A Cognitive ESL/EFL Grammar Lesson

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Abstract: This paper aims at a cognitive approach to the specific grammar instruction about ‘Conditional Sentences 1-2-3 in English’. In this investigation, the emphasis is put on the lesson protocol analysis, a fundamental methods of cognitive research. The lesson protocol doesn’t account for the teacher’s or the students’ outward classroom behavior. Basically, so to speak, this protocol analysis becomes a task analysis including as many observations as possible, made by the teacher, about the lesson planning and classroom teaching, the lesson content, and the material used for this lesson. The task analysis focuses on several crucial issues such as: classroom teaching as an ill-structured problem; task environment created as instructional environment; the students’ learning process, etc.. The more practical implication of this study about the ‘Conditional Sentences’ has to do with the improvement of the grammar teaching method, traditionally called cognitive or translation method. It should help students to study grammar in a more active-interactive way so that grammar instruction might change in a significant way and become more and more student-centred, dialogue-oriented.

Key words: Cognitive Approach; Instruction; Conditional Clauses

The following study is the analysis of a grammar lesson about “Conditional Sentences in English” - a lesson the author has given in the Department of English, at Nanjing Xiaozhuang University, China, in 2004. The author has chosen a cognitive approach to the specific grammar instruction. For the sake of the analysis of this grammar lesson, moreover, he has made use of the so-called lesson protocol, “a fundamental method of cognitive research.” (Bruer, 1993: 44)

The investigation, including what cognitive psychologists call a “task analysis”, (Bruer, 1993: 34) has come up with results as regards certain crucial issues such as: (a) exploring the intricate interrelation between the theory of cognitive psychology and learning, and between the planning and teaching design of the above-mentioned lesson; (b) defining the role of the teacher as expert lesson planner, respectively as expert problem solver, and the role of the students as intelligent novices and expert learners; (Bruer, 1993: 51-79) (c) demonstrating the relevance of the lesson’s task environment and the necessity of elaborating on it as an instructional environment; (d) confirming the importance of the task demands and the impact that they make upon the teacher, the students, and the various classroom interactions; (e) identifying the expert’s as well as the novices’ cognitive choices and their cognitive processing of
language knowledge and language information as part and parcel of a genuine problem solving process; (f) establishing the problem-solving process as a sine qua non for any genuine learning to occur, in particular, in the course of this grammar lesson, therewith, enhancing the cognitive orientation of this domain-specific language teaching-learning correlation as a whole.

1. COGNITIVE THEORY AND TEACHING PRACTICE

1.1 Classroom Teaching: An Ill-Structured Problem

It may be useful to remember that the teaching of any classroom lesson per se presents for teachers, in general, an ill-structured problem, comparable to the problem of writing, for instance, the writing of this very essay included.

Why, we might ask, is the classroom teaching called an ill-structured, respectively ill-defined problem? It is called so (a) because there is no unique solution and no standard, universal method of finding solutions in the context of teaching; (b) because every student-teacher interaction can change the teacher’s goals and choice of operators; (Bruer, 1993: 32) (c) because there is much too much ambiguity, and there are too many possible–impossible interpretations with which the problem-solver is confronted in dealing with the kind of problem such as classroom teaching. In short, since “there is no ready-made, best initial representation and no standard solution method, (teaching in the sense of) solving ill-structured problems may be difficult, but it gives us (teachers) opportunities to be creative.” (Bruer, 1993: 218-219)

1.2 Lesson Protocol and Teachers as Observers

1.2.1 Lesson Protocol Definition

To solve ill-structured problems such as the teaching of classroom lessons of any kind, the above-mentioned grammar lesson included, the author falls back upon the so-called lesson protocol or protocol analysis. By the way: “Protocol analysis is a fundamental method of cognitive research, it exploits a kind of ‘talking to ourselves’ feature of working memory” (Bruer, 1993: 44) as part and parcel of cognitive research and its attempts to understand the functioning of mental processes, better and better.

