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# Designing a Growing Functional Modules “Artificial Brain”

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## Abstract

The present paper illustrates the design process for the Growing Functional Modules (GFM) learning based controller. GFM controllers are elaborated interconnecting four kinds of components: Global Goals, Acting Modules, Sensations and Sensing Modules. Global Goals trigger intrinsic motivations, Acting and Sensing Modules develop specific functionalities and Sensations provide the controlled system's feedback. GFM controllers learn to satisfy some predefined goals while interacting with the environment and thus should be considered as artificial brains. An example of the design process of a simple controller is provided herein to explain the inherent methodology, to exhibit the components' interconnections and to demonstrate the control process.

**Keywords:** growing functional modules, learning based control, machine learning, connectionism, embodiment, artificial brain editor, embodied robotics, emergent behaviors.

## 1. Introduction

In computer science, controllers are designed to provide real time response to events sensed by the system they control. Controllers usually perform in real time and in a real world, such environment is characterized by its complexity, illegibility, dynamics among other confusing aspects. Hence, to face these adverse conditions, programmers drastically reduce the intricacy of the robot's environment; otherwise, the number of lines of code would increase drastically. “Classical” Artificial Intelligence does not offer much help because replacing sequential-imperative programming by another paradigm (functional, logical) still implies a huge coding effort. Biological entities, whose brains may be perceived as controllers, are able to deal with the complexity of the real world thanks to their learning abilities.

The Growing Functional Modules' project, inspired by machine learning, connectionism, and embodiment, is setting out to do the same: allowing the design of learning based controllers. Such controllers result from the interconnection of dynamic acting and sensing modules that do not integrate any previous knowledge but elaborate it gradually while interacting with the environment and hence, should be considered as “artificial brains”.

At this stage, the earliest experiments attest to the well founded of this approach [1]. Nevertheless, different tools have been required to pursue the project's development, among others robots' simulators, an embedded interface to implement robots and presently, a graphic editor to help designing the controllers [2]. As the controller results from the interconnection of different components, the editor is particularly convenient in order to create, update and display the resulting internal structures. A previous version of the editor [3] soon became obsolete because only one of the actual four kinds of components was implemented.

The purpose of the present paper is to explain how GFM controllers perform, illustrating their design, step by step of a simple learning based controller integrating its four components: Global Goals, Acting Modules, Sensations and Sensing Modules. The content has been organized in order to facilitate this achievement: section 2 describes the GFM basic control loop and section 3, the controller's components integrated in the editor. An illustration of an architecture's design is given in section 4 while its execution and graphical displays are described in section 5.

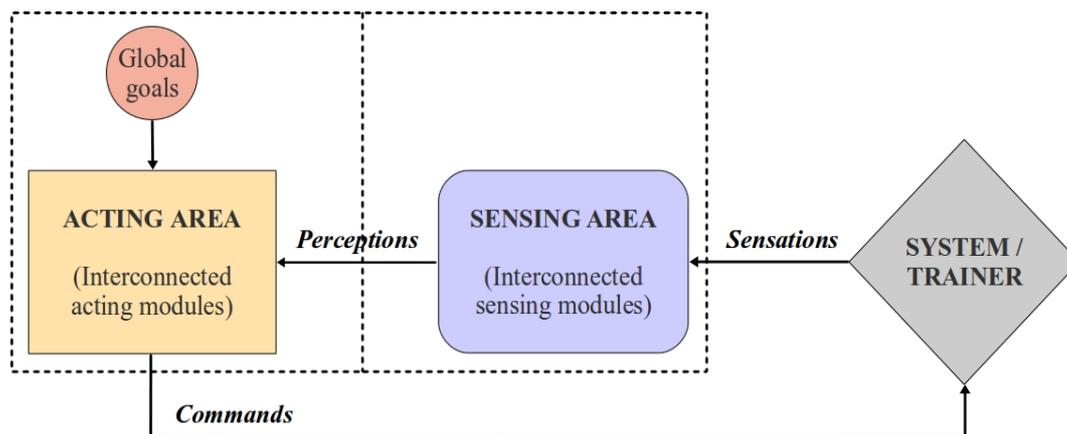


Figure 1. The GFM controller and its control loop

## 2. The control loop

The GFM control loop has many similarities to a standard one as shown in figure 1. The controller, delimited by a dotted line, sends during each cycle an output command in order to trigger some mechanical or virtual actuators and in return, receives a feedback composed of a sequence of sensors' values. However, the concept of reference value is replaced by “Global Goals” which are integrated to the controller. The Global Goals' concept refers to the set of motivations that induces the controller's activities and consequently, the system's behavior. An illustration of such “motivation” is given in section IV.

Moreover, the controller's architecture is divided in two areas, the “Sensing” and the “Acting” ones. The Sensing Area is in charge of interpreting the feedback sent by the system, the feedback is referred as “Sensations” (figure 1). Sensations are processed in input by a set of interconnected sensing modules that produce “Perceptions” in output. Perceptions are translated to the Acting Area where a set of Acting Modules processes these feedback values. According to these values and the input requests, the Acting Area triggers the next command to the system, initiating thus a new cycle of the control loop.

## 3. The controller's components

The controllers' components include Sensation, Global Goal, Acting Module and Sensing Module; there are available by clicking on the associated button of the editor's toolbar. The components functionalities and configurations are described in the following subsections.

### 3.1. Sensations

Each “Sensation” corresponds to an integer value corresponding to a specific system's sensor. Sensations are symbolized by a green rectangle on the editor's canvas (figure 2.a). Each newly created sensation is assigned an identifier previously incremented. Its unique field, initially filled with question-marks, allows it to associate a mnemonic in order to facilitate its interpretation.

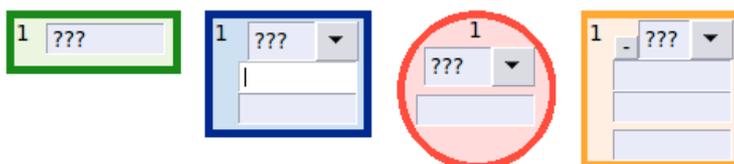


Figure 2. The editor's components from left to right:  
 a) Sensation, b) Sensing Module, c) Global Goal, d) Acting Module.

The defined sequence of sensations represents the system's feedback that is a sequence of sensors' values. Thus, both sequences must have the same length and their values must be in the same order. Sensations are employed as inputs for Sensing Modules and/or as feedback for Acting Modules.

### **3.2. Sensing modules**

Sensing Modules are symbolized by a blue rectangle on the editor's canvas (see figure 2.b). Each newly created Sensing Module is assigned an identifier previously incremented. The upper field, initially filled with question-marks, indicates the type (or functionality) of the component. For example, this functionality may consist in applying a specific classification on sensations given in input. The component internal process will acquire this functionality meanwhile the system is interacting with its environment.

Connecting input Sensations is performed by right clicking a component in order to create a new connection specifying the output component. The middle field allows the specification of an Acting Module's identifier that confirms the correctness of the Sensing Modules output perception in order to allow learning. The lowest field contains some extra-parameters whose number and meaning are specific to each type of module. The input connections of a Sensing Module come from a subset of Sensations or Sensing Modules' outputs.

### **3.3. Global goals**

Global Goals are symbolized by a red circle on the editor's canvas (figure 2.c). Each newly created Global Goal is assigned an identifier previously incremented. The upper field, initially filled with question-marks, allows the definition of the Global Goal's type. This type determines the request that will be sent to a unique Acting Module connected in output. The type specifies, among others, a constant, minimum, cyclic or user-specified bequest's value.

The lowest field allows the capture of some extra-parameters whose number and meaning are specific to each type of Global Goal. For example, if the type indicates that the request corresponds to the selection of a random value inside an interval then, the Global Goal requires two extra-parameters specifying both limits of this interval.

### **3.4. Acting modules**

Acting Modules are symbolized by an orange rectangle on the editor's canvas (figure 2.d). Each newly created Acting Module is assigned an identifier, previously incremented. The upper field, initially filled with question-marks, indicates the type (or functionality) of the component. For example, Real Time Regulation in order to learn how to maintain one system's component inside a precise range [4] or Causal Inference in order to trigger states' transitions [5].

A single Global Goal or another Acting Module connected in input specifies at each cycle the request that should be reached. According to its type, the component's internal process is able to acquire a specific functionality while interacting with the environment. At each cycle, the result of this interaction is given by a subset of Sensations and/or Perceptions; this subset is specified in the upper middle field as a list of Sensations and Perceptions identifiers.

The lowest field contains some extra-parameters whose number and meaning are specific to each type of module. Right clicking allows the creation of output connections up to a maximum of four output Acting Modules. If no output connection is specified then, it is considered that the Acting Module sends commands to the system. In that case, the list of commands and their associated amplitudes should be declared in the lower middle field.

## **4. Designing a controller**

The previous section offers a description of the different components and of the way to interconnect them. The present section will illustrate how to design a GFM architecture using the editor and interconnecting the described components.

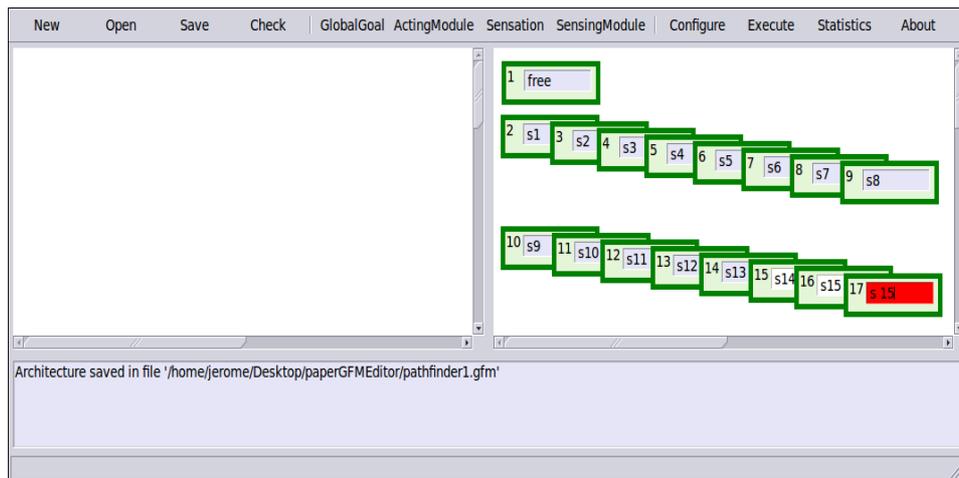


Figure 3. Describing the sequence of input sensations sent by the system.

The control system's challenge consists of a basic simulation of an autonomous vehicle equipped with sixteen proximity sensors regularly disposed on its front part. Each sensor returns a positive value when an obstacle is present at a short distance in front of this sensor. The simulation generates a random row of obstacles presenting a large enough opening to allow the vehicle to pass through. The vehicle's controller should learn to change the vehicle's position in order to cross through the opening. Figure 10.a illustrates this behavior: the first lines of text shows a success, the vehicle's controller encounters a path free of obstacles at the first try while for the next row of obstacles, five attempts are necessary to succeed.

#### 4.1. Design step 1

To design the controller, first of all, the user should click the button “new” on the toolbar to create an empty canvas and to assign it a controller's name, presently “pathfinder”. Then, the first convenient step is to describe the feedback given by the system as a sequence of sensations (see figure 3). The first sensation named “free”, indicates if the vehicle has been able or not to cross the range of obstacles. Each of the next sixteen values is associated to its corresponding proximity sensors that points out the presence of an obstacle. They are given a name beginning with “s” followed by a number. The red color of the last sensation's field indicates that the given name is invalid; presently, because it contains a blank character.

#### 4.2. Design step 2

The next step consists in adding a Sensing Module able to classify the sixteen obstacles to produce a single output perception. In this case, the module's type is CBC meaning “Combination Based Classifier”. According to this type, some perceptions corresponding to obstacles' configurations are later discarded; others are gradually adapted to generate a successful pattern.

The next step consists of connecting the sixteen sensations in the input of the Sensing Module. To do this, the user must right-click on each Sensation, then on “new connection” and indicate the Sensing Module identifier. The resulting design is presented on figure 5. Finally, the Acting Module's field is set to “1” (indicating the number of the Acting Module that later will assess the correctness of the perception) and the unique extra-parameter set to “20” (related with the module's behavior).

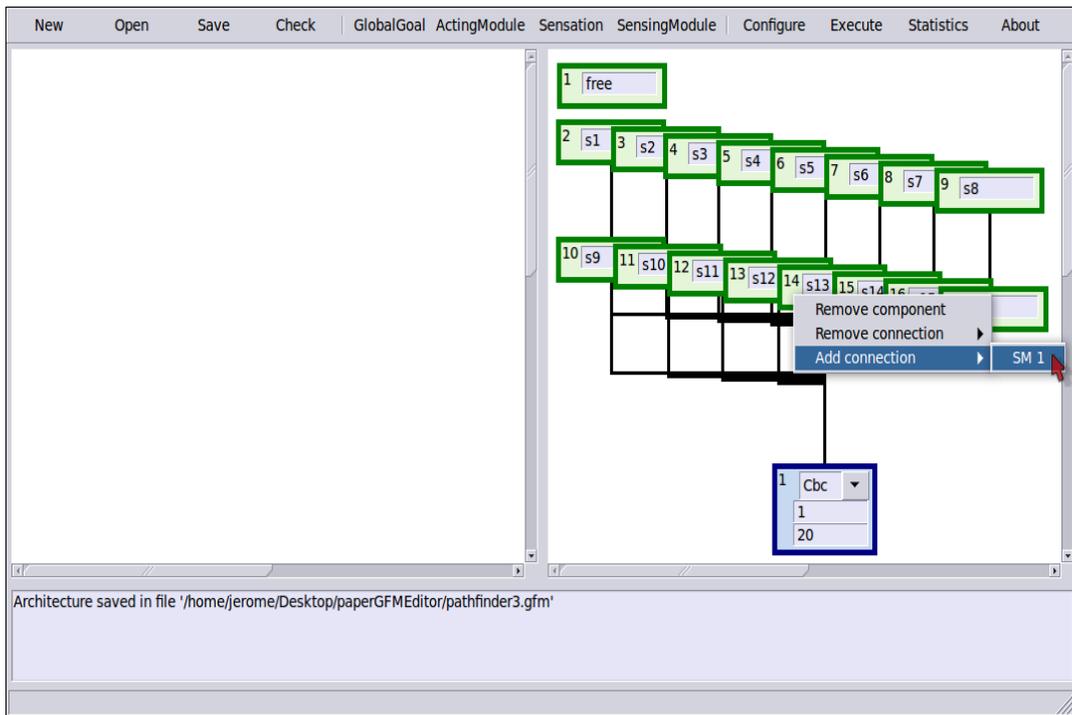


Figure 4. Adding a Sensing Module and selecting its type

### 4.3. Design step 3

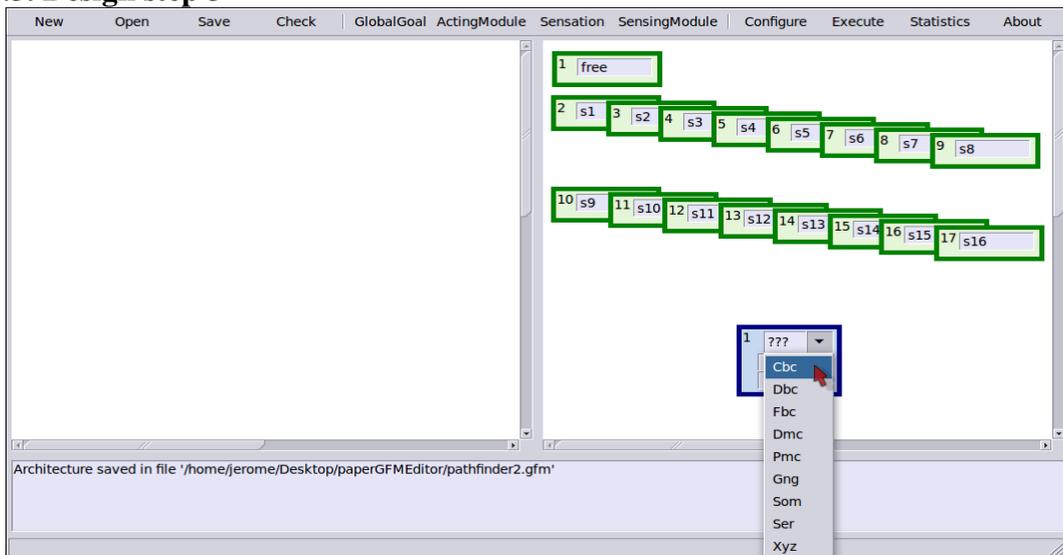


Figure 5. Adding connections from Sensations 2-17 to the Sensing Module 1

The next step consists of adding a Global Goal expressing a motivation required by the controller. The goal is to keep the vehicle's front free of obstacles, thus the Sensation “free” should stay equal to “1”. After adding a new Global Goal, its assigned type should be “Cst” corresponding to a constant output request (see figure 6). In the parameter field, its specified value is “1”.

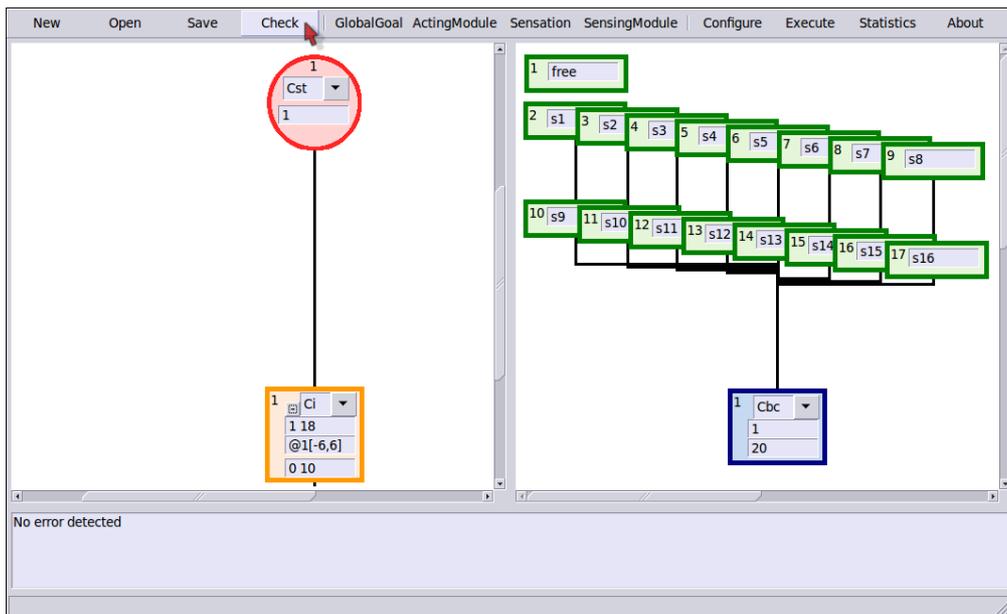


Figure 6. Adding a Global Goal with its required type

#### 4.4. Design step 4

The fourth step consists of adding an Acting Module, its configuration values and input connection as shown in figure 7. A type “CI” is assigned because its functionality will consist of triggering a steering command in accordance with the perception from the Sensing Module and in order to satisfy the input request from the Global Goal. Consequently, the feedback is set to “1 18” where “1” is the reference to the Sensation “free” and “18” to the perception in output of the Sensing Module. The identifier “18” for this perception is computed as at the total number of Sensation plus one (first sensing module). Identifiers and their references are automatically updated when a Sensation is added or deleted.

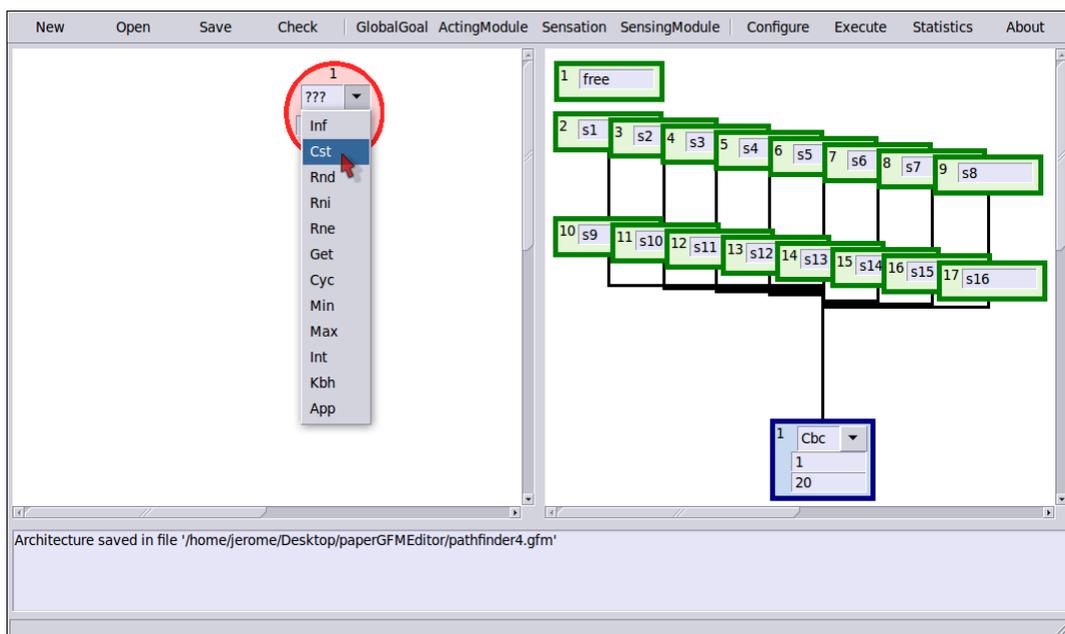


Figure 7. Adding an Acting Module, its configuration values and its input connections

The next field of the Acting Module, corresponding to the output command to the system is assigned the string “@1[-6,6]” indicating that there is a single output command “1” whose amplitude may vary from -6 to 6. Next, the two required parameters according to the type “CI” are set to “0” and “10”.

