Interactive Effects between IQ and Cognitive Style on Achievement in EFL Learning: A Pilot Study

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A wide range of characteristics have been postulated as affecting the learning of English as a foreign language (EFL) —— intelligence, cognitive style, foreign-language (FL) aptitude, reserved/outgoing personality, assiduity, mental development, age, language ego, ...to name only a random few. A greater knowledge of these and other characteristics will help EFL teachers to understand more about the diversity in EFL learning and will be useful in helping them to plan methods fitting the idiosyncratic needs of each learner. The research described in this paper was undertaken with this in mind. It explores the way the triad of cognitive style, intelligence, and EFL achievement are interrelated at the level of a junior high school EFL course. We have assumed that cognitive style and intelligence are complementary to each other, affecting EFL achievement in either a positive or negative way.

Variables of Cognitive Style in Foreign Language Learning/Teaching

Parhaps most experienced EFL teachers have asked themselves why some of their students seem to learn almost without effort, while others have considerable difficulty despite assiduous efforts. Many such teachers have tried earnestly to find a definite answer to the problem, but without much success, partly because the whole picture of individual differences among learners has not been clear. It still remains to be seen, for example, whether and how those factors that are supposed to make individual differences in EFL learning are interdependent. One of the ways to do this is to study as carefully as possible the idiosyncracies relevant to EFL learning in an achievement-oriented classroom situation.

Cognitive style has been of particular interest recently to researchers in FL achievement, but as yet few have addressed its nature and role in FL/SL learning and the possible ways to adapt teach-

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ing methodology to each learner's response tendencies. Cognitive style, which is naturally reflected in the FL learning strategies employed by each learner, may be defined simply as a hypothetical construct referring to the characteristic ways an individual consistently organizes and processes information regardless of situation.

A review of FL/SL educational studies of cognitive style shows that recently such variables as field independence vs. dependence, and impulsivity vs. reflection have received most attention among researchers.[1)] In the study done by Hansen (5. 349–367), field independence was positively related to the results measuring 'linguistic competence' and 'integrative competence.' Hansen & Stansfield (6. 29–38) report that field independence had a marked correlation with cloze test performance. Meredith (11. 321–327), in his research on conceptual tempo, that is, on reflection vs. impulsivity, succeeded in improving demonstrated proficiency in an oral production skill with implusive students by forcing them to delay response in an interview situation. Another study by Hansen & Stansfield (7. 263–273) examining the interaction between the cognitive styles of learners and teachers shows that field-independent female students were consistently at the highest level in test scores regardless of the instructor's tendency toward field independence/dependence (FI/D), whereas field-dependent male students were repeatedly the lowest in their attainment. They concluded "the learner's FI/D cognitive style played a greater role in the outcome (student FL achievement) than did the cognitive style of the teacher."

A survey of the available literature on the subject shows that under the term cognitive style the following may be seen to have some association with FL/SL acquisition :

Field independence versus field dependence——"the field-independent person is generally thought to be more analytical, precise, and affectively independent. On the other hand, the field-dependent person is thought to be more empathic, open, and affectively and cognitively perceptive of total patterns." (12. 171)

Reflection versus impulsivity——"impulsive students are generally characterized by a tendency to jump into a task without considering its various components, ... they are not overly concerned with the adequacy or accuracy of a response and will often give the first answer they think of. Reflective learners are too attentive to detail and discriminate so finely that they lose the general thread of a listening or reading passage. .....they may give too much thought to alternatives before coming to a decision." (2. 337)

Conceptual styles——"stable individual preferences in mode of perceptual organization and conceptual categorization of the external environment." (4. 10)

Cognitive complexity versus simplicity——the tendency to view and structure the environment around a person in a multidimensional or complex manner as opposed to a sigle dimensional or simple

manner.

Category width or overgeneralization versus undergeneralization——the tendency to subsume too many items or examples under a particular category or rule as opposed to the tendency to create a single category or rule for every item or example.

