THE ROLE OF INFORMATION CONSTRUCTION IN SECOND LANGUAGE LEARNING

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ABSTRACT

This article describes the second phase of a three-phase study designed to teach less successful second language students a set of effective strategies used by successful students. The first phase consisted of identifying strategies used by successful students in their response to information contained in teacher's corrective feedback. A closer analysis of the successful students' protocols has revealed the effectiveness of some strategies[1] in terms of learning compared to others and hinted at the feasibility of finding a scale of 'constructive' processes ranging from low to high levels of information construction. This paper describes the various steps taken towards the elaboration of such a scale. It is suggested that the lack of constructive processing engaged in by average and below average students may affect their progress in attaining linguistic proficiency.

I. INTRODUCTION

Corbeil (1990) used thinking-aloud methodology to elucidate cognitive processes of more and less successful second language learners when they were provided with teacher's corrective feedback. The more successful students engaged in higher levels of information construction than did the less successful students.

For instance, they were found to identify elements of information, to explore related forms, to establish connections between existing and new knowledge, to resolve discrepancies between these two sources of information, and to engage in hypothesizing rules. In contrast, poor students frequently repeated the teacher's correction inaccurately, or if accurately without signs of understanding illustrated in their responses such as 'Je comprends', 'Okay!'. In analyzing students' protocols, it became obvious that not all processes were equally learning-oriented or 'constructive', that even among the processes engaged in by more successful students, some processes were more 'constructive' than others. These observations suggested the feasibility of devising a scale of qualitative learning or constructive processes.

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[1]In this paper, 'strategies' and 'processes' refer to the same sort of mental activities and are therefore used interchangeably.

Although attempts at investigating the quality of learning processes in a variety of domains date back to the 1950s, relatively little has been done in this respect in second language learning. In the area of problem-solving, for instance, Bloom and Broder (1950) found that successful problem-solvers read the directions and set up their own hypotheses, as opposed to unsuccessful students, who lose sight of these directions and rather select answers on the basis of 'impressions' or 'feelings'. Similarly, in the area of human information processing, Schroder, Driver and Streufert (1967) found differences among students in their handling of tasks aimed at measuring differentiation, discrimination, and integrative complexity. While some students tended to process information in a superficial way, others attempted to integrate or connect new knowledge to previous knowledge. To capture the differences in information processing, the authors developed the following scale ranging from complete lack of integration to full integration of new knowledge with prior knowledge. Four levels of information processing were identified:

1. Low integration index: No alternative interpretation is considered. Conflict or uncertainty is seen as unpleasant.
2. Medium low integration index: Alternative rule structures for perceiving the event are available. Alternate and different perceptions of the same event are generated simultaneously.
3. Medium high integration index: Two conflicting or different interpretations are integrated. Ability to take another person's point of view is demonstrated.
4. High integration index: Outcomes for various comparisons are considered. More 'connectedness' between alternatives is produced.

Similar results were reported by Marton and Saljo (1976a, 1976b) who made the distinction between deep processing and surface processing of information. In surface processing, the student approaches information with the main objective of reproducing it; in deep processing, an effort is made to grasp the meaning of the information and to relate this to prior knowledge.

Another major investigation into the nature of qualitative processes took place in the 1980s. Based on students' observable outcomes on a variety of academic tasks, Biggs and Collis (1982) developed an instrument called the *Structure of the Observed Learning Outcome* (SOLO taxonomy). This scale outlines five increasing levels of qualitative responses, ranging from illogical connection to full consideration of a good number of divergent alternatives. The scale corresponds to the mental hierarchy described by Piaget:

• Pre-structural: no logical relationship to the given information.

- Uni-structural: response contains one item relevant to the given information but misses others that might modify or contradict the response. Rapid closure oversimplifies the issue.
- Multi-structural: several items in the response but only those that are consistent with the closer conclusion are stated. Closure is selective and premature.
- Relational: most or all of the relevant data are used and conflicts are resolved by the use of a relating concept that applies to the context of the given information which leads to a firm conclusion.
- Extended abstract: the context is seen only as one instance of a general case. Questioning of basic assumptions, counterexamples and new data. Consequently a firm closure is often seen to be inappropriate.