Finally, left clicking on the Global Goal allows to add a new connection from this Global Goal to the input of the Acting Module.

## 5. Running the controller

### 5.1 The “configure” command

Before running the controller, it is necessary to specify the communication's configuration. When pressing the “configure” button, two text windows appear (figure 8). The upper one allows to specify the application's localization in order to run it previously to the controller. Presently, the corresponding simulation will run on the same machine, thus the name of the corresponding executable file must be specified. Otherwise, in the same field, the user should specify the IP address of the server where the controlled system is running.

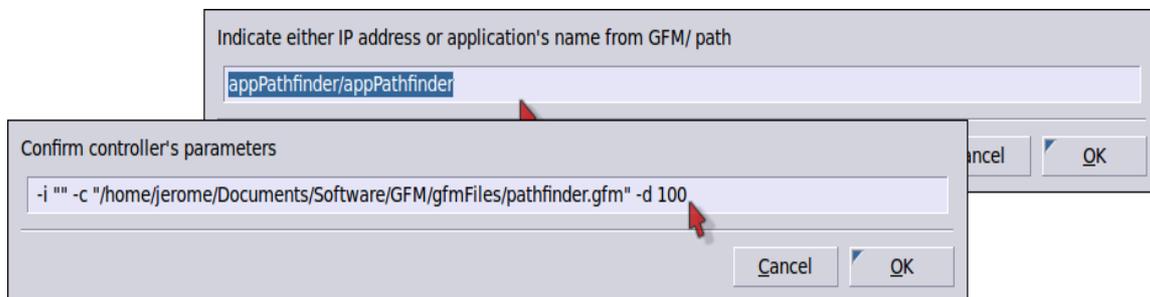


Figure 8. Configuration of the controller

The second and lower window specifies the controller's parameters including the descriptor file, the duration of a period, an eventual seed for the random number generator and so on...

### 5.2. The “save” command

At this step, the graphic design and configuration of the controller have been completed. Clicking the “save” button will generate a description of the controller that is written in a file identified by the controller's name and the extension “gfm”. This file will be loaded by the controller when starting to set the components and their interconnections. The content of the file that corresponds to the controller “pathfinder.gfm” is given in figure 9.

```
#application's name
pathfinder
#number of errors
0
#errors

#execution configuration
-i "" -c
"/home/jerome/Documents/Software/GFM/gfmF
iles/pathfinder.gfm" -d 100
appPathfinder/appPathfinder
#number of global goals
1
#number of sensing modules
1
#number of acting modules
1
#number of sensations
17

#number of perceptions
1
#sensations
free o1 o2 o3 o4 o5 o6 o7 o8 o9 o10 o11
o12 o13 o14 o15 o16
#x coordinate
4 3 112 221 331 441 551 34 144 254 363
473 80 190 300 409 519
#y coordinate
13 63 63 63 63 63 115 115 115 115 115
174 174 174 174 174

#sensing module type
Cbc
#sensing module ident
1
#input values position
2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 -
1
```

```
#output values position          #extra parameters
18 -1                           20
#prediction position            #x coordinate
1 -1                            304
                                #y coordinate
                                357
                                #acting module type
                                Ci
                                #acting module ident
                                1
                                #amplitudes of commands
                                @1[-6,6]
                                #input acting module's ident
                                -1
                                #input global goal's ident
                                1
                                #output acting module's ident
                                -1
                                #feedback position
                                1 18 -1
                                #extra parameters
                                0 10
                                #x coordinate
                                355
                                #y coordinate
                                284

                                #global goal type
                                Cst
                                #global goal ident
                                1
                                #output acting module's ident
                                1
                                #extra parameters
                                1
                                #x coordinate
                                357
                                #y coordinate
                                24
```

*Figure 9. Content of the file corresponding to the “pathfinder” controller*

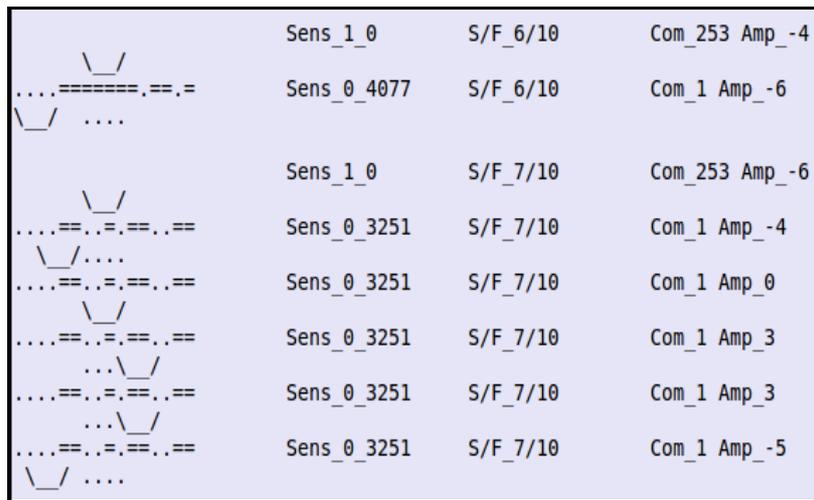


Figure 10.a. Simulation's display: The characters “\\_/” represents the front part of the car that should pass through the string “....==..==..==” representing the range of obstacles

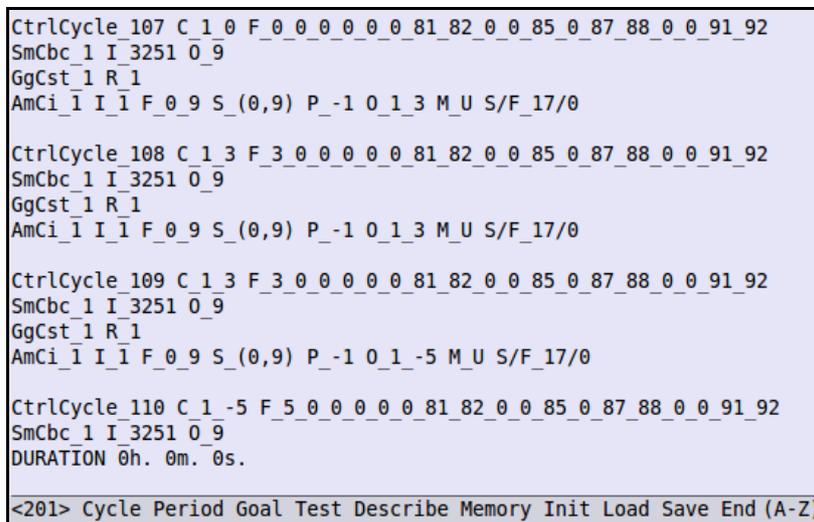


Figure 10b. The control loop's information displayed by the controller

### 5.3. The “execute” command

Once performed the design and configuration, the controller and the local application are executed by pressing the corresponding button. In case of a local simulation, two terminal windows are generated. The first one, localized on the left side of the screen (figure 10.a), displays the behavior of the simulation; the second one, localized on the right side of the screen (figure 10.b), displays the behavior of the controller. Both application run concurrently and their respective contents allow the user to observe and monitor the control session. The last text line of figure 10.b displays the set of commands at cycle 201.

### 6. Displaying statistics

Clicking the button “statistics” opens three graphics displays of different log files describing the behavior of a previous control session. Each of these files contains a list of different kinds of events that have been occurring during the cycles of the control loop.

The first file, identified as *<controllerName>Growing.sts*, is a record of the sizes of acting and sensing modules throughout the control session. Instead of bytes, the size represents the number of basic components created to store a new information. Hence, rather than memory size, the value expresses the number of allocated objects. This is an always relevant information concerning the controller's behavior, in particular to detect modules' excessive growing. The corresponding graphic is displayed in figure 11.a.

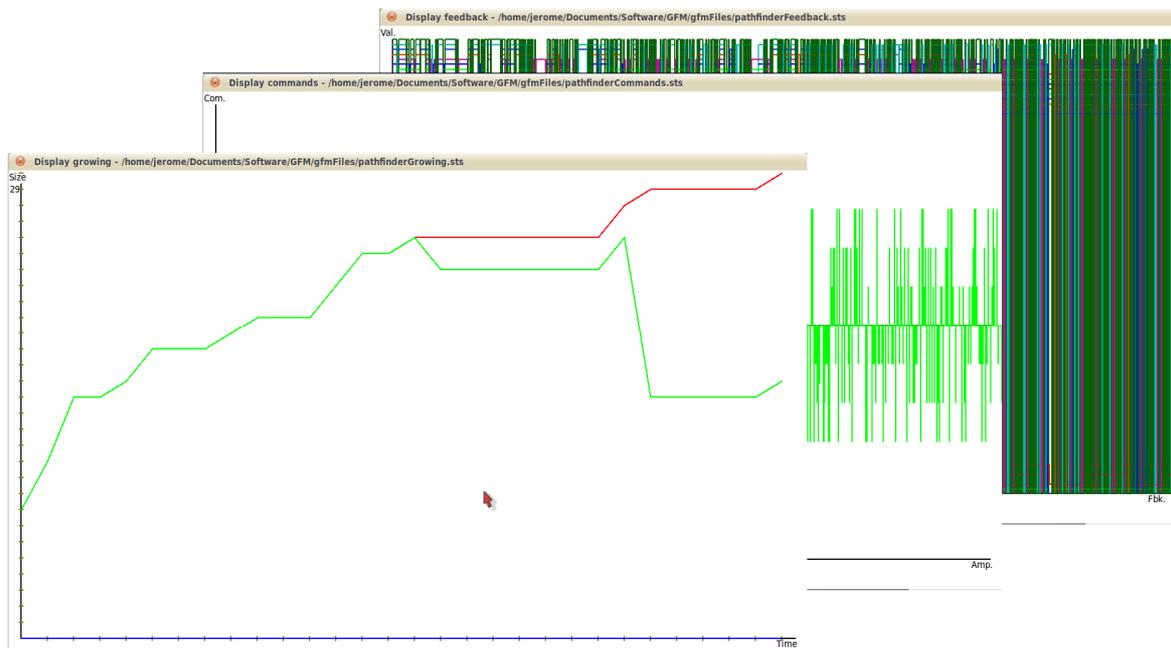


Figure 11. Graphics displays of the controller's behavior (from left to right)  
 a) Growing of the modules, b) Commands, c) Feedback

The second file, named *<controllerName>Commands.sts*, is a record of the command-amplitude values send by the controller at the beginning of each control loop. This could lead to meaningful interpretation, for instance, a diminution over time of the amplitudes reflects that learning is favoring the system's performance: reaching a similar behavior with less commands. The corresponding graphic is displayed in figure 11.b.

The third file, named *<controllerName>Feedback.sts*, is a record of the feedback values send back to the controller at the end of each control loop. Displaying these values exhibits the actuators' and sensors' behaviors, reflecting thus the controller's fitness over time. In particular, these data to evaluate the precision the resulting control. The corresponding graphic is displayed in figure 11.c. These three files must be previously created during the control's session; in practice, they may be opened or closed at each cycle of the control loop.

Nevertheless, the main result concerning the learning ability of the controller, the evolution of the accumulated error through time, is not displayed as part of these statistics. The reason is that this task must be performed by the application/trainer which always has more accurate criterion to evaluate a successful behavior. For example, considering the present application, to be considered successful, a path through a range of obstacles must be found at the first attempt. The resulting curve of accumulated errors is presented figure 12. As shown, a rather trustful controller is obtained after 800 challenges (approximately 2000 cycles); nevertheless, sporadic errors still occur due to side effects of permanent learning (learning is not limited to a previous phase).

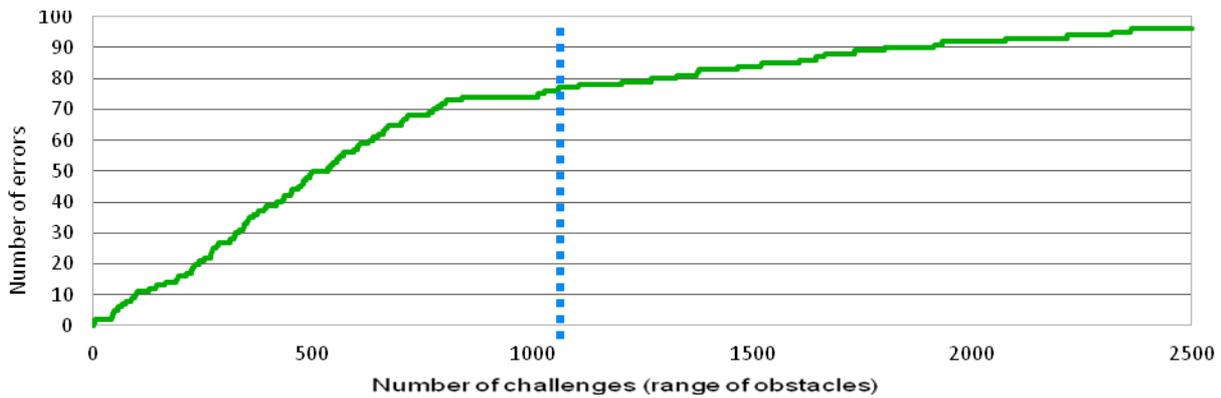


Figure 12. Evolution of errors' number through challenges' number

## 7. Conclusions

A minimalist GFM controller should integrate at least three components: one Sensation, one Acting Module and one Global Goal. The controller described herein, includes seventeen Sensations, one Sensing Module, one Acting Module and one Global Goal, in order to give a complete overview of the GFM proposal. More complex controllers have already been designed. Among others, the editor has been employed to ease the creation, actualization and visualization of two recent masters' thesis projects: an auditory subsystem conceived to learn in context [6] and an equilibrium subsystem implemented in a humanoid robot [7]. For both projects, the editor has become a very helpful tool. In fact, both applications have contributed to improve the functionalities integrated in the editor but also their corresponding counterpart. In particular, the format of the gfm files that contain the description of the components' interconnections has been updated to be compatible with the editor and the controller.

The design process described herein, clearly shows the role of the different components and of their interactions specified by their interconnections. Moreover, the behavior of the controller may be analyzed by displaying the record files of the control loop. Further developments of the editor will consider improving its visualization functionalities. In particular, module activations or module growing could be displayed in real time.

Finally, the main goal of this research project has been to develop artificial brains that should allow a controlled system to develop an emergent behavior while interacting with its environment in order to satisfy some predefined global goals. The controller described in the present paper offers an illustration of such behavior. Therefore, GFM is a paradigm that would potentially allow the programming phase of a control system to be replaced with the visual design of a learning based controller.

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# Self-initiated Self-repair Attempts by Japanese High School Learners While Speaking English

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## Abstract

In Japanese high school English classes, students are often left to have interactions or perform communicative activities not with a teacher but with other students due to a large class size. In the situation, students are ideally notice their own insufficient utterances in order to carry out self-initiated self-repair. This study investigated self-initiated self-repair attempts and their effects on Japanese high school learners. Thirty-two Japanese high school students with low-intermediate English ability and a native speaker of English participated in the study, with the native speaker interviewing the students. *The students' utterances were quantitatively and qualitatively analyzed, and it was found that:* self-initiated self-repair occurred frequently and, in general, successfully; error repair was most frequently recorded; the success rate of lexical repair was the lowest. Findings observed during the students' self-initiated self-repair attempts are discussed, followed by discussion of their *possible effects. Finally, suggestions are given based on the pedagogical implications from the study.*

**Keywords:** self-initiated self-repair, error repair, different information repair, appropriacy

## 1. Introduction

Errors naturally appear in spontaneous speeches and conversations. Especially in a second or foreign language, it is only natural that mistakes happen as a part of the learning process. After an inappropriate expression is detected, it can be corrected. This act of correcting can be initiated either by the speaker (non-native speaker) or the recipient. The former is termed as self-initiated, while the latter as other-initiated (Schegloff, Jefferson, & Sacks, 1977) [20]. Occasionally, non-native speakers (NNSs) correct or modify their output to make it more comprehensible after they detect an insufficient previous utterance. This phenomenon is referred to in second language acquisition (SLA) research as self-initiated self-completed repair (Kasper, 1985) [5].

In Japanese high schools, classes average around 40 students, making it practically impossible for teachers to have frequent one-on-one interactions providing students with corrective feedback. Thus, in many cases, students are left to converse with other students in the L2, being asked to perform communicative activities without direct oversight of the teacher. In this situation, students are ideally expected to provide their partners with feedback or to notice their own insufficient utterances in order to carry out self-initiated self-repair.

As previous research has not yet fully investigated self-initiated self-repair attempts by Japanese high school learners, examining the phenomena and their role is important to further substantiate the effects of output and related claims in SLA. More importantly, it will help us to create more effective output-based English lessons in the Japanese high school classroom.

The present study examines how Japanese EFL high school learners self-initiate repair on their previous utterances to repair them in order to make them correct, more comprehensible or more appropriate during face-to-face conversations with a native speaker (NS).

## 2. Background

In the contexts of NS/NNS and NNS/NNS interactions, L2 learners attempt to modify their erroneous or insufficient utterances in the direction of more comprehensible output: the learner him/herself realizes the trouble source (a trigger) and reacts to it by trying to repair it (Kasper, 1985) [5]. The following is *an excerpt of a* self-initiated, self-repair *extracted from the present study.*

I go ...um went to his house yesterday.  
(trigger) (self-initiated part) (self-repair)

The student detected that the form of the output (go) was erroneous, stopped the speech flow, and finally corrected the error. Shehadeh (2001) [21] examined and compared the effects of other-initiation and self-initiation with adult L2 learners in an interactive task (picture description, opinion exchange, and decision making) and found that learners produced more modified output after self-initiation. He concluded that self-initiations have a crucial role in promoting modified output.

Kormos (1999) [7] suggested that self-repair may serve in the same way as uptake (a move taken by the NNS in response to the feedback given to his/her previous utterance). She explained that as it is a part of a mechanism that promotes pushed output, self-repair expands the learners' linguistic repertoire. Kasper (1985) [5] investigated negotiated information between a NS and an NNS, as well as NNS/NNS exchanges, and concluded that self-initiated self-completed repair is more important than other-initiated other-completed repair for successful language learning. According to Schegloff, Jefferson, and Sacks (1977) [20], self-initiated repair may occur within the same utterance turn, immediately after the end of the turn, or in a subsequent turn. Schegloff (1979) [19] concluded that "self-initiation, same turn repair is the most common and most successful" (p. 268).

However, empirical research shows that learners do not correct every mistake they have made and that they correct not only linguistic (phonological, lexical, syntactic) errors but also pragmatically inappropriate utterances and inadequate information [10]. In a study of NS/NS interaction, Schegloff et al. (1977) [20] observed that repairs focused more on content and pragmatic errors than on linguistic errors. Kasper (1985) [5] found that in an NS/advanced NNS interaction, the majority of repairs focused on content and pragmatic repairs rather than linguistic repairs.

As for the effects of learners' English proficiency on the occurrence and the success of self-initiated self-repair, Lyster and Ranta (1997) [11] noted that only when learners have acquired an adequate level of English proficiency is self-initiated self-repair feasible. In a descriptive study with Japanese high school students whose English proficiency was low, Sato (2008) [17] revealed that successful self-initiated self-repair did not occur frequently. In his study, it was observed that when students attempted to self-repair their insufficient previous utterances, they were often unsuccessful, making another error; repeating the same error; or giving up repair in the course of the act. Sato (2008) [17] concluded that "without knowing or internalizing some grammatical structures or expressions, learners cannot notice their own mistakes and so cannot correct them" (p.232).

The timing of self-correction according to the types of triggers has been researched (e.g., Kormos, 2000 [8]; Van Hest, 1996 [24]); the occurrences of self-initiated repair according to the different task conditions learner are engaged in are researched, for example, in Shehadeh (2001) [21]. In terms of uptake or success rate, studies on recasts are conducted (e.g., Sato, 2009 [18]; Kim & Han, 2007 [6]; Trofimovich, Ammar, & Gatbonton, 2007 [23]; Philp, 2003 [16]). However, the effects of types of triggers on the occurrences or uptake of self-repair is rarely researched especially in the Japanese EFL environment, indicating the need for further study in the EFL situation in Japan.

## **2.The purpose of the study**

Sato (2008) [17] examined self-initiated self-repair on low-level Japanese learners of English without high motivation toward learning English. He revealed that while the students were performing communicative tasks with a partner (another student), self-initiated self-repair frequently did not occur successfully. As previous research indicates that self-initiated self-repair can be utilized more effectively by high and intermediate learners than by low-level learners, it is necessary to investigate the act of self-repair not only by low-level Japanese learners but also by intermediate Japanese ones.