In this connection, it is important to refer to what H.H. Stern points out, namely to observe and analyse only classroom teaching and teachers’ and/or students’ outward behavior is not enough and, indeed, doesn’t mean very much as regards this kind of lesson protocol, respectively this sort of lesson protocol analysis. Subsequently, it is of paramount importance for any detailed cognitive, psycholinguistic lesson analysis to “include in these observations what teachers say and do about their plans and their intentions as well as teachers’ work schemes, curricula, syllabuses or courses of study.” (Stern: 1997, 501)

1.2.2 Teachers and Students as Observers

In the context of this study, the protocol analysis is going to be, first and foremost, the teacher’s analysis of his own lesson protocol, respectively the teacher’s painstaking analysis of his own problem-solving behavior. Or, in other words, the teacher has to analyse himself as teacher, that is to say, the author has to analyse the collected moment-by-moment data on his own problem-solving behavior, his cognitive processing before, during, and after his grammar lesson. However, this analytical awareness, respectively the all-round observation, automatically includes the students before, during, and after the particular grammar lesson.
A further remark seems useful. As far as the students are concerned, they haven’t been asked to write individual lesson protocols. Subsequently, there doesn’t exist any protocol in which, from under the learners’ cognitive perspective, students might have written their own observations about themselves as well as about the lesson in the course of this grammar instruction. There doesn’t exist any report either in which students might have described the lesson content and the lesson assignments in detail. Ultimately, there doesn’t exist any detailed description either of how the students themselves have remembered and revised their grammar knowledge of the particular topic, i.e. the 3 types of Conditional Sentences – ‘the Probable, the Improbable, and the Impossible Conditional Sentences’, or of how they have made use (good or bad) of their knowledge, previously acquired, respectively whether they have applied (successfully or unsuccessfully) their knowledge to the problem-solving process that they are involved in by means of the various grammar exercises and classroom tasks, during this lesson.

1.3 Cognitive Approach And Grammar Instruction

1.3.1 The Relevance to Theory and Practice

To make this investigation become mutually relevant, useful, and practical for practitioners and theoreticians alike, the author has to elaborate on two things: On the one hand, he has to establish the relevant values which the theory of cognitive psychology and learning has for the teaching of the particular grammar lesson on the ‘Conditional Sentences’. On the other hand, he has to demonstrate the relevant values which this grammar teaching has for the theoretical basis of cognitive psychology relating to teaching and learning in general.

In other words, the author has to establish a kind of equation: task demands + subjects’ behavior = subjects’ psychology. By means of a step-by-step description of both the task demands as well as the teacher’s and the students’ classroom behavior and their interactions, the author has to demonstrate the expert’s as well as the novices’ cognitive processing inhering in this particular cognitive teaching-learning correlation. It is by means of the description of visible and observable facts that the author assumes to be able to convincingly reveal and explicitly articulate all that is part and parcel of human cognitive psychology, and thus mainly implicitly and indirectly observable.

1.3.2 Task Analysis

The author is fully aware of the cognitive complexity of the so-called ill-structured problem of lesson planning and classroom teaching, and of the crucial impact of the former upon the latter, and vice-versa.

It is for this very reason that the author considers the task analysis the teacher’s very first task in undertaking the writing of this protocol. Of course, the task analysis is the analysis of the task demands, i.e. the planning and the teaching of this particular grammar lesson, and of the impact lesson planning and teaching make upon the teacher as expert lesson planner and as expert problem solver before, during, and after the lesson, and upon the students and their mental behavior chiefly during and after the lesson.

1.3.3 Task Demands and Their Impact on (a) the Teacher, (b) the Students

(a) The various task demands (i.e. lesson topic, lesson organisation, lesson material, etc.) which the teacher comes up against in the course of the planning of his grammar lesson can be considered, broadly speaking, synonymous with the “task environment” he usually has to create for any lesson, as a whole, and this, particularly, while planning as well as while teaching the lesson.

