EDITOR'S FORUM

EDUCATIONAL IMPLICATIONS OF GROUP DIFFERENCES IN COGNITIVE STYLE: EVIDENCE FROM PACIFIC CULTURES

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Teachers in multicultural settings in the Pacific region report impressions of cultural differences in the ways students learn (James 1983). Educators are concerned about such apparent group differences in learning styles, but more than impressions are needed to improve educational practice. Understanding cultural differences in the classroom requires the use of sound theoretical constructs in their investigation. Such a construct is field dependence/independence (FD/I), one of the most popular and fertile in contemporary psychology. Widespread interest in this approach to cognitive style is indicated by more than four thousand studies assembled and classified in a series of bibliographies issued by the Educational Testing Service since 1972 (Cox 1980; Cox and Gall 1981; Cox and Witkin 1978; Witkin et al. 1973; Witkin, Cox, and Friedman 1976). Furthermore, the many and diverse domains in which FD/I has been explored provide convincing evidence for its heuristic value.

The accumulated research base indicates that FD/I relates to many parts of a person's personality and functioning. The construct can be viewed as a continuum, with a holistic orientation on one end and an analytic orientation on the other. "Field dependents" (persons on the holistic end of the continuum) tend to rely more on others, to be more skilled in interpersonal relations, and to derive their self-identity from people around them. They tend to be strongly influenced by context

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and prefer integrative approaches to problem solving and learning. "Field independents" (those on the analytic end of the FD/I continuum), on the other hand, tend to be more independent, competitive, and self-reliant. They operate without being influenced to the same extent by context, and they prefer more analytical approaches (Witkin and Goodenough 1981). The FD/I construct is said to be "value neutral," that is, different advantages accrue to different cognitive styles. In many educational contexts, however, a bias toward a field-independent orientation appears to put field-dependent students at a disadvantage (Castaneda, Herold, and Ramirez 1974).

The research summarized here uses the FD/I construct as a heuristic in the investigation of cultural differences among university students in Hawaii. The questions addressed in the research are: (1) What are the FD/I tendencies of Pacific region cultural groups? Do the cultures differ significantly in their cognitive styles? (2) What effect does the university experience have on cognitive-style orientation? (3) How does FD/I relate to language learning among these groups? Is classroom language learning enhanced through the matching of student and teacher cognitive styles?

Group Differences in Field Dependence/Independence

Field independence gradually increases through childhood, but from the mid-teens to adulthood an individual's FD/I remains relatively stable (Witkin and Goodenough 1981). Cross-cultural research suggests that the extent to which a field-independent cognitive style is developed by maturity is related to the type of society and home in which a child is reared (Berry 1976; Witkin and Goodenough 1981). Agrarian or authoritarian societies, which are usually highly socialized and have strict child-rearing norms, have been shown to produce more field dependence than democratic, industrialized societies with more relaxed child-rearing practices. The societies compared in previous cognitive-style studies have been classified on a scale of social "tightness" or "looseness" (Pelto 1968). Societies at the tight end of this tight-loose continuum are characterized by an elaborate social structure, considerable role diversity, and pressure on the individual to conform to social, religious, and political authorities. Societies at the loose end have a less elaborate social structure, fewer roles, and more individual freedom. With a high degree of regularity, the results of numerous studies support the hypothesis relating FD/I to the extent of stress on social conformity in the society.

In societies where significant sex differences in FD/I have been found, the males tend to be more field independent. Cross-cultural studies have shed light on the sources of these differences. Sex differences are more likely in tight-conforming than in loose-nonconforming societies (Witkin and Goodenough 1981). The greater role differences between sexes in tight than in loose societies, and the stricter enforcement of sex-role expectations, appear to contribute to a tendency toward greater sex differences in FD/I in tight societies. The lesser value placed on women's contributions and the greater emphasis on obedience in female socialization make field-dependence among women particularly likely in such groups.

Method

The principal site for the research reported here is an English Language Institute (ELI) in Hawaii. The university sponsoring the ELI program has a large proportion of foreign students, most of them coming from the South Pacific and the Asian Rim. In connection with a study of FD/I and second-language acquisition (Hansen-Strain 1989), cognitive-style data were collected from 816 of these students in their ELI classrooms. The subjects were between the ages of 17 and 30 years and represented twenty-two different first-language backgrounds.

In connection with a study on FD/I and language proficiency testing (Hansen 1984), data were also gathered in six Pacific island cultures from 286 students in English-language classrooms in feeder high schools to the above university. These research sites were in Apia, Western Samoa; Nuku'alofa, Tonga; Papeete, Tahiti; Suva, Fiji (Native Fijian and Fijian-Indian groups); and Oahu, Hawaii. The students in the South Pacific samples were in Form 5; in the Hawaii sample they were in grades 11 and 12. In Hawaii, Tonga, and Tahiti two classes were tested, one of them consisting of students with higher scholastic achievement (H1, T1, and Tal on Table 1); that is, they were advanced-placement or college-track classes.