The present study examined self-initiated self-repair by low-intermediate high school learners, most of whom are college bound. Learners are engaged in an interaction not with another student with a native speaker of English. Well-formed repair after self-initiation was counted as successful. Types of triggers were classified as: errors; different information; appropriacy. Errors were subcategorized into four groups: grammatical; lexical; phonological; the first language use. These definitions will be explained in more detail later. The following research questions (RQs) were formulated.

Q1. Is the success rate of self-initiated self-repair high?

Q2. Is there any difference in the occurrence of self-initiated self-repair according to the types of triggers?

Q3. Is there any difference in the success rate according to the types of triggers?

Q4. Is there any difference in the occurrence and success rate among the different types of error repair?

## **4. Method**

### **4.1 Context**

In Japan, English has long been taught as a knowledge-based subject and, for many students, passing of knowledge-based exams is the primary objective. Japanese students seem to have dual orientations for learning English: a practical, realistic goal related to examinations and grades, and a vague idealistic goal related to using English for international or intercultural communication (Yashima, 2000 [27]). It seems that most students have the former type of motivation (related to tests) more than the latter (related to communication) in the Japanese EFL situation.

### **4.2 Participants**

Thirty-two second-grade, college bound Japanese high school students (15 males and 17 females, aged 16 or 17) participated in the study. All of the students had passed the entrance exams for the academically higher level high school with relatively high scores in English. A native English teacher from Australia who had been teaching English as an assistant language teacher (ALT) for five and a half years in Japan, taught the students in a communication-oriented English class once every two weeks. In a questionnaire conducted just before the study, 28 out of 32 students (88%) answered that they liked the communicative English classes taught by the ALT. Thus, in this study we regarded them as low-intermediate students with relatively high motivation toward learning English and English conversation.<sup>1</sup>

### **4.3 Procedure**

Students and the ALT, David (this name is fictitious pseudonym), had conversation for the study. In free conversation in the form of an interview, David asked questions and the student talked about his/her daily life covering topics such as hobbies, study, family, future dreams and so on. As this was a natural communication-based task, target structures were not set for the study. David had told students that he would evaluate their English performances. He knew that their interactions would be recorded but did not know the purpose of the study. David had not been given any instruction on which types of feedback should be given to students after their self-initiated self-repairs. All recordings were transcribed and re-checked by the researcher to ensure their accuracy. Additionally, in a limited number of cases where there were still unsolved transcription difficulties, the original participants were invited to interpret the results. The database includes 32 interviews totaling 362 minutes. The average length of the interview per student was about 11 minutes; the longest one was 15 and a half minutes, and the shortest lasted about 9 minutes.

In the present study, self-repair attempts issuing from self-initiation after a trigger is termed as self-initiated self-repair. The following is an example of a self-initiated self-repair from the present study.

#### Example 1

David: When did you start playing the piano?

Student 1: My twelve, in twelfth grade.

Student 1 detected her error (trigger) and successfully repaired it by herself.

As for classification of self-repairs, mainly referring to Levelt (1983) [10] and Kormos (2000) [8], self-initiated self-repairs were classified into three groups for the present study: different information, appropriacy, and error. A different information repair is defined as speakers' encoding of different information from a previous formulation. An appropriacy repair is defined as speakers' encoding of information that needed to be "more precise, more coherent, pragmatically more appropriate, or less ambiguous" (Kormos, 2000 [8], p.150). An error repair refers to the act of speakers' attempts to repair their previous erroneous utterances. As the fourth type of repair, a rephrasing repair was given in Kormos (2000) [8], and defined as a repetition of a slightly modified version of a previous utterance resulting from uncertainty about its correctness. However, it was assumed that it would be difficult to draw a clear line between a rephrasing repair and an error repair (or appropriacy repair), without a retrospective interview with speakers for confirmation. Thus, it was decided not to include the category of a rephrasing repair in the present study. The following are examples of a different information repair and an appropriacy repair from the study.

#### Example 2 Different information repair

S2: I, my family had a dog. (Successful)

#### Example 3 Appropriacy repair

D: Are you in any clubs?

S3: Yes. I belong to the club, the soccer club and... (Successful)

Student 2 uttered "I" but decided to encode different information by repairing it to "my family". In example 3, student 3 decided to make his previous utterance more precise and pragmatically more appropriate and it was successfully conveyed.

Error repairs were subcategorized into four groups according to the type of triggers: grammatical, lexical, phonological, and the first language, Japanese, (L1) use. This grouping was based on Lyster and Ranta (1997) [11]: (1) Grammatical errors are errors in the use or lack of determiners, particles, verb forms, word order; (2) Lexical errors include inappropriate, imprecise or inaccurate choices of lexical items; (3) Phonological errors address inappropriate, imprecise or inaccurate pronunciation; (4) Unsolicited use of Japanese is an instance where a student speaks Japanese instead of English. The following are some examples.

#### Example 4 Grammatical

D: What junior high school did you go to?

S4: I was gone to, I went to Matoba Junior high school. (Successful )

#### Example 5 Grammatical

D: Why do you want to be a nurse?

S5: I'm take, I like take care of people. (Failed)

#### Example 6 Lexical

S6: Last night I see, I saw a dream. (Failed)

D: Oh, you had a dream last night.

#### Example 7 Phonological

D: What was the last thing that you bought?

S7: Hmm... I bought a bak, bag. (Successful)

#### Example 8 L1 use

D: After school when you are at home, what do you do?

S8: I *neru* (sleep in Japanese), sleep at home. (Successful)

In example 4, the student successfully self-repaired the grammatical error, while student 5 failed to repair her error in expressing her desire or will. In repairing her error, student 6 made a wrong word choice. In example 7, mispronunciation of bag resulting from Japanese pronunciation was successfully repaired. On many occasions, students first used L1 and then changed it into English. In the activity, they were required to speak only in English, and as it is crucial for them to communicate without using Japanese, L1 use was coded as an error in the study.

Classification and sub-categorization of self-initiated repairs was conducted by the researcher. A week after the first classification, it was conducted again by the same researcher. This method of classification follows Alderson, Clapham and Wall (1995) [2], who wrote that multiple rating sessions increase the reliability of the rating. Where there were discrepancies between the two ratings (3 cases), a second rater, a high school English teacher with more than 15 years of teaching experience, was invited to rate them after discussion, disagreement was resolved.

## 5. Results

The first research question asked about the success rate. Eighty-six self-initiated self-repair attempts were conducted successfully and 25 failed. To examine whether there was a statistical difference between the number of successful self-initiated self-repairs (86) and failed ones (25), a chi-square statistic was calculated, finding a statistically significant difference between them ( $\chi^2 = 33.52$ ,  $df = 1$ ,  $p = .00$ ).

*Table 1. Success rate of self-initiated self repair attempt*

	Total	Success	Failed	Success rate
Self-repair attempt	111	86	25	77%

The second research question asked about the occurrence of self-initiated self-repair according to the types of triggers. In total, 111 self-initiated self-repairs were reported. Among them, error repairs occurred 86 times (78%); different information repairs occurred 9 times (8%); and appropriacy repairs occurred 16 times (14%). A chi-square statistic test revealed there was a statistically significant difference in the occurrence by the types ( $\chi^2 = 98.0$ ,  $df = 2$ ,  $p < .05$ ). It also revealed that the difference in the occurrence of error repairs (86) and that of different information repairs plus appropriacy repairs (16+9) was statistically significant ( $\chi^2 = 98.0$ ,  $df = 1$ ,  $p = .00$ ). There was no statistically significant difference between different information repairs and appropriacy repairs.

*Table 2. The occurrence of self-initiated self-repair according to the types of triggers*

Types	Frequency	Proportion
Error repair	86	78%
Appropriacy repair	16	14%
Different information repair	9	8%
Total	111	100%

The third research question concerned the success rates according to the types of triggers. It was reported that error repairs had a 77% success rate, different information repairs had 89% and appropriacy repairs was 75% successful. A chi-square statistic test with Yates' continuity correction revealed that there was not a statistically significant difference in the success rates according to the types.

*Table 3. The success rates according to the types of triggers*

Type	Frequency	Success	Failed	Success rate
Error Repair	86	66	20	77%
Appropriacy repair	16	12	4	75%
Different Information repair	9	8	1	89%
Total	111	86	25	77%

The fourth research question concerned the occurrence and success rate of error repair according to the types. The category of error repair was further sub-classified. The success rate of each was: L1 use repairs had an 83% success rate, grammatical repairs 79%, phonological repairs with 75%, and lexical repairs had a 50%, success rate. To examine whether there was a statistically significant difference in the success rates by the four types, a chi-square statistic test with Yates' continuity correction was conducted and we found that there was no difference.

*Table 4. The occurrence and success rate of error repair according to the types*

Type	Frequency	Success	Failed	Success rate
L1 use	36	30	6	83%
Grammatical	34	26	8	79%
Phonological	8	6	2	75%
Lexical	8	4	4	50%
Total	86	66	20	77%

Table 5 summarizes the results (RQ2, 3 and 4).

*Table 5. The occurrence and success rates*

Types		Frequency			Success rate
		Total	Success	Failed	
Error repair	Phonological	8	6	2	75%
	Lexical	8	4	4	50%
	Grammatical	34	26	8	79%
	L1 use	36	30	6	83%
		86(78%)	66	20	77%
Different Information repair	Information repair	9(8%)	8	1	89%
	Appropriacy repair	16(14%)	12	4	75%
	Total	111	86	25	77%

## 6. Discussion

### 6.1 The success rate of self-initiated self-repair

Results of this study implied that learners are more likely to be successful in self-initiated self-repairs than to fail at them: a greater number of well-formed L2 self-repairs were recorded as compared to ill-formed ones. This result is compatible with earlier study findings (Kasper, 1985 [5]; Schegloff et al., 1977 [20]; Shehadeh, 2001 [21]; Van Hest, 1996 [24]). At the moment of detecting errors and mistakes, or triggers, in their original utterances, students noticed a gap between utterances and the target language. This led them to produce a modified output (Swain & Lapkin, 1995 [22]). It was recorded that David provided students with adequate time for them to produce an output. This presented them with sufficient time to attend to form while planning speech acts, and the opportunity to self-repair their erroneous original utterances. This situation created favorable conditions for self-initiated self-repair as defined in previous studies (Shehadeh, 2001 [21]; Yuan &

Ellis, 2003 [29]). It can be argued that in some cases learners found that they had made a mistake in the sense that Ellis (1997) uses that word: an accidental slip of the tongue resulting from tiredness or some kind of pressure to communicate (Ellis, 1997) [4]).

Example 9

D: What did you do after school yesterday?

S9: I go, went to a convenience and buy, bought? bought a magazine.

Example 10

D: Why do you want to be a teacher?

S10: Because, because I like child, children very much.

In these examples, students made a mistake and corrected it immediately after detecting its deviance from the correct form. It is interpreted that it was not so difficult for students to correct mistakes by using explicit knowledge, which is knowledge about language with awareness and learners can verbalize it.

## 6.2 The occurrence of self-initiated self-repair according to the types of triggers

The occurrences of self-initiated self-repairs according to the types of triggers were reported as: Error 86 times (78%) > Appropriacy 16 times (14%) > Different information 9 times (8%). The majority of students' repair was on errors. The results were incompatible with Van Hest (1996) [24], which reported appropriacy repairs accounted for 39.7%, followed by error repairs (22.4%) and different information repairs (10.1%). In the study of NS/NS discourse (Schegloff et al., 1977 [20]) and NS/ advanced NNS discourse (Kasper, 1985 [5]), it has been reported that the vast majority of repairs consisted of content or pragmatic repairs rather than linguistic ones. The results of the present study did not support these findings either.

Kormos (2006) [9], after evaluating previous studies, concluded that as L2 proficiency increases, the nature of repair changes from simple error repairs to more complex discourse level repairs. As a rationale for this argument, Kormos (2006) [9] explained that compared to less-proficient learners advanced learners acquire greater declarative knowledge, which is factual knowledge that is expressed explicitly. Those advanced learners are able to automatize that knowledge to a greater extent, leading them to attend to their own utterances at the level of discourse and content. This may be because students in the present study did not have enough attention available for monitoring at the level of discourse or content.

Levelt (1983) [10] supposed that the act of self-repair would be intended to prevent potential communication breakdown. However, in this study, even when communication breakdown did not seem to occur, students frequently self-initiated to repair their errors.

Example 11

S11: Last night I watch, watched the movie on TV.

In this example, student 11 did not have to repair "watch" just to avoid a communication breakdown as "last night" had made the context clear. The followings are examples in which students self-repaired their errors even when communication breakdown did not seem to occur.

Example 12

S12: I read many book, books this summer.

Example 13

S13: My father drink, drinks beer every night.

Example 14

S14: When I was a junior high school student, I play, played soccer after school.

Errors of the third person-S, the plural -S and regular past tense in a sentence with an adverbial phrase or clause would not usually cause communication breakdowns. However, students

self-repaired errors of the third person-S 3 times, the plural -S, 4 times and errors of regular past tense 6 times. Kormos (2006) [9] goes on to state that the demand of accuracy in the situation influences speakers' decisions on the implementation of the repair. She mentions that formally instructed foreign language speakers who are taught explicit grammar pay more attention to the linguistic form than the information or content.

As this was an interview test in which their English proficiency would be measured, it is likely that students put priority on linguistic form or accuracy. In the formally instructed, accuracy-oriented Japanese EFL environment which is language-centered rather than content-centered, students in general would assume that using accurate English has primacy, leading them to repair errors frequently.

To account for the relatively low frequency of different information repairs, we can point out our observation that students tended not to initiate repair even when the wrong message would be conveyed.

Example 15

S15: I didn't study English at all in junior high school.

D: Oh, your junior high school didn't have English class.

Example 16

S16: We Japanese usually eat sushi, tempura, and sukiyaki...

D: Oh, you are very rich.

In these examples, students sent simplified potentially inaccurate messages. Neustupny (1982) [15] reported that in speaking English to native speakers, Japanese people tended to convey simplified exaggerated messages. They avoided using more difficult complicated language structures and did not revise their utterances due to their perceived insufficient English proficiency, even though they knew their messages were not correct. In some cases, students in the current study also must have realized the need for repair to convey what they really meant during or just after the production, but did not repair incorrect messages. This may be because students chose to leave incorrect messages untouched due to the difficulty of revising them to be correct in English, as reported earlier (Neustupny (1982) [15]).

### 6.3 The success rate according to the types of triggers

As for the success rates according to the types of triggers, different information repairs was the highest (89%) followed by error repairs (77%) and appropriacy repairs (75%). Success rates were relatively high and there was no statistically significant difference according to types.

In the different information repair, students decided to use information different from the original source; information in which they did not have to experience linguistic problems. In situations where linguistic problems were found to be beyond their English proficiency, it may be assumed that they did not even attempt to repair them. In the following example, student 17 easily succeeded in providing different information.

Example 17

D: Tell me about your father.

S 17: My father plays, likes watching golf on TV.

This interpretation can be applied to appropriacy repair.

Example 18

D: Why do you want to go to Korea?

S18: I want to study, learn Korean.

It is interpreted that the student tried successfully to repair the previous word "study" to make it more precise and pragmatically appropriate as this act was not beyond her English proficiency. High success rate of error repair resulted from high success rates of L1, grammatical

and phonological repair. This will be discussed in the next section. Only in one case out of nine was a failed different information repair was reported.

Example 19

D: Why do you study English hard?

S 19: It is important for me, we, because English is international...

In the example, it can be assumed from the context that the student wanted to say learning English is important. In changing the meaning of “me” (English is important for her) to “us” (for other people, too), the student attempted to add information that English is an international language. This dual task possibly made the repair cognitively demanding, and led to an error. In the eight other cases, students successfully changed the information.

#### 6.4 The occurrence and success rate of error repairs according to the types

In the category of error repairs, 36 of 86 instances were L1 use (42%), 34 were grammatical (40%), and only 8 instances each (9%) were phonological and lexical. Success rates of each were: L1, 83%; grammatical, 79%; phonological, 75%; lexical, 50%. It was frequently recorded that students, at first, used Japanese, and then restated it into English.

Example 20

D: Are you fast in the half marathon?

S 20: *Amari hayakunai*, I'm not so fast.

Example 21

D: Do you like to play the piano?

S 21: *Hai*, Yes.

Example 22

D: What are your good points?

S22: *Akaruikana~*, cheerful.

As these instances show, students answered in Japanese followed by the English counterpart. In most of the cases, correct English was produced immediately after the use of the L1 (Japanese). From this observation, it is thought that even though students did not have linguistic problems, they still chose to use Japanese first and then restate the utterance in English. This category having the highest success rate (83%) suggests this interpretation is correct. The mechanism of this common behavior observed in the study should be further examined.

As a reason for the high frequency rate of grammatical repairs, McDonough (2005) [13] stated that as EFL students are learning the target language in formal educational settings with explicit grammar teaching, they find grammatical error particularly noticeable. In this study, by using their explicit knowledge, students monitored their utterances and self-repaired them when triggers were detected. In this situation, learners were able to repair an utterance only when they had explicit knowledge of the grammar rule of the trigger. If not, they were less likely to try to correct their own grammatical errors. This could have contributed to the relatively high success rate of grammatical repair (79%). One common phenomenon, which possibly contributed to the high frequency of use as well as the high success rate, is the students' use of the be-copula before the correct use of verbs.

Example 23

D: Do you belong to a club?

S23: Yes. I am, I belong to the cooking club.

Example 24

D: What did he do that was clever?

S24: He was, listened to ten people.

This phenomenon is interpreted as a transfer from their L1. In the Japanese language, *wa* assumes some of the functions of the be-copula and is used before verbs as well. Due to such transfer, students often put be-copula first and then immediately after the detection of the error they repaired to the appropriate verb. This phenomenon was reported often, with nine occurrences in the study.

The reported frequency rates of phonological and lexical repairs were both low (9%). It is generally accepted that Japanese learners often cannot pronounce English correctly especially when they pronounce certain phonemes which do not exist in the Japanese language (MacKain, Best & Strange, 1981 [12]). Additionally, students are not well trained to listen to or pronounce subtle variations in phonemes. Nakamori (2009) [14] pointed out that once Japanese learners of English acquire the manner of perceiving and expressing English sounds based on Japanese sounds (phonemes, syllables, intonations) it is extremely difficult to overcome the problem. In this study, students possibly could not detect their mispronunciations and if so, they could not try to correct them, leading to a low frequency rate.

As for the low frequency (9%) and success rates (50%) of lexical repairs<sup>2</sup> it was perhaps difficult for students to attend both to grammaticality and appropriacy of word choice.

#### Example 25 Lexical

S25: This morning I drink, drank medicine. (Failed)

D: Oh, you took medicine.

In the example, the student succeeded only in grammatical correctness but not in an appropriate choice of a lexical item. The sentence is grammatically correct, but as it is lexically incorrect it was counted as failed. Widdowson (1989) [25] found that when learners are learning grammar through a rule-based approach, they often produce output that is grammatically correct but linguistically incorrect. As EFL Japanese students are learning English in formal educational settings with explicit grammar teaching which emphasizes accuracy or rules, it is felt that they were not instructed with attention to appropriate word choice but instead to grammatical correctness.

## 7. Conclusion

This study has shown the relatively high success rate of self-initiated self-repair (77%): It has also shown that the occurrence and success rates of self-initiated self-repair vary according to the types of triggers. Analyses of the findings and observation offer several pedagogical implications.

Teachers can be encouraged to give learners an explicit direction that they should try to repair their utterances when they detect their own errors or mistakes. It was thought, from the observation, that learners would not often repair their messages, even when the message was not what they meant to say. Teachers may have to encourage learners to repair their wrong message, as the move to produce a correct message would develop students' interlanguage.

As it was observed that learners are less likely to self-initiate to self-repair their phonological and lexical errors, teachers, while interacting with a learner, should give students some feedback. By giving them prompts such as a clarification request and repetition of the error, teachers can push learners to modify their non-target output. They can also provide learners with models through recasts, confirmation checks or explicit correction, when learners cannot detect their non-target output.

A shared common behavior of L1 use followed by a restatement in English should be considered as a negative move by the learner. Unnecessary L1 use hinders target language development, causing possible communication breakdown with non-Japanese speakers. In this study, the results implied that students attend to linguistic errors more than to discourse or content level in monitoring. Keeping this tendency in mind, teachers can encourage students to monitor their utterances, attending to not only the linguistic aspect but also to discourse- or content-related aspects of speech.

Self-initiated self-repair involves a higher level of cognitive activity, positively accompanied by noticing the gap, as opposed to merely noticing an L2 example provided by feedback such as recasts (Egi, 2010) [3]. Shehadeh (2001) [21] has stated that self-initiated self-repair is a normal learning/teaching strategy because of its high occurrence, prevalence and constancy. This study reported a relatively high success rate of self-initiated self-repair, supporting the argument that self-initiated self-repair is an effective learning /teaching strategy. It should therefore be utilized more in Japanese high school classrooms.