However, the way or the ways how the teacher usually copes with these teaching task demands makes the difference in how he teaches, in the course of the lesson, in the certain context of the lesson’s task environment, a task environment which is thus to become, ultimately, either a more and more purely behaviorist and audio-linguistic-oriented language learning and training environment, or a more and more genuinely cognitive and problem-solving-oriented language learning and training environment. In
other words, it entirely depends on the language teacher’s way of teaching. It depends on how she/he understands his language teaching task, and on how she/he solves the task-specific problems, namely, either as low-order skill problems of language learning and training, or as high-order skill problems, e.g. of cognition, of learning, in general, of thinking, and of knowledge acquisition.

(b) Indeed, the task analysis is the analysis of the task demands and of the very impact which the task demands make, during the lesson, on the students’ individual behavior, i.e. on their long-term memory and their working memory, on their initial problem representations and their problem-solving capacities; in short, on students’ minds and the inherent cognitive architecture enabling them to process cognitive demands of this sort, as adequately and as promptly as possible.

With this cognitive frame of reference and with the global picture in mind of the teaching plan and of the classroom lesson as regards the ‘Conditionals 1-2-3’, it is necessary to take a closer look at the content of the lesson aims and objectives, at the skills to be practised, at the methodology chosen, at the work schemes; and this should mainly be operated in terms of the instructions which articulate the task demands more explicitly and address the students more directly than anything else.

2. LESSON PLANNING AND CLASSROOM TEACHING

It is primordial to look closely at how especially the Instructions have been formulated in correlation with the language material, especially with the language facts and the learning strategies within the context of the Work Schemes; and this for the sake of a deeper understanding of the students’ reactions and interactions as regards the various tasks to be performed by the students.

Precisely, these mental reactions and knowledge processing interactions enhance the cognitive orientation of the entire language teaching – language learning process throughout the lesson. This makes it possible, finally, to pursue and, hopefully, to achieve the lesson’s overall double goal of foreign or second language learning (here about the conditional sentences in English) and of learning how to learn any language, either mother tongue or foreign language. Looking at the Work Schemes, for instance, it can be said that the students are asked to deal with the Conditional Sentences 1-2-3, mentally speaking, in an active rather than a passive way. Right from the very beginning of the lesson, the students have to combine declarative or explicit knowledge and procedural or implicit knowledge, form and function, inductive and deductive teaching sequences.

2.1 Instructions and Problem-Solving Processes

In the part on Classroom Teaching, under the heading ‘Instructions 1’, the students find four important statements about the three types of ‘Conditional Sentences’ – statements which clearly indicate what the students are expected to do with these sentence stimuli. First and foremost, they are expected to respond, step by step, to the different tasks or task demands, interrelated with each other. It goes without saying, intricately interrelated as the tasks are, the students do not solve completely different tasks, respectively a series of isolated, more or less haphazardly chosen problems or exercises about these Conditional Sentences in English. Indeed, the students solve these grammar problems as part and parcel of a ‘problem-solving process which they become increasingly involved with and aware of in the course of the lesson. In other words, the so-called “problem-solving process” becomes the cognitive challenge par excellence.

2.2 Problem-Solving Process As Cognitive Challenge

Why does a “problem-solving process” become the cognitive challenge par excellence for the students? Because the “problem solving process” must be understood as closely interdependent with “the solver’s problem space” as well as with the “the solver’s initial problem representation” which is nothing else
As far as the certain interdependence itself is concerned with the “problem-solving process”, the “problem space”, and the “initial problem representation” with each other, the “initial problem representation” undoubtedly plays the most essential role in this context. Why? It does play an essential role because (a) the “initial problem representation” shapes the course of problem-solving in general and in particular; (b) it determines a student’s path of knowledge states from the initial state to the goal state; (c) it influences a student’s choice and use of appropriate operators (i.e. grammatical rules, sentential patterns, words, word orders, tenses, aspects and moods like indicative and subjunctive mood, etc.) to generate or construct the set of knowledge states, necessary to solve the particular problem, here, of the Conditional Sentences; (d) it constrains each student’s “problem space”, of course, since the problem space is the very set of all possible knowledge states. (Bruer, 1993: 33)

2.2.1 Students’ Initial Problem Representations

Applied to the author’s grammar lesson, in general, this means that the students’ problem representations are the certain symbolic structures which they construct to encode, from the task environment, all the data available about the form and function, the formation and construction of the Conditional Sentences in English, to process them, and to store them in the memories.