A similar scale was designed recently for the purpose of capturing the constructive effort engaged in by first language readers who were instructed to think out loud while reading from informative texts (Chan 1987; Scardamalia, Bereiter, Burtis, Chan, & Mumford 1988). Five possible levels of constructive effort were developed with respect to each of three specific text-processing operations: *relating information, questioning information,* and *evaluating information.* For instance, under *relating information,* the lowest level of constructive effort was defined by such operations as making personal suppositions cued by one-word surface features and giving fragmentary paraphrases, whereas the highest level of constructive effort involved such operations as making inferences to predict and to extrapolate knowledge. As for the category *questioning information,* the lowest level referred to asking questions based on personal supposition while the highest level consisted of formulating situation-based problems to extend knowledge. In the category called *evaluating information,* the lowest level indicates provision of non-analytic affective comments while the highest level refers to the evaluation of conflicting information leading to a new perspective.

These studies have demonstrated that qualitative learning or construction of information can be captured on a scale of increasingly sophisticated cognitive processes in a variety of domains. Based on the results of the first phase of the study, it appeared that a scale of a similar nature could be devised for specific use in the area of second language learning.

One could argue that a scale could have well been devised on the basis of the results of studies designed to identify and describe second language learners' learning strategies (Holec 1987; Faerch & Kasper 1980, 1983; Naiman et al., 1978; O'Malley et al. 1985; Rubin 1975, 1981, 1987; Tarone 1980; Wenden 1986a, 1986b). Had that been the case, however, the resulting scale might not have had the depth and reliability with respect to cognitive processes that the present scale could offer. In the present study the concurrent thinking-aloud technique

was used: students speak their thoughts out loud at the time of participating in learning tasks. The results were therefore likely to demonstrate more reliability than techniques commonly used in second language studies such as observations, students' self-reports, students' semi-structured and structured interviews. As pointed out by other researchers (Cohen & Hosenfeld 1981; Ericsson & Simon 1984), these methods of investigation may not be representative of learners' spontaneous practices.

2. SUMMARY OF THE FIRST STUDY

2.1 Participants

The participants were 14 anglophone adult volunteers – seven men and seven women, ranging in age from 20 to 35 – enrolled in intermediate courses of French in the Continuing Education Program offered by one of the Community Colleges in Toronto. They had previously taken 2 courses – 84 hours – of French for beginners. Most of them had been exposed to French while in high school.

While half of them were successful students scoring between B+ and A, the remainder were less successful students scoring between D+ and C+. They were judged as such by their respective teachers on the basis of their previous linguistic proficiency scores which consisted of a global score on the ability of students to carry out various communicative tasks with accuracy and fluency.

2.2 Methodological approach

To capture students' mental operations while they were engaged in communicative activities, on-line reporting through thinking aloud was considered most appropriate. Although there have been criticisms of using verbal reports as data, concurrent verbal protocols are considered to be reliable, because the thoughts are verbalized at the time the information is heeded by the central processor (working memory) (Nisbett and Wilson 1977, Ericsson and Simon 1984).

To ensure that students understood the process called 'thinking out loud' the investigator met individually with each student who was equipped with a tape recorder and a microphone. A conversation was initiated by the investigator and students were prompted to voice their thoughts every time the investigator detected a puzzled look, a pause or hesitation. The training lasted approximately 15 minutes with each student, and was interrupted on occasion to have students listen to their tapes and assess the reliability of their recordings.

Upon completion of the training, students met, after class, in groups of 2, 3, or 4 with the investigator. They were equipped with individual tape-recorders and microphones, and were audio-taped for the duration of the sessions. One 2-hour

meeting was held every week for a period of 5 weeks with different grouping combinations, amounting approximately to a total of 20 hours. Topics of discussion revolved around everyday situations. Students were reminded often through these sessions to voice their thoughts into their microphones.