The instrument used for measuring cognitive-style orientation was the Group Embedded Figures Test (GEFT). This measure of FD/I requires the subject to outline a simple geometric shape embedded within a complex design. One must be able to separate the relevant information from the contextual visual field in order to find the correct shape. There are eighteen points possible, and the higher the score the higher the level of field independence indicated. The GEFT has been shown to have high reliability as determined by correlations between

parallel forms, and high validity as assessed by correlations with other established measures of psychological differentiation (Witkin et al. 1971).

Results

As expected, the means for the Hawaii samples (H-l and H-2) are higher than the other Pacific island high school groups tested (Table 1). A statistical significance of .00l for the group differences is substantiated by using a one-way ANOVA to compare the means. A post hoc comparison using the Scheffe test reveals differences at a significance level of .05 between Glass H-l and classes T-2, Ta-2, and both Fiji groups.

A further interesting contrast between the Hawaii students and those tested in the South Pacific can be seen in the comparison of male and female performances on the GEFT. The level of statistical significance of the sex differences was determined by t-tests. The male mean is higher than the female in all of the South Pacific groups, the significance of this difference varying from a level of .05 for T-l, Ta-1, and the Fiji groups; to .0l for Samoa and Ta-2; to .00l for T-2. Neither Hawaii group, on the other hand, shows a significant sex difference in GEFT performance.

TABLE 1. **GEFT Scores of High School Students in Six Pacific Cultures**

Culture	Group Mean	SD	Mean		Sex Difference	*N*
			Male	Female		
Hawaii						
H-l	12.1	4.0	11.6	12.2	-0.57	27
H-2	10.7	3.9	10.8	10.5	0.32	30
Tonga						
T-l	9.4	4.8	11.4	8.4	3.00*	31
T-2	7.0	4.7	9.8	3.8	6.01***	33
Tahiti						
Ta-1	9.1	5.3	12.8	7.9	4.94*	25
Ta-2	5.9	4.2	8.0	3.4	4.62**	19
Samoa	8.3	4.7	10.9	6.5	4.45**	30
Fiji						
Fijian-Indian	7.3	4.0	8.6	6.4	2.23*	59
Native Fijian	6.6	3.9	7.9	5.4	2.53*	32

* $p<.05$ ** $p<.01$ *** $p<.001$

As predicted by FD/I theory on the sources of psychological differentiation, the "tight" societies of the South Pacific island cultures do tend to produce individuals who are more field dependent as well as significant sex differences in cognitive-style orientation. The "loose" society found in Hawaii, the setting of the university that many of the subjects in the study would attend, produces individuals who are more field independent.

Among the cultural groups in the university ELI' program (Table 2), the mean scores of students from the Asian Rim are higher than those of the South Pacific students. These group differences are highly significant, as substantiated by a one-way ANOVA ($p < .00l$). No sex differences are apparent within four of these groups: Hong Kong, Micronesia, the Philippines, and Other Chinese. Significant differences between male and female scores were found, however, for the Samoans, at the .0l level, and for the Tongan, Japanese, Korean, and Other Asian groups, at the .00l level.

University Experience and Cognitive-Style Modification

The second question addressed here concerns the effects of university experience on cognitive style. As pointed out above, a gradual increase in field independence develops during childhood, but from the mid-teens to adulthood, restructuring abilities have been said to remain relatively stable. Upon entering the university, then, students will presum-

TABLE 2. **GEFT Scores for University Students from Pacific Island and Asian Rim Cultures**

Culture	Group Mean	SD	Mean		Sex Difference	N
			Male	Female		
Japan	14.1	4.5	15.8	13.3	2.5***	112
Hong Kong	13.7	4.3	13.8	13.7	.1	194
Other Chinese	13.3	3.6	13.7	13.5	2.0	55
Korea	10.4	4.7	12.5	9.3	3.2***	103
Other Asian	10.2	3.9	12.1	7.5	5.6***	13
Samoa	9.9	4.4	10.7	8.2	2.5**	83
Tonga	8.4	5.5	11.0	5.2	5.8***	139
Micronesia	6.8	4.0	6.2	7.3	-1.1	63
Philippines	6.5	4.6	6.6	6.5	.1	42
Other South Pacific	5.7	4.9	6.6	3.6	3.0*	12

*$p < .05$ **$p < .01$ ***$p < .001$

ably have reached the level of field independence that will characterize their adult lives, with the more field dependent likely finding themselves at some disadvantage in an educational milieu that caters to analytic cognitive styles.