Applied to the above-mentioned task demands, in particular, it means that “students learn by modifying long-term memory structures” (Bruer, 1993: 47) under the impact of effective instructions. That is to say, what students “notice, recall, and remember (is influenced by) long-term memory structures, here, called ‘production systems’. The existing rules and the initial representations affect one another. Effective instruction must break into and change this interaction. Breaking and changing the interaction often requires detailed, explicit instruction on what the initial representation should be. Often this instruction has to include teaching an effective strategy for encoding and memorising. Students who can’t learn spontaneously from new experiences need direct instructions about the relevant facts and about the strategies to use. Teaching just facts or teaching strategies in isolation from the facts won’t work.” (Bruer, 1993: 47-48)

2.2.2 Students’ Cognitive Choices and the Conditional Sentences in English

Coming back to the ‘Conditional Sentences’ in English, the way these sentences, respectively the way the disconnected fragments or chunks of these sentences with their various conjugated verbs are introduced involves the students in a series of cognitive choices, namely: (a) The students are given within a particular context 6 different verb tenses of several different verbs, tenses which they must clearly recognize, distinguish, and isolate. (b) Then, they must match the sentence fragments combining or connecting the parts into whole sentences according to the tenses of the verbs in these sentence fragments: i.e. (If+) Present Simple + Future; (If+) Past Simple + Present Conditional; (If+) Past Perfect + Perfect Conditional. (c) Simultaneously, they must take into account the context of each verb or verb tense in each partial sentence and define the idea, respectively the action, in terms of the three concepts of Probable Action, Improbable Action, Impossible Action. This permits the students to qualify the “cause” and the “result”-sentences and to determine the conditions for the action either to occur or to happen or not to occur or not to happen, in short, to be realistic or to be hypothetical. (d) Finally, they must reconstruct or rebuild meaningful Conditional Sentences, either realistic or hypothetical ones; there exist three possible meaningful combinations in all, according to traditional grammar, about the three types of Conditional Sentences in English; ultimately, they must classify these sentences, thus structured according to the three possible sentence types.

2.2.3 Work Schemes 1 and 2, Instructions 1 and 2, Exercises 1 and 2

The Work Scheme 1, used for the Instructions 1, serves for the students’ sake as an ideal frame of reference in connection with the task demands. The students have to complete the Work Scheme by
themselves. Thereby, they can rely on the teacher’s above-mentioned direct instructions and the implied cognitive strategies. In this way, the students simultaneously make use of (a) the relevant grammatical knowledge given or provided as regards the Conditional Sentences, (b) the appropriate learning strategies needed for the practical, accurate, and skilful use of each of these three types of sentences in connection with the grammar exercises as well as with every day’s life context.

This particular function of the Work Scheme 1 is enhanced in the sense that it provides the frame of reference for the certain “problem space” and the special “conflict problems” which the students have to solve in connection with the main task demand, namely the construction, respectively the re-construction of the three types of ‘Conditional Sentences’.

For repetition’s sake, these moves or steps made by the students are made in a linear problem-solving process. They may be summed up as follows: memorising, encoding, distinguishing the 6 tenses connecting the 6 sentence fragments, reconstructing the sentences, ordering and grouping the sentences into three meaningful categories, defining the action or idea expressed in each sentence according to the real or hypothetical character predominant in the one or the other of three different Conditional Sentences.

All this is going on in view of what follows in the second part of the classroom instruction in connection with Instruction 2, the ensuing Work Scheme 2, and ensuing Exercise 2. Compared to the Instructions 1 and, especially, to the Work Scheme 1, accordingly, with Instruction 2 and Work Scheme 2, the students are asked, step by step, to apply the knowledge, earlier brushed up, in a direct and more and more integral approach, almost single move, thus making the smaller single steps, formerly practised one by one, now overlap and take shape as one unique mental leap or articulation. In other words, what has been so far a series of linear mental moves into and out of the students’ so-called “working-memory” becomes a concentric movement composed of, or, better simultaneously re-assembling the various individual steps which have been indicated before. The focus clearly shifts from the students’ “initial problem and knowledge representations” over to the immediate knowledge application, enhancing and intensifying drill and automaticity.

