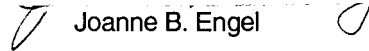


AN ABSTRACT OF THE DISSERTATION OF

Jeffrey Karl Lukehart for the degree of Doctor of Philosophy in Education presented on June 6, 1995. Title: A Cross-Cultural Study of Verbal-Spatial Preferences for Learning.

Abstract approved: \_\_\_\_\_

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 Joanne B. Engel

The successful educator must be cognizant of and accommodate individual learner needs. The mediation of learning between the educator and learner is at the very root of successful teaching and learning. Recognizing and acknowledging that educators have preferred methods of operation (teaching style preferences) and students have preferred methods of operation (learning style preferences) should change practical efforts that seek to facilitate learning outcomes. Educational literature on situational constraints and educational preferences is well-documented, but until recently, little attention has been given to learner differences. The primary purpose of this study was to discover if verbal and spatial preferences for learning significantly differed among Asian and American undergraduate students. A secondary purpose was to determine if there was any significant difference across cultures in gender preferences for verbal and spatial learning cues. Two hundred eighty-six undergraduate students from Kook-min, Tokyo International, and Willamette Universities volunteered for this study. The subjects were administered the Engel Selection Skills Evaluation to index verbal-spatial preferences for learning. A MANOVA design was used to examine each research question at the .05 level of significance. Given cell size disparity, analyses of variance were conducted with equal cell sizes using both relative and absolute scores. Both of the analyses of variance confirmed a significant preference for verbal cues across the three cultures. Results indicated that Japanese students had the strongest preference for verbal cues followed by the American and South Korean students respectively. But, both analyses of variance failed to reveal any significant gender preferences.

This study implies that there are cultural differences in verbal-spatial modalities for learning that could be of real interest to students of cognitive processing. Further, the study suggests that a fruitful avenue of research comes from expanding our knowledge in the study of cross-cultural preferences for certain perceptual modalities.

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A Cross-Cultural Study of Verbal-Spatial Preferences for Learning

by

Jeffrey Karl Lukehart

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Oregon State University

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the requirements for the  
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This dissertation is dedicated to my maternal grandparents, Roy S (1885- ) and Jennie Louise (1887- ) Mills, my mother, Cornelia Mills Lukehart, and my late father, Karl Joseph Lukehart for their unconditional love and support throughout my entire life.

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# A Cross-Cultural Study of Verbal-Spatial Preferences for Learning

## CHAPTER I

### INTRODUCTION

Over the years, tremendous effort has been expended by educational researchers to identify salient factors which contribute directly or indirectly to successful teaching and learning. One of the major strands of research has been devoted to examining variables that affect learning.

This thesis argues that the successful educator must be cognizant of and accommodate individual learner needs. Laurillard (1993) observes that teaching involves the *mediation* [italics mine] of learning between the educator and the learner (p. 6). Mediation, in this sense, connotes negotiation, a seeking of accommodation. This mediation function is at the very root of successful teaching and learning. For it is the educator's ability to artistically juggle teaching strategies, learner needs, and outcome requirements that signifies the master teacher and, simultaneously, typifies the satisfied and "educated" learner. As Dunn and DeBello (1981) bluntly state, "We can no longer afford to assume that all students will learn through whatever strategy the teacher prefers to use" (p. 372).

The mediation of learning is confounded by a myriad of factors which can and do influence the teaching-learning process. Some of the learner-oriented factors are readily identifiable such as pre-existing mastery of basic skills, prior knowledge, aptitude, and intelligence. Other learner factors such as interest, motivation, and environmental conditions are highly serendipitous and idiosyncratic. Educator-oriented factors include mastery of teaching strategies, facility with basic communication skills, content area knowledge, and sense of humor. As a result, the so-called window of optimal teaching-learning opportunity or "the teachable moment" is illusive and seldom easy to predict or contrive. Anderson and Adams (1992) concur and point to learning style awareness as central to optimal teaching and learning:

[o]ne of the most significant challenges. . . is to be tolerant and perceptive enough to recognize learning differences among their students. . . . Effective teaching cannot be limited to the delivery of information; rather, it needs to be based on a model of minds at work. Effective teachers are those who involve all

of their students in learning how to learn. This generative process of learning is most effective when instructors (1) affirm the presence and validity of diverse learning styles and (2) maximize the climate or conditions for learning in the classroom through the deliberate use of instructional design principles that take account of learning differences and increase the possibilities of success for all students. (p. 20)

Teaching and learning can be most aptly characterized as a process of continuing attempts to align teaching and learning preferences. Recognizing and acknowledging that educators have preferred methods of operation (teaching style preferences) and students have preferred methods of operation (learning style preferences) should change practical efforts that seek to facilitate learning outcomes. Successful education negotiates an accommodation between educator and learner preferences and situational constraints. Educational literature on situational constraints and educational preferences is well-documented, but until recently, little attention has been given to learner differences. As Guild (1994b) so eloquently argues, "If we believe that people do learn--and have the right to learn in a variety of ways, then we will see learning styles as a comprehensive approach guiding all educational decisions and practices" (p. 21).