This small-scale study examined self-initiated self-repair attempts, and reported their effect on Japanese learners. However, the results should be considered cautiously, as there are some limitations to its findings. In this study, interviews as stimulated recall measurements were not conducted. To confirm the interpretations of the observed phenomena, retrospective interviews should have systematically been done with all of the students and the interlocutor, David. In the activity, even though David and the students had spontaneous interactions, the setting was an interview test. The results could have been different, if it had not been an interview test. Since the findings are within the context of the learners and the NS investigated in this study, conclusions should be taken as tentative without generalizing the results to other contexts.

To validate the findings and interpretations of the observed phenomena in the study, a focused empirical study in different settings with introspective data is required. If further studies support the findings and interpretations of the phenomena found in the present study, the importance of self-initiated self-repair for Japanese students' learning English should be more widely acknowledged.

### Notes

1. Although they had obtained high scores in the entrance exams in English, they cannot be regarded as intermediate learners if we refer to, for example, the American Council on the Teaching of Foreign Languages (ACTFL) proficiency guidelines (ACTFL Proficiency Guidelines–Speaking, 1999) [1]. As the scores of English proficiency tests such as Test of English for International Communication (TOEIC) or Test of English as a Foreign Language (TOEFL) were not available, we decided to regard them as low-intermediate learners.

2. There was no statistically significant difference in the success rates according to error types. An adjusted residual of lexical errors computed through the residual analysis revealed  $\pm 1.9$ , which was not a statistically significant difference ( $\pm 1.96$ ), but this can be attributed to the low frequency of lexical repairs.

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# The Teacher-Student Communication Pattern: A Need to Follow?

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## **Abstract**

This study is intended to investigate the teacher-student communication patterns in an upper-intermediate English class. There are major questions in this study; (a) what the nature of interaction is in a foreign language classroom, (b) what the characteristics of teacher-student turn taking are, (c) what type of feedback is taken by the teacher, (d) how the teacher's competence and performance are. The participants of the study are female adult students and a female teacher majoring English literature at MA level that has had five years of teaching experience. Five partial sessions of the class are recorded, transcribed, and analyzed. According to the findings, the type of discourse is teacher-initiated one and the question type is both WH-questions and questions with auxiliaries. The way of student's reply is brief and limited to one teacher-student turn-taking. The type of interaction is based on the questions posed by the teacher and long interaction such as discussing, debating, and challenging could rarely be seen in the classroom in question. The type of feedback depending on the skill and tasks dealt with, ranging from recast to direct correction. The teacher's competence and performance are satisfactory with correct pronunciation and near native accent.

**Keywords:** adjacency pairs, discourse, feedback, interactional talk, transactional talk, turn-taking.

## **1. Introduction**

Discourse analysis is the construing of language use by members of a speech community. It involves looking at both language form and functions and includes the study of both spoken interaction and written texts. It identifies linguistic features that characterize different styles as well as social and cultural factors that aid in our interpretation and understanding of different texts and types of talk. The discourse analysis of written texts may include a study of topic development and cohesion across the sentences, while an analysis of spoken language might focus on these aspects plus turn-taking practices, opening and closing sequences of social encounters, or narrative structure.

The study of discourse has developed in a variety of disciplines—sociolinguistics, anthropology, sociology, and social psychology. Thus discourse analysis takes different theoretical perspectives and analytic approaches: speech act theory, interactional sociolinguistics, ethnography of communication, pragmatics, conversation analysis, and variation analysis (Demo, 2001). Although each approach emphasizes different aspects of language use, they all view language as social interaction. It provides examples of how teachers can improve their teaching practices by investigating actual language use both in and out of the classroom, and how students can learn language through exposure to different types of discourse.

Demo (2001) believed that "even with the most communicative approaches, the second language classroom is limited in its ability to develop learners' communicative competence in the target language" (p. 1). It might be due to different reasons such as the restricted number of contact hours with the language, minimal opportunities or lack of opportunities for interacting with native speakers, and limited exposure to the variety of functions, genres, speech events, and discourse types that occur outside the classroom. Classroom research is one way for teachers to monitor both the quantity and quality of students' output. Nassaji and Wells (2001) believed that in the classroom, the dominant mode of interaction is not 'casual conversation', since most talk between teacher and students has a pedagogical purpose. In teacher-whole-class interaction, in particular, it is almost always teachers who initiate sequences.

Gillies and Boyle (2008) believed that cooperative learning classroom are the best type of class in which interaction can be seen and its success lies in helping students to see the value of the process, learning to develop authentic learning rather than repetition, and achieve quality outcomes.

Erton (2000) asserted that "every single utterance is valid and has a function in language in particular circumstances since it is produced for a purpose if considered in appropriate context. Thus, the importance for focusing on functional interpretation of language in context in a teaching situation is the focus on emphasis." (p. 210) Classroom can be considered the best place where the functional aspect of language is seen in the interaction between teacher and students. The discourse used in this interaction is of great importance too.

Bannink and Van Dam (2006) believed that "in some sense everything that happens between the bells that signal the beginning and the end of a lesson at school is 'the lesson'. Even if not part of a focused learning activity in the narrow sense of the term, whatever happens can at least be reported as having occurred during the lesson." (p. 285) Interruptions and embeddings create structural rather than sequential transition points in an ongoing discourse. Therefore, the discourse analysis is a challenge with its own complexity.

Cots (1996) assumed that "when we approach language as discourse is that communication cannot be explained as the simple transfer of preexisting meanings. Rather, a communicative event must be conceived as the locus where meanings are created through the negotiation of intentions and interpretations." (p. 81) Nunan (1993, cited in Cots, 1996) stated that 'verbal interaction is the result of the cooperative work of the speakers to make sure that their messages are being received in the way they were intended, and of the listeners to ensure that their interpretation coincides with the speakers' intentions.' (p. 82)

On the other hand, Morell (2007) studied the importance of lecture discourse in the classroom. He found out that lectures are more highly regarded if they allow for reciprocal discourse, especially for students of other languages who need help in understanding the content.

Bateson (1972, cited in Creider, 2009) introduced frames and stated that interactive frames are used by participants to understand what kind of interaction they are engaged in at any one time. Goffman (1981) showed, most interactions can be framed in a variety of ways. For instance, depending upon context, a question such as —Do you have siblings? may be a request for information or a test of student ability in a new language. In either situation, participants understand the purpose of the question by understanding how the interaction itself is framed—in this case, as a conversation between acquaintances or as a student/teacher interchange (cited in Creider, 2009).

Demo (2001) proposed a four-part process of Record-View-Transcribe-Analyze by which second language teachers can use discourse analytic techniques to investigate the interaction patterns in their classrooms and to see how these patterns promote or hinder opportunities for learners to practice the target language. He believed that "this process allows language teachers to study their own teaching behavior—specifically, the frequency, distribution, and types of questions they use and their effect on students' responses." (p. 2)

## 2. Questioning

Long and Sato (1983, cited in Creider, 2009) studied the kinds of questions found in a second language classroom, differentiating between *display* questions, where the teacher already knows the answer; and *referential* questions, which are more open-ended. Nunn (1999) suggested that 'the distinction between referential and display questions is not always appropriate in the classroom, and that in some contexts what would be called display questions can have important purposes, such as that of reconstructing textbook information.' (cited in Creider, 2009, p.94) However, the important notion here is that even questions that should be referential can be treated as display questions when teacher and students are working from an interactional frame that is more focused on language form than on content.

Another way of thinking about questions is in terms of the kinds of interactions they generate. The three-part *Initiation-Response-Feedback* (IRF) structure continues to be explored by

researchers and even by teachers. It was first described by Sinclair and Coulthard (1975) but it slightly changed by Mehan's (1979) discussion of *Initiation-Response-Evaluation* (IRE) sequences. In both cases, the teacher starts the interaction with a question, usually a display question. A student offers a brief response, and the teacher either provides feedback (IRF) or evaluates the student response (IRE). Some recent studies have explored how these two kinds of teacher-responses (evaluation and feedback) can affect teacher/student roles in the classroom. Thus, recent work on the IRE sequence in the second language classroom has explored the way that teacher discourse can affect teacher and student roles in the classroom.

McCarthy (1991) mentioned some forms and patterns of different types of talk and consider whether there are things that can be taught or practiced to assist language learning:

### **3. Adjacency pairs**

The dependency of the pairs of utterances in talk is not unknown to language experts. There are many examples concerning this property of speech. One of them is that a question predicts an answer, and that an answer presupposes a question. Adjacency pairs are defined as pairs of utterances such as *greeting-greeting* and *apology-acceptance*. McCarthy (1991) stated that adjacency pairs are of different types; identical (*hello- hello*), and different second pair-part (*congratulations-thanks*).

### **4. Turn-taking**

Turn-taking is one of the basic facts of conversation in which speakers and listeners change their roles in order to have a fruitful and normal interaction. The mechanism in turn-taking may vary between cultures and between languages. Kato (2000) stated that in ordinary conversation, it is very rare to see any allocation of turns in advance. Those involved in the interaction naturally take turns. Of course, there should be a set of rules that govern the turn-taking system, which is independent of various social contexts: (a) when the current speaker selects the next speaker, the next speaker has the right and, at the same time, is obliged to take the next turn; (b) if the current speaker does not select the next speaker, any one of the participants has the right to become the next speaker. This could be regarded as self-selection; and (c) if neither the current speaker nor any of the participants select the next speaker, the current speaker may resume his/her turn (cited in Kato, 2000).

### **5. Interactional and transactional talk**

McCarthy (1991) defined transactional talk as "it is for getting business done in the world, i.e. in order to produce some change in the situation that pertains." (p. 136) It can be in the form of telling somebody something that they need to know, to get someone to do something, and many other forms. On the other hand, he elaborated on the functions of interactional talk "its primary functions are the lubrication of the social wheels, establishing roles and relationships with another person prior to transactional talk, confirming and consolidating relationships, and expressing solidarity." (p.136)

Dorr-Bremme (1990) found out that "when contextualization cues are enacted by a person who is recognized as the leader of the activity at hand, such as a classroom teacher, they can function as direct, immediate means of regulating the flow and content of discourse." (p. 398) The cues can serve to indicate who has the floor, what topics of talk are relevant to the official agenda now, and what ways of listening are appropriate at the moment. The cues can function in these ways even when they are unexplained, implicit, and subtle.

### **6. Feedback**

There has been considerable interest in the relationship between types of corrective feedback and their efficacy. Lyster and Ranta (1997) investigated types of corrective feedback and their relationship to learner uptake in a primary French immersion classroom. The researchers classified feedback into six types: explicit correction, recasts, clarification requests, meta-linguistic feedback,

elicitation, and repetition. Lyster and Ranta also categorized learner uptake, a student utterance following the teacher's feedback, into two types: repair and need-repair, or in other words, successful and unsuccessful responses.

The results revealed that the most frequent type of feedback was the recast, the teacher's reformulation of all or part of a student's ill-formed utterance, without the error. The recast accounted for about half the total feedback, and led to the least uptake (31% of the time). In addition, the recast never led to student-generated repair; the learner merely repeated what the teacher had said. In contrast, elicitation and meta-linguistic feedback, providing the correct form explicitly by indicating that what the student said is incorrect and giving grammatical meta-language that refers to the nature of the error, were less frequent (14% and 8% of the time, respectively), and were found to be effective in that they encouraged learners to generate repair (45% and 46% of the time, respectively). Lyster and Ranta (1997) explained that the low rate of uptake following the recast was accounted for by the fact that the teachers also used repetition of well-formed utterances to confirm and develop students' statements. As a result, students had to figure out whether the teacher was concerned about form or meaning, and sometimes failed to recognize the recast as corrective feedback. Lyster and Ranta concluded that corrective feedback can lead to learner uptake when there is "negotiation of form, the provision of corrective feedback that encourages self-repair involving accuracy and precision" and when cues are given to make students aware of the necessity of repair of ill-formed utterances (p. 42).

## **7. Method**

### *Participants*

There were fifteen female language learners in this study. They have already passed intermediate levels and they were studying in an upper-intermediate level. Some have already had the class with this teacher and for others this is the first experience with this teacher. There was no stress or debilitating anxiety in the classroom. Therefore, students could freely utter their opinions and points of view.

### *Procedure*

At the outset of this study, five partial sessions of upper intermediate English classrooms were recorded with an MP4 recorder. Next, the recordings were listened carefully and the desired notions were transcribed for further study. The transcript made it easier to identify the types of questions in the data and to focus on specific questions and student responses. Finally, the transcript was studied and analyzed based on the criteria made for this research.

The criteria were such as the actual classroom interaction, turn taking role in the classroom, teacher's pronunciation, the type of feedback presented by the teacher, and so on.

## **8. Data collection and analysis**

Five sessions of the classroom interactions were taped using a digital MP4 recorder. Because the teacher moved around quite a bit, she was sometimes loud and sometimes quiet. The interactive part of the recorded tape was transcribed and analyzed based on the criteria leveled by the researcher such as turn-taking, feedback, performance and competence of the teacher.

## **9. Discussion**

The researcher found very interesting notions after transcribing the desired sections of the recorded text. In the process of teacher questioning, student answering and what follows up, there seems to be a questioning cycle which usually starts with a question by the teacher and an answer by the student followed by the feedback by the teacher. Hicks (1995) and Wells (1993) proposed this triadic dialog and which is a form of teacher-student communication pattern in talking. In this study the same pattern was governing the atmosphere of the classroom.

Feedback in the classroom in question was seldom seen regarding the students mistakes. The mistakes in conversation or when the student was telling a story or giving her ideas were totally tolerated. The students received an appreciation for their participation in the classroom interaction.

Excerpt 1:

T: ok, have you ever heard any stories about animals helping people?

S: Yes.

T: could you tell us?

S: A snake that secure the person that, I think it was injury? Was injured and .....

T: good, anyone else?

As shown in the interaction between student and teacher, the cycle of a teacher question, a student reply, and teacher follow up is repeated here. The other important issue which can be inferred from this excerpt is that the teacher ignores the mistakes of the student and gives just a thankful utterance at the end of the story. However, this tolerance of mistakes is not seen when students want to learn the meaning of the new words from the book. They are immediately stopped and corrected by the teacher. The correction can be due to the pronunciation mistakes, meaning misinterpretation, and the appropriate function in which the word or expression is used. The following excerpt indicates this type of correction.

Excerpt 2:

T: Anything else?

S: Sheep out.

T: Sheep out or ship out.

S: Ship out.

T: if you say sheep it is an animal.

S: No ship out.

When students were asked to read the passage, the teacher listened to their pronunciation and corrected the mispronunciations of the students on the spot. Some students preferred to pronounce the difficult words or the words they could not enunciate it correctly in a questioning intonation. Then teacher pronounce the word and the student repeated the correct form.

Excerpt 3:

S: (reading a text) In September 1985 an earthquake devastated? (student checks the pronunciation with the teacher in a question)

T: devastated.

There was an issue in the discourse between the teacher and student which was very intriguing and attracted the attention of the researcher and that was motivation which was given by the teacher in every interaction between her and her students. Even if the response by the student was not satisfactory, she tended to thank for the risk the student has taken to answer the question.

Excerpt 4:

T: Any other stories?

S: Teacher, once there was a man that he had a very bad disease that any doctor couldn't help him.....

T: Thank you very much.

Concerning the issue of adjacency pairs it could be seen that the teacher-student interaction was as proposed by McCarthy both identical and different pair-part. When teacher asked a question, the reply was direct to that question; therefore, it was identical. However, sometimes students could not provide a right answer for the teacher's question. Then the teacher thanked her and repeated her question for the other learner. In this instance of interaction and discourse different pair-part was followed by the teacher.

Excerpt 5:

T: Leila, What is meant by slang?

S: I think informal language, and.(student could not finish giving the definition of slang)

T: Anything else?

Throughout the recorded sessions of the class, the pronunciation and intonation of the teacher were carefully studied and the researcher could be convinced that it was at a satisfactory level of proficiency. This was very beneficial and useful for the students to consider it as a model of learning. As it is usually expressed by the scholars, the type of exposure to language plays an important role in language classrooms.

## 10. Conclusion

McCarthy (1991) said that "discourse analysis is *not* a method for teaching languages; it is a way of describing and understanding how language is used." (p.2) The study was intended to find out the extent to which a well-trained teacher considers the type of interaction and feedback needed for the classroom context. Tang (2008) claimed that even from the brief content analysis carried out on the teacher-students' discourse the trainee teachers *are* making connections between their instruction in text analysis and their lives as teachers and readers outside the classroom walls. Even from the brief content analysis that the researcher has carried out on the teacher-students' interaction, useful findings could be detected. The experienced teacher could well understand the importance of interaction in the class discourse and the motivation needed to initiate and continue interaction in that context.

From the extracts presented above, the researcher could see that a critical awareness about language and an interest in everyday texts are being developed in majority of the students. It is suggested that while experts are training the teachers, they should teach them the type and degree of interaction and how they are to tune in their discourse with their students.

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# **A Critical Look at the Status of Affect in Second Language Acquisition Research: Lessons from Vygotsky's Legacy**

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## **Abstract**

The phenomenon of affect and its relationship to second language learning is well-known and has been experienced by most language learners. One of the main debates that has recently appeared in the Second Language Acquisition (SLA) literature is related to the status of affective factors in this domain. The present paper attempts at mulling over the current controversies over affect with a special attention to Vygotsky's account of the matter.

**Keywords:** affective factors, affective filter hypothesis, Vygotsky's sociocultural theory, perezhivanie, collective ZPD, dialogic thinking framework, and second language acquisition

## **1. Introduction**

To put it in plain words, Brown (2000) argues that the affective element encompasses a plethora of psychological factors that remind the educators that learners are not abstract entities but human beings with feelings about themselves and the people they come into contact with. Overlooking this elementary observation does not mend feelings of insecurity, anxiety, and inhibition in learners and can derail the interactive aspects of even a well-crafted instructional plan.

## **2. On affect in SLA**

The phenomenon of affect and its relationship to second language learning is well-known and has been experienced by most language learners. One of the main concepts that has appeared early in the Second Language Acquisition (SLA) literature is what is known as the Affective Filter Hypothesis. The Hypothesis has been intended to account, in large part, for why some people are able to learn second languages while others are not.

One way of accounting for non-learning in Krashen's (1985, as cited in, Gass & Selinker, 2008) view is to claim that learners have not received comprehensible input in sufficient quantities; another way pertains to the claim that an inappropriate affect is to blame.

Affect, from Krashen's (1985, as cited in, Gass & Selinker, 2008) perspective, is intended to include factors such as motivation, attitude, self-confidence, anxiety, etc. Krashen proposes an Affective Filter. If the Filter is up, input is prevented from passing through; if input is prevented from passing through, there can be no acquisition. If, on the other hand, the Filter is down, or low, and if the input is comprehensible, the input will reach the acquisition device and acquisition will take place. According to Krashen, the Affective Filter is responsible for individual differences and variations in second language acquisition and differentiates child or first language acquisition from SLA because the Affective Filter is not something that children have/use.

## **2.1. Criticisms of SLA in terms of affective factors**

As said by Jordan (2004), one of the main arguments recently posed among Second Language Acquisition (SLA) researchers is concerned with what an SLA theory should or should not consist of, i.e., its domain. The choice of different domains is claimed to reveal fundamental incompatibilities.

In this line of argument, Jordan presents the discussion that another increasingly important disagreement about domain involves the role of Sociolinguistics. In this way, Jordan strives to take account of the debate put forward by Firth and Wagner (1997, as cited in, Jordan, 2004) that has criticized SLA research for disregarding the social context and suggested that SLA research should relinquish its preoccupations with what goes on in the learner's mind and pay more attention to the impact of the social and affective factors. As Jordan (2004) simply puts it, lurking behind this criticism is the related question of the research methodology.

In this regard, Vygotsky's (1978, 1986) Sociocultural Theory (SCT), which is conceived to be still influential in the SLA approaches, is deemed to contribute to this recent focus, as, according to Saville-Troike (2005), it views interaction as the essential genesis of language.

Despite the foregoing arguments posed in favor of affective factors, Garrett and Young (2009) accept as true that affect and emotion are terms that have been in the shadows of discussions of the classroom foreign language learning, where the primary focus has been on the development of cognition and knowledge and use of the new language. They believe that one reason for this is the ignorance of emotion by psychologists during most of the 20<sup>th</sup> century. Putting it this way, at the end of that century, Damasio (1999, p. 39, as cited in, Garrett & Young, 2009, p. 209) writes that:

Emotion was not trusted in the laboratory. Emotion was too subjective, it was said. Emotion was too elusive and vague. Emotion was at the opposite end from reason, easily the finest human ability and reason was presumed to be entirely independent from emotion.

Cordova and Perio (2010) argue that in assessing student achievement over the years, the instructional milieu can be primarily criticized on the ground that it has been merely occupied with the cognitive processes. In the second place, the affective domain has been frequently interpreted only in terms of a single factor, namely a student's motivation to learn. Measures of affective processes other than motivation, say, self-regulation and self-efficacy, which are only a few to mention, among others, have been rather neglected. Besides, the affective processes are rarely considered as interacting with the cognitive processes.