The Instructions 2 chiefly concern the gap-filling Exercise 2. By now, the students should be able to do this exercise very well. By now, indeed, they should be able to change a poor “initial (grammar) problem representation” into a good one, they should be able to change a small “problem space” into a suitable one, and they should be able to make an eventually difficult exercise about e.g. ‘Conditional Sentences’ an easy and trivial one.

2.3 Strategies And Learning Process

The strategies imply a certain number of operators which the students have to use, that is to say, a certain number of mental moves or steps which the students have to make in the context of their grammar study, using the appropriate language material, grammar rules, etc. from the initial knowledge state to the goal state; that is to say, moves or steps outlined in the teaching plan, in more general terms, specified in the task environment of classroom teaching, in more concrete terms.

2.3.1 Students’ Learning Process

Indeed, it is necessary to repeat: “Students learn by modifying long-term memory structures.” By modifying long-term memory structures, students don’t learn how to modify certain structures for their own sake. On the contrary, they learn how to modify certain structures in order to improve certain domain-specific initial problem representations for the sake of a more and more adequate interpretation of certain domain-specific problem statements or task demands in certain corresponding task environments. It is a more flexible acquisition of grammatical knowledge.

Since the students’ problem representations, namely their individual interpretations of the problem statements, are seldom identical to the problem statements in the task environments of a particular knowledge domain or of field skill acquisitions, here, they certainly can learn how to bridge cognitive
gaps such as there normally exist between their initial problem representations and the problem statements in the task environment of the particular exercises assigned to the students.

### 2.3.2 Learning and Working Memory

As a sort of “problem-space”, the Work Schemes 1 and 2 automatically become the frame of reference suitable for the integration of language facts and learning strategies, essential for the very learning process to occur, as the aforesaid indicates.

Working memory tasks might combine the demand for remembering information with the demand for doing some processing on that information, and our capacity to remember and process information is understandably less than our capacity to remember something alone. Just as Bruer said: “Skilled thinking, problem-solving, and learning depend on how well we can manage this limited resource—on how efficiently we can store, process and move information into and out of working memory.” (1993: 28-29) The grammar teaching about the Conditionals in English, as outlined in this lesson protocol analysis, is a good example of combining the different kinds of demands, i.e. of combining the task demands which address the learner as language learner with the task demands which address the learner as learner and as thinker, as becoming an intelligent novice and expert as regards the grammar usage and the faculty of thinking.

### 3. CONCLUSION

This study clearly shows that the lesson protocol analysis and the task analysis, two fundamental methods or theories of cognitive research, form the cognitive core, so to speak, of the planning and teaching of this grammar lesson. Both these methods serve the teacher best because most adequately, in his endeavor to plan, to organize, and to teach the lesson, mentioned above. Both these methods help the teacher to solve problems of all sorts: the so-called ill-structured problems inhere in any kind of lesson planning and teaching from the very beginning as well as problems that, as specific discrepancies between the planning and the teaching of the particular grammar lesson are most likely to occur in the course of the very classroom teaching and the numerous interactions between teachers and students, respectively between students.