Integrative complexity——differences in the tendency of an individual to perceive the outer world in an abstract way as opposed to a concrete way.

Intolerance versus tolerance of ambiguity——individual differences in tolerance for emotional ambiguity, that is, tolerance for unexperienced or unrealistic situations or tasks. This psychological tendency can affect the perceptual and cognitive functioning of an individual.

Sensory modality proclivity——differences in the preference of an individual to memorize verbal materials or information in terms of visual modality, auditory modality, and kinesthetic modality.

Cognitive preferences——individual differences in the aspect of information arousing interest and in the way of processing it.

Some other variables in cognitive style, such as locus of control, authoritarianism, rigidity, and dogmatism, should be noted here, but we do not have sufficient evidence to support the feasible connection of these with FL/SL learning/teaching.

Hypothesis——Ambivalent Effects between Cognitive Style and Intelligence on EFL Achievement

Intelligence testing has been of the greatest concern to the people in the profession because more intelligent learners tend to get better scores on their school FL tests and show more zeal for FL learning, though FL teachers confront exceptions to this and there is a controversy concerning the extent to which learner intelligence favors FL achievement at school.

Hatori (8. 24–26) states that the following quadrants are manifest in the relationship between learner IQ and EFL achievement in formal linguistic environments :

(1) learners with higher intelligence and better EFL grades.

(2) learners with higher intelligence and lower EFL grades.

(3) learners with lower intelligence and better EFL grades.

(4) learners with lower intelligence and lower EFL grades.

Thus, he suggests that there is, generally, a positive relation between intelligence and FL learning ability, but that the relation is not as great as we might expect. Some abilities or factors other than intelligence are believed to intervene, depressing or improving the correlation of intelligence with successful achievement in EFL. Cognitive style can be one of these. We postulate that some variables of cognitive style are 'cooperative' and others are 'uncooperative' with intelligence, although

learner intelligence is highly related to EFL achievement, as Hatori states. 'Cooperative' variables of cognitive style are to be found in those students with lower intelligence and better EFL achievement, while 'uncooperative' ones are found in those with higher intelligence and lower EFL achievement. Thus, variables of cognitive style may be seen to function either facilitatingly or debilitatingly in EFL learning in addition to intelligence. The object of this study is to examine these effects in more detail.

Method

1. Subjects

Our sample was a group of junior high school students at the ages of thirteen and fourteen. They had been studying English for more than one year. The class met three days per week fifty minutes daily. This schedule had been maintained since the subjects entered the school. The class put emphasis mainly on graphic skills——reading and writing, not too much on oral-aural skills. A brief explanation of the general idea of our research was given to the subjects, but the hypothesis underlying the administration of the tests was not made clear to them. The class consisted of twenty-two male and twenty-two female students, but two of them (one male and one female) were absent on the day when the tests were administered.

2. Instruments

Tests of Variables in Cognitive Style

A Cognitive Style Test consisting of the following five subtests was administered to the subjects: an embedded figures test (EFT), a matching familiar figures test (MFF), a cognitive complexity test (CCT), a conceptual style test (CST), a cognitive preference test (CPT).[2] Before administering this test, the subjects were told that the test results would be kept confidential and would never have any influence on their EFL course grades at school. The test was administered in June, 1983, and it lasted about forty minutes.

The embedded figures test——this test was used to measure the tendency toward field independence/dependence (FI/D). The subjects were required to find a simple geometrical figure within a complex design full of distracting and irrelevant visual stimuli. Those subjects who were able to recognize the figure embedded in the distracting stimuli were labeled field independents, while those who were not were labeled field dependents.