The extent to which adult field dependents may be able to adapt their holistic orientations to the demands of university requirements is not known. We do not know whether relatively field-dependent groups, such as the South Pacific island populations, are able to modify their cognitive styles during prolonged periods in educational environments in which it would be advantageous to do so. Experiments with perceptual training in the manipulation of figure-ground relationships indicate that some development of cognitive restructuring skills in adulthood may be possible (Witkin and Goodenough 1981), but the duration of such training effects is uncertain.

Method

To examine the development of cognitive restructuring abilities in the university population in the present study, a longitudinal research design was used. The GEFT was administered to each of three groups of subjects two times (Table 3). Group 1 comprised 57 subjects from among the high school students who took the test in 1982. It includes those subjects from two of the cultures, Hawaii and Tonga, who could be located and retested in 1987-1988. Of these, 34 had attended college upon completion of high school. When they were retested, the majority were juniors or seniors at our principal research site. The remainder of Group 1, 23 subjects, had not attended an institution of higher learning. Their vocations at the time of retesting included cook, construction worker, grounds maintenance worker, hotel maid, housewife, receptionist, mechanic, missionary, secretary, and waitress.

Groups 2 and 3 are foreign university students who first took the GEFT in their ELI courses within a year of their arrival in Hawaii:

TABLE 3. **GEFT-Change Score for Pacific Island Students**

Group	Mean Change	SD	N
1 (1982 and 1987-1988)			
No College	-0.13	2.05	23
College	3.09	2.19	34
2 College (1984-1985 and 1987-1988)	2.60	2.86	47
3 College (1986 and 1987-1988)	1.79	2.31	53

Group 2 in 1984-1985, group 3 in 1986. They were retested in 1987-1988. For Group 2 this was three to four years after the first test administration; for Group 3 a year to a year and a half later.

Results

Table 3 gives the mean changes in the GEFT score for each of the three groups over the two times they were tested. Group 1 is separated on the table into the two subgroups, those who had attended college and those who had not. Because the GEFT-change scores did not differ significantly between the groups in Tonga and Hawaii, these are combined in Group 1 for the analysis. Of those who did attend the university, the longer they had been there the greater the increase in score on the GEFT. Since higher scores on this eighteen-point test indicate higher levels of field independence, one could interpret this as evidence for a gradual increase in analytic restructuring abilities while at the university. Important evidence for an association of this increase with the university experience is provided by the comparative data from the No College group subgroup: the mean difference between test administrations for them is -0.13. Unlike their former high school classmates who had attended the university, the No College subgroup experienced no change in their FD/I cognitive style over the five-year interval. The group differences in GEFT-change between the College and No College subgroups is shown by an ANOVA to be significant at the .01 level. Thus, maturation alone does not provide an adequate explanation for the gradual increase in cognitive restructuring abilities of the college students.

Field Dependence/Independence and Second-Language Learning

My final question concerns the relation between ELI students' cognitive styles and their language learning success. A growing body of research, all correlational, has examined the relation between FD/I and second-language learning. In these studies, scores on the GEFT have been correlated with scores on a variety of language learning measures. Consistently higher correlations of GEFT scores with those on cloze tests than with other language measures (Stansfield and Hansen 1983; Hansen 1984; Day 1984) suggest that field-independent learners have a slight advantage in performance on this particular type of test, one unrelated to their second-language achievement. There is evidence from these correlational studies that field-independence is associated with success in

second-language acquisition, at least in classroom settings (Chapelle and Roberts 1986; Day 1984; Hansen and Stansfield 1981; Hansen 1984; Hansen-Strain 1987; Naiman et al. 1978), since small positive correlations between GEFT score and language measures have generally been found.

One variable that may affect the relation between field sensitivity and language learning in the classroom is the interaction between the cognitive style of the teacher and those of the students. Dunn and Dunn (1979) suggest that "teachers teach the way they learned." These researchers report that instructors believe that the way they themselves learn best is the "easy" or "right" way, and they therefore direct others toward mastering knowledge in the same manner. Thus, Dunn and Dunn conclude that "teaching style tends to correspond to how each person learned." To the extent that this is true, it would appear that learning advantages would accrue to those students who have the same cognitive style as their teacher.

In a review of studies reported in the education literature that examine the effects of matching the type of instruction to students' cognitive style, Cronbach and Snow (1977) suggested that empirical evidence showing a positive advantage for matched instruction is weak. In another review article ten years later, however, with a decade more of research to draw upon, Willing (1987) claimed that considerable evidence supports the hypothesis that learning is enhanced through matching learning style to type of instruction. The few analyses in the second-language research literature of studies that consider the effects of matching student and teacher cognitive styles (Hansen and Stansfield 1981) or of tailoring teaching to students' styles (Wesche 1981) report trends for students to perform better on language-proficiency measures when their cognitive styles have been accommodated in the classroom.