In understanding learner differences, research has focused on learning style preferences. As Marshall (1987) comments, "The interest in learning styles seems to have developed out of the post-Thorndike proposals that how information is presented to students may be more important to the learning process than the general aptitude of students" (p. 417). It is axiomatic that individuals are different in the ways they prefer to learn (e.g., Dunn & Dunn, 1972, 1979; Dunn, 1984; Griggs, 1985). The explanations for individual differences vary from biobasic phenomena to cultural determinants.

Research suggests that individual differences in learning are a biobasic phenomenon; that is, individuals have biologically and experientially induced characteristics that either foster or inhibit achievement. Research also supports the hypothesis that gender, hemisphericity, and ethnicity have been demonstrated to directly manifest learner differences. Severiens and Ten Dam (1994) reviewed the research on gender and learning styles of students 18 and older

through a quantitative meta-analysis on Kolb's Learning Styles Inventory and Entwistle's Approaches to Studying Inventory. They conclude that the abstract conceptualization mode of learning is preferred by more men than women, that women are more likely to be intrinsically motivated, and that men are more often extrinsically and achievement motivated. They further conclude, however, that little research explores the nature of the link between gender differences and student learning. Specifically, they note a "lack of investigation of the role of education in creating the differences in learning styles" (Severienes & Ten Dam, 1994, p. 489).

Mann, Sasanuma, Sakuma and Masaki (1990) extend the research on gender and cognition to non-Western student populations. Their investigation of high school students in Japan and America concludes that gender differences in cognitive ability are consistent across cultural contexts. Although they find that "females excel on certain tests of verbal skill, whereas males excel on certain tests of visual spatial skill" (Mann, Sasanuma, Sakuma, & Masaki, 1990, p. 1063), these results "do not warrant different educational goals for men and women" (p. 1075). Reviews of cognitive-based gender differences are provided by Garai and Scheinfeld (1968) and Maccoby and Jacklin (1974).

Kail and Siegel (1978) and Eubank and Sparks (1993) attribute cognitive differences between males and females to hemispheric differences and conclude that these differences are reflected in different gender preferences in learning styles. In a study of optometry students, Eubank and Sparks (1993) conclude that the recognition of a "student's cognitive and learning styles and their subsequent interactions in order to provide the most efficient learning environment" is essential because as "a degree of success is achieved in a learning endeavor, the strategies that allow cerebral dominance to be in harmony with preferred learning style become more evident and ingrained" (pp. 23-24).

Finally, the reality of diversity in the classroom has prompted relatively recent interest in determining whether culture influences the multicultural learner's decoding and processing of information. Robinson (1985) observes that culture determines how people interpret and mentally organize the world and control the information that is received and processed (p. 28). A

number of studies conducted on public school students have concluded that certain ethnic groups (e.g., African American and Hispanic) have learning style preferences that are distinctly different from those of other ethnic groups (Berry, 1966; Hale, 1982; Jacobs, 1987; Jalali, 1989; Williams, 1989; Matthews & Jones, 1994).

Bell (1994) concurs with this research in arguing that any cultural worldview includes epistemology. Her research on African American worldview argues that “a valid understanding of the meaning of knowledge acquisition in African Americans can only be derived from analyses that respect the integrity of African American philosophical-cultural orientation to reality” (Bell, 1994, p. 53). The educational implication, then, is that “[s]chool learning environments should respect the integrity of their cultural orientation to learning and problem solving” (Bell, 1994, p. 59). A recent study of gifted African American, Mexican American, and American-born Chinese middle grade students determined that preferred learning style differences did exist. Ewing and Yong (1993) remind educators that findings from their study supports earlier scholarship that concluded “[f]ailure among minority group children is partly due to the failure of traditional schools to accommodate their learning styles [Abrahams & Gay, 1972; Gilbert & Gay, 1985; Hale, 1982; Hilliard, 1976; Powell, 1983]” (Ewing & Yong, 1993, p. 40).

Guild (1994) contends that although we need to appreciate cultural differences in preferred learning styles, educators must be careful not to generalize about a minority group to the extent that one fails to recognize individual learning style preferences within the group. Given that caveat, Guild enumerates four generally agreed upon conclusions of learning style research: (1) “students of any particular age will differ in their ways of learning”; (2) “learning styles are a function of both nature and nurture”; (3) “learning styles are neutral”; and (4) there is a “cultural conflict between some students and the typical learning experience in schools” (1994b, pp. 18-19).