## **2.2. Affective versus cognitive binary oppositions**

As Ellis and Larsen-Freeman (2006) put it, when considering the interface, human beings have alluded to Descartes' Dualism, namely the separation of *res cogitans*; that is, God and the human soul and *res extensa*, i.e., the corporeal world. Dualism has pervaded the scientific thinking since Descartes. Humans have divided their world into contraries and perceived and interpreted these binary oppositions as mutually exclusive. Applied Linguistics has been also driven by such either/or dichotomies. However, these contraries are also emergent attractor states. Human thinking, like nature, appears to partition things, events, and ideas into binary pairs, whereas these pairs are emergent, and they are more mutually dependent than mutually exclusive.

Accordingly, the cognitive and affective factors have not been devoid of such binary oppositions. The affective processes have been seldom considered as interacting with the cognitive processes. As Smith and Ragan (1999) have pointed out, any cognitive or psychomotor objective carries on its back a certain affective component to it.

In line with the foregoing argument, Dufficy (2005) debates that until recently, research within the field of SLA has tended to concern itself with an individual's acquisition of discrete aspects of the language and employed the notions of input and output as central organizing metaphors. Constrained by these metaphors, language has been seen to contain meanings which, when transmitted by speech or writing, could be emptied into the mind-as-container of the recipient.

For Guiora, Brannon, and Dull (1972), the issue becomes further complicated with respect to the question of the language ego, as learners engage in the process of developing new identities in the target language. Furthermore, as Gilner (2008) puts it, a learner's self-image may be strongly dependent on a mode of expression that relies on specific descriptors and semantic notions that cannot be transferred until a certain level of competency is achieved.

### **2.3. Spinoza's non-dualistic philosophical account of affect and cognition**

The philosophical roots regarding the rapport and the dialectic relationships between affect and cognition in language learning can be traced back to the work of Spinoza (1883, as cited in, Cole & Yang, 2008), according to which affects are bonds that are said to unite the rational conduct with life. Spinoza's system of affects has constructed a coherent argument in his oeuvre, *Ethics*, and a non-dualistic system for understanding the connection between the world and the human endeavor. Spinoza's ideas have been taken up and developed by numerous philosophers and thinkers, who, according to Cole and Yang (2008), are unified in their application of affects as essential yet multifarious elements in the construction of language and thought due to the point that they provide a link between communication, cognition, and emotion.

#### **2.3.1. Beyond cognitive/affective dualism: Vygotsky's uncompleted work**

Following Spinoza, the rejection of the cognitive versus affective dualism has been also announced by Vygotsky (1978, 1986) and, unfortunately, has not been followed by a model within which a unitary conception of thinking and feeling could be discussed and implemented in the milieu of the empirical research. In this respect, Dufficy (2005) discusses that Vygotsky's idea of the mediation and the primacy of the inter-psychological processes leads to a less commonly discussed aspect of Vygotskian-inspired Sociocultural Theory, and that is the role that emotion plays in learning and development. Vygotsky is said to have been profoundly aware of the critical role of affect in learning and at the time of his death has been working on a manuscript titled *The teaching about emotions: Historical-psychological studies*. Vygotsky's uncompleted work on emotions, which has only become available in English in 1999, has had important implications for education.

##### **2.3.1.1. Vygotsky's perspective towards affect and cognition**

Vygotsky (1978) makes a distinction between psychological tools and technical tools. From Vygotsky's perspective, technical tools are employed to generate transformations in other objects, whereas psychological tools can be drawn on to direct both the mind and behavior. Affective tools are seen of social rather than organic or individual origin. Vygotsky argues that since the auxiliary stimulus possesses the precise function of the reverse action, it transports the psychological operation to the higher mental and qualitatively novel forms and authorizes the human beings to regulate and control their behavior from the outside by means of the extrinsic stimuli. Vygotsky's dialogic notion that learning is, first and foremost, a situated, inter-psychological phenomenon suggests that one needs to go beyond a predominantly cognitive theory of learning, in general, and SLA, in particular.

Exploring the dialectical relationship between thought, affect, language, and consciousness, Vygotsky (1987, p. 282) postulates that:

[Thought] is not born of other thoughts. Thought has its origins in the motivating sphere of consciousness, a sphere that includes our inclinations and needs, our interests and impulses, and our affect and emotions. The affective and volitional tendency stands behind thought. Only here do we find the answer to the final "why" in the analysis of thinking.

### **2.3.1.2. Vygotsky's concept of perezhivanie**

Vygotsky's (1978) primary emphasis on the self-construction through and with the available tools foregrounds two critical issues. In the first place, it portrays the individual as an active agent in the social development. Secondly, it affirms the significance of contextual influences in that development takes place through the utilization of those tools, which are accessible at a particular time and in a particular place.

Technically, the social mediation helps share new formations in personality development since, according to Vygotsky (1998, p. 170, as cited in, Mahn, 2003, p. 130), the innermost transmission of external social relations between people provides the basis for the architecture of personality. Vygotsky (1994, p. 342, as cited in, Mahn, 2003, p. 130) makes use of the term perezhivanie that implies:

the individual unity of personal characteristics and situational characteristics. .... Perezhivanie is a unity where, on the one hand, is an indivisible state, the environment is represented, i.e., that which is being experienced ... and on the other hand, what is represented is how I, myself, am experiencing this, i.e., all the personal characteristics and all the environmental characteristics are represented in perezhivanie.

According to Mahn and John-Steiner (2002), Vygotsky's perezhivanie, for which no equivalent English still term exists, is occasionally equated with the lived or emotional experience. Perezhivanie describes the affective processes through which interactions in the Zone of Proximal Development (ZPD) are individually perceived, appropriated, and represented by the participants. Vygotsky describes the fundamental role played by language in an individual becoming aware of, and making meaning from, the lived experience. The emotional aspect of language and the importance of the human connection in social interactions are both integral to Vygotsky's concept of perezhivanie. To explain it, Vygotsky relies on the dense textures of language as motivated by feelings, enriched by previous experience, and focused on by volition. He also emphasizes the emotional aspects of social interaction and their impact on learning for the reason that the study of learning remains incomplete unless the human need to connect emotionally is integrated with the need to think and know.

To put it in plain words, Vygotsky's analysis of meaning, in which he approaches the hidden, complex, affective dimensions of thinking and speech by studying the emotional subtext of utterances-- what he refers to as sense-- is also central to his analysis of perezhivanie. According to Vygotsky (1987, p. 276, as cited in, Mahn & John-Steiner, 2002), a word's sense is the cumulative total of all psychological facts that come to pass in subjects' consciousnesses in consequence of the word. Sense is a dynamic, fluid, and complex formation that has several zones that fluctuate in their stability.

Mahn and John-Steiner (2002) believe that Vygotsky's concept of perezhivanie can play an important role in understanding the appropriation of the social interaction. They have also come to realize that this appropriation in the ZPD plays a crucial role in transformative experiences of all types and is not limited to children and other novice learners. Careful listening, intense dialogue, and emotional support sustain the cooperative construction of understanding, of scientific discovery, and of artistic forms. This is true in interaction across generations, namely in parenting, teaching, mentoring, and among the creative partners.

### **2.3.1.3. Post-Vygotskian legacy: Perezhivanie and collective ZPD**

Regarding the Vygotskian-inspired perezhivanie and the rejection of the dichotomy between affect and cognition, Daniels's (2001) suggestion is that the term pedagogy should be construed as referring to certain forms of social practice, which shape and form individuals' cognitive, affective, and moral development. If pedagogic practices are conjured merely in terms of those which impinge upon the formation of identity as well as learning outcomes as defined in, say, just test

scores, then a form of social theory is necessitated to authorize the instructional model and explore the factors, which may be exercising a certain amount of influence.

If the Zone of Proximal Development (ZPD) is redefined from a broader affective as well as cognitive perspective, as put forward by Rio & Alvarez (1995, as cited in, Daniels, 2001), then, according to Daniels (2001), a further robust and coherent concept comes into sight. This conception of ZPD would be robust thanks to the point that it is determined to embrace both cognitive and affective domains, and it would be more coherent given that it should handle these domains as highly interconnected and/or entrenched matters.

In this line of argument, certain Post-Vygotskian authors have referred to these interwoven processes as the collective Zone of Proximal Development (Moll & Whitmore, 1993). Mahn and John-Steiner (2002) present the debate that such expanded analyses of the ZPD posit the degree of complementarity as a determining factor in the success of the interaction between the participants, whether the interaction involves adult with child, teacher with student, peer with peer, or whether it occurs among a number of individuals within the ZPD.

#### ***2.3.1.4. The dialogic thinking framework***

According to Fernyhough (2008), the Dialogic Thinking (DT) framework draws on Vygotskian and Neo-Vygotskian ideas in exploring the implications of the internalization of mediated interpersonal activity for the individual cognition. In so doing, it highlights an assumption implicit in Vygotsky's writings but never properly examined by him, namely that the resulting forms of cognition preserve the dialogic nature of the interpersonal and affective exchanges from which they originate. The internalization of dialogue necessarily entails the internalization of the alternative perspectives on reality manifested in that dialogue, and the consequent restructuring of cognition to enable the simultaneous accommodation of multiple perspectives upon a topic of thought.

Drawing on Bakhtin's (1981) dialogic imagination, Fernyhough (2008) acknowledges that the key to understanding how dialogue can incorporate different, semiotically manifested perspectives on reality lies in Bakhtinian-inspired perspectives. Specifically, an assimilation of the Bakhtinian concepts of voice and dialogue can provide a powerful extension of Vygotsky's theory. The DT framework is founded on one significant implication of this Bakhtinian idea, namely that, in internalizing dialogic exchanges, the individual does more than merely appropriating the utterances of the other. If Bakhtin is correct to claim that an individual's utterances in dialogue are reflective of his or her orientation to reality, then the internalization of dialogic exchanges, or, in Vygotsky's (1997, as cited in, Fernyhough, 2008) terms, their reconstruction on the intrapsychological plane, will necessarily involve a certain degree of the adoption of the other's perspective. The problem of understanding other minds thus shifts from the question of how an isolated epistemic subject could ever come to know about the non-observable mental and cognitive states of another epistemic subject, towards a reconsideration of how such mental states might be manifested in the concrete social, affective, and semiotic exchanges, which are subsequently internalized to ground the individual's mediated thinking.

Certainly, dialogue of this kind involves both the internalization of the meanings created in the inter-mental forum of discussion and the externalization of those intra-mental meanings that are constructed in response; it also constitutes a particularly clear instance of Vygotsky's (1981, as cited in, Wells, 2000) insight that the individual develops and is developed into what he/she is through what he/she produces for others, which entails a dialogical relationship between input and output.

### **3. Conclusion**

To augment the affective factors in SLA, it seems promising to take account of Kumaravadivelu's (2006) position on the basis of which interaction as an interpersonal activity offers participants in the L2 class opportunities to establish and maintain social relationships and

individual identities through pair and/or group activities. It enhances the personal rapport and lowers the affective filter. The affective-humanistic activities involve the learner's wants, needs, feelings, and emotions. These activities are carried out mainly through dialogues, role-plays, and interviews, among others. At the initial stages of the language production, these activities begin with short dialogues that contain a number of routines and patterns although more open-ended role-plays and interviews are utilized at the later stages.

In due course, the present study has strived to present a brief tour regarding the status of affect identified in the literature of Applied Linguistics. In so doing, the domain of SLA has been criticized on the ground that it has been dominated by the binary opposing pairs. Accordingly, it has been shown that the presented classifications of language learning in the realm of SLA have not been bereft of such dichotomies, namely the cognitive versus affective factors. Drawing on Vygotsky's uncompleted work on affect and cognition, it has been attempted at establishing a dialectic relationship between affective and cognitive factors.

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# On the Relationship between Right- brain and Left- brain Dominance and Reading Comprehension Test Performance of Iranian EFL Learners

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## Abstract

A tremendous amount of works have been conducted by psycholinguistics to identify hemisphere processing during second/ foreign language learning, or in other words to investigate the role of the brain hemisphere dominance in language performance of learners. Most of these researches have focused on single words and word pairs (e.g., Anaki et al., 1998; Arzouan et. al., 2007; Faust & Mahal, 2007) or simple sentences (Rapp et al., 2007; Kacinik & Chiarello, 2007), and it has been discovered that there is an advantage of right hemisphere for metaphors and an advantage of left hemisphere for literal text. But the present research was designed to study Iranian EFL learners' performance in different reading tasks, so there could be differences between the consequences of the former research and the results of the present study due to the context. Here left-brain and right-brain dominance was investigated in 60 individuals (20 right-handed and 10 left-handed male, 20 right-handed and 10 left-handed female) via the Edinburg Handedness Questionnaire (EHQ). The research results suggested that the right-handed learners who are supposed to be left-brain outperformed the left-handed ones; and regarding participant's gender, male learners outperformed female learners on reading comprehension test tasks.

**Key words:** psycholinguistics, brain hemisphere, left-brain, right-brain, left-brained, right-brained, reading comprehension, interhemispheric processing.

## 1. Introduction

Psycholinguistics is a branch of study which examines the relationship between the human mind and language. In other words, it can be said that it is the combination of the disciplines of psychology and linguistics. In psycholinguistic research language users and producers are considered as individuals not samples and representatives of the society. And linguistic performance of each individual is determined by the strengths and limitations of the mental apparatus which all human beings share. In fact, psycholinguistics traces similar patterns of linguistic behavior among large groups of individual speakers of a particular language or of all languages. It examines the processes that occur in brain while producing and perceiving both written and spoken discourse, even though the involving processes may be so well established to be aware of them. Since psycholinguistics believes the notion that language is produced by the human mind, it has two interconnected goals; one of them is to understand the processes underlying the language and the other one is to study language as a product of human mind and therefore as an evidence of the way in which human beings organize their thoughts and impose patterns upon their experiences (Field, 2003).

## 2. Review of literature

In the 1960s, Sperry found out that the right and left hemispheres of the brain think and process information in very different ways. Before he starts his work on cognition and behavior, for decades it was known that the left or right-hemispheres or halves of the brain are responsible for doing different tasks. In the 1860s, Broca found out that speech is related to the front area of the left hemisphere; and in 1940s, it was discovered by Penfield and Jasper that motor function of one side of the body is related to the opposite hemisphere of the brain; i.e., the left hemisphere commands the person to lift their right hand. By the

1969s, scientists and doctors conducted research on neural functions of different areas of the brain. The research was done on the patients who suffered from brain damages in which only one or a few aspects of brain functions were affected. Evidence from those research lead to the idea that the left hemisphere is superior to the right one and it is responsible for higher order brain functions. In other words, it can be said that our left brain is the dominant half of the brain and so, more evolved than the right one. However, when Sperry started to work on human and animal brain and thought, it was found that the whole brain is much greater than its parts. In the 1950s, when he severed connections between the left and right brains of chimpanzees, i.e., the two hemispheres could not communicate with each other and could not access information stored in the opposite brain, the obtained result was that each half of the brain was still able to learn and function (Cardarelli, 2010).

Since the 1940s, specific severe epileptics were treated by surgically severing left and right brain connections (a commissurotomy). Severing this connection reduced seizure severity and frequency with otherwise little effect on behavior and the patients' ability to learn. Sperry tested 10 commissurotomy patients and then found out that the two halves of the brain are very specialized. He also discovered that these two halves are totally independent and each one is capable of thought, emotion, and memory which are not accessible to the opposite half of the brain (Cardarelli, 2010).

In split-brain experiments, they tell to a patient to look at the centre of a screen or piece of paper, and then images or words are presented to one hemisphere. When the image is placed to the right of the centre, it can only be seen by the right eye, so, only the left hemisphere can process the image. In commissurotomy patients, there is no connection between the two hemispheres, therefore, scientists are able to test each half independently (Cardarelli, 2010).

A patient is able to read a word without hesitation, when it is presented to the left hemisphere. When the same word is presented to the right hemisphere, although the meaning or context of the word will be conjured, the word cannot be read by the patient. For example, when the word walk is written on the crosswalk, although it is the left hemisphere that can read the word, the context and meaning of the word walk can be understood by the right hemisphere. In a similar way, when a picture from an object is presented to patients, the left hemisphere can recognize its name. However, the right hemisphere is able to see the object, but it cannot communicate what it is, even the patient may say that I have not seen anything. Here, the patient can also select the presented object from a group of objects, but they have no idea about why the subject has been selected (Cardarelli, 2010).

The left brain when isolated is able to calculate and do math functions without problem, but the right brain can only do easy addition problems (just up to the number 20), and it is not able to subtract, divide or multiply. Research done by Sperry indicated that in fact the passive right hemisphere is superior to the dominant left hemisphere in some ways. It is said that the left brain is responsible for speech, writing, and calculation, and the right brain takes part in the complex tasks such as spatial perception, word comprehension, and non-verbal communication. Right-brain tasks constitute important mechanisms; with the help of these mechanisms humans are able to perceive and interact with the world. The right-brain functionality is required for some processes such as music appreciation, intuition, and reading faces. The right brain seems passive and inferior to the left-brain because it is basically mute. It is able to think, process, and feel, but it cannot communicate those thoughts because the major language center of the brain is not located in this hemisphere. However, most evidence up to now shows that both halves of the brain are needed for most tasks and there is no time when one side of the brain is working while the other is only idling (Cardarelli, 2010).

Reading comprehension which is the focus of our research, is often seen as a single skill that depends on a unitary cognitive process, but it is viewed by many scholars as a progressive sequence that moves from visual symbol recognition, to letter-sound correspondence, to phonetic decoding, and finally to text comprehension (Chall, 1979; Perfetti, 1979, cited in Grimes, 2003). Many believe that reading process is a unitary process in which readers use the same set of cognitive processes and process and comprehend different types of the text in the same way. However, it is said that reading comprehension is not a singular cognitive process. Different cognitive skills may underlie different types of reading comprehension demands (Guthrie, 1973, cited in Grimes, 2003) and

different kinds of text structure may demand different kinds of cognitive processing abilities. Reading comprehension can be viewed as the process of getting meaning from written text. It can be considered as a subvocalized language function in normal subjects involving complicated language processing skills that originate in the left hemisphere. Many readers report "hearing" the words in their heads as they read silently. It is known that in as many as 90% of individuals, language processing involves structures in the language and speech areas of the left hemisphere (Leonard, 1997, Grimes, 2003) and studies of the brain confirm activation of these areas of the brain during reading tasks (Shaywitz, Pugh, Jenner, Fulbright, Fletcher, Gore, and Shaywitz, 2000; Horwitz, Rumsey, and Donohue, 1998; Carlson, 1998; Baynes, 1990, cited in Grimes, 2003).

According to Grimes (2003), there are lots of theories that have tried to maintain the role of right and left hemisphere to the reading process. Among them Graham and Kershner (1996) who proposed that the analytic, sequential, and "auditory" aspects of reading are maintained by the left brain, and holistic, simultaneous, and visual spatial processing during reading by the right brain. Children's preferred learning styles through use of questionnaire were investigated by these two researchers and learning styles were compared to reading achievement; it was investigated that dyslexic readers do not indicate a strong learning preference in either auditory (left hemisphere) or visual (right hemisphere) modalities. Bakker (1979- 1992) hypothesized that two types of dyslexia resulted from an over-reliance of each hemisphere, with the right hemisphere contributing spatial-perceptual reading strategies and the left hemispheric adding syntactic-semantic reading strategies. A Balance Model of reading developed by this researcher stresses a developmental process in which reading begins as a predominantly right-hemisphere process with emphasis on strict visual processing when decoding before finally switching to a more fluid linguistic process involving language centers of the left hemisphere for fluent readers. Later on, in an EEG reading study which supported his model (Bakker, 1992), it was mentioned that readers relied heavily on right hemisphere functions to process words visually when decoding, while more experienced readers indicated dominant left brain activation when reading because text comprehension had become much like an internalized language function involving language centers of the left hemisphere.

Bakker (1992) recorded brain responses at the parietal and temporal locations in the left and right hemispheres of fifty kindergarten children while they were reading single words to test his theory. For four years, follow up brain recordings were also taken at one-year intervals. Consequences of the study indicated large hemisphere amplitudes during the first two years of the study, so, it was suggested that the children read the words with mainly right hemisphere activation. On the other hand, data obtained from the final two years of the study showed that a large shift to the left brain activation occurred and that the children read words with mainly left hemisphere activation. Findings of this study supported the idea that reading begins as a primarily visual, right hemisphere function but progresses to a more language dominated function mediated by the left hemisphere (Grimes, 2003).

Later on, a Bilateral Cooperative Model of Reading was suggested by Taylor and Taylor (1983). This model introduced the concepts of LEFT and RIGHT track processes and proposed that reading is not a sole language function of the left hemisphere. These authors defined that LEFT processes are those aspects of reading that involve processing sequentially ordered material, phonetic coding and syntax, while RIGHT tract processes handle pattern-matching functions, relate text to real-world context, and evoke mental associations and images. Here, the ideas were not directly related to hemisphere lateralization, but contribution of the hemispheres to these reading processes could be seen. LEFT track processes are consistent with known functions of the left hemisphere. Taylor and Taylor claimed that LEFT track processes involve processing sequential material, which is a well established function of the hemisphere (Halpern, 2000, cited in Grimes, 2003) and would account for the accurate processing of letters in sequence when decoding words. It was said that, LEFT track processes also involve phonetic coding and syntactic processing, which are other identified left hemisphere functions (Gazzaniga, Ivry, and Mangun, 1998, cited in Grime, 2003) that further contribute to accurate reading. Right track processes are also consistent with

well-known functions of the right hemisphere. According to Taylor and Taylor, RIGHT track processes handle pattern matching functions, which is a visual spatial process mediated by the right hemisphere (Halpen, 2000, cited in Grimes, 2003). Visual spatial processing identifies the correct orientation of letters, so it plays a role in word identification. It was also stated that RIGHT track processes evoke mental associations, which is another well-established role of the right hemisphere (Loring-Meire and Halpen, 1999, cited in Grime 2003). Mental association relies on the ability to generate a mental image, which is a function that can aid comprehension of text (Grimes, 2003).