Method

The GEFT was given to 816 foreign students from twenty-two different first-language backgrounds. In addition, 26 of their ELI writing teachers took the test. As a measure of language learning, the Michigan Test of English Language Proficiency (MTELP) was also given to the students. Gain scores for the MTELP were derived by subtracting the equated scores from a first administration, before enrollment in an ELI writing class, from the equated scores on a second administration of the test, at the conclusion of the course. In addition, the students' grades in

the writing class were included as a variable in the study, computed on the basis that A = 4.0, B = 3.0, C = 2.0, D = 1.0, and F = 0.

To look at the influence of the interaction of teacher/student cognitive styles on language acquisition, a cognitive match analysis was done in which both teachers and students were placed in field-dependent and field-independent groupings. For the teachers, those scoring between 16 and 18 on the GEFT (*n* = 16) were considered field independent, those between 5 and 10 *(n* = 8) field dependent. Teachers with scores between 11 and 14 *(n* = 2) were eliminated for the analysis. For the students, approximately the upper third, those scoring between 15 and 18 on the GEFT *(n* = 277) were placed in the field-independent group, those between 0 and 9 *(n* = 269), approximately the lower third, in the field-dependent. Four cognitive matches were then identified for the analysis. In Match 1 both teacher and student tested field independent; in Match 2, both field dependent. In these two groups then, the student is matched with the teacher for cognitive style. In Match 3 the teacher tested field independent, the student field dependent, while in Match 4 the teacher is field dependent, the student field independent. In these latter two groups student and teacher are not matched for cognitive style.

Findings

The mean grades received in the ELI writing classes of the matched groups, groups 1 and 2, were higher than those of the unmatched (Table 4). A one-way ANOVA shows that the difference is significant *(p* < .003), indicating that students who are matched with their teacher for cognitive style tend to receive slightly higher grades in their ESL writing courses than those who are not.

The grade a student receives in a language class, however, can be influenced by many factors in addition to how much language has been

TABLE 4. Cognitive Match Analysis for Course Grade and MTELP Gain Score

Match Group	Mean Grade	SD	Mean Gain	SD	N
1	2.74	11.7	2.54	8.21	229
2	2.55	12.0	3.30	7.60	46
3	2.38	13.1	2.17	9.64	223
4	2.18	13.9	1.89	5.66	48

learned. In measuring gains in language proficiency over time, therefore, results of standardized language proficiency tests, administered before and after completion of a course, could be expected to be a more accurate index of learning. The gain score means for results of such administrations of the MTELP are slightly higher for groups 1 and 2 than for groups 3 and 4 (Table 4), just as the mean grades were higher. For the gain scores, however, the trend of higher means for the matched groups is not statistically significant, as determined by an ANOVA analysis. Although the ELI students with the same cognitive style as their teacher did tend to receive higher grades in their class, these data fail to confirm a correspondingly greater gain in English proficiency.

Summary and Conclusions

The findings reported here show, first, that there are significant group differences in cognitive style among students in a multicultural university in Hawaii; the Asian cultures tend to be more field independent, the South Pacific ones, more field dependent. In some of these groups (Japan, Korea, Samoa, and Tonga) males tend to be more field independent than females.

Second, evidence was presented that suggests a gradual increase in analytical restructuring abilities associated with the university experience. This finding of a significant change in adult FD/I over time, made possible through the longitudinal design of the study, has not been reported in previous cross-sectional research. In future work the stability of the change, as well as its implications for post-university life, should be examined. Research is needed into the effects of a more analytic cognitive orientation on personal characteristics that are known to be related to FD/I. For example, concomitant changes in such areas as interpersonal competencies and autonomy in interpersonal relations could have important consequences for the readjustment of university graduates to field-dependent cultures in the South Pacific when they return home.

Third, cognitive-style effects in second-language classrooms were examined. English-language teachers were found to give higher grades to students who shared their own cognitive-style orientation, even in the absence of evidence that these students had made correspondingly greater gains in subject matter mastery. This suggests that the interaction of teacher-student cognitive styles affects teachers' evaluations of students' progress and may result in a bias against students whose cognitive styles differ most from their own. In connection with these teacher

perceptions, it seems likely that other aspects of affect in the classroom, such as student-teacher rapport and student motivation, may be influenced by cognitive-style interactions as well, and should be investigated. In programs such as the English Language Institute in which most teachers have analytic cognitive orientations, a tendency to perceive students of the same cognitive style more favorably would most often work to the disadvantage of students who are field dependent.

While the present study provides evidence for cultural differences in cognitive style, a cautious approach is urged in making applications of the findings. Cultural differences are never absolute. They are generally expressed as group tendencies towards a particular characteristic or behavior. No matter how much culture influences learning, these influences will be expressed in unique ways in each individual.

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