Considerable debate has arisen over the issue of neutrality of learning styles. Anderson and Adams (1992) agree with Bell's concern that educators treat learning styles as neutral: “The notion that all students' cognitive skills are identical at the collegiate level smacks of arrogance and

elitism by sanctioning one group's style of learning while discrediting the styles of others. Differences in learning (or learning style) do not imply the deficits often associated with men of color or with women students" (pp. 19-20).

To date the inquiry into differences in preferred learning style as a cross-cultural variable has been quite informative. However, this body of research is confined to American ethnic groups and public school elementary and secondary school students. Given the scholarship on age as a variable in learning styles, it is important to extend this research to college-age populations.

Some limited research has explored non-Western learning behavior. The Mann, Sasanuma, Sakuma and Masaki (1990) study noted earlier discovered a pattern of gender differences in cognitive skills between young Japanese and American women and men. Specifically, through their battery of cognitive tests (i.e., Story Recall, Digit-Symbol, Mental Rotation, Word Association, WISC-R Maze, Arithmetic Ability, Memory for Printed Nonsense Words, Memory for Nonsense Designs) they found that in three out of four instances where gender difference was apparent, there was no indication that the differences were culture-dependent (Mann, Sasanuma, Sakuma, & Masaki, 1990, p. 1070). Further research is needed to determine whether the learning style conclusions are a product of Western cultural patterns or can be extended meaningfully to learning in non-Western cultures.

#### Purpose of the Study

The primary purpose of this study was to discover if verbal or spatial preferences for learning significantly differed among Asian and American undergraduate students. A secondary purpose was to determine if there was any significant difference across cultures in gender preferences for verbal or spatial learning cues.

#### Statement of the Problem

Two main problems were examined in this study. The first problem considered was whether an inventory that derived preference for verbal or spatial cues could be useful in

determining if Asian and American undergraduate students differed in their preferences as a function of culture. The second problem considered was whether the same instrument would reveal any significant gender differences across cultures in verbal or spatial preferences for learning.

### Subproblem

The subproblem concerned the development of the Engel and Engel Selection Skills Evaluation instrument (1990) designed to differentiate between verbal-spatial preferences for learning. While the verbal-spatial dimension has been recognized as a distinct cognitive modality and a number of studies have investigated this modality, no previously reported study has used the particular instrument employed in this current research project to detect cultural and gender differences in preferences for verbal or spatial cues for learning.

The actual inventory closely followed the format of the original test designed to differentiate subject preferences for learning on a word-shape modality. The Japanese and South Korean versions of the inventory were translated and validated by faculty linguists and visiting researchers at the institution sponsoring this research.

### Definition and Explanation of Terms

1. Cognitive style - psychological or aptitude construct which reflects personal preferences; habitual ways of processing information.
2. Learning style - an attribute of the individual which interacts with instructional circumstances to produce differential learning achievement (Dubin & Taveggia, 1986).
3. Learning - acquisition of new information (Ormrod, 1990).
4. Verbal-spatial preferences for learning - a specific dimension of perceptual modality for extracting information from the environment based upon a preference for either language or physical cues. Specifically, spatial abilities or skills involve perceiving and manipulating shapes and images. Verbal abilities or skills involve comprehending and reasoning with words.

5. Cross cultural study - examination of a variable(s) across distinct cultural boundaries.

#### Research Questions

In the absence of clear direction from previous research about what constitutes learner differences in a cross-cultural context that would guide the advancement of specific hypotheses, this current study examined the following two research questions:

1. Are there differences in verbal-spatial preferences for learning among Asian and American undergraduate students at the .05 level of significance?
2. Are any differences in verbal-spatial preferences for learning among male and female Asian and American undergraduate students significant at the .05 level of significance?

#### Limitations

This study was subject to the following limitations:

1. The subjects were volunteers.
2. The subject's degree of willingness to respond quickly to the sets of trials.
3. The subjects were all male and female students enrolled in liberal arts courses in their respective universities.
4. Asian subjects were limited to those students who were attending English-speaking courses.
5. Subjects were limited to those individuals who completed the entire inventory.



## CHAPTER II

### LITERATURE REVIEW

This review intends to accomplish a number of objectives. First, a discussion of the conceptual framework for understanding learning style as a construct will ground this study. Second, the predominant instrumentation used to objectify individual learning styles will be examined. And, finally, a review of research directly relevant to this current investigation will be provided.

#### Conceptual Framework of the Study

The genesis of current learning style research can be traced directly to antecedents in the phrenology movement in the early 1800s. The phrenology movement sought to establish the brain as "the organ of the mind." Early phrenologists postulated that certain physiological functions could be correlated to localized areas of the brain.