As Hansen (5. 350) points out, "theoretically, the tendency toward field independence information processing is believed to nurture greater cognitive restructuring ability in various perceptual and symbolic tasks. Conversely, a field dependent cognitive style preference is considered to foster greater skill in interpersonal or social behaviors." Brown (12. 171–172) speculates that in terms of learning

environments, "field independence may be more important in the classroom setting where learning is measured by tests, and field dependence may be more important in the natural setting where learning is measured by how well the learner can communicate with speakers of the target language." Thus it seems that a tendency to FI is more likely to affect language learning favorably in a formal and traditional classroom situation than an inclination toward FD is.

The matching familiar figures test——this test was used to assess the tendency toward reflection/impulsivity. The subjects were presented with a standard picture and six other pictures, all of them similar to the standard but only one of them identical to it, and were required to select the identical one. Those subjects whose responses were rapid and erroneous were considered impulsive, whereas those whose responses were slow and accurate were considered reflective. Meredith (11. 321–327) shows that in measuring oral foreign language skills by conversation-based tests, a impulsive conceptual tempo in a testee does not work favorably for him, because the testee naturally tends to respond to the question by offering the first answer that comes to his mind, even if it is not correct, without pondering different possible answers before reaching a proper decision. Doron (3. 239) suggests that a reflective learner tends to be slower in reading speed and more accurate in reading comprehension than an impulsive learner. Our impression is that variables in reflective/impulsive conceptual tempo are similar in some aspects to individual variations in the use of a monitor[3] and affect the processing of verbal information in an EFL/ESL learning situation.

The conceptual style test——this test was used to assess degrees of analytic, relational (functional), and inferential style. The subjects were required to choose two pictures among a triad that they thought fit with each other. Their conceptual style was evaluated by their choices. Goldstein & Blackman (4. 11) describe conceptual style as follows: "an individual whose style is analytic-descriptive groups pictures on the basis of common elements, such as people without shoes. An individual whose style is relational utilizes functional, thematic relations in his groupings: for example, two people are grouped together because they are married. An individual whose style is inferential-categorical makes his groupings on the basis of a more abstract similarity between the pictures: for example, two individuals may be seen as poor."

The cognitive complexity test——this test was used to measure the extent to which the subjects review and construct their environment in cognitively simple or complex terms. The subjects were presented with nine geometrical figures, some of them simple in shape and form, and others complex, and were required to select the two figures that they liked most, and the two that they disliked most. Those subjects who selected figures similar in shape and form in either case were labeled simple, whereas those subjects who showed the opposite tendency were labeled complex. That is, 'simple' subjects tended to show the same patterns of responding to stimuli, while 'complex' subjects were

varied in their patterns of responding to stimuli.

The cognitive preference test——this test was used to measure individual differences in the way interest was shown for presented information. The subjects were divided into four different types according to the way they responded to each test item; an interrogative type, a reasoning type, a memory type, and an image type. Few studies seem to have been so far reported to demonstrate the role of cognitive preference in FL/SL learning.

Test of Intelligence and EFL Academic Grades

The measurements of these two factors were obtained from scores on a standardized intelligence test and a standardized EFL test respectively. Data analysis procedures were carried out simply for a correlational design : the obtained data were computerized to analyze the relationships among the tendencies in learner cognitive style, IQ measurement, and EFL achievement.

Findings and Discussion

The hypothesis with which this research study began was that there would be some patterns in which IQ and cognitive style variables interacted in relation to EFL achievement at the junior high school level. An examination of the test results indicates that field independence/dependence and reflection/impulsivity were the most significantly related to academic performance in a formal EFL course among the five cognitive style variables measured. It was also observed that student IQ was generally related positively to successful EFL achievement, but not in a definite fashion; there were exceptions to this. Even though no rigid statistical analysis was made of the three test scores, it may be assumed that cognitive style variables, especially, field independence/dependence and reflection/impulsivity, do play a significant role in learning EFL in a classroom situation.