### **3. Methodology and research design**

#### *3.1 Participants*

Subject selection in this study was done on the basis of handedness, normal reading ability, age, and also level of the participants. The participants were 60 EFL Students from different branches of Kish institute in Tehran in intermediate level; it should be mentioned that in the present study intermediate level has been considered as a continuum, i.e., from pre-intermediate to upper-intermediate. All of the subjects of this study were Persian speakers for whom English was considered as a Foreign Language. The samples selected were mixed in terms of their gender, 30 men and women. The subjects were between the ages of 15 to 32 years old ( $M=23$ ), and on average they have been studying English for 3 years. The students were randomly selected from the available classes in intermediate level, while half of them were male and the other half female students. At first there were about 95 subjects in this study, but 35 of them were removed from final data analysis, because a homogeneous group was needed. So, the number of them was decreased to 60 ( $N= 60$ ). 40 the subjects were right-handed and the other 20 were left-handed as assessed by a questionnaire; namely Edinburgh Handedness Inventory. The mentioned assessment was carried out according to what was made by Gonzaleza & Goodalea, 2009 and also Vanve, 2009. All participants of this study were naïve to the purpose and hypothesis of the study.

#### *3.2 Instrument and procedure*

To meet the requirements of the present study, a host of various instrumentations were used.

Solution Placement Test (Elementary to Intermediate) was used in this study. The test was taken to determine the subject's level and homogeneity. The test helped the researcher to make sure if all of the subjects were in intermediate level as was decided. The mentioned test has been developed by Lynda Edward (2011) after consultation with teachers and is designed to assess the subject's knowledge of the key language as well as their receptive and productive skills.

Sine no exact instruments have been found by the researcher to determine right-brain and left-brain dominance (after consulting many experts in the related fields of study), Edinburgh Handedness Questionnaire (EHQ), a handedness questionnaire, was used to measure the mentioned phenomenon in subjects of the present study. According to Grimes (2003), it has been confirmed that 90% of right-handers have left- hemisphere dominance for language. And also, it has been estimated that over 95% of right-handed people and 70–80% of left-handers show language lateralization to the left hemisphere (Annett & Alexander, 1996; Kimura, 1983; McKeever, Seitz, Krutsch, & Van Eys, 1995; Rasmussen & Milner, 1977, as cited in Gonzaleza & Goodalea, 2009).

The purpose of this study was to check the students' comprehension with regard to each type of reading, so two formats of items including multiple choice and cloze test were applied here. The reading tests were selected from the book *Intermediate Total English: Teachers Resource Book* by Moreton, Naughton, Bewsher, and Peebles (2006). The present test comprised two passages, one including nine multiple choice items and the other 40 cloze test items; totally 49 questions, each with three answer choices. The first passage including multiple choice items was presented exactly from the mentioned book with no changes, so there was no need to test its validity and reliability. Cloze test items for the second passage were developed by the researcher. Following the principles of cloze construction, there was no deletion in the first and the last sentence of the text, then words in the other sentences of the passage were count in order and about every seventh word was deleted.

For the scoring on cloze passage to be easier and more objective, the removed items were presented in the form of three answer choices. The test takers required to attempt to choose the original words from the items provided. It is to be noted that like any other teacher-made or researcher-made tests, there was an obligation to carry out a full validation and reliability before the test become operational.

The design of the study was a comparison paradigm (Mackay, 2005) with two groups: a left-brain dominant group and a right-brain dominant one. The participants were 60 EFL Students from different branches of Kish institute in Tehran in intermediate level; 30 male and 30 female; in each group 20 right-handed and 10 left-handed. Each group was asked to perform three tasks mentioned above. The time frame for the study was 65 minutes for the placement test, 10 minutes for the questionnaire, and 30 minutes for the reading test, spread over two sessions. Placement test was given to the participants separately in one session, and the questionnaire and the reading test both in another session.

### 3.3. Data analysis

Depending on the obtained results from the test, nonparametric-tests of association were applied to test the research hypotheses; a non-parametric test was conducted since the assumptions of parametric test were not met. It goes without saying that descriptive statistics is indispensable to arrive any statistical inference. Four assumptions were considered in order to analyze the data through parametric tests: interval data, independence, normality, and homogeneity of variances. For interval data and independence there were no statistical tests. The MC and Cloze tests were measured on an interval scale while the subjects of the study did not participate in more than one group. Normality of each group was tested through ratios of skewness and kurtosis over their respective standard errors. Ratios between the ranges of  $\pm 1.96$  show that the assumption of the normality is met. Here, the ratio of 2.03 for the Cloze test indicated that it was not distributed normally in terms of its kurtosis. Regarding MC test, the skewness of 4.33 and the kurtosis of 7.28 which are higher than  $\pm 1.96$  indicated that it also did not enjoy a normal distribution. According to these results and also because of unequal groups' sizes, the non-parametric test of Mann-Whitney U – a non-parametric equivalent for independent t-test- was used to find the answers of the research questions. The obtained results for non-normality of the data on MC and Cloze tests was also supported by the results of the Kolmogorov-Smirnov and Shapiro-Wolf tests, since all of the statistics had significance values less than .05.

## 4. Results and Discussion

In what follows, firstly various statistical calculations are presented followed by the discussion as a separate section.

Table 1. Normality Test results for MC and Cloze Test

HANDDOM	Left-Handed		Right-Handed	
	Cloze Test	MC	Cloze Test	MC
N	Valid	Missing	Valid	Missing
	20	0	40	0
	20	0	40	0
Mean	28.8000	7.4000	30.9500	7.0500
Std. Deviation	3.90142	1.27321	3.08802	.98580
Variance	15.221	1.621	9.536	.972
Skewness	-.926	-2.217	-.281	.065
Std. Error of Skewness	.512	.512	.374	.374
Normality Test of Skewness	-1.80	-1.80	-.75	.17
Kurtosis	2.016	7.267	-.437	-.934
Std. Error of Kurtosis	.992	.992	.733	.733

<b>Normality Test of Kurtos</b>	2.03	7.28	.59	-1.27
<b>Minimum</b>	18.0	3.0	25.00	5.00
<b>Maximum</b>	34.00	9.00	37.00	9.00

The results of the Kolmogorov-Smirnov and Shapiro-Wolf tests support the above findings as non-normality of the data on MC and cloze tests. All of the statistics have significance values less than .05.

*Table 2. Test of normality for MC and Cloze Tests*

	Kolmogorov-Smirnov			Shapiro-Wilk		
	Statistic	Df.	Sig.	Statistic	Df.	Sig.
<b>Cloze Test</b>	.140	60	.005	.951	60	.018
<b>MC</b>	.211	60	.000	.873	60	.000

What is the relationship between the brain dominance and reading comprehension ability of Iranian EFL learners?

Results obtained from the normality test indicated that the non-parametric tests are needed here; so, two- independent samples Mann-Whitney test was run to investigate any significance between the brain dominance and reading comprehension ability of Iranian EFL learners. The Mann-Whitney statistic was 313.50, which was not a significant one ( $P = .173 > .05$ ). According to the mentioned results, it might be concluded that there is not any significant relationship between the brain dominance and reading comprehension ability of Iranian EFL learners. Therefore, the answer to the question is that there is not any significant relationship between the brain dominance and reading comprehension ability of Iranian EFL learners. Meanwhile, the medians for the left-handed students is 37 and for the right-handed ones is 38 which verify the support of first question answered.

*Table 3. Mann-Whitney Test Statistics for brain dominance with Reading Comprehension*

Mann-Whitney U	313.500
Wilcoxon W	523.500
Z	-1.363
Asymp. Sig. (2-tailed)	.173
a. Grouping Variable: HANDDOM	

*Table 4. Median Statistics Left-Handed and Right-Handed Students on Reading Comprehension*

	Median
Left-Handed	37
Right-Handed	38

Does the brain dominance affect the learner's performance in different reading test tasks?

There is not any non-parametric equivalent for Multivariate analysis, so two separate Mann-Whitney tests were run in order to compare the right-handed and left-handed learners' performance on cloze test and MC. So, the second question is divided into two minor ones. As follows:

Does the brain dominance affect the learners' performance on cloze test?

Does the brain dominance affect the learners' performance on MC test?

Regarding the first minor question, Mann-Whitney statistic of 260.50 is significant ( $P = .027 < .05$ ). So, according to this result, it can be concluded that there is a significant difference between the right-handed and left-handed learners' performance. Thus, the answer to the first minor hypothesis is positive. The median for the left-handed learners on cloze test is 29 and for the right-

handed learners is 31. So, the right-handed learners outperformed the left-handed ones on the cloze test.

Regarding the second minor question, the Mann-Whitney statistic of 294.50 is not significant ( $P = .083 > .05$ ). So, according to these results, the answer to this question is negative and it can be concluded that there is not any significant difference between the right handed and left-handed learners' performance on MC test. The medians for the left-handed and right-handed students on MC test are 8 and 7 respectively.

*Table 5. Mann-Whitney Test Statistics Brain Dominance on Cloze Test*

Mann-Whitney U	260.500
Wilcoxon W	470.500
Z	-2.209
Asymp. Sig. (2-tailed)	.027
a. Grouping Variable: HANDDOM	

*Table 6. Median Statistics Left-Handed and Right-Handed Students on Cloze Test*

	Median
Left-Handed	29
Right-Handed	31

*Table 7. Mann-Whitney Test Statistics Brain Dominance on MC Test*

Mann-Whitney U	294.500
Wilcoxon W	1114.500
Z	-1.733
Asymp. Sig. (2-tailed)	.083
a. Grouping Variable: HANDDOM	

*Table 8. Median Statistics Left-Handed and Right-Handed Students on MC Test*

	Median
Left-Handed	8
Right-Handed	7

*Do left-brain dominant learners outperform the right-brain dominant learners in reading comprehension test tasks?*

Results obtained from the normality test indicated that the non-parametric tests are needed here; so, two- independent samples Mann-Whitney was run to investigate any significance between the brain dominance and reading comprehension ability of Iranian EFL learners. The Mann-Whitney statistic was 313.50, which was not a significant one, i.e., ( $P = .173 > .05$ ). According to the mentioned results it can be concluded that there is not any significant relationship between the brain dominance and reading comprehension ability of Iranian EFL learners. Therefore, the answer to the question is not positive and it can be said that left-brain dominant learners do not outperform the right-brain dominant learners in reading comprehension test tasks. Moreover, the medians for the left-handed students is 37 and for the right-handed ones is 38 which verify the support of first question answered.

*Does participants' gender affect their performance in reading comprehension test tasks?*

The Mann-Whitney statistic of 305.50 is significant ( $P = .032 < .05$ ). Based on these results, the answer to the fourth question is negative and it can be concluded that there is a significant difference between the male and female learners' performance on reading comprehension test tasks. The median for the male learners on reading comprehension test is 38.5 and for female learners is

37. Therefore, it can be said that male students outperformed female learners on reading comprehension test tasks.

*Table 9. Mann-Whitney Test Statistics Gender on Reading Comprehension Test*

Mann-Whitney U	305.500
Wilcoxon W	770.500
Z	-2.147
Asymp. Sig. (2-tailed)	.032
a. Grouping Variable: HANDDOM	

*Table 10. Median Statistics Male and Female Students on Reading Comprehension Test*

	Median
Male	38.5
Female	37

## 5. Conclusion

Regarding the brain dominance, it can be said that although the two hemispheres of the brain seem to be similar, each one has its specific functions. The right hemisphere of the brain is dominant for emotions, creativity, music and rhythm, intuition, sensitivity, daydreaming, spontaneity, humor, emotions, exploration, experimentation, inventiveness, musical expression, hands- on learning and creativity; and the left hemisphere for mathematical and language abilities, analytical thought, logical thinking, sequencing, categorizing, planning, speech, spelling, as well as word and number recognition. It is worth noticing that both sides of the brain are able to analyze process and store information from thoughts and ideas and also make decisions, but one side of it is usually more dominant than the other side (Day, 2009).

Support for the present study was based on several studies by Atchley et al., 1999; Coney & Evans, 2000; Faust et al., 1995; Faust & Chiarello, 1998, cited in Vance, 2009, Anaki et al., 1998; Arzouan et. al., 2007; Faust & Mahal, 2007, Rapp et al., 2007; Kacinik & Chiarello, 2007), that had shown activation of right hemisphere for metaphors and an advantage of left hemisphere for literal text based on single words and word pairs. So, it seemed plausible to conduct a study to determine if context could be considered as an influential factor in comprehension of EFL learners.

Results of the study were as follows:

1. There is not any significant relationship between the brain dominance and reading comprehension ability of Iranian EFL learners.
2. The second question of the present study can be broken down into two minor ones and the results for this question are as follows:
  - a. Brain dominance affects the learner's performance on cloze test. The right-handed learners who are supposed to be left-brain dominant outperform the left-handed ones who are right-brain dominant.
  - b. Brain dominance does not affect the learner's performance on MC test. In other words there is not any significant difference between the right-handed and left-handed learners' performance on MC test.
3. According to what was mentioned in result number 1, it was rejected that left-brain dominant learners outperform the right-brain dominant learners in reading comprehension.
4. Participant's gender affects their performance in reading comprehension task. And, male learners outperform female learners on reading comprehension test tasks.

## 6. Pedagogical implications

The research questions investigated in this study have relevance to educational psychology and suggest implications for the improvement of educational practices.

Research on the contribution of the brain hemispheres to the reading process will increase understanding individual differences in the reading process. Understanding how reading develops and where it breaks down may lead to more specific and efficient interventions to aid the development of reading skill among EFL learners. Recognizing reading as a complex cognitive process will allow researchers and educators to identify at which stage and for what reason reading becomes insufficient for learners.

It was highly likely that the left hemisphere is involved in complex process of reading. However, it was necessary to continue research to promote our understanding of hemispheres contribution to the reading process.

Understanding about the brain and its specific areas has encouraged language teachers to teach in a way that reflect these special functions of the brain. For instance, right and left hemisphere teaching is a way that is selected by some teachers who are interested in particular functions of the left and right hemisphere. On the other words, knowing about the brain and the way it learns naturally will be helpful for language teachers and educators to be more effective in their classrooms. Providing different materials, time frames and grouping arrangements can be helpful for educators to provide different learning styles for different individuals. Because individual differences are not a simple matter, it is an issue that is closely related to personal differences (Genessee, 2000).

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- A worse B worst C baddest D most bad
17. My dad \_\_\_\_\_ his car yet.  
A hasn't sold B didn't sell C doesn't sell D wasn't sold
18. I've been a doctor \_\_\_\_\_ fifteen years.  
A since B for C until D by
19. Look at the sky. It \_\_\_\_\_ rain.  
A will B can C is going to D does
20. If I \_\_\_\_\_ this homework, the teacher will be angry!  
A am not finishing B won't finish C don't finish D didn't finished
21. This book is even \_\_\_\_\_ than the last one!  
A most boring B boringer C more boring D far boring
22. I'll meet you \_\_\_\_\_ I finish work.  
A if B when C as D so
23. We're getting married \_\_\_\_\_ March.  
A in B on C at D by
24. If you \_\_\_\_\_ steak for a long time, it goes hard.  
A cook B are cooking C have cooked D cooked
25. I \_\_\_\_\_ you outside the cinema, OK?  
A 'll see B am going to see C am seeing D see
26. I \_\_\_\_\_ not be home this evening. Phone me on my mobile.  
A can B could C may D should
27. The criminal \_\_\_\_\_ outside the hotel last night.  
A was caught B has been caught C is caught D caught
28. He asked me if I \_\_\_\_\_ a lift home.  
A wanted B want C was wanting D had wanted
29. If I \_\_\_\_\_ older, I'd be able to vote in elections.  
A had B am C were D have
30. You \_\_\_\_\_ go to the supermarket this afternoon. I've already been.  
A mustn't B can't C needn't D won't
31. Kathy drives \_\_\_\_\_ than her sister.  
A more carefully B more careful C carefully D most carefully
32. The \_\_\_\_\_ near our village is beautiful.  
A country B woods C view D countryside
33. I'm \_\_\_\_\_ I can't help you with that.  
A apologise B afraid C regret D sad
34. It was really \_\_\_\_\_ this morning. I couldn't see anything on the roads.  
A cloudy B sunny C icy D foggy
35. Can you look \_\_\_\_\_ my dog while I'm away?  
A for B at C to D after
36. If I'd started the work earlier I \_\_\_\_\_ it by now.  
A would finish B had finished C will finish D would have finished
37. This time next year I \_\_\_\_\_ in Madrid.  
A am working B will work C will be working D work
38. I wish he \_\_\_\_\_ in front of our gate. It's very annoying.  
A won't park B wouldn't park C doesn't park D can't park
39. He said he'd seen her the \_\_\_\_\_ night.  
A last B before C previous D earlier
40. I \_\_\_\_\_ agreed to go out. I haven't got any money!  
A mustn't have B shouldn't have C couldn't have D wouldn't have
41. It was good \_\_\_\_\_ about her recovery, wasn't it?  
A information B words C news D reports
42. I \_\_\_\_\_ the report by 5.00 p.m. You can have it then.  
A have finished B will have finished C finish D am finishing
43. Because of the snow the teachers \_\_\_\_\_ all the students to go home early.  
A said B made C told D demanded

44. Thanks for the meal! It was \_\_\_\_\_.  
A delighted B delicious C disgusting D distasteful
45. Look! Our head teacher \_\_\_\_\_ on TV right now!  
A is being interviewed B is been interviewed C is interviewing D is interviewed
46. It's \_\_\_\_\_ to drive a car over 115 km/h in the UK.  
A illegal B illegals C dislegal D legals
47. There's a lot of rubbish in the garden I need to get \_\_\_\_\_ of.  
A lost B rid C cleared D taken
48. I'm afraid it's time we \_\_\_\_\_.  
A leave B must leave C are leaving D left
49. He wondered what \_\_\_\_\_.  
A is the time? B the time was C was the time D is the time?
50. They \_\_\_\_\_ our salaries by 5%.  
A rose B made up C raised D lifted

## Part 2. Reading

Read the text.

### Saucy dragons

Levi Roots, a reggae singer from Jamaica, has a big smile on his face these days. In case you missed it, Levi recently appeared on the famous reality show for people with business ideas, Dragon's Den. The participants have to persuade the team of business experts that their ideas are excellent and hope that two or more of the team will decide to invest money in their business idea.

Levi did just that!

The singer, who has been a successful music artist for several years, also sells something he calls 'Reggae, reggae sauce'. It is made using special secret ingredients from his grandmother and is a hot Jamaican sauce that is eaten with meat. Until now it has only been possible to buy the sauce from Levi's website or once a year at the famous Notting Hill carnival. But now, thanks to the TV programme, that is all going to change!

Levi presented his business idea to the team and started with a catchy reggae song about the sauce to make them sit up and listen. He certainly got their attention! He then described his plans for the sauce. This part of his presentation didn't go so well. He made mistakes with his figures, saying that he already had an order for the sauce of 2 and a half million when in fact he meant 2 and a half thousand! But, the team were still interested and amazingly, two of the team offered to give £50,000 to the plan in exchange for 40% of the company. Mr Roots was ecstatic!

Levi is even happier today. It seems that two of the biggest supermarket chains in the UK are interested in having the sauce on their shelves. In addition to this, Levi is recording the 'Reggae, reggae sauce' song and we will soon be able to buy or download this. 'It's all about putting music into food,' says Levi with a big, big smile on his face! And music and food will probably make him a very rich man indeed!

### 1. Are the sentences true or false?

1. At the moment Levi isn't very happy. \_\_\_\_
2. Levi sells something we can eat. \_\_\_\_
3. His song is a big success. \_\_\_\_
4. He sang his song on TV. \_\_\_\_
5. Some supermarkets want to sell his product. \_\_\_\_

### 2. Choose the best answers.

1. Dragon's Den is a show about  
A. cooking.

**B.** new business ideas.

**C.** famous people.

**2.** To make the sauce

**A.** you have to go to Notting Hill.

**B.** you have to ask a member of Levi's family.

**C.** you need a good recipe book.

**3.** When Levi presented his idea

**A.** he finished with a song.

**B.** two and a half million people were watching.

**C.** he talked about the wrong figures.

**4.** Some people on the team

**A.** own supermarkets.

**B.** didn't like the taste.

**C.** bought part of Levi's company.

**5.** Today Levi

**A.** is a millionaire.

**B.** has two things he can profit from.

**C.** prefers music to food.

### Part 3. Writing

Imagine you have just returned from a two-week holiday. Write an e-mail to your friend telling him/her about the holiday. Include information about the journey, where you stayed, what you did and the people you met.

### Appendix 2 Edinburgh Handedness Questionnaire (EHQ)

Please indicate your preference in the use of hands for each of the following activities or objects by placing a check in the appropriate column.

	always left	often left	both hands	often right	always right
writing	-----	-----	-----	-----	-----
Drawing	-----	-----	-----	-----	-----
throwing	-----	-----	-----	-----	-----
using scissors	-----	-----	-----	-----	-----
using a toothbrush	-----	-----	-----	-----	-----
using a knife	-----	-----	-----	-----	-----

using a spoon

using a broom (the upper hand)

striking a match

opening a box( the lid)

### Appendix 3 Reading Test

#### Part 1.

Read the text about Malta and answer the following questions.

Malta is a truly wonderful country whose towns are populated with baroque palaces and its countryside abounds with the oldest known human constructions in the world. The best time to visit is spring or autumn as it is still hot enough to get a suntan and hotel prices come down significantly. The weather, sea and sandy beaches are a bonus, however. The main attractions are definitely the island's antiquities and the Baroque architecture.

There are an amazing number of things to discover as you explore 7,000 years of history. In fact, the Maltese Islands have been described as one big open-air museum. Wherever you go, the scenery on the island and the architecture are truly spectacular.

Malta is the ideal place to get away from it all with its rocky coastlines, narrow and tranquil village streets, marinas and fishing villages, etc. But the best thing about a stay there is that you can experience several holidays in one and there are endless things to do. For people who are physically fit, it is a great place for rock climbing, trekking and several types of water sports.

You can enjoy a busy calendar of cultural events all year round, as Malta is also a bilingual country which has strong historical and cultural links to Britain. It is also an enjoyable place to learn and practice English, so English courses are available in several language schools and English language newspapers, books and magazines are sold everywhere. People even drive on the left here! The capital of the country is Valletta, which is less than two kilometers in length so it is possible to explore this beautiful city in a relatively short time. It has many interesting squares that are surrounded by palaces and other historical buildings. Another important tourist attraction is Gozo, which is separated from the mainland by three kilometers of sea. This island has a spectacular rocky coastline and also has a relaxing, rural atmosphere. The cuisine has Italian, French and Maltese influences. Standards are generally high and fresh fish is a favourite in local restaurants and bars. Many species of seafood are consumed all year around and this is what Maltese restaurants do best. Several dishes with rice, meat and vegetables are also popular, however.

Malta's hot, dry summers can be uncomfortable but they are normally very pleasant and the mild winters are also nice. The rain is heaviest in winter but is still only moderate. In the high season, the most economical option is a package tour that includes the flight and seven nights in a two or three star hotel as this will cost under \$ 500. Whether you end up choosing a package tour or travelling independently in Malta, you are guaranteed to have an unforgettable experience.

Choose the correct definition for these words and expressions. They are underlined in the text so look at them carefully in their context before answering.

1. abounds with means:
  - a) to be full of
  - b) to have a few of
  - c) to be decorated with

2. **bonus** means:
  - a) the best thing
  - b) an extra or added benefit
  - c) a nice surprise
  
3. **amazing** means:
  - a) incredible
  - b) useful
  - c) interesting
  
4. **to get away from it** all means:
  - a) to have fun
  - b) to escape from the pressures and routines of daily life
  - c) to have an adventure
  
5. **endless** means:
  - a) fantastic
  - b) with limitations
  - c) without limit
  
6. **standards are generally high** means:
  - a) the food has a lot of variety
  - b) the food is normally expensive
  - c) the quality of the food tends to be good
  
7. **mild** means:
  - a) variable
  - b) very cold
  - c) gentle or soft, i.e. not too cold
  
8. **the high season** means:
  - a) the most popular time of the year for tourists
  - b) the time of the year with the highest temperature
  - c) the festival period
  
9. **travelling independently** means:
  - a) travelling on your own
  - b) arranging your travel
  - c) arranging travelling without dependents

## Reading Test

### Part 2.

**Read the text and look at the following multiple choice items. Decide which word is missing in items 1 – 40. Then tick (☐) the correct answer.**

Nearly 30 million African could soon be facing famine. The immediate cause is drought, which has destroyed crops and left people and livestock without food and water. But this is not the only **1)** ----- why Africa suffers regularly from famine. **2)** ----- African countries do not produce enough **3)** ----- and depend very much on imports **4)** ----- on having the income to pay **5)** ----- them.

Famine is caused by not **6)** ----- food being produced or people not **7)** ----- able to obtain it. This may **8)** ----- because there is not enough water **9)** ----- because people can't afford to buy **10)** ----- . Even in famine-free years, it **11)** ----- common across Africa for people to **12)** ----- have sufficient food, especially in rural **13)** ----- . The United Nations estimates that the **14)** ----- in sub-Saharan Africa is worse **15)** ----- than it was thirty years ago. **16)** ----- poverty in Africa has left the **17)** ----- with a population that has the **18)** ----- food problem in the world.

Interestingly, **East 19)**----- South Asia, where there have been **20)**----- increases in agricultural production and significant **21)** ----- growth have reduced the number of **22)** ----- who are not properly fed **23)** ----- forty-three percent to thirteen percent **24)** ----- sub-Saharan Africa has not managed to get **25)** ----- rate below the 1969 figure of thirty four **26)** ----- of the population.

The Nobel Prize-winning economist Amartya Sen **27)** ----- argued that hunger **28)** ----- famine are caused mostly by poverty and **29)** ----- just a country's ability to grow **30)** ----- food. People in poverty often go hungry **31)** ----- they do not have enough money **32)** ----- buy food when they have not **33)** ----- able to produce enough themselves. So **34)** ----- there is a drought or something similar **35)** ----- become the first victims of famine. Professor Sen argue **36)** ----- if countries in Africa could make **37)** ----- income, they would be able to avoid **38)** -----, as they could afford to import **39)** ----- to make up for any food they **40)** ----- produce themselves.

Natural disasters frequently happen, but it is when they hit countries that are already suffering from the effects of other problems that famine become inevitable.

- |     |            |            |            |
|-----|------------|------------|------------|
| 1)  | reason     | way        | factor     |
| 2)  | more       | most       | much       |
| 3)  | products   | exports    | food       |
| 4)  | rather     | as much    | and        |
| 5)  | or         | yet        | for        |
| 6)  | too        | rare       | enough     |
| 7)  | to         | being      | having     |
| 8)  | be         | have       | being      |
| 9)  | and        | or         | that       |
| 10) | food       | lunch      | anything   |
| 11) | become     | is         | got        |
| 12) | not        | no         | none       |
| 13) | areas      | places     | contexts   |
| 14) | situation  | process    | state      |
| 15) | before     | today      | in future  |
| 16) | growing    | to grow    | grow       |
| 17) | country    | city       | continent  |
| 18) | big        | bigger     | biggest    |
| 19) | or         | and        | as well    |
| 20) | enormous   | very       | an         |
| 21) | economic   | economical | economist  |
| 22) | person     | people     | crowd      |
| 23) | to         | in         | from       |
| 24) | but        | nor        | as well as |
| 25) | the        | a          | some       |
| 26) | percent    | number     | amount     |
| 27) | has        | have       | had        |
| 28) | and        | yet        | since      |
| 29) | not        | or         | with       |
| 30) | very       | many       | enough     |
| 31) | because    | cause      | why        |
| 32) | being      | been       | to         |
| 33) | been       | being      | to         |
| 34) | when       | that       | if         |
| 35) | it         | that       | they       |
| 36) | that       | whether    | no matter  |
| 37) | sufficient | too        | no         |
| 38) | hungry     | famine     | hunger     |
| 39) | food       | water      | nutrition  |
| 40) | don't      | doesn't    | didn't     |

# Learners Test Performance and Gardner`s MI Theory: Intercorrelation in a Bilingual Context

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## **Abstract**

Although decisions and inferences made based on test scores depend both on the characteristics of test takers and testing environment, the former seems to have the most overriding importance. The present study which was conducted in a bilingual environment is in line with this assumption and is aimed at investigating intelligence as one of the test taker characteristics. First, it aimed at finding the possible correlation between any of the eight types of intelligences in Gardner`s MI theory and EAP test performance. Second, it intended to survey the intercorrelation among the eight types of intelligences themselves. To that end, 122 male bilingual EFL learners who were all sophomore university students were chosen as the participants of the study. They sat for the final EAP exam and filled the questionnaire on multiple intelligence. The test takers' scores on EAP exam were correlated with their multiple intelligences. The result did not demonstrate any statistically significant go-togetherness between EAP test performance and any types of intelligence; however, a significantly positive correlation was observed among the eight types of intelligences themselves showing that all types of intelligences are equally important and ought to be equally dealt with in EFL context.

**Key words:** EAP, multiple intelligence, correlation, intercorrelation.

## **1.Introduction**

Technically speaking, intelligence should not be considered as a unitary construct, since, according to the theories proposed, it is made up of different components with hierarchical organization. Intelligence is described as the combination of a general factor and several specific factors. All people can access the general factor to the same extent for all kinds of cognitive acts, while the strength of specific factors fluctuates from one act to another (Dörnyei, 2005). In 1930s Thurstone made a distinction between seven chief cognitive abilities and listed them as verbal comprehension, word fluency, number facility, spatial visualization, associative memory, perceptual speed, and reasoning. After a while, Thurstone proposed seven primary cognitive abilities as: verbal comprehension, word fluency, number facility, spatial visualization, associative memory, perceptual speed, and reasoning (cited in Dörnyei, 2005). Next, after different theories and models proposed for intelligence, Gardner (1983) introduced his prominent theory of multiple intelligences consisting of eight distinct intelligences.

### **1.1. Multiple intelligence**

Gardner`s Multiple Intelligences was first developed as a reaction to the traditional conceptualizations of intelligence and later became a major contributor to educational practices and reforms. Gardner questioned the validity of traditional IQ tests in that he thought they would only tap the logic and language, however, the human brain has other equally important competencies.

Therefore he defined intelligence as "a biopsychological potential to process information that can be activated in a cultural setting to solve problems or create products that are of value in a culture" (1999: 34). Initially the theory consisted of seven distinct intelligences proposed as Linguistic, Mathematical-Logical, Visual-Spatial, Bodily-Kinesthetic, Musical, Interpersonal, and Intrapersonal (Gardner, 1999). Naturalistic intelligence was subsequently introduced by Gardner and was added to the previous seven intelligences, therefore made the total of eight distinct intelligences. In stating the rationale of his theory, Gardner (1991) posited that:

All human beings are capable of at least seven different ways of knowing the world — ways that I have elsewhere labeled the seven human intelligences. According to this analysis, we are all able to know the world through language, logical-mathematical analysis, spatial representation, musical thinking, the use of the body to solve problems or to make things, an understanding of other individuals, and an understanding of ourselves. Where individuals differ is in the strength of these intelligences — the so-called profile of intelligences — and in the ways in which such intelligences are invoked and combined to carry out different tasks, solve diverse problems, and progress in various domains (p12).

The linguistic intelligence enables us to use the words effectively both in the oral and written form. In other words, this intelligence enables people to manipulate the structure, phonology, and the semantics of language to reach pragmatic results. Logical-mathematical intelligence is the capacity to use numbers efficiently. It arouses the sensitivity to logical patterns and relationships, statements and propositions, functions and other related abstractions, and thus demystifies the use of possesses such as categorization, inference, generalization, calculation and hypothesis testing. Spatial intelligence is the competence for recognizing the visual-spatial world accurately and applying transformation on that perception. This kind of intelligence is useful in appreciation of color, line, shape, form, space, and the relationship existing among them. Bodily-Kinesthetic Intelligence accounts for the use of the whole body to express ideas and meanings and also the use of hands to produce and transform things. Musical intelligence involves one's sensitivity to rhythm, pitch and melody, duration etc. of a musical piece. It enables people to perceive, transform, discriminate and express musical forms. By musical intelligence, one can recognize the moods, interests, motivations and personalities of other people. Intrapersonal intelligence, on the other hand, accounts for recognizing one's own mood, behavior, motivation and interest; or simply put, having a precise picture oneself. Naturalistic intelligence, which was added later on by Gardner, enables us to recognize and categorize a variety of different kinds of environments. It involves the sensitivity to natural phenomena.

Armstrong (2009) proposed some key points regarding the MI theory. Armstrong claimed that all human beings have access to all types of intelligences. Given the appropriate incentive, reinforcement, support, and instruction, most people are capable of enhancing each of the intelligences to a satisfactory level of competency. All intelligences most often work together in an intricate way, that is, no intelligence exists alone and all intelligences interact with one another. Finally, Armstrong stated that "There are many ways to be intelligent within each category - there is no standard set of attributes that one must have to be considered intelligent in a specific area. Consequently, a person may not be able to read, yet be highly linguistic because he can tell a terrific story or has a large, oral vocabulary. Similarly, a person may be quite awkward on the playing field, yet possess superior bodily-kinesthetic intelligence when she weaves a carpet or creates an inlaid chess table. MI theory emphasizes the rich diversity of ways in which people show their gifts within intelligences as well as between intelligences" (p. 16). Gardner (1987) also draws attention to the overriding importance of recognizing and nurturing all of the human intelligences and the combination of those intelligences since it is held that they interact in an abstruse way.

## **1.2. English for academic purposes (EAP)**

Language for specific purposes (LSP) is a movement toward serving the language needs of those who need to learn language so as to carry out particular tasks and roles with it. Therefore, the

main purpose is acquiring content and real-world skills by means of a second language rather than acquiring the language for its own sake. English for academic purposes (EAP) is a sub category of LSP that was coined by Tim Johns and appeared in the collection of papers edited by Cowie and Heaton for the first time (Jordan, 2002). EAP, currently, refers to any English language teaching course that has a study purpose. Hyland (2006) asserts that EAP is a very broad term that covers all areas of academic communicative practice from pre-tertiary, undergraduate, and postgraduate teaching and classroom interactions to research genres and administrative practice (such as course documents and doctoral oral defenses).

To investigate the relationship between multiple intelligences and EAP test performance, three research questions were posed:

1. Is there any significant correlation between any type of intelligences and EAP test performance?
2. Which one of the intelligence types in MI theory is most highly correlated with EAP test performance?
3. Is there any correlation among the eight types of intelligence in MI Theory?

Three null hypotheses were offered accordingly as follows:

1. There is no correlation between any type of intelligences and EAP test performance.
2. None of the intelligence types in MI theory is highly correlated with EAP test performance.
3. There is no relationship among the eight types of intelligences in MI theory.

## **2. Methodology**

### **2.1. Participants**

The current study involved 122 Iranian second-year university male students, majoring in Computer Sciences. They speak Turkish as their first language, Persian as their second language, and they were learning English as a foreign language. The classes were held once a week for 90 minutes and were compulsory for all students. The main activity in the classes was reading technical texts. The amount of participants' past exposure to English, both inside and outside the classroom was estimated by asking them about their backgrounds. They were asked about the past experiences of travelling to or studying in an English-speaking country, and the English classes they had taken so far. Results showed that none of the students had been abroad, and that they had studied English for about 6 years, mainly through reading-based formal education in the Iranian secondary and high schools.

### **2.2. Instruments**

Two main instruments were applied in this study: An EAP test and the Multiple Intelligence Developmental Assessment Scale (MIDAS). In the final term exam, a test was given to the subjects in four sections: A, B, C, and D. In section 'A' they were asked to complete 6 sentences with the given words. In part 'B', which included 8 multiple choice items, they were required to select the correct option. In part C that involved 4 items, the correct forms of the words given in parentheses must be used for completing the sentences. In part D, they were asked to translate 2 short paragraphs into Persian.

MIDAS is a questionnaire recommended by Gardner and developed by Shearer (1996) for measuring multiple intelligences. The instrument takes 35 minutes to be completed and includes 119 likert-scale (from A to F, with E being the highest and F being 'I do not know') questions that cover eight areas of abilities, skills, interest, and activities. In this study, eight types of intelligence

were surveyed and recently proposed 9<sup>th</sup> intelligence (Gardner, 1999), existential intelligence, was not included.

### 2.3. Procedure

At first EAP final test was given to the participants. After finishing the test, they were asked to read the questionnaire on multiple intelligences carefully and mark their desired options in a separate answer sheet. Also they were given some extra clarifications for a couple of the items to alleviate any ambiguity. The participants' results on the two tests were collected and analyzed respectively.

### 3. Data analysis

Pearson product-moment correlation coefficient was calculated to investigate the relationship between EAP test performance and the multiple intelligences. A multiple correlation was run in order to explore the correlation between each of the multiple intelligences and EAP test performance on the one hand and the intercorrelation among the different types of intelligences.

### 4. Results and Discussion

The result of correlational analysis is shown in table 1:

*Table 1. Intercorrelation among different types of intelligences and EAP test performance*

	Intrapersonal	Interpersonal	Musical	Kinesthetic	Naturalistic	Linguistics	Math/Logic
Spatial							
EAP test performance	.090	.098	.274	.172	-.003	.113	.065
Intrapersonal		<b>.460</b>	.310	.111	<b>.525*</b>	<b>.514*</b>	<b>.735**</b>
Interpersonal			<b>.634**</b>	<b>.531*</b>	<b>.493*</b>	.427	<b>.671**</b>
Musical				<b>.665**</b>	.276	.290	.367
Kinesthetic					<b>.605**</b>	.332	.332
Naturalistic						.388	<b>.521*</b>
Linguist							<b>.621**</b>
Math/Logic							<b>.615**</b>
							<b>.546*</b>

The correlation coefficient for intrapersonal intelligence and EAP test performance was .090 which did not indicate any relationship between the two variables ( $r(122) = 0.090$ ,  $p < 0.05$ ). Pearson's correlation coefficient also yielded a very trivial positive correlation between interpersonal intelligence and EAP test performance which was not statistically significant ( $r(122) = 0.113$ ,  $p < 0.05$ ). There is a proportionately higher correlation between musical intelligence and EAP test performance, however, the result is not significant yet again ( $r(122) = .274$ ,  $p < .05$ ). A negative correlation was observed between EAP test performance and naturalistic and spatial intelligences. The correlation coefficients for EAP test performance and naturalistic and spatial intelligences are respectively  $-.003$  and  $-.079$ . Mathematical-logical intelligence showed a negligible correlation with EAP test performance ( $r(122) = .065$ ,  $p < .05$ ). The kinesthetic and linguistic intelligence were roughly correlated to the same degree with EAP test performance. The Correlation coefficient was  $.172$  for kinesthetic intelligence and  $.113$  for linguistic intelligence.

The result of the correlation analysis between EAP test performance and multiple intelligences did not demonstrate any significant value for the correlation coefficient; therefore, the

first null hypothesis stated as “There is no correlation between any type of intelligences and EAP test performance” is confirmed. None of the eight intelligences in the MI theory appeared to have a high significant correlation with EAP test performance. However, among the eight intelligences, musical intelligence relatively had the highest correlation with EAP test performance.

Although there was a very low and negligible correlation between EAP and the eight types of intelligences, a high significant intercorrelation was observed among the multiple intelligences themselves; therefore, the third null hypothesis stated as “There is no relationship among the eight types of intelligences in MI theory” is rejected and the relationship among them is confirmed, which is in line with the findings by Visser, Ashton, and Vernon (2006) who also found a high intercorrelation among the eight intelligences.

## 5. Conclusion

Gardner (1987) held that through recognizing one's multiple intelligences, we will have a better opportunity for coping more appropriately with the many problems that are confronted in the world. Currie (2003) also maintains that in bringing the MI theory into effect in classrooms, it is crucially important that teachers take into account the students' strength in order to make the process of learning more attainable. The present study was aimed at uncovering the relationship between EAP, which is an essential aspect of competence for postgraduate and university students and the eight types of intelligences as a highly critical theory in psychology and education proposed by Gardner. The results showed a lack of go-togetherness between the EAP test performance and the eight types of intelligences. This lack of correlation might be due to the small number of participants or that particular context in which the study was carried out. Another finding of the study was the existence of a significant positive correlation among the eight types of intelligences that support the idea that all different types of intelligences interact with one another in an intricate way, and that all human are equipped with all of these intelligences to some extent. However, this study was performed in a bilingual situation with a limited number of participants; other studies need to be conducted in different contexts with larger number of participants.

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# Critical Thinking in Higher Education: Unfulfilled Expectations

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## Abstract

Success in adult life and effective functioning in education depends among other things on critical thinking. The present study consisted of two parts. First, critical thinking (CT) skill of a group of 68 students majoring in education in Islamic Azad University, Kermanshah Branch was evaluated. The participants, divided into two experimental and control groups, received California Critical Thinking Skills Test (CCTST) which is a 34 item Multiple-Choice test. The students in the control group were freshmen and the experimental group, junior students. To the researchers' dismay, junior education students did not perform significantly better than did the freshman students. Using a qualitative method of research, another study was conducted to see whether the university instructors in the education department who had the responsibility of teaching different courses to the same students were aware of the principles of CT. A semi-structured interview was conducted and eight volunteering faculty members in the department of education took part in the interview. Result revealed that, although these instructors highly valued CT and were aware of its tenets, there were some constraints which did provide a situation to let the students practice CT in their classrooms, and much had to be done to help instructors implement CT in their classrooms.

