home in English [L3] than I ever was in German.

The next set of responses regarding the extent of LT thought are of a more general nature, not referring specifically to submersion in the language and culture:

English-L1 trilingual: I find that when I do make the effort to make internal dialogue in L2, it makes it easier to speak without as much hesitation.

English-L1 quadrilingual: Always—I am successful. I talk to myself in LTs, describing even simple things.

English-L1 quintilingual: It seems to aid reading comprehension and oral communication when I try to think in the LT system.

English-L1 quadrilingual: The first year I studied Spanish, I practiced translating my thoughts from English to Spanish all the time—at work, play, walking around, etc. I believe it served to ingrain my knowledge immensely. I considered it "studying any time, any place, without even sitting down and opening my book."

English-L1 sextilingual: Yes. My language ability improved. I communicated more and better. I began to automatically think in the second language and to rehearse mentally what to say in various situations I encountered or anticipated.

English-L1 trilingual: Yes, I can exist in Swedish—and I do not know many telephone numbers of my Swedish friends in English. I have to write them out and translate if I give them, for example, to an international operator.

English-L1 trilingual: If you can do it, it always pays off.

Only two of the respondents had a somewhat negative response to the question about whether they used LT thought extensively:

Japanese-L1 trilingual: Yes, but I guess that I tended to get exhausted at a particular point in the process of thinking. Also I seemed to be thinking more slowly. (Thus, I was more frustrated.)

English-L1 bilingual: Not usually, unless I'm also speaking or reading in German.

So, the conclusion that one might reach after reviewing the responses from the mini-survey and from my own examples is that there are definite benefits from making an effort to think in the LT. The issue at hand is what

such "thinking in the LT" really means and how to do it most effectively. Just as Kern questions the extent to which the LT is actually a language of thought as opposed to a language of reference, so Lantolf (personal communication, May 13, 1994) contends that when nonnatives plan and rehearse what they want to say subvocally in an LT (as some of the respondents reported doing above), this does not really constitute thinking in the LT; likewise, Lantolf sees this activity more as thinking about the LT. In other words, the fact that the speakers have to engage in such activity might suggest that they cannot think in the LT. Of course, if they are rehearsing the LT material and also thinking about it in the LT at the same time, then perhaps this would more directly constitute thinking in the LT.

Once we have all of these various distinctions sorted out and arrive at a good working definition of what we mean by thinking through the LT, then it will be beneficial to conduct a series of studies assessing the effects of both qualitative and quantitative differences in the amount of LT thought on outcomes at various stages in the learning process.

Additional Empirical Data on the Language of Thought

A Study of Mental Translation in Reading

As noted at the outset, Kern (1994) has recently conducted empirical research which provides new insights into the language of thought for comprehending foreign language texts. The researcher explored the actual uses for translation into the L1 in the language learning/using process. He had 51 students of intermediate-level college French (in high, medium, and low reading ability groups) participate in verbal report interviews while reading French texts at the beginning and the end of a fifteen-week semester. An analysis of the verbal report data provided a series of reasons for why the learners of French as a foreign language chose to perform mental translation into their L1, English. The study provided a number of insights as to why LT learners may well choose to think through their L1 or an LO instead:

1. By so doing, the learners have an easier time processing the thought since L1 or LO processing facilitates semantic processing. For example, learners may have a more difficult time chunking LT lexical items into semantic clusters than they do with translated items. If the learners stay only in the LT, they are more likely to store words as discrete units in working memory, which in turn places a greater burden on memory capacity.
2. If learners process the input exclusively in the LT, they run the risk of losing their train of thought as soon as the chunks are long or syntactically complex, since such chunks are harder to hold in short-term memory. Indulging in mental translation during LT aural comprehension or reading, on the other hand, is likely to allow the learner to represent in a familiar, memory-efficient form, portions of the oral or written LT text that exceed cognitive limits. Translation then serves as a means of maintaining concentration long enough for meaning to be integrated and assimilated.

3. By thinking in the L1 or an LO, the concepts are likely to come alive because the learners' network of associations is usually richer than in the target language. The semantic potency of words may simply be less in the LT than in the L1 or an LO.