2.3 Summary of results

All tapes were transcribed verbatim. An analysis of the protocols was carried out to identify the strategies used by both the successful and less successful students. Instances of these strategies are listed below; a full account can be found in Corbeil's (1990) study.

Successful students' strategies:
- Attempt to recognize elements of information by identification of constructions.
- Questioning two words similar phonetically but dissimilar semantically.
- Re-use of unfamiliar material.
- Attempt to identify unfamiliar elements in terms of metalinguistic categorizations.
- Hypothesis-testing.
- Recognition of corresponding patterns in both languages and initial attempt at making rules.
- Complication of straightforward productions.

Less successful students' strategies:
- Inaccurate repetition of all elements of teacher's corrections.
- No repetition of teacher's correction.
- Acknowledgement by means of translation into English without any attempt at French.
- Off-focus attention.

3. DESCRIPTION OF THE PRESENT STUDY

3.1 Refinement of existing categories

Preliminary work on the data consisted of first grouping together students' protocols according to their linguistic performance and second, grouping together protocols of the same strategic content and giving them a meaningful label (see Corbeil 1990). It was then possible to design a scale of constructive processes. Before proceeding, however, it was necessary to establish a more refined categorization of students than the one set up in the first phase of the study which discriminated between *two* groups: successful (A, A-, and B+) and less successful (C+, C, C-, and D+) students. It was hypothesized that students with A and B+ standing were using more complex constructive processes than the ones

with C+ standing, and similarly for students with C+ standing compared to students with D+ standing. The three following categories were then devised: above average (A, A-, and B+), average (C+, C, and C-) and below average (D+). Strategies used by students belonging to different linguistic performance categories were discerned.

A closer look at the strategies listed under each linguistic proficiency category revealed that a number of the same strategies were used by students at different levels. For instance, strategies like the repetition of the corrected word or the contrast between the corrected and the incorrect forms were found among learners of various levels of linguistic proficiency.It thus became necessary to eliminate from a category strategies common to other ones in order to be left with mutually exclusive categories. This was done by screening strategies of identical content across categories and by eliminating from a higher category a strategy found in a lower one. This process was helpful in singling out the strategies that were responsible for the attainment of a specific level of linguistic performance.

3.2   Summary of results[2]

Identification of Above Average Students' Processes
- Exploration of related forms followed by hypothesis-making: students are provided with a novel expression and attempt to figure out other related but novel forms.
- Elaboration of information: students who are not being addressed by the teacher try to re-activate words which have shared semantic features.
- Re-activation of contrasting but related categories: students hear a word belonging to a category and re-activate a contrasting category. For instance, in the case of a word in the masculine form, they then attempt to retrieve the feminine form.
- Searching for other contexts of use: students are not familiar with the new information and question its use in other contexts.
- Attempt at making rules: students attempt to make rules based on a reliable sample of similar constructions.

Identification of Average Students' Processes
- Highlight of a correction made by use of a literal but unusual translation in English: students hear a new word, notice the unusual form compared to the first language and contrast the current form in English with the unusual form through use of the literal translation of the French expression.

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[2]Instances of these processes can be found in Corbeil's (1990) study.

- Contrast made between their incorrect response and correct response provided by the instructor: students are given a correction which they contrast with the incorrect one.
- Search for parallel structures: students are given a correction and re-activate parallel structures.
- Repetition of teacher's corrections with signs of understanding: students repeat teacher's corrections and add signs of understanding such as 'Yes', 'Je comprends', 'Okay!'.
- Minimal transformation of teacher's corrections: students who are not addressed attend to corrections given to peers and attempt minimal transformations[3].

Identification of Below Average Students' Processes

- Inaccurate repetition of teacher's corrections: students are provided with a correction but do not repeat it accurately.
- Accurate repetition of new information provided to a peer: students repeat accurately the correction addressed to a peer without signs of understanding.
- Attention to only 1 alternative when 2 are suggested: students are provided with information about two competing phrases, but pay attention to only one.
- Off-focus attention: students express irrelevant comments instead of focusing on the correction.
- No repetition of teacher's correction: students who are corrected by the teacher do not repeat the correction.