The cognitive frame of reference provides the teacher with the appropriate means, necessary to achieve a certain number of goals such as: (a) anticipating possible discrepancies between lesson plan and classroom teaching; (b) articulating meta-cognitively informed instructions so as to elaborate work schemes suitable for the development of a problem-solving process in which the students become progressively involved; (c) increasing students’ grammar knowledge awareness in the sense of an awareness of their initial grammar problem representations and their goal state, i.e. their final problem-solving behavior; (d) connecting language facts and learning strategies by means of both strategy-instruction, i.e. instruction about when the strategies are useful, and an explanation why they are useful” (Bruner, 1993: 75) and meta-cognitive monitoring skills which are “the abilities to predict the results of one’s own actions (Did it work?), to monitor one’s progress toward a solution (How am I doing?), and to test how reasonable one’s actions and solutions are against the larger reality (Does this make sense?)” (Bruner, 1993: 72); (e) making students recognize their possible cognitive “bottlenecks” as regards the Conditionals and the discrepancy between students’ “initial (grammar) problem representation” and the problem statement in the Work Schemes 1 and 2 as well as in the Exercises 1 and 2; (f) helping students find the necessary strategies and making students use these strategies in order to make the appropriate cognitive choices and bridge their cognitive gaps; (g) teaching students how to improve their “initial problem representations”, namely “by modifying (their) long-term memory structures, here, called production systems” (Bruer,1993: 256), and thus enabling them to learn and to solve the lesson’s particular grammar problems as well as to learn and to understand the cognitive process itself inhering in the acquisition and use of grammar knowledge and of grammar production.
Let me then sum up this study in Bruer’s own words: “We are beginning to learn what knowledge, processes, and skills distinguish more effective from less effective teaching performances. These findings are expanding the knowledge base of the teaching profession and will contribute to better teacher training” (Bruer, 1993: 17).

REFERENCES


APPENDIX: CONDITIONALS 1-2-3 (REVISION LESSON)(CLASSROOM TEACHING)

Instructions 1:
(1) Read the parts of the sentences (1–3) and (a-c) and underline the verb forms or tenses in the sentences.
(2) Match the sentences (1-3) with the sentences (a-c) in a meaningful way, according to the specific tenses used and the kinds of actions expressed in these sentence parts, start the sentences with the particular conjunction normally used for Conditional Sentences in English.
(3) Isolate the tenses of the various Conditional Sentences and define the main idea or action expressed in each sentence, then describe the idea or action in terms of one of the three types of actions, i.e. probable, improbable, impossible.
(4) Put the sentences in one or the other of the three boxes according to the three different types of actions defined before, classifying thus the three types of Conditional Sentences in English.

Exercise 1:
1) I had time a) you wouldn’t have made this mistake.
2) you had listened to.  
   b) I’ll come and see you.
3) I have time …  
   c) I’d (=would) come and see you.
IF I HAVE TIME, I WILL COME AND SEE YOU.

C1

PRESENT SIMPLE

PROBABLE COND.

ACTION WILL PERHAPS HAPPEN.

C2

PAST SIMPLE

IMPROBABLE COND.

ACTION WILL MOST LIKELY NOT HAPPEN.

C3

PAST PERFECT

IMPOSSIBLE COND.

ACTION DID NOT HAPPEN.

IF YOU HAD LISTENED TO YOUR TEACHER, YOU WOULDN'T HAVE MADE THIS MISTAKE.
Instructions 2:
1) Highlight/Underline the conjugated verbs in the sentence with “if” (=the ‘cause’ clause), respectively in the sentence without “if” (=the ‘result’ clause).
2) Put the verbs into the correct tenses, and incorporate any other elements in the brackets in your answer.
3) Divide the sentences into three different groups, depending on the various tenses used and the ideas expressed in them, and put the numbers of these sentences in one or the other of three boxes.

Exercise 2:
1. They ___________ (post) your letter to Rodger if you ask him.
2. If it __________ (snow) tomorrow, he’ll go by train.
3. If you __________ (ask) them, they would have told you.
4. You ___________ (understand) if he spoke more clearly.
5. You __________ (can) do this if you try.
6. I’d get higher marks if I __________ (pay) more attention in class.
7. I won’t go on unless you __________ (stop) marking a noise.
8. I __________ (can, draw) more pictures if I’d had time.
9. ___________ (she, wake) up on time, she wouldn’t have been late for school.
10. Our local football team would win more often if they ___________ (take) the game more seriously.
11. ___________ (not, cross) the road if there is a car coming.

Work Scheme 2:

CONDITIONAL 1 = PROBABLE
Sentences:

CONDITIONAL 2 = IMPROBABLE
Sentences:

CONDITIONAL 3 = IMPOSSIBLE
Sentences: