

## **COGNITIVE STYLE OF INTERNATIONAL AND DOMESTIC GRADUATE STUDENTS IN AGRICULTURAL EDUCATION AND AGRICULTURAL ECONOMICS**

Larry E. Miller, Professor  
The Ohio State University  
Kathleen M. Escolme  
Carnforth, Lancaster UK

Cognitive style is a dimension of learning style and can be defined as the distinctive and preferred way a learner organizes and retains information (Keefe, 1979). The two dimensions of cognitive style presented in this research originated from their search of Dr. H. A. Witkin. His research divided cognitive style into the dimensions of field dependent and field independent. When individuals are presented with a task designed to assess their cognitive style, field dependent individuals perceive a seen field as a whole; it would be difficult for such a person to separate a pattern from the surrounding environment (Escolme, 1988). They have a global perception of their environment. Field independent individuals tend "to experience parts of the field as discrete from the surrounding field even when the field (was) so organized as to strongly embed the part" (Witkin, 1974). They perceive their environment analytically.

Because individuals have different ways of retaining and organizing information, different learner characteristics develop. According to the literature, the selection of an academic major, the chosen method of problem solving, and preferred teaching methods reflect learner cognitive style. The cultural background of an individual can influence cognitive style (Witkin & Berry, 1975). International students come from very diverse and different cultural backgrounds when compared to domestic students. Would cognitive style be diverse as well?

International students studying in the U. S. may be stressed by changes in language, diet, climate, attitudes, and culture. They may also encounter conflicts in their academic pursuits as a result of their cognitive styles. Any variability in learning style might be explained by other characteristics of the individuals, such as gender (Howard & Yoder, 1987) or academic major.

### **Purpose and Objectives**

This study sought to describe the cognitive styles of both international and domestic graduate students. The review of literature yielded a paucity of information regarding the cognitive style of international students studying in the United States. Four research questions were used to guide the research:

1. What is the relationship between the nationality of a student and cognitive style?
2. What is the relationship between the gender of a student and cognitive style?
3. What is the relationship between academic major of a student and cognitive style?
4. What factors of educational background might help identify problem areas an international student may encounter when studying in an American university?

### **Methodology**

The design of this study was descriptive/correlational. The target population was graduate students in the Department of Agricultural Economics and the Department of Agricultural Education at The Ohio State University. A potentially intervening variable to explaining variability in cognitive style in this study could have been the orientation of the students to the social versus the more discipline-specific agricultural sciences. To control this potential rival explanation, the study was limited to graduate students in the College of Agriculture from the social and behavioral sciences. The total population of all full-time ( $N = 120$ ) students were invited to participate.

Two instruments were used to obtain information essential to the study: 1) The Group Embedded Figures Test (GEFT) was administered to all participants, and 2) individual interview schedules were completed with eight selected students. The GEFT booklets were obtained from the Consulting Psychologist's Press, Palo Alto, California.

The GEFT has a tested reliability in the range of high .80's to low .90's (Goldstein & Blackman, 1980). Correlations of the GEFT with other tests of cognitive style have shown that the GEFT has concurrent validity in the field independent/dependent constructs (Vitkin, Oltman, Raskin & Karp, 1971). The interview schedule was developed by the researchers and content validity was confirmed by a panel of experts familiar with interview techniques.

Letters describing the study and listing times when the GEFT would be administered were placed in mail boxes of the graduate students. When necessary, individual testing times were arranged to accommodate students. Eighty (67%) usable tests were completed. Nonresponse seemed to be a function of individual schedules and not of any potential intervening variables as determined by personal interviews with four (10%) of the nonrespondents.

Upon completion of the GEFT's, individual scores were categorized by field dependent or field independent orientations. Possible scores on the GEFT ranged from 0 to 18. In this study, the division between field independent/dependent was set at a score of 12, as recommended by Vitkin, Ottman, Raskin, & Karp(1971). Students scoring 12 or above on the GEFT were classified as field independent, as they more easily completed the task of finding the "hidden" figures. Students scoring 11 or below were classified as field dependent, as they could less easily disemble the "hidden" figure from the surrounding pattern.

Four international students classified as field dependent, and four field independent, were randomly selected and interviewed individually to provide enriched information regarding their educational backgrounds prior to studies in the U. S. The interviews were tape recorded and primary answers were transcribed. Data provided by the GEFT were analyzed using SPSS/PC+ (Norusis, 1988). Differences were tested at an alpha level of .05. Inferential statistics were used as the population was considered as a sample of other future populations. Interviews were analyzed qualitatively.

### **Findings and Conclusions**

Graduate students participating in the study were both domestic (51%) and international (49%), male (79%) and female(21%), and nearly equally distributed between agricultural education (49%) and agricultural economics (51%) as illustrated in Table 1. GEFT scores ranged from 1 (very field dependent) to 18(very field independent), indicating much variation in cognitive style among the respondents.

**Question 1:** Table 1 includes a comparison of domestic and international graduate students. The t-test revealed a statistically significant difference between the two groups with domestic students higher inscore: field independent. As illustrated by Table 1, in general, US. students and Asian students exhibited similar field independent tendencies, African students had fairly equal field dependent and field independent tendencies, and South American students showed the highest percentage of field dependent individuals. Years lived in the United States did not account for any differences in cognitive style among international students.

**Question 2:** Overall gender of the graduate students did not account for significant differences among the students. Further examination revealed that international males majoring in agricultural education were more field dependent than any other group studied. International female graduate students were proportionally more field independent than U. S. female graduate students.

The relationships among the attribute variables and the GEFT scores of students are revealed in Table 2. The magnitude of the correlations would indicate that the predictability of the GEFT based upon these variables would not be substantial.

**Question 3:** Table 1 showed that the average score of agricultural education majors was 10.8, and 12.9 for agricultural economics majors. Thus, agricultural economics majors tended to be more field independent than agricultural education majors, although the difference was not statistically significant.

A significant difference was not found among the academic interest areas and cognitive style orientation (Table 1). However, some tendencies were noted (Table 3). The areas of finance, international development and international trade, and environmental ecology had, proportionately, higher numbers of field independent individuals. Human relations skills would be required of extension administrators and the GEFT reflected this tendency as 61.5% of the students were field dependent.

Table 1  
GEFT Score by Characteristic

Characteristic	<u>F. Dependent</u>		<u>F. Dependent</u>		<u>Total</u>		m	t
	<u>N</u>	<u>%</u>	<u>N</u>	<u>%</u>	<u>N</u>	<u>%</u>		
<u>Geographic Area</u>								
United States	14	34	27	66	41	51	13.2	2.35*
International	33	41	47	59	39	49	10.5	
Asia	5	36	9	64	14	18		
Africa	7	54	6	46	13	16		
South America	6	67	3	33	9	11		
Europe	0	0	2	100	2	3		
Middle East	1	100	0	0	1	1		
<u>Gender</u>								
Male					63	79	11.7	-.57
United States	9	30	21	70				
International	18	55	15	45				
Female					17	21	12.5	
United States	5	46	6	55				
International	1	17	5	83				
<u>Academic Major</u>								
Agric. Economics					41	51	12.9	-1.76
United States	4	29	10	71				
International	9	33	18	67				
Agric. Education					39	49	10.8	
United States	10	37	17	63				
International	10	83	2	17				
<u>Years in U.S. by International Students</u>								
Field Dependent							2.63	-1.05
Field Independent							3.25	

\*p ≤ .05

Table 2  
Correlation of Variables with Student GEFT Score

Variable	Point-biserial Correlations
Geographic area <sup>1</sup>	-.29
International/U.S. <sup>2</sup>	-.26
Academic major <sup>3</sup>	.19
Gender <sup>4</sup>	.06

<sup>1</sup> Geographic Area coded: U.S. (0), Asia (1), Middle East (2), Africa (3), South America (4), Europe (5)

<sup>2</sup> International/U.S. coded: U.S. (1), International (2)

<sup>3</sup> Academic Major coded: Agric. Education (1), Agric. Economics (2)

<sup>4</sup> Gender coded: Male (1), Female (2)

Table 3  
Field Dependence/Independence Orientation by Academic Interest Area

Interest Area	<u>F. Dependent</u>		<u>F. Independent</u>		<u>Total</u>	
	<u>N</u>	<u>%</u>	<u>N</u>	<u>%</u>	<u>N</u>	<u>%</u>
Teacher Education	5	45.5	6	54.5	11	100.0
Communications	1	100.0	0	0.0	1	100.0
Research	4	50.0	4	50.0	8	100.0
Finance	2	28.6	5	71.4	7	100.0
Intl. Development	0	0.0	3	100.0	3	100.0
Business	0	0.0	1	100.0	1	100.0
Intl. Trade	2	25.0	6	75.0	8	100.0
Extension Admin.	8	61.5	5	38.5	13	100.0
Environ. Ecology	0	0.0	5	100.0	5	100.0
Economic Theory	2	66.7	1	33.3	3	100.0
Evaluation	2	66.7	1	33.3	3	100.0
Production Agric.	2	40.0	3	60.0	5	100.0
Marketing	3	37.5	5	62.5	8	100.0
Overall	31		45		80	

Cramer's V = .42

The areas of teacher education and research appeared to deviate from previous research. The area of research may be assumed to require analytical skills, yet, 50% of the students interested in this area were field dependent. Likewise, teacher education would be thought to require personal skills; however, 54.4% of students interested in the area were field independent.