3.3   Design of a scale of constructive processes

A first procedure consisted of setting up two main categories to account for strategies where the construction of information and contributions to advance learning were questionable and for the more complex strategies which gave evidence of advancing learning. The first category was called *Minimal attention to the teacher's corrections*; the other was called *Increased attention to the teacher's corrections.*

The following processes were grouped under the category *Minimal attention to the teacher's corrections:*

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[3]Minimal transformation consists of supplying on one's own uncomplicated grammatical or lexical items in relation with the corrected word. For example:

Student	J'ai allé à l'église
Investigator	Tu ES ALLÉ à l'église...
Student	(non-addressed) (Je suis allé à mes cours...)

- No obvious response to teacher's corrections.
- Simple acknowledgement of teacher's corrections.
- Translation in English without any attempt at French.
- Inaccurate or incomplete repetition of teacher's correction.
- Mere repetition of the correction without signs of understanding.

These strategies do not assure accuracy and fluency of further production and without a more complex transformation of information, no significant progress towards linguistic proficiency is likely to be achieved.

However, a strategy which consists of repeating the teacher's correction with signs of understanding will give students more chances to produce similar examples with accuracy and eventually with fluency. This strategy could then be listed under the category *Increased attention to the teacher's corrections*, and ranked at level 1 to account for its relatively low complexity and its small contribution to the learning process. This level – the first in a five-level scale of constructive processes – is described as:

Level 1:   Reconstructing all elements of the teacher's correction, with inflections or signs of understanding used to suggest comprehension of critical items in the utterance. Students who are corrected by the teacher, and peers who listen, repeat the information accurately and completely. They use expressions which show their understanding such as 'Okay!', 'I understand', 'I remember, now'. They translate into English whenever necessary, in order to remember the new material or whenever the new material does not represent a perfect mapping with English.

Example (1)[4] illustrates this level:

(1)   S/A   J'ai fait le badminton mercredi soir.
        Invest.   Tu as fait DU badminton...
        S/A   Oui...J'ai fait DU badminton...
        S/-A   Okay! You played badminton/Tu as fait DU badminton)

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[4] Abbreviations used in the examples:

S/A =	Student addressed. This refers to the student who is given the correction.
S/-A =	Student not addressed. This refers to the other students who listen to the student who is given the feedback.
Invest. =	Investigator.
CAPITALIZED WORDS =	Words pronounced with extra stress.
( ) =	Verbalized thoughts. This means the thoughts students speak out loud into their microphones.
... =	Pauses, hesitations, etc.

As demonstrated by the example, students who repeat a correction with signs of understanding are likely to repeat this instance accurately, but they cut themselves short of a good deal of information necessary to move towards the attainment of linguistic proficiency. If there had been more complex mental processes involved such as questioning the preference given to the use of this particular structure over another one or inquiring about other instances for which the same rule applies or does not apply, students would have increased their knowledge of the language.

A slightly more complex strategy might have consisted of contrasting the corrected version with the incorrect one. This represents level 2 in the scale of constructive processes, described below:

Level 2:   Perception of something different or unusual (on the surface).

a) Students, whether addressed or not, repeat the teacher's correction and contrast the wrong and the correct ways of saying it, as in example (2a) below:

(2a)	S/A	J'ai attendé un concert hier soir….
	Invest.	Tu as ASSISTÉ A un concert…
	S/-A	(Tu as ASSISTÉ A un concert…pas, tu as attendé un concert…I understand…)

b) Students who are corrected by the teacher and the peers who listen, observe something unexpected or unusual about it.

(2b)	S/A	As-tu fait quelque chose intéressant hier?
	Invest.	Quelque chose D'intéressant
	S/A	Quelque chose D'intéressant… (something of interesting…funny…)
	S/-A	(Quelque chose D'intéressant… 'of interesting' instead of just 'interesting'… special…)

c) Students try to seek a closer association with the first language.

(2c)	S/A	Quand le professeur a marké le test…
	Invest.	a CORRIGÉ le test…
	S/A	a CORRIGÉ le test…(to mark…to correct…a corrigé)
	S/-A	(Oh! he marked it…he corrected it…il a corrigé…)

Students who use strategies which highlight in some ways the peculiarity of the correct expression put themselves in a better position to remember and reproduce accurately and fluently this particular instance than had they only repeated the correct expression as practised at level 1. However, they would have extended their knowledge of the language by asking for more information about various applications of each of the competing forms. As far as their progress towards linguistic proficiency is concerned, students who limit themselves to this

level may succeed in the long run in repeating accurately and fluently a few expressions, but they deprive themselves of acquiring a good deal of vocabulary, and therefore do not make significant advances towards their command of the new language. They might have benefited more from the correction had they attempted to transform the information provided by the teacher in a slightly more complex way. For example, they could have identified elements of information in terms of metalinguistic categories as is done at level 3.

Level 3:   Attempt at recognizing elements of information by metalinguistic identification of constructions or noting English / French parallels.

a) Students who are given the teacher's correction and/or the peers who listen to it try to identify the correction that is given to them.

(3a)	S/A	J'ai levé tard ce matin...
	Invest.	Tu T'ES levé tard... Vous comprenez?...
	S/A	Oh! Je ME SUIS levé... (Okay!...pronominal...avec 'être'...)
	S/-A	(Se lever...to get up...passé composé... 'être' pas 'avoir'... le pronom aussi...)

b) Students correct their peer's speech in advance of the teacher's correction.

(3b)	S/A	J'ai allé à la discothèque hier...
	S/-A	(Je SUIS allé à la discothèque...)
	Invest.	Tu ES allé à la discothèque...
	S/-A	(Okay! I was right...Je SUIS allé...tu ES allé...)

c) Students re-use teacher's corrections as often as they can and in as many different contexts as they can. Students who attempt to identify elements of correction in terms of metalinguistic statements, or who ask the teacher to provide them with this information, are likely to remember the correction more accurately and to trigger other related expressions associated with the metalinguistic label they have supplied. In the example given above, the recognition of an instance of a specific category of verb classes may lead to the retrieval of similar cases, resulting in a better grasp of verb classes. However, students who go beyond the identification of elements of information and try to analyze rules of usage are learning much more about the new linguistic system. This represents the next level which is explained below.

Level 4:   Analysis of rules of usage and/or active search of parallels for complex and unfamiliar expressions. Students who are corrected by the teacher or peers who listen to the correction try to connect new information with related concepts from either the first or the second language (French). Students try as well to find out rules of usage based on connections they establish between the new information and the previous knowledge acquired from different sources.

(4)   S/A   J'ai appelé ma mère et j'ai dit: Soyez prête...
            Invest.   Tu pourrais dire: Préparez-vous...
            S/A   Préparez-vous...What's that? with the 'vous' after... This is different from 'Ecoutez'...Sounds like a reflexive verb, like levez-vous?
            S/-A   (Préparez-vous...To get prepared...) Has this anything to do with 'to get'...like 'to get up' ... 'se lever'?
            S/-A   (It's funny that 'Get' is not translated...It's like 'Prepare yourself...' instead...It's the same with 'Get up'...which is translated by 'Rise yourself'...)

Students are also found to re-use teacher's corrections, but unlike level 3, they transform the corrections in more complex ways. The investigation of contexts of use for a specific instance of correction will likely result in broadening the repertoire of these students and at the same time strengthening accuracy of production. Speculations about the construction of an expression and the retrieval of closely related forms for recognition purposes generate discussions that are likely to result in a greater knowledge of the workings of the new linguistic system.

A look at the example given above is informative in this respect. The student who recognizes some form of command of the phrase 'Préparez-vous' with which s/he is not too familiar, tries to come up with connections through which s/he will eventually recognize the construction. The other behaviours associated with this level, such as making rules of usage based on connections established between the new information and previous knowledge, are likely to promote greater accuracy and fluency of production compared to the mere identification of elements of a single instance of correction as done at level 3.