A group of the subjects ranked highest in EFL achievement were seen to possess certain characteristics : most of them showed either mediate field independence with a tendency toward reflection or mediate field dependence with a tendency toward reflection in their cognitive styles, though the students with the latter trait were much fewer in number than those with the former. It is interesting to note that mediate field-independent students with a tendency toward reflection scored uniformly higher in the IQ test, and that field-dependent students with a tendency toward reflection, on the other hand, were miscellaneous in their IQ test scores, including those at the lowest level. It may be that mediate field-dependent students with a tendency toward reflection can be categorized as the 'overachievers' of EFL learning.

Characteristics of the students low on the list of EFL achievement were analyzed in terms of both their IQ test scores and cognitive style test results. They were seen to have either of two

traits: their low achievement was connected with either field dependence plus a tendency toward impulsivity or strong field independence with a strong tendency toward reflection. Those students with the former trait showed IQ test scores above the average, but not very high in most cases. Those students with the latter trait, on the other hand, showed IQ test scores much higher than the average. They may be called the 'underachievers' of EFL learning. Two of the subjects were identified as 'underachievers' in our research work.

Our findings should be approached with proper caution, because the number of subjects in our study was only forty, not enough to be of any statistic significance. We did not consider the problem of the interdependence of other factors affecting EFL learning, such as motivation, attitudes, aptitude, personality traits, or study habits. Many 'distorting' factors could enter into the results of the achievement test, and it was impossible for us to remove these factors in the present study. Further continuous efforts should be made to deal with these and other specific problem areas, which are impediments to our goals.

Summary and Conclusion

The present research was made in order to look for any positive or negative effects of cognitive style on EFL achievement in reference to learner intelligence. EFL teachers often notice that highly intelligent students do not always perform well in their EFL learning, some of them even being labeled underachievers, while some students are remarkable in their EFL achievement regardless of their IQ measurement. The accepted idea that intelligence has a necessary effect on FL learning cannot be justified in some cases. To study what factors do have a necessary effect, an intelligence test, a cognitive style test, and a standardized EFL achievement test were administered to forty junior high school students.

Our findings were that mediate field-independent students with a tendency toward reflection and mediate field-dependent students with a tendency toward reflection generally scored at much higher levels in their EFL achievement test. Field-dependent students with a tendency toward reflection may be labeled 'overachievers,' since they were notably high EFL achievers, compared with their intelligence test scores. Field-dependent students with a tendency toward impulsivity were found mostly at the lowest level of attainment in the EFL achievement test, though there were exceptions. Many of the students with this cognitive style were just above or around the average in the intelligence measurements. Dominant field-independent students with a strong tendency toward reflection were also seen at the lower level in the EFL achievement test, though they were well above average in their intelligence test scores. They may be called 'underachievers,' since they were relatively low in their EFL outcome in contrast to their intelligence test results. No significant interactive effects

on EFL achievement were noticed among the other cognitive style variables——cognitive complexity, conceptual styles, cognitive preference. Sex difference was not observed.

More data should be gathered about the cognitive style variables of EFL students. The more information we get, the better we can understand the nature and the role of cognitive style in the field of EFL education. No two learners are the same in their abilities. 'Regimentation' in EFL teaching naturally fails to create satisfaction with and willingness for EFL learning on the part of learners. A teaching method that works well for some students may not for others, that is, no single teaching method is equally valid with all learners. Any reliable information about the various cognitive styles of learners will help get us on the move to the development of generalizations that expound and predict diversity in behavioral traits in EFL acquisition, so that we can optimize treatments (=teaching methods) commensurate with aptitudes (=abilities) for each learner.

1) For good summaries of variables other than those mentioned here, refer, for example, to Bialystok & Fröhlich (1. 327-336), Birckbichler & Omaggio (2. 336-345), Brown (3. 231-244), Mary-Ann Reiss (10. 257-266), Schumann (12. 163-178).
2) The reader can see examples of the first two subtests on pages 297—298 (Appendix A).
3) See Krashen (9. 175-183) for the operation of the Monitor Model and general characteristics of monitor users.