4. Thinking in the L1 or an LO converts the input into more familiar, user-friendly terms, enhancing the learners' confidence about their ability to comprehend it. This may serve as an affective boost, reducing the insecurity they may feel.

5. Learners may also revert to the L1 or an LO because they have found that it helps them in clarifying syntactic roles, verifying a verb tense, or checking for comprehension (Kern, 1994).

The fact that learners resort somewhat or extensively to the use of the L1 or an LO does not necessarily mean that translation works to the learner's advantage. For example:

1. Attempts at translation may be inaccurate, leading to miscomprehension.

2. Translations done too much on a word-by-word basis at the micro-level may not adequately provide for integration of meaning. Hence, the learner may come away with a bottom-up sense of how portions of text and isolated items function and what they mean, without having an overall, top-down sense of what the material is all about.

3. Learners who are translating during language processing may be attending to LT forms only very briefly and reserving the bulk of meaning processing for the L1 mental representation. In other words, it is possible that during much of the meaning-integration process, learners focus primarily on transformed L1 representations rather than on the original LT forms. Furthermore, some or much of the thought that goes on during mental translation may be of a technical or perfunctory nature--e.g., searching for literal equivalents of LT forms, rather than determining the general coherence of the text. In an extreme case, the LT input may make little impact on the learners' knowledge of the LT forms. It is more likely that while such a language comprehension strategy would diminish the likelihood of LT learning, some learning would nonetheless take place.

Studies of L2 Writing by Means of Translation

While Kern's study focused on mental translation for the purpose of comprehending text during reading, studies have also begun to look at the effects of translation from L1 on the production of foreign language writing. A study by Paivio and Lambert (1981), for example, found that the translation of individual words called for deeper language processing than simply copying down the foreign language synonymous word or phrase, and that this act of translation helped to fix the words more solidly in long-term memory.

At the text level, a study of EFL composition writing was conducted with 48 Japanese university students who were at the low-intermediate to low-advanced levels and who had all had four years of university

(Kobayashi & Rinnert 1992). Choosing from among four topics, one group wrote the first essay in Japanese L1 and then translated into the foreign language, English, while a second group wrote directly in English first. The next day the groups reversed tasks and wrote their second essay on another topic.

The results showed that the translations were rated higher (in content and style) than were the essays written directly in English, the foreign language. In terms of content, organization, and style, lower-level writers benefited from translation whereas higher-level writers did not. Syntactic complexity was found to be greater in the translations. When the students were asked for their writing preference, 77% reported preferring direct composition to translation. They based their view on the difficulty of conveying subtle nuances of meaning when translating, and on the tendency to use familiar words and structures and simpler ideas when writing directly. In addition, several indicated preferring the direct approach because they wanted to think in English.

As for the advantages of translating, ideas were easier to develop, thoughts and opinions could be expressed more clearly, and words could be more easily found through the use of a dictionary. The students reported being able to think more deeply in their native language and better express their thoughts and opinions. Translating was also viewed by some as helping in vocabulary acquisition.

The investigators asked for retrospective self-reports from the students as to "how much Japanese they thought they were using in their minds while they were writing directly in English." Since 55% of the higher-proficiency students and 87% of the lower-proficiency students reported using Japanese half the time or more when supposedly writing directly in English, the *direct writing* treatment was actually somewhat less direct than the label would imply.

Another study of foreign language writing through translation was conducted by Brooks (1993). She compared two methods of producing French compositions among intermediate college French students: writing and revising a draft in English and then translating the finished version into French vs. conducting the entire process in French. She found that out of 31 students, seventeen were rated better on their translated essay than on the one they wrote directly in French. Twelve students received a higher rating for the essay that they wrote directly in French, and two had identical scores. In this study, the students were not asked to report on the extent to which they thought in the L1 while composing directly in the foreign language, French.

Studies such as these two, by Kobayashi and Rinnert (1992) and by Brooks (1993), would lead to speculation that for a percentage of intermediate nonnative writers, writing directly may actually constitute a lowering of a standard that can be set by writing first in the native language and then translating. Contrary to popular belief, the attempt to think directly

through the LT may actually detract from the production of good writing. If so, this would be an indication of a way in which thinking in the L1 can actually support the production of foreign language despite the admonition that such cognitive behavior encourages negative transfer and is thus counter-productive.