With the emergence of experimental psychology as an outgrowth of experimental physiology in the early and mid-1800s, basic brain research continued to explore some of the fundamental hypotheses of phrenology. Under the guise of functional psychology, the general goal of this stream of experimental research was to more specifically localize functions of the brain.

During the early 1900s, Gestalt psychology was advanced as an independent challenge to American behaviorism. Gestalt psychologists, "emphasized the importance of organizational processes in perception, learning, and problem solving and believed that individuals were predisposed to organize information in particular ways" (Omrod, 1990, p. 129).

Gestaltists argued that a person was predisposed to impose a particular structure on a situation. Learners were presumed to be actively involved in the learning process. If learners controlled their own cognitive processes, then, learners were uniquely deterministic regarding what information they would learn and how they would learn that information. Learning, or the formation of new connections, was deemed another central brain function.

Paralleling the emergence of the Gestalt and educational psychology movements was the experiential learning movement. Experiential theorists John Dewey, Kurt Lewin and Jean Piaget each emphasized the centrality of experience as well as the environment in the learning process. Collectively, experientialists said that learners are actively involved in their own learning and the structuring of their individual cognitive processing through particular coding strategies to help them learn.

Any investigation of the teaching-learning process requires particular appreciation for the role of cognition. Simply, cognition refers to how people receive, store, retrieve, transform, and transmit information. The cognition process, or more precisely cognitive processing, is highly individualistic and manifests itself as a profile of distinct processing behaviors. Research which focuses on the interface between cognition and personality has concentrated on cognitive style.

Cognitive style refers to a quality of living and adapting reflected by distinctive personality types. Cognitive style is a psychological or aptitude construct that reflects personal preference, the ways one structures beliefs and attitudes about the world and the way one responds to incoming messages. Individuals manifest patterned pervasive qualities or traits which persist across situations. A style develops over time, changes slowly, and reflects other personality characteristics such as idiosyncratic traits of motivation, topic interest, and readiness to learn.

Cognitive style can be thought of as habitual ways of processing information. Cognitive styles reflect consistencies in information processing that develop in tandem with personality traits. Messick (1982) observes that cognitive styles are "information processing regularities that develop in congenial ways around underlying personality trends" (p. 4). Pintrich (1990) says, "The traditional personality orientation, often an older view, characterizes cognitive styles as relatively stable personality traits of the individual that are consistently expressed in most situations" (p. 828).

To date, research has identified a variety of cognitive style dimensions or cognitive control styles. These include field dependence versus field independence (global versus analytical orientation), reflection versus impulsivity (the tendency to approach tasks with speed versus

accuracy), locus of control (individual versus group), scanning versus focusing (extent to which an individual attempts to validate the judgments made by scan or focus), leveling versus sharpening (the degree to which one is prone or resistant to assimilation of new information), risk-taking (the willingness to take chances in approaching goals), convergence versus divergence (the tendency to converge toward or diverge from the obvious in hypothesis generation), and cognitive complexity versus cognitive simplicity (the degree of "differentiation or hierarchic integration" of cognitive structures). These dimensions or control styles represent specific constructs that contribute to the structuring of a learner's cognitions.

The measures of cognitive style noted above tend to be bi-polar. A particular learner will typically exhibit a preference for one cognitive process somewhere along a dimensional continuum. For instance, a learner might, on a gross level, prefer complexity to simplicity, divergence to convergence. Moreover, a style tends to be rather stable throughout one's learning life. Thus, how individuals react to their learning environment is their cognitive style. In many cases, cognitive style is simply referred to as learning style. As James and Blank (1993) claim, "a good case can be made for either label; however, *learning style* seems to be taking hold" (p. 47).

Clarifying the relationship between the terms "learning style" and "cognitive style" is problematic. Merriam and Caffarella (1991) argue that the difference between the concepts of cognitive style and learning style "lies in the emphasis placed on the learning situation versus the more general notion of how people perceive, organize, and process information" (p. 177). Quite often, the terms have been, and continue to be, blurred in the literature.

There seems to be precedent for the terms to be used interchangeably. As Mann and Sabatino (1985) simply state: "The distinction between the two is arbitrary. What we called *learner styles* encompass cognitive styles, and cognitive styles constitute learner styles" (p. 202). The community of learning style (or cognitive style) scholars seem generally little-troubled by the relative lack of agreement.

Learning style, as operationally defined in the literature, is an interaction between learner and the learning venue. Learning style can be envisioned as an attribute of the individual that interacts with instructional circumstances to produce differential achievement (Dubin & Taveggia, 1986). Learning style represents attributes derived from the individual's interaction with instruction to produce differences in learner achievement. Individuals acquire a preferred style of learning that over time becomes habituated. Learning style, then, can be thought of as the characteristic way a person collects, organizes, and transforms information into useful knowledge; style facilitates learning. However, as Galloway and Labarca (1990) observe, "Readers reviewing the literature on learning styles will benefit from a high tolerance of ambiguity" (p. 113). But, as Kinsella (1995) notes, "Because a learning style involves perception, cognition, conceptualization, affect, and behavior, it is understandable that various learning-style models and definitions exist" (p. 171).

Regardless of the lack of definitional rigor, some clear general consensus on learning style does emerge. Kolb (1984) declares that learning styles are possibility-processing structures that are an outgrowth of experiential learning (p. 19). Gregoric's (1979) phenomenological definition says learning style "consists of distinctive behaviors which serve as indicators of how a person learns from and adapts to his environment. It also gives clues as to how a person's environment operates" (p. 234).

Della-Dora and Blanchard (1979) explain learning style as "a personally preferred way of dealing with information and experience for learning that crosses content areas" (p. 22). James Keefe (1990) defines learning styles as "characteristic cognitive, affective, physiological behaviors that serve as relatively stable indicators of how learners perceive, interact with, and respond to the learning environment" (p. 5). Entwistle (1987) observes that learning style "can be considered to be an expression, in the academic context, of more fundamental, and relatively stable, components of cognitive style and personality" (p. 24). Smith (1982) offers the most widely-quoted definition: learning style is an "individual's characteristic ways of processing information, feeling, and behaving in learning situations" (p. 24). These various definitions make it

clear that learning styles are intimately interwoven with the affective, temperamental, and motivational structures of one's personality.

Keefe (1987) identifies three factors that contribute to learning style: cognitive style, affective style, and physiological style (p. 12). Cognitive styles are the information processing habits that characterize a learner's typical approach to perceiving, thinking, problem solving, and remembering. Affective styles consist of a learner's personality aspects that influence attention, emotion, and valuing. Physiological styles, as Keefe (1987) writes, "are biologically-based modes of response that are founded on accustomed reaction to the physical environment, sex-related differences, and personal nutrition and health" (p. 13). In summary, examination of how a learner prefers to process information focuses on the cognitive component of learning style. Specifically, consensus on what learning style "means" emerges at two particularly significant points: learning style is a meaningful construct that captures the essence of individual experiential learning and learning style reflects a repertoire of distinct, overt behaviors that blueprint a person's learning endeavors.

The research on learning style acknowledges the existence of a variety of learning paradigms that include perceptual modality preferences, that is, a learner will rely predominately on one of the five senses such as visual or verbal, spatial, or auditory cues when attending to new information. James and Galbraith (1985) expand the list of modalities to include print, aural, interactive, visual, kinesthetic, haptic, and olfactory.

A perceptual modality can be thought of as a means through which information is extracted from the environment (James & Galbraith, 1985). A modality is a preference and a measurable behavior. Studies of perceptual modality correlate cognitive and physiological style variables. For instance, Richardson (1977) reports on measures for individual differences on a verbalizer-visualizer dimension of cognitive style. Garland, Parsons and Nixon (1993) examine visual-spatial learning preferences of young adult male and female nonalcoholics from families with and without a history of alcoholism. Their research links perceptual modalities to earlier studies, especially that of Maccoby and Jacklin (1973), by correlating perceptual modalities with gender

differences. Women in this study as in earlier research performed more poorly than men on visual-spatial learning tasks. Additionally, they find an increased degree of hemispheric specialization for verbal and spatial abilities in men than in women. Messick (1984) uses the concept of "typical propensity" to designate a person's preferential ways of processing the information that has been extracted from the environment.

Wislock (1993) attends to how the brain receives information in a learning setting. He argues cognition is made possible through a network of perceptual modalities. While learners differ in the perceptual modalities that they prefer, all learners have a dominant perceptual modality, "it is the sensory channel through which information is processed most efficiently" (Wislock, 1993, p. 6). Learners also have secondary perceptual modalities. And, as Kinsella notes, "Modality strengths evolve and generally become more integrated with age" (p. 173).

The roots of learning styles are grounded in perceptual differences--each individual's perception is inherently unique; style describes the strategies for accessing information that make a learner unique. Typically, a learner will prefer either verbal or spatial strategies for accessing information. Verbal skills or abilities have been operationalized as vocabulary size, anagram-solving skill, spelling, language-acquisition rate, verbal expressiveness, and analogy problem solving. Spatial skills or abilities involve perceiving and manipulating shape and images as well as visualizing spatial cues.

One final area of learning style research bears note; research suggests cultures have distinctive learning styles. As Guild (1994b) notes in a recent issue of Educational Leadership, "There is very little disagreement that a relationship does exist between the culture in which children live [or from which they are descended] and their preferred ways of learning" (p. 17). But, as Guild (1994b) further asserts, "no work, to my knowledge, claims to be comprehensive on the topic of culture and learning styles" (p. 17). The issue of how to address culturally-linked learning style preferences remains. Must educators familiarize themselves with the worldviews of their students including culturally preferred ways of knowing? How do teachers from one worldview address the learning style preferences of students from another worldview? Recognizing that

cultural preferences are linked to academic achievement, what steps, if any, should be taken to mediate the identified problem areas?

Two other particular cognitive processes are recognized as inhering to learning style. Learning strategies reflect how learners strategically engage and accomplish a learning task. According to Snowman (1986), learning strategies are "a general plan one formulates for determining how to best achieve a set of academic objectives *prior* to dealing with the learning task itself" (p. 244). Reid (1987) says that these strategies are methods employed by a learner in mastering material. Finally, Weinstein and Mayer (1986) observe that the strategies represent "learners' actions and thoughts that occur during learning and that influence motivation and encoding, including acquisition, retention, and transfer" (p. 310). Learning strategies, then, are individual learner differences in information-processing patterns for specific academic tasks such as studying for an examination, writing an essay, taking lecture notes, and preparing for a laboratory practicum.

Another cognitive process which directly relates to a learner's style for processing information is learning preference. Cross (1981) suggests that learning preference reflects how a learner would like to learn. Learning preferences are tactics or modes of choice which embody preferred techniques when strategizing learning tasks. For instance, a learner will typically have a preferred method or tactic which he or she uses when studying for an examination. A preference is a product of trial and error and an outcome of a learner's conscious attempts to discover a successful way to efficiently and effectively accomplish a learning task. Thus, learning preferences are stable to the extent that a learner is able to rely on a preference to produce a positive result. (See Figure 1 for a summary of definitions ).

Figure 1  
Summary of Definitions

<p><b>Cognitive style</b></p> <p>personality trends lead to information processing regularities (Messick, 1982, p. 4)</p> <p>relatively stable personality traits expressed in most situations (Pintrich, 1990, p. 828)</p>
<p><b>Learning Style</b></p> <p>individual attribute interacting with instructional circumstances (Dubin &amp; Taveggia, 1986, p. 27)</p> <p>experiential learning possibility-processing structures (Kolb, 1984, p. 19)</p> <p>distinctive behaviors indicating how a person's environment operates (Gregoric, 1979, p. 234)</p> <p>preferred way of dealing with information and experience for learning (Della-Dora &amp; Blanchard, 1979, p. 22)</p> <p>characteristic cognitive, affective, physiological behaviors of perception and interaction with the learning environment (Keefe, 1990, p. 5)</p> <p>an expression of cognitive style and personality (Entwistle, 1987, p. 24)</p> <p>pattern of processing information, feeling, and behaving in learning situations (Smith, 1982, p. 24)</p>
<p><b>Learning Strategies</b></p> <p>formulation of how to best achieve a set of academic objectives (Snowman, 1986, p. 244).</p> <p>methods employed by a learner in mastering material (Reid, 1987)</p> <p>actions and thoughts that occur during learning (Weinstein &amp; Mayer, 1986, p. 310)</p>
<p><b>Learning Preference</b></p> <p>how a learner would like to learn (Cross, 1981)</p>

The previous discussion of various elements of learning style tends to create some definitional clutter. An onion is a meaningful metaphor to clarify the essence of learning style and



its various layers. Adapting Curry's (1983) onion metaphor, Claxton and Murrell (1987) offer a glimpse of how an onion's layers are analogous to the layers of learning style: basic personality characteristics form the core, information-processing characteristics form the second layer, social interaction characteristics form a third layer, and instructional preferences form the fourth and outermost layer.

Currently, we know that individuals differ in their preferences for how to learn. Learning style is one of the many variables in the process of learning. And, research has contributed to an understanding of many variables which actively demark such preferences. Finally, we also know that these preferences significantly influence how and what the learner actually learns. However, given the biobasic nature of learning there is yet to emerge a more complete picture of cultural differences in preferences for learning.

The quest to identify particular individual preferences for learning has been accomplished through the use of instruments designed to index learning styles in a variety of learning contexts. This next section will provide an examination of some of the more frequently used inventories constructed to assess adult learning style preferences.

### Learning Style Inventories

According to Curry (1990), upwards of 100 existing learning style instruments are available (p. 10). However, four particular diagnostic instruments remain the most popular and oft-used inventories for indexing the learning styles of adult populations across a variety of contexts. Learning style researchers have continually expressed a clear precedence for using either Kolb's Learning Styles Inventories (1976, 1985), Canfield's Learning Styles Inventory (1983, 1988), The Myers-Briggs Type Indicator (1962), or the Witkin, Oltman, Raskin, and Karp Embedded Figures Test (1971). The bulk of current information about adult learning style has been the product of using these four inventories.