**Key words:** critical thinking, instructors' belief, top down educational system, inductive reasoning

## 1. Introduction

With everyday advancement and progress in different areas of technology in the world today, especially in the area of communication and information technology, one may assume that students must be merely trained to be able to cope with this progress in technology; however, success in adult life depends on, among other things, the capacity for (CT); purposeful and goal-directed cognitive skills or strategies that increase the likelihood of a desired outcome (Halpern, 2002). Put another way, human beings, especially students must be trained CT skills to be able to think critically for their future career (Badri and Fathi Azar, 2006). As Hongladarom (2002) holds, "It is widely recognized nowadays that CT has become a necessary ingredient in all levels of education. Educators and educational policy makers agree that one of the desirable goals of education is that students are able to think critically" (P. 1). There are some other scholars (e.g., Yeh, 2002) who put more emphasis on CT skills and suggest that success in school greatly depends on CT skills. Accordingly, extensive bodies of literature focus on CT (e.g., Browne & Keeley, 2001; Ennis, 1987; Resnick, 1987) and applications of CT in education (e.g., Henderson, 2001; O'Tuel & Bullard, 1993; Pogrow, 1990, 1994; Raths, Wasserman, Jonas, & Rothstein, 1986; and Torff, 2003). Last but not least, Paul and Nosich (1991) believe that developing CT skills in educational settings engenders intellectual empowerment. Students use their minds as thinking instruments. In fact, they change into more effective readers, writers, speakers, and listeners. These skills and abilities are also highly transferable to work place.

As to what CT is and what its role can be in education, Bauerlein (2011) notes,

Instruction in CT is to be designed to achieve an understanding of the relationship of language to logic, which should lead to the ability to analyze, criticize, and advocate ideas, to reason inductively and deductively, and to reach factual or judgmental conclusions based on sound inferences drawn from unambiguous statements of knowledge or belief. . . including an understanding of the formal and informal fallacies of language and thought (p. 2).

However, if CT is not practiced at schools, students may not have the opportunity to learn the skills from any other source. This means that they will lose the chance to get the necessary skills for their future life and career. In that case, they will not be well-prepared or even prepared enough for what is waiting for them in the future. Weil (2009) believes, "It is dangerous to neglect CT. An inability to assess information critically, especially in an Internet age of massive information and misinformation, leads to an inability to participate honestly and realistically in a democracy." (p. 2). Too, in another part of her paper, she very briefly states, "... an absence of CT in educational settings will lead to a lack of academic rigor." (Weil, 2009, p. 3).

Duron, et al., (2006) argued that despite the fact that thinking as a natural process is taken for granted, but "when left to itself, it can often be biased, distorted, partial, uninformed and potentially prejudiced; excellence in thought must be cultivated" (p. 160). In the same vein, Black (2005) states that students' thinking skills can be improved if they are instructed to do so. However, it seems that instructors' assumptions regarding the importance and practicality of CT are critical in this regard.

For the past fifteen years, the concept of instructors' belief has come into favor in education. Based on Yin (2006), there are a number of sources which influence instructors' traits and greatly affect the development of their personalities. The first source comes from instructors' personal experience and understandings as an individual. Every individual develops his own understanding and interpretation of the world after birth. A second source of instructors' beliefs is the experience each one has obtained from his own experience when he was a student. Instructors, as human beings, seldom forget the school days and the kind of education they had in schools. Sometimes these are so vivid that can be a model for an instructor's instruction. A third origin of instructors' beliefs is their formal knowledge acquired through training whether in in-service sessions or in instructor education centers. The fourth source of beliefs is instructors' contexts of work. The context in which instructors practice, has a great influence on their philosophy of teaching and instructional approaches. There is a great pressure in schools on naïve instructors to conform to the practice of more experienced ones.

Lauer (2005) notes that instructors who conceive their roles as disseminators of knowledge may have different ideas about CT and the way it should be incorporated into classroom activities than those who play the role of mediators and perceive teaching as enabling students to think for themselves and identify their own duties as imparting necessary skills and strategies to students. Whenever an instructor has the role of the mediator, based on Williams and Burden (1997), interaction happens between the learner and him/her and the learner becomes an active participant of the learning process. On the contrary, when an instructor perceives his/her role as disseminator of information, there is less attention to students' input and feedback. In such a situation the instructor is solely in control of the teaching situation.

### *What is CT*

In traditional teaching classes, instructors often use didactic instruction in their teaching process. In this kind of instruction, information and facts are transmitted to students, the whole class is teacher-centered, and students are assumed to be passive participants (Qing, et al., 2010). As the sole authority, the instructor is entrusted with the responsibility of taking care of everything. With the minimum amount of interaction, students passively receive the lectures copy down. In this kind of instruction, students know nothing. Instructors think, while students are taught. Instructors talk, while students listen. Students have to comply with whatever instructors choose. As Duron, et al., (2006) notes, "Passive thinkers suffer from a limited and ego-centric view of the world; they answer

questions with yes or no and view their perspective as the only sensible one and their facts as the only ones relevant” (p. 160).

Such a view of education is regarded detrimental to students’ learning since the role of learner is regarded to be passive. What has assumed to liberate students from the passive state, in the current views of education (Erkalic, 2008) is thought to be CT (Lang, n.d.).

There is no consensus regarding the exact definition of the term ‘CT’. It is often linked with creative thinking, problem-solving, and decision-making as well as inductive and deductive reasoning. However, Howe (2004) believes that terms such as creative thinking, problem-solving and decision-making refer to the circumstances in which CT may occur. Conversely, some educational philosophers argue that CT is inductive, encompassing, divergent, and creative thinking skill. Others recognize it as primarily deductive, convergent, and logical in nature. Halpern (2002) defines CT as:

Cognitive skills and strategies that increase the likelihood of a desired outcome...thinking that is purposeful, reasoned, and goal-directed; the kind of thinking involved in solving problems, formulating inferences, calculating likelihoods, and making decisions. (p. 4).

Duron, et al., (2006) identify CT as a scientific endeavor:

CT is, very simply stated, the ability to analyze and evaluate information. Critical thinkers raise vital questions and problems, formulate them clearly, gather and assess relevant information, use abstract ideas, think open-mindedly, and communicate effectively with others. (p. 160).

Based on the literature, a person who thinks critically, asks appropriate questions. In order to answer the question, he gathers relevant information, reasons logically from this information, and comes to conclusions which are reliable. Such a discipline of thinking not only enables students to be successful at school but also improves their thinking skills and thus better prepares them for after-school life.

Birjandi & Bagherkazemi (2010) hold that a critical thinker has the following features:

- has a strong intention to recognize the importance of good thinking;
- identifies problems and focuses on relevant topics and issues;
- distinguishes between valid and invalid inferences;
- suspends judgments and decisions in the absence of sufficient evidence;
- understands the difference between logical reasoning and rationalizing;
- is aware of the fact that one’s understanding is limited and that there are degrees of belief;
- differentiates between facts, opinions and assumptions;
- watches out for authoritarian influences and specious arguments;
- anticipates the consequences of alternative actions. (p. 137).

CT cannot be learned by direct teaching (Howe, 2004). However, as Howe (2004) notes, it can be incorporated into all different subject areas. Since as he maintains, “CT often requires imagining possible consequences, generating original approaches, or identifying alternative perspectives” (p. 508). Any form of human activity may involve CT. Moreover, in different cultures, people may have different conceptions of CT, though there may exist commonalities among them regarding what CT is. It seems that while there are different definitions for CT in the world, one of the purposes of education in all modern systems of education is preparing students for after-school life.

Instructors’ perception of learning has a great influence on their behaviors in the classrooms (Choy & Cheah, 2009). Instructors who are not aware of the effectiveness of CT, as well as those who cannot implement it in their classrooms may have to comply with the traditional perspectives of education and have passive students who are not active participants in the classrooms. Browne

and Freeman (2000) hold that CT comes in different forms; however, those classrooms which encourage CT have some distinguishing features as follows:

a) Frequent questions: One of the students' activities which most likely develops CT is a classroom in which frequent questions are asked and answered. Of course by questions Browne and Freeman (2000) do not surely mean the questions which are solely related to fact questions and therefore are part of low critical activity (Torff, 2005). According to Browne and Freeman (2000) "CT can be usefully conceptualized as ... knowing how to seek answers to questions and enjoying the process of asking them at appropriate times" (p. 303).

b) Developmental tension:

Sometimes a little uneasiness and tension may foster learning. Thinking sometimes is accompanied with uncertainties and doubt. Such an uncertainty may encourage students to seek solutions and find appropriate ways out of the dilemma. The authors emphasize that "the process of value change depends on learners' awareness of contradictions, tension and confusion in their current belief system" (Browne and Freeman, 2000, p. 305).

c) Fascination with the contingency of conclusions

Students have to learn to be open to different opinions and critically appraise the possible truth in them. Classrooms which develop CT encourage commitment, but also give the insight to students to frequently re-examine those commitments to their own ideas as they encounter new logic, evidence, and different accounts.

d) Active learning:

Most lecturers, especially those at universities, tend to be transmitters of body of facts or knowledge to the audience who passively are supposed to acquire those facts. However, those who favor CT have different approach and try to develop active learning in students by letting them have active participation. Too, they provide a situation in which students are affectively involved in the discussions.

CT is an important life skill for people today (Mimbs, 2005). Instructors need to model CT skills to their students and explicitly teach them to think critically. Instructors can be transformed in their teaching and students can be transformed in their learning through continued and consistent use and application of CT skills.

Since instructors are decision-makers in classrooms, and they are mainly responsible for students' learning, exploring certain issues regarding their beliefs about CT seems to be necessary. Instructors in different contexts in Iran have valued didactic system of education and have been expected to do so. Research regarding instructors' beliefs, especially university instructors, about CT is scarce. The impetus for this study was that one of the present researchers had a long contact with some of the PhD students of this study who in numerous informal contacts with the researcher showed to be knowledgeable in their field of study; however, based on the informal interview of the researcher with the head of department, these two instructors' teaching was lecture-based and they gave little opportunity to students to participate in classroom discussion, seek answer to the question and even worse, they were given no chance to critically appraise what they study. A cursory look at the final exams, given by these two instructors revealed the fact that nearly all items were directed toward assessing students' shallow learning.

1. Is there any significant difference between CT skills of Freshman and Junior education students?
2. What are university instructors' perceptions of CT?
3. What constrains, if any, impedes instructors from implementing CT in their classrooms?

## **2. Method**

The design of the research was both qualitative and quantitative since both a test and an interview were employed.

### *2.1. Participants*

To do the present study, 8 completely and well-educated university instructors (5 PhD holders and 3 PhD students) with a high command of CT skills were selected. All of the instructors were either holding PhD or they were studying for their PhD in Education. They were, to the researcher's knowledge, very studious and knowledgeable in their related fields and in informal meetings held in the department (the researcher's department and those of the instructors' were in the same place) they showed to know enough about the philosophy of education and current views on education. From among these 8 instructors' classes which had been taught for three consecutive semesters, some 36 subjects were randomly selected. Then 32 students in the department (freshmen) who were new to the university were selected randomly to form a control group.

### *2.2 Instruments*

In this study, the authors used a 34 item multiple-choice test together with an interview.

The first one was California Critical Thinking Skills Test (CCTST) Facione & Facione (1992). The test contains 34 multi-choice questions with a correct answer in the five CT cognitive skills domain. The reliability and validity of the test were reported to be reasonable. In fact, the test coefficient for reliability was .62. Factor Analysis indicated that CCTST has been formed from 5 factors (elements), namely: Analysis, Evaluation, Inference, Inductive and Deductive Reasoning (Khalli & Hossein Zadeh, 2003).

The second instrument was a semi structured interview based on Choy and Cheah's (2009) questionnaire. The modified questions were as follows:

1. From your perspective, what is CT?
2. Do you think that CT happens in your classroom when you are teaching your students? If so, how do you know?
3. How do you think you could bring about CT among students? Specifically, what are some things you do or could do to get your students to think critically?
4. What are the problems faced by students when you are trying to teach them CT? If so identify them.
5. Do you think you need to give all the information to your students in order for them to learn your subject? Why and why not?
6. Do you think you would be able to implement CT into your lessons if you were required to do so? Why and why not?

### *2.3. Procedures*

The 34 item Multiple-Choice test was given to all of the subjects (both control group subjects who were new to the university and the experimental group subjects who have had at least three consecutive classes with the same instructor).

An interview was also held in which eight participants were required to answer a total of 6 questions. All the instructors who voluntarily took part in the study had taught some courses in the Islamic Azad University, Kermanshah branch. They accepted to answer the questions at the university and felt free to add any comments and express their ideas freely.

## **3. Results**

To see if there was any difference between the experimental and control groups regarding their responses to the 34 item multiple-choice test (CCTST), the authors used an independent samples t-test. The results show that there was no specific difference between the mean and standard deviation of the experimental and control groups. (See Table 1).

Table 1. Descriptive Statistics of Exp. & Control Groups for Multiple-Choice Test

MCTestGroup		N	Mean	Std. Deviation	Std. Error Mean
MCTest	Experimental	36	8.39	2.309	.385
	Control	32	8.00	2.794	.494

As Table 1 shows, the mean and standard deviation of the experimental groups are 8.39 and 2.309, while the mean and standard deviation of the control group are 8.00 and 2.794. It can be seen that there is no specific difference between the two groups regarding their mean and standard deviation. Too, the researchers used an independent samples t-test to see if the difference between the two groups was meaningful. (See Table 2)

Table 2. Independent Samples t-test for Experimental & Control Groups in Multiple-Choice Test

	Levenes's Test for Equality of Variances		t-test for Equality of Means						
	F	Sig.	t	df	Sig (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of Difference	
								Lower	upper
Equal Variances assumed	.413	.523	.628	66	.532	.389	.619	-.847	1.625
Equal Variances Not Assumed			.621	60.356	.537	.389	.626	-.863	1.641

According to Table 2, the amount of observed t with 66 degree of freedom and 95% confidence interval of difference is .628, which is not meaningful at all. This means that there is no meaningful difference between the experimental and control groups regarding their answers to the Multiple-Choice test of CT. In other words, those students who were in the aforementioned classes for three consecutive semesters were not better than the freshmen who were new to the university in answering the MC test of CT. But, what can be the reason for this. To answer this question, we went to our second instrument, i.e., the interview. In fact, the interview was a modified form of Choy and Cheah's (2009) questionnaire. As mentioned above, the interview consisted of six questions. Below are the responses given by the instructors to the six questions.

#### *Instructors' perception of CT*

All instructors gave comprehensive definitions of CT. Six out of eight participants wrote that CT is the ability to ask appropriate questions about different phenomena and find answer to the questions. They noted that to find answers to the questions one has to look for relevant information and interpret the information in light of inductive and deductive reasoning. The others, who had nearly the same opinion, held that in order to be a critical thinker one has to distinguish facts from opinions. What was the distinguishing characteristic of a critical thinker to his opinion was the power of ration as they believed. One of the participants remarked that CT has to do with higher order thinking and problem solving activities.

*Does CT happen in the instructors' classroom when they are teaching their students? If so, how do they know?*

Seven respondents explicitly and implicitly indicated that they did not have CT in real sense in their own classrooms. However, as they explained whenever they ask students to look at facts from a new perspective, a sort of CT happens in the classroom. Six of the instructors were more critical of their own teaching and explained that since their teaching was predominantly lecture-based and they did not give students enough opportunity to freely express themselves and above all, since there was little democracy in the classroom, no CT occurred in the course they taught.

*How do instructors think they could bring about CT among students? Specifically what are some of the things they did or could do to get their students to think critically?*

All the participants answered that asking students to do research or project works is the best activity to encourage learners think critically and go through the stages of CT. They also emphasized posing questions to the students and asking them to find answers to the questions. Three of the participants wrote that providing a suitable environment improves the situation to have CT in the classrooms; however, they did not mention how such an environment should be established. One of the instructors answered this question by saying that establishing democracy in the classroom is very crucial for having critical thinkers. He wrote that “whenever the instructor is the sole speaker who does not allow students to express themselves, have their voice in the course, and takes the floor for the time he is in class, there is no likelihood of developing CT”. Another participant believed that students should be problem solvers, asked to seek the solution via books, internet and different sources available.

*What are the problems faced by students when an instructor is trying to teach CT?*

Five participants expressed that they felt a pressure to cover the content in a short time; therefore, they had to lecture in order to cover more content in a shorter time.

Two of the instructors wrote that most of their students lacked the skills of judgment and enquiry and that they had accustomed to being given the most straightforward answers by the authorities. One of these two added that if they were left to themselves, they had no ability to decide how to study on their own.

One of the respondents answered that from the first days of schooling, his students “were not taught how to think”, and they had been only “asked to cram materials in their heads for the exam”. Therefore, as he believed “they resist higher order thinking.”

*Do the instructors think they need to give all the information to their students in order to learn the subject? Why and why not?*

All the participants unanimously agreed that there is no need to provide their students with all the facts and information. All identified the CT as a process of enquiry in which students have to seek the answers to the questions posed by themselves or others.

*Do the instructors think they would be able to implement CT in their lessons if they were required to do so? Why and why not?*

Six out of eight participants argued that with the current state of affairs they were not able to implement CT in their classrooms. They believed that unless from the first days of schooling students are taught to think critically and solve problems, they would not think critically. Moreover, they knew the system of education responsible for such a problem. They asserted that the curriculum is top down, assessment is based on memorization of materials, and pre-service instructor education universities do not seriously involve instructors in such a process.

Two other respondents agreed that it would be possible to incorporate CT in different degrees in their courses. As they believed such a shift toward CT may be slow and difficult but possible. They argued that such a shift could begin with instructor education centers and teaching materials. They insisted that workshops, seminars, pre-service and in-service courses for instructors can make instructors aware of the importance and process of CT.

#### **4. Discussion and conclusion**

CT is of great importance in education, and it should be taught to students in all educational settings (Black, 2005; Yeh, 2002); however, the findings of this study showed that while junior students of education were expected to be familiar with the skills of CT, it was not so at all. Thus, to find the reason, the study intended to investigate instructors’ familiarity and view regarding the

issue. To this aim, an interview with six questions was held with the eight instructors with the following results.

As to the first question of the interview which asked the definition of CT, it seemed that all the participants were familiar with the term. However, what is not clear is whether they were familiar with the components of CT as well as its characteristics. Furthermore, further research is needed to see if the instructors are aware of how to implement practically CT in their usual courses. Despite lack of such information for the researcher, from the answers provided by the instructors and use of terms such as low CT activities, appraisal, and scientific inquiry by the instructors, it could be understood that they were aware of the related literature.

It is evident from the answers that nearly none of the instructors believed that CT happens in their classrooms. It is not surprising that though all the participants in the study were familiar with the concept in the field, they themselves may have been subjected to the same top down educational system in which students were well informed about the theories; however, had no power to implement what they had learned in the new contexts. Based on the responses, it was clear that the instructors were compelled to cover the content. To do so, they felt that they did not have enough time to *teach* what they taught to be the features of CT. Although in Iranian universities instructors are somehow free to choose the books and specify the content based on the guidelines prescribed by Ministry of Science and Technology, they have to cover some pre-specified goals and objectives of the courses especially for courses which are prerequisite for other university courses.

As the instructors reported, one of the barriers which was hard to tackle was that from the first days of schooling students in Iran have learned to be passive listeners whose freedom to have voice in the classrooms is very limited. Therefore, they lacked eagerness and were reluctant to spend extra mental effort required by high level thinking. Such a way of thinking in a class as a mini-society may be due to the cultural norms in the country. Davidson (1998) points out that that CT must be clearly defined and adapted culture-wise. If CT is not valued in the society, it may be likely to meet with opposition in schools and universities. Such an attitude even has molded instructors' expectations who would like to have everything under their control and not to overload students who prefer to be given the most straightforward information. Moreover, students in all years of schooling may already have experienced a pedagogy that rewards note taking and good recall of facts (Peirce, 1998). The consequence of such an education, as Peirce (1998) notes, is having students be more interested in the right answer than the way the answer is obtained.

It seems that instructors view CT as an activity which needs more time than the conventional methods of teaching. Perhaps, students need enough time to think about and explore the answers to the questions, raise their own questions, discover information, and construct their own models since CT as other approaches to constructivism, as Marlowe and Page (1998) note, "is about thinking and the thinking process rather than about the quantity of information a student can memorize and recite" (p. 11).

Wang (2009) notes that CT "is an ability that allows students to freely express their own ideas". As one of the instructors mentioned, students rarely have freedom to express themselves. Of course creating a condition in which students are able to have their say and participate in the process of decision-making may help them get more involved in deep learning.

To change such a situation and implement CT, as the instructors mentioned, are not easy. As van Gelder (2004) points out, while "...it can seem quite basic, it [CT] is actually a complicated process, and most people are just not very good at it (p. 2). It needs unanimous endeavor from the side of those responsible for developing curriculum, instructor education centers to give enough practical insights to the instructors, and workshops to maintain such an attempt.

CT effectively helps students to perform well both at educational settings and in after school life. It contributes to better decision making in the social and interpersonal contexts; therefore, attempts should be made to resolve the problems and constraints encountered by instructors to teach critically.

Further research with a sample of more instructors is needed to see if the instructors' beliefs are compatible with that of students. Instructors who took part in the study may not have

implemented CT only because they may have had wrong assumptions about their students' beliefs. They even may not have been aware of the techniques to implement CT.

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