Students could have extended their vocabulary by searching for other ways of conveying the same meaning, for instance: 'Je te prends en passant... Tu te prépares... J'arrive... Fais vite... Ne me fais pas attendre...'. This intensive search for various expressions characterizes the next level.

Level 5:   Active search for various structures to convey the same meaning, and/or contrasting of the current construction with currently used procedures.

(5)   S/A   Je manque mon ami...
            Invest.   Tu t'ennuies de ton ami...
            S/-A   Oh! I know 'Tu ennuies ton ami'... 'You bother your friend'...but why 'Tu t'ennuies de ton ami...' You bother yourself of your boyfriend? That doesn't make sense... Would it be that this verb has more than one meaning and more than one form?

S/-A   Does that mean we can't say 'Je manque mon ami...' but could we say... 'Mon ami manque moi...' I heard something...like this...like the other way around compared to English...

S/-A   Could we say: 'J'ai hâte de voir mon ami...'?

At this level, students who are given a correction about one instance reactivate other related forms and attempt substantial transformations. Students also go beyond problem-posing and try to solve problems by accessing previous knowledge. This level is characterized by learners *taking charge of their own learning* and relying on the teacher only when personal resources have been exhausted.

What more is to be gained in terms of learning from level 5 compared to level 4? The active search for various structures to convey the same meaning will no doubt expand learners' repertoire considerably, especially when this search is initiated and conducted by learners themselves. This practice, which necessitates the search of previously learned forms and the discrimination between forms which carry the same meaning and those which hold only remote links with the target expression, will result in a greater command of the language. Using a given structure to convey a specific meaning instead of currently used structures will help students get a better grasp of the subtleties of the language. Grasping these subtleties represents a significant step towards the mastery of a new language. As was pointed out in the description of this level, what characterizes level 5 is the self-directed nature of learning by learners themselves. Unlike level 4, learners question the teacher only after their own investigation has failed to provide them with the correct answer, or when this investigation has brought up conflicting accounts between their interpretation and the teacher's. Another important difference between this level and level 4 is the intensity or the magnitude of students' involvement in learning. Becoming autonomous learners will undoubtedly make them more effective learners and thus more effective communicators.

As indicated in the first phase of the study, this classification does not imply that learners who are found at level 5 never engage in lower level processes. On the contrary, these students are found using a variety of processes that are not observed among less successful students. For instance, while successful students are observed using high and low levels, less successful students are seldom found engaging in high levels of cognitive processing.

3. CONCLUSION

This study has shown that successful second language learners act upon new information in ways similar to successful learners from different fields of study. Based on those students' protocols, it was possible to discern the sophistication of some processes compared to others which led to the design of a scale of constructive processes comparable, in many respects, to the scales previously mentioned.

The next step to be undertaken was to validate the scale of constructive processes. There was evidence of the face validity of the scale given that a) level 5 was accessed only by the most successful students, never by average or less successful students; b) level 4 was often accessed by successful students, on occasion by average students and never by less successful students; and c) levels 1, 2 and 3 were accessed by both successful and average students but rarely by poor students. However, a more rigorous assessment was in order and constituted the third phase of the study.

It is hoped that the present study has brought another dimension to the already invaluable information on second language learners' strategies. By adding a dimension of complexity of information construction, the scale of constructive processes outlined in this study can serve as a complement to the current work done in second language learning in the area of learning strategies. For instance, while repetition of information is listed among those cognitive strategies which help remembering, a refined scale assigns either a low, moderate or high rating in terms of qualitative learning, depending on whether repetition was accompanied or not by signs of understanding, identification, transformation or expansion of elements of information. This refinement is expected to provide students with a better indication of what a simple strategy like repetition might accomplish in terms of learning outcomes when operated upon in a constructive way, as opposed to being attended to only in a passive way. It is also expected that such a measure would help students assess their current state of involvement in their learning and motivate them to surpass this state in order to maximime learning.

The study has also provided positive answers to the questions raised at the beginning of this paper. According to the results of the study, it would appear that there are cognitive processes that are more conducive to learning than others and that access to high level processes, practised mainly by above-average students, might explain their higher rate of achievement among second language learners.

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