This section is designed to accomplish two goals. First, a brief introduction to each of these four diagnostic instruments will be provided. Second, a brief discussion will be provided to document each instrument's validity and reliability.

### Kolb's Learning Styles Inventory

Without doubt, Kolb's LSIs (1976, 1985) are the most frequently used inventories. The majority of current information available about the learning styles of distinct adult populations in various contexts is derived from Kolb's inventories. The basic instrument consists of nine items, each with four options that can be ranked in order of preference. Responses are organized into two bi-polar constructs of learning ability: concrete experience versus reflective observation, and abstract conceptualization versus active experimentation. Identifying the predominant point on each dimension locates a particular learning orientation or learning style, e.g., diverger, converger, assimilator, and accommodator.

The *accommodator* style emphasizes concrete experience and active experimentation. Accommodators are willing to risk and tend to employ intuition and trial-and-error in problem-solving; they are hands-on, practical learners. The *converger* style exhibits a propensity for abstract conceptualization and active experimentation. The converger orientation reflects a preference for individual problem-solving, decision-making, and practical application of ideas; they are comfortable with technical tasks. The diverger style exhibits concrete experience and reflective observation. Divergers are feeling-oriented and respond to concrete ideas from a variety of perspectives; they are usually imaginative. Finally, the *assimilator* style prefers abstract conceptualization and reflective observation. These learners who excel in intuitive reasoning are not people-oriented and concentrate on evaluating ideas on a theoretical basis.

Kolb's instruments produce maps of individual learning abilities. Each style represents a descriptive profile of personal orientation for learning which indexes specific learning behaviors.

There have been numerous critiques of Kolb's original and revised instrument (Freedman & Stumpf, 1980; Certo & Lamb, 1980; Sims, R.R., Veres, J.G. & Shake, L.G., 1989; Sims, Veres,

Watson & Bucker, 1986; Atkinson, 1988; Veres, Sims & Shake, 1987; Geiger, Boyle, & Pinto, 1992; and Goldstein & Bokoros, 1992). The original instrument is critiqued for low reliability on the scales and because researchers question whether there is a bi-polar characteristic of the learning dimension. Revised in 1985, researchers continue to question the instrument's reliability. Kolb's LSI, nonetheless, continues to be regarded as the most satisfactory measure of learning styles. Cornwell and Manfredro (1994) review fifteen years of research using the Kolb instruments and conclude that although the "results of the empirical studies have generally not been supportive of Kolb's theory" (p. 318) and the "procedure is invalid because ipsative scores are highly intercorrelated" and not suitable for either psychometric evaluation or theory testing (p. 319), "learning styles do exist" and "Kolb's original impetus in developing the LSI as a diagnostic tool. . .has much merit" (p. 326).

#### Canfield Learning Styles Inventory (CSI)

The *Canfield Learning Styles Inventory* (1983, 1988) is an instructional preference instrument consisting of 30 general items, each with four options (conditions, structure, achievement, eminence) that result in 120 items to be ranked in preferential order. Each option contributes to a different scale, so that 21 scores result. Eight of the scales measure the student's preferred Conditions for Learning including peer, organization, goal-setting, competition, instructor, detail, independence, and authority; 4 scales measure Areas of Interest including numeric, qualitative, inanimate, and people; 5 scales measure expectations for the course grades; and 4 scales measure preferred Modes of Learning including listening, reading, iconic, and direct experience. A learning style is determined by locating the intersection of vertical columns offering a continuum of social to independent and horizontal columns reflecting a conceptual continuum.

The Inventory profiles nine learning types: the social learner prefers interacting with peers and teachers; the independent prefers working alone and appreciates self-selected and self-paced learning opportunities; the applied learner appreciates exercises directly linked to real-

world experiences; the conceptual learner prefers lectures and reading; the social/applied learner enjoys group problem-solving and practicums; the social/conceptual learner uses highly organized language-oriented materials and a balance of discussion and lecture formats; the independent/applied learner prefers independent labs and self-directed applications to real-world experiences; the independent conceptual learner prefers individual research and reading projects; and the neutral preference learner matches none of the above categories all of the time.

The Canfield Learning Styles Inventory has been used to assess teacher learning style preferences in comparison with the learning style preferences of their students. The assumption is that students will learn best from teachers whose style is compatible with their own.

The Inventory is reportedly valid, discriminating meaningful group differences in learning styles, with reliability values on individual items .87 and above and split-half reliability values ranging from .96 to .99. Gruber and Carriuolo (1991) document "the construction of a Learner Typology based on the Canfield Learning Styles Inventory (LSI)". . . .and provide "additional validity evidence for both typologies based on the typology results and informed judgments of expert instructors, administrators, and counselors in college developmental studies programs" (p. 839). They conclude that because, as is the case with Kolb's instrument, the use of ranking produces an ipsative measure, typical factor analysis measures are not an appropriate analytic procedure. Extension factor analysis, however, reveals preliminary validity evidence. Bonham (1988) critiques Canfield's instrument because it is normed on "restrictive ranges of subjects: community college students only" (p. 15).