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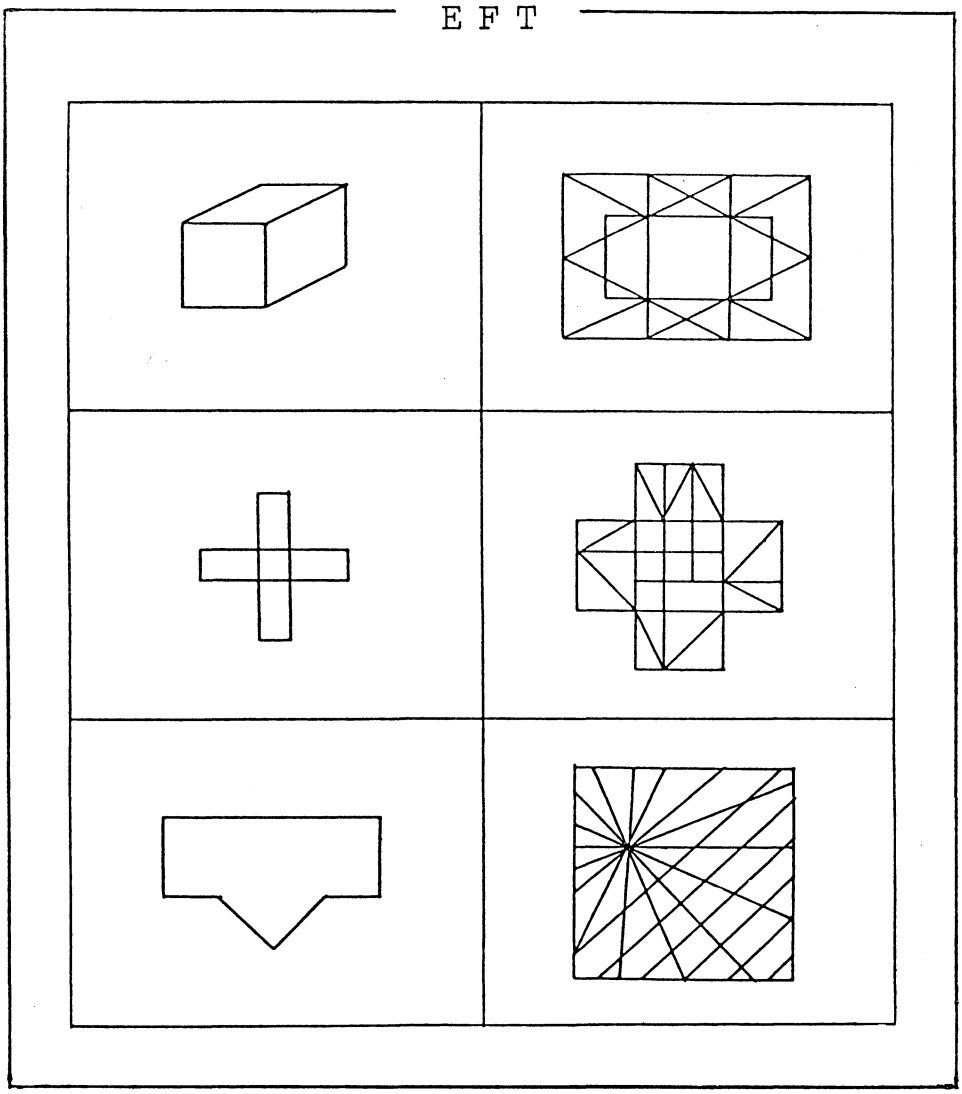
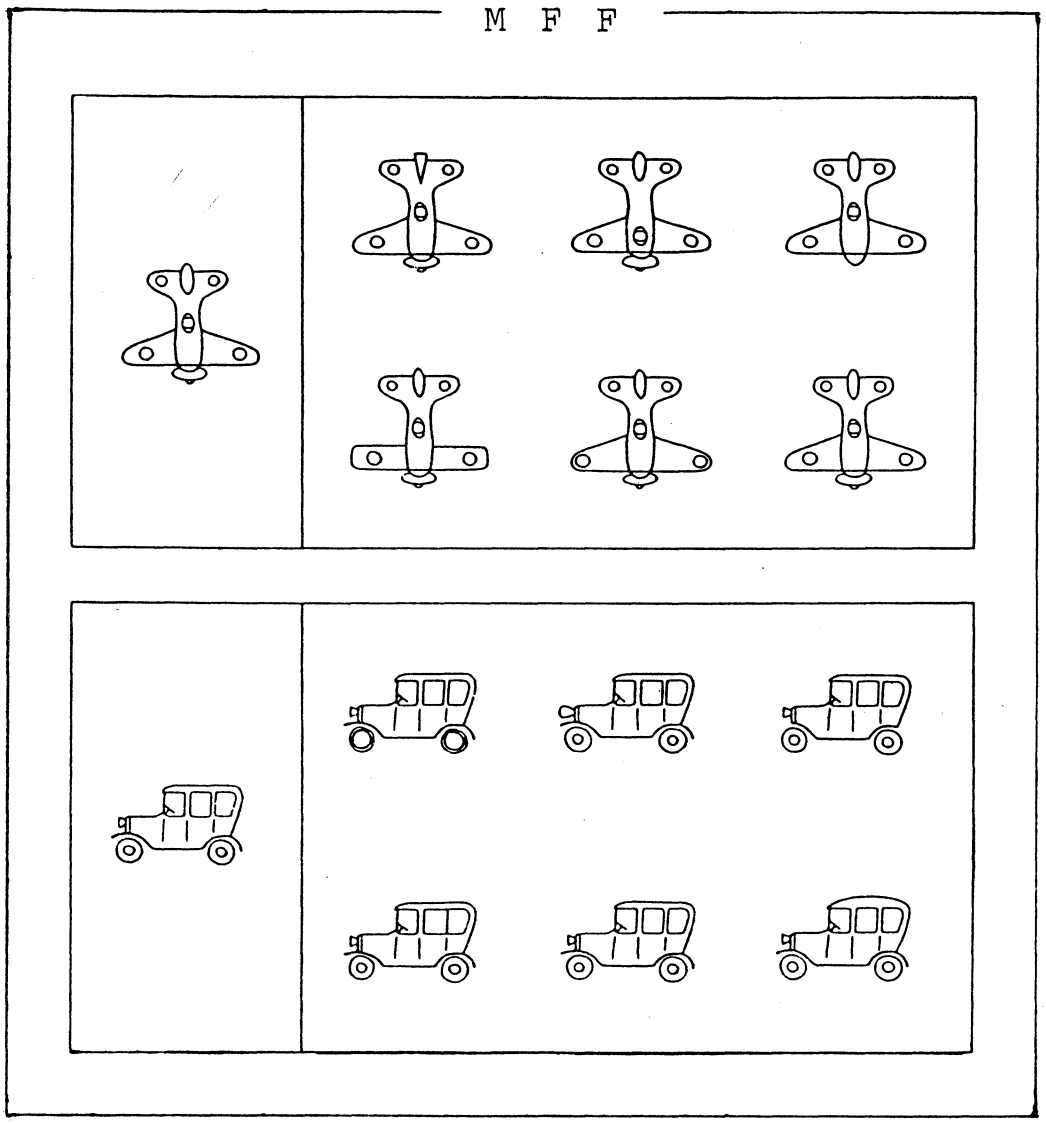
APPENDIX A

1) Examples of **EFT** (Embedded Figures Test)



The testees were presented with twenty-four test items of this kind, and were asked to find and shade the embedded geometrical figure on the right that was the same in shape as the stimulus figure on the left. The test items were ordered along a continuum, depending on their difficulties.

2) Examples of **MFF** (Matching Familiar Figures Test)



The testees were presented with fifteen items of this kind, and were asked to choose and encircle which of the six pictures on the right was identical with the original on the left.