**Question 4:** Interviews were conducted with international students in each of the tendency categories to attempt to explore potential problem areas for these students studying in the U. S. During the interviews, students described teaching techniques or methods, testing, and teacher/student interactions from their home country experience.

All students reported the primary teaching method as lectures. However, the general trend indicated that field dependent students may have had more discussion or varied techniques in their educational experiences. Most students spoke of very limited teacher/student interactions. As one student stated, "There is very little interaction ... don't give argument to the teacher, that is our customs." When asked to describe an ideal university professor, both academic and personal skills were described. All students indicated that thorough knowledge of the subject matter and willingness to help students were essential.

All students reported the use of comprehensive examinations in their countries, which were often used as a basis for promotion. While all students reported that essay and short answer questions were often used, several stated that they had not encountered multiple choice questions until they began study in the U. S. From a list of words which might be used on examinations and which were selected to indicate various levels of cognitive activity (Newcomb & Trefz, 1987), students were asked to identify words which might often be used for examination questions in their home country. Remembering-level words were most often used by both field independent and dependent students. Words indicative of processing, creating or evaluating were selected rather equally by both field dependent and field independent students. Likewise, few differences were noted on written paper assignments or note-giving experiences. Most perceived greater variety in teaching methods in the US.

### Discussion

International students carry unique sets of cultural and educational experiences to graduate education. Professors must be cognizant of ways to effectively enhance learning for these and all students. The more one can learn about the students the better their needs can be accommodated. A variety of teaching methods should be used for the benefit of all students. Further, a variety of

test formats within a course would permit the accommodation of the cognitive styles of all students by allowing for their different reasoning strategies.

The literature (Johnson & White, 1981; Witkin et al., 1977; Witkin & Moore, 1974; Witkin et al., 1971) alludes to educational implications resulting from knowledge of cognitive style. Related to problem solving abilities, field dependent individuals may not do as well solving problems in which an essential element must be separated from the context in which it is presented and used in a different context; however, field independent students are more likely to organize spontaneously material lacking structure, be less reliant on teacher imposed structure, and prefer their own strategies.

Considering how field dependent individuals interact with people, they are very socially sensitive, interested in others, verbal, and may be more easily influenced by peer pressure. Field independent individuals are inclined to be less attuned to social cues, have more theoretical and abstract interests, are less verbal, and may be more individualistic. Field dependent individuals more easily learn and remember socially oriented materials, appreciate personal application of concepts, and tend to avoid majors in the sciences. Field independent persons more easily learn and remember impersonal material, have a hard time with detail, and tend to avoid majors in the social and behavioral sciences. Field independent students in the two majors studied may have to adapt the content of the disciplines to their style of cognition.

### References

Escolme, K. M. (1988). Cognitive style of international and domestic graduate students in agricultural education and agricultural economics. Master's thesis, The Ohio State University, Columbus, Ohio.

Goldstein, K. M. & Blackman, S. (1978). Cognitive style: five approaches and relevant research. New York: Wiley.

Howard, J. M. & Yoder, E. P. (1987). Effectiveness of two instructional modes for teaching vocational agriculture students of differing learning styles. Paper presented at the 14th Annual National Agricultural Education Research Meeting, Las Vegas, Nevada.

Johnson, K. A. & White, M. D. (1981, April). Cognitive style in library/information science education. Paper presented at the Annual Meeting of the American Educational Research Association, Los Angeles, California, ERIC # 203 863.

Keefe, J. W. (1979). Learning styles: An overview. Student learning styles. Diagnosing and prescribing programs. Reston, Virginia: National Association of Secondary School Principals, ERIC # 182 859.

Newcomb, L. H. & Trefz, M. (1987, December). Levels of cognition of testing and student assignments in the College of Agriculture, The Ohio State University. Paper presented at the meetings of the American Vocational Association, Las Vegas, Nevada.

Ohio State University (1988). Memorandum: Graduate school enrollment patterns Autumn Quarter 1987.

Witkin, H. A.; Moore, C. A.; Oltman, P. K.; Goodenough, D. R.; Friedman, F. & Owen, D. R. (1977, February). A longitudinal study of the role of cognitive styles in evolution during the college years. GRE Board Research Report GREB No.76-10R.

Witkin, H. A. & Berry, J. W. (1975) Psychological differentiation in cross-cultural perspective. Journal of Cross-Cultural Psychology, 6, (1), 4-87.

Witkin, H. A. & Moore, C. A. (1974). Cognitive style and the teaching/learning process. Princeton, NJ: Educational Testing Service. ERIC # 097 356.

Witkin, H. A.; Oltman, P. K.; Raskin, E. & Karp, S. A. (1971). A manual for the embedded figures test. Palo Alto, CA: Consulting Psychologists Press, Inc.