An Anecdote from the Culver City Spanish Immersion Program

Immersion programs pride themselves on producing a more natural, enduring form of bilingualism than do more limited programs which simply teach foreign languages as a subject (e.g., FLES). The Culver City Spanish Immersion Program--the first full-immersion program in the U.S.--represents one of the most conscientious efforts to stick strictly to the target language for academic subjects and for social interaction over the early grades. During the first decade or two of the program, the teachers made it a point of sticking to their foreign-language guise and never spoke English. They even pretended not to be able to, although they made it clear that they understood all that was said by students in English.

I recently had an opportunity to spend extended time with one of the students in the first class to go through the Culver City Spanish Immersion Program (starting kindergarten in 1971), and to speak Spanish with her. The information that she shared with me and actual insights from her efforts at using Spanish during that meeting underscored for me the need to conduct systematic research regarding the language of thought in such programs. After several years in France and no continued use of Spanish, the former immersion student's Spanish was "rusty." She understood most everything but spoke it only haltingly. What was interesting was that she spoke it with a near-native accent and that she reported thinking directly in Spanish when she spoke it.

When she wanted to order a turkey sandwich in Spanish at a Subway restaurant (the attendant was Mexican-American), she could not remember *pavo* "turkey," but instead of thinking, "How do you say turkey in Spanish?" she thought, "No es 'pollo.' ¿Cómo se dice?" ("It's not 'chicken.' How do you say it?") In other words, her thoughts were in a Spanish inner speech. She reported that when she spoke in French after having lived in France for several years, she would often think in English first. As she put it, "'Glass' is *verre*, while in Spanish the word *vaso* just comes right out directly."

While the former immersion student was confident that her early start with Spanish made it easier for her to learn French and to learn it well, in some ways she did not and perhaps could not learn French as "deeply" as she had learned Spanish. Thus, it appears that Spanish had special status in her mind, although considerable language attrition had taken place. Cognitive psychologists have long maintained that the durability of memory traces depends on the depth of processing, or the degree of analysis afforded the material in question during the various moments or stages in the input process (Craik & Lockhart 1972, Craik 1977). It would seem

that getting an early start on language acquisition through early full immersion and participating in such a program that is rich in repeated exposures to the language would help to enhance or deepen the learning.

It may be of benefit to follow up on this anecdote by determining whether this "deep processing" phenomenon is shared by other immersion students who later became fluent in another language. If so, then perhaps it says something about the quality of the language learning experience in early immersion.

Findings from a Recent Study of Spanish Immersion Learners

While it is often presumed that immersion program pupils come to think through the target language while performing school tasks, the learners may actually be thinking largely through their native language or another language. For example, a study was conducted with 32 Spanish immersion pupils selected from third through sixth grade at a full-immersion school in St. Paul. A team of five investigators collected verbal report and observational data from the pupils over a five-month period (Cohen 1994; Parker, Heitzman, Fjerstad, Babbs, & Cohen in press; Heitzman 1994).

The study was designed to examine the nature of the internal language environment that emerges in learners as a result of the specific external language environment established in immersion classrooms. *External language environment* was defined as all language-related elements that influenced the learner from without, namely, curriculum goals, classroom policies and procedures, classroom materials and activities, and communicative exchanges between students, teachers, and administrators. The *internal language environment* referred to how learners processed language in their minds—that is, their native- and second-language systems and the role played by each in performing the cognitive tasks for which the second language was a vehicle.

The findings revealed that for the immersion students under study English seemed at times to play a more prominent role in their internal language environment than did Spanish. In responding to both numerical and verbal problems in math, students reported favoring English in their cognitive processing and were also observed to be doing so. They read the problem in Spanish but would shift to English immediately or as soon as they had some conceptual difficulty.

Thus, it appeared that the pupils in the St. Paul immersion program were reverting to English for much of their cognitive processing—performing rapid, online translation or reprocessing when needed (Cohen 1994; Parker, Heitzman, Fjerstad, Babbs, & Cohen in press; Heitzman 1994). This finding may be interpreted in both a negative and a positive light. On the minus side, online reprocessing into the L1 may help to suggest why the immersion pupils were not as fluent in Spanish as might have been expected after so many years of daily exposure to it in the classroom. On the plus side, there may well be advantages of a cognitive nature stemming from skillful two-language "translation-bouncing" (Wallace

Lambert, personal communication, January 14, 1994). Skillful translation would mean doing it so swiftly and successfully that no one could call it a crutch and few would even be aware that it is going on. The assumption, of course, is that the pupils can bounce back—that is, perform two-way translation with ease. Immersion programs may well have this feature of promoting flexibility in simultaneous translation, but the extent to which it is a two-way skill needs to be investigated.

Multilingual Thought Processes in Producing an Utterance

The research literature is all but devoid of systematic research on the language(s) that multilinguals actually do their thinking in from moment to moment. There is a considerable amount on the languages speakers use for given interactions, but virtually nothing on the thoughts leading up to those utterances. Cohen and Olshtain (1993) began to investigate this issue by asking respondents to view videotaped footage of themselves performing speech acts in role play situations in English as a foreign language, and to reconstruct the choice of language for the planning of the utterances.

Looking at the total group of fifteen respondents performing six role plays each, the three most common patterns were "planning in English and responding in English" (21 instances across 9 speakers), "planning in Hebrew and translating from Hebrew to English in the response" (17 instances across 7 speakers), and "planning in Hebrew with the response in English" (16 instances across 8 speakers). There were actually 16 other patterns. Hence, response patterns were complex, and further such research would seem warranted.

While investigating the selection of particular speech styles in the LT, Cohen and Olshtain found that multilinguals who may function largely through an LO while learning and using the LT, may revert to their L1 to determine the appropriate style for a given utterance. This is what a native French speaker reported after role playing a situation of asking his teacher for a lift home. He indicated that he thought the utterance through in French (the L1) first because he was aware it called for deference to status. He then translated the utterance into Hebrew (the LO), and finally produced what he felt would be an appropriate English (L3) equivalent of that utterance (Cohen & Olshtain 1993).

Conclusions

This paper has asked more questions than it has answered. Since inner speech is by its very nature "inner," it is difficult to describe the extent to which a multilingual's various languages might play a role in it. For this reason, a brief comment about research methodology seems in order. Perhaps the most viable means of collecting such data is through verbal report, as seen in the several studies reported above (Kern 1994; Cohen 1994, Heitzman 1994, Parker et al., in press; Cohen & Olshtain 1993). Such ver-

bal reports would include data that reflect self-report (learners' descriptions of what they do, characterized by generalized statements about their language behavior), self-observation (the inspection of specific, not generalized language behavior introspectively--i.e., within 20 seconds--or retrospectively), self-revelation (think-aloud, stream-of-consciousness disclosure of thought processes while the information is being attended to), or some combination of these (Cohen 1987, Cohen & Hosenfeld 1981, Radford 1974).

Critics of verbal report methods note that much of cognitive processing is inaccessible because it is unconscious (see, for example, Seliger 1983). Even if the processing is not unconscious, it has been considered either as too complex to capture in protocols (Dobrin 1986), or as putting too great a burden on the learners' memory for them to report mental processing with any accuracy. Thus, researchers who use such measures either have to somehow raise the level of conscious awareness of processing or make do with insights regarding those processes to which respondents have conscious access. The use of such measures may also require of respondents that they unravel some of the complexity inherent in a given set of cognitive processes and/or improve their recall skills.

Verbal report techniques are also criticized for their potentially intrusive effect. For example, in reading research, attention is drawn to the possibility that immediate retrospection may distort the process of reading if the readers read more closely than normal, read sentence by sentence, or concentrate on the additional cognitive and metacognitive task (Mann 1982). Not only is there the possibility that the verbal report task may cause reactive effects, and thus produce data no longer reflecting the processes intended to be investigated; there is also the possibility that the results will vary according to the type of instructions given, the characteristics of the participating subjects (some more informative than others), the types of material used in collecting protocols, and the nature of the data analysis (Olson, Duffy, & Mack 1984).

Despite the numerous criticisms that have been raised, research has demonstrated that verbal reports, elicited with care and interpreted with full understanding of the circumstances under which they were obtained, are, in fact, a valuable and a thoroughly reliable source of information about cognitive processes (Ericsson & Simon 1980, 1993). Whereas the neurological origin of cognitive processes may not be available for inspection, the cognitive events themselves are available through verbal report (Steinberg 1986: 699). It is suggested that language learners underestimate the extent of conscious (or potentially conscious) processing because they are not attending to it. Furthermore, the directness of introspection gives it a character not found in any other investigation of psychological phenomena (Bakan 1954).

In a recent study by Nyhus (1994), seven college ESL students read a sociology text and provided think-aloud protocols in English as they read, as well as retrospective verbal report while they listened to the tape-re-

ording of themselves thinking aloud. They also responded to questions regarding their attitudes toward the research methodology of verbal report itself. Respondents were found to view most of the effects they attributed to verbal report as beneficial. For the most part, they felt that think-aloud verbal report affected their thinking about their reading in a positive way. It was reported to enhance their awareness of themselves as readers and of their interaction with the text. The two students who had some negative comments about the verbal report, which was conducted in English, were those with more limited English. Respondents viewed verbal report as useful as both a diagnostic tool and as a study technique. They felt that doing it in pairs or in a group allow them to realize alternative ways of thinking about a text.

Hence, the challenge is to refine the methods for describing the language of thought of multilinguals—to investigate where possible through verbal report and other methods the differential uses of the languages in thinking. Undoubtedly there is much that will not be accessible to description, but the field can benefit greatly from more insights regarding what can be described. It could be of interest to determine the extent to which multilinguals think in mixed codes, just as certain multilinguals may speak in mixed codes, and also to determine the effects that such language behavior has on the outcomes.

Just as it is valuable to sort out the issues of multilingual thinking and inner speech from a psycholinguistic perspective, there is a commensurate need to explore more fully the sociolinguistic dynamic of inner speech. How do adult multilinguals think through issues in different discourse domains? How do children in language immersion programs do the same? It would appear that knowledge regarding these phenomena could help inform foreign language teaching and in content-based instruction delivered through a second or foreign language. It would, for example, be possible to generate a grid of the context/content of data collected from the sample through verbal report. The grid could indicate the nature of the content, the context or discourse domain it belongs to, and the extent to which the thoughts involved one of a series of categories as in Cook's (1994) survey—e.g., memory tasks, mental calculations, display of emotion, and so forth.

While we only looked at a limited data set regarding the effects of extensive target language thought during language learning, the evidence seems to suggest that the effects are positive. All the same, the appropriate role of a paper such as this one may simply be to define a possible research area and to encourage applied linguists to explore it before making pronouncements about which course of action is preferable with regard to foreign language teaching methodology. Ultimately there may emerge a set of guidelines for learners as to the advantages and disadvantages of thinking through the native language while performing target language

tasks. Such guidelines may even be specified according to learning style, stage in the learning process, and so forth. At present we can only speculate about these matters until more research data such as those collected by Kern (1994) are amassed.

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Appendix

In Which Language Do/Should Multilinguals Think?

1. a. Did you ever find yourself thinking in some language without intending to? Describe the situation.
b. Do you then purposely switch your thoughts to another language? If so, why?
2. Have you ever had multilingual thoughts—i.e., thoughts that begin in one language, continue in another, and possibly end in a third? Describe.
3. a. Have you ever chosen to think through a second language for the purposes of learning a third language (e.g., because the L2 was closer to the target language than your native language, such as in learning Portuguese through Spanish rather than through English)? Please describe the situation.
b. If the answer is "yes," to what extent do you continue to think through that L2 when you use your L3 today? Please explain.
4. a. During your L2 learning experiences, have you ever been admonished by your teacher to think through that target language? Describe.
b. Have you made an effort to think extensively through the target language? If so, with what results?
5. a. When you are reading in an L2, to what extent do you find L1 or L3 glosses/translations for words you don't know? Explain.
b. To what extent do you gloss words by means of an L2-L2 dictionary?
c. Think of an L2 you have contact with at present. To what extent do you just read without going to a dictionary? Explain.
d. How well does this work?