The Canfield LSI is designed to produce a profile of learning style based upon a subject's self-report of preference among particular learning conditions. The instrument is valid and reliable for discriminating group differences.

#### The Myers-Briggs Type Indicator (MBTI)

*The Myers-Briggs Type Indicator* was developed in 1962 as a measure of personality orientations that might be linked to job performance. The instrument modifies psychologist Carl

Jung's theory to measure four personality constructs in an attempt to identify an individual's basic preferences in terms of his or her habitual patterns of perception and judgment. As Carrell and Monroe (1993) explained: "Each of the four scales of the MBTI represents polar opposites, and the theory assumes that each pole is valuable and at times indispensable. Every person is presumed to use both poles of each of the four scales at some times, but to respond first or most often in a preferred style" (p. 149). The basic instrument contains 143 forced choice items each linked to one of four bi-polar constructs: extraversion versus introversion (EI); sensing versus intuition (SN); thinking versus feeling (TF); and judgment versus perception (JP) (Myers, 1962). This last dimension is an addition to Jung's theory and seeks to measure whether rational or irrational judgments dominate. A resulting pattern when filtered through Jung's personality theory is used to predict behavior and attitudes. Sixteen different personality types or portraits result from a composite preference on the bi-polar constructs.

Pittenger (1994) reviews the "large and often conflicting body of research that examines the validity of the test" (p. 467). A number of studies fault the instrument for not showing a bimodal distribution of data which should be present if MBTI is a true measure of psychological types (Sticker & Ross, 1962; Hicks, 1984; McCrae & Costa, 1989). Studies of the test-retest reliability of the four scales have both found a lack of stability in the personality characteristic (McCarley & Carskadon, 1983) and positively interpreted the stability of the personality characteristic (Carlson, 1980; DeVito, 1985; Murray 1990). Pittenger (1993) finds the positive reviews "inappropriate because the MBTI was evaluated using standards appropriate for trait tests" (p. 472) instead of type tests. Pittenger (1993) concludes, "Taken as a whole, these data suggest that the MBTI does not provide the assessment of personality types that it claims" (p. 475). An experimental analysis of MBTI "confirmed only that the MBTI can measure broadly defined traits. Therefore there is a conspicuous absence of empirical corroboration that 16 different types represent distinct and unique affective, behavioral, and cognitive propensities" (Pittenger, 1993, p. 478).

The MBTI operationalizes a learner's style as a profile derived from the interaction of the four general personality constructs. Recent efforts to validate the ability of the MBTI to clearly discriminate the 16 behavior types is in doubt. Thus, the MBTI's use to index learning styles is also in question.

### Embedded Figures Test (EFT)

Witkin, Oltman, Raskin, and Karp (1971) developed the *Embedded Figures Test* to reveal "the extent to which the person perceives part of a field as discrete from the surrounding field as a whole, rather than embedded in the field" (pp. 6-7). Renninger and Snyder (1983) explain the educational implications:

field-dependent teachers and students may be more likely to prefer team problem-solving situations, whereas field-independent teachers and students might be more likely to prefer situations that call for independently generated problem-solving strategies. More generally, field-independent students and teachers are more content oriented (Wu, 1967), whereas field-dependent teachers and students share a greater interpersonal orientation (Witkin, Moore, Goodenough, et. al., 1977). (p. 668)

The test consists of 18 pictorial items each of which is a non-meaningful geometric shape with an embedded non-meaningful geometric target shape. In other words, a subject is asked to locate a simple, non-meaningful figure (not readily recognized geometric shape) which may be obscured by a larger, more complex figure. The EFT is designed to measure a respondent's ability to find simple geometric figures within complex drawings. Scores index a respondent's preference for differentiation on a bi-polar scale measuring field dependence or independence.

A variation of the original instrument, the *Group Embedded Figures Test*, is available for administration in groups. It has three timed sections, a first, practice section and second and third section, each with nine items. The number of figures correctly traced in sections two and three are combined to yield a raw score. A high raw score signifies field independence; a low raw score signifies field dependence.

Bonham (1988) identifies some problems with the EFT, not the least of which is that the test measures field-independence. Field-dependence is determined by the lack of field-

independence. Bonham concludes, "there is no way to tell whether a person is good at both approaches and could consequently choose whichever style is most effective in a given situation-or even whether the traits are true opposites" (1988, p. 12). Bonham argues that the EFT relies on spatial tasks on which males and females may have differing abilities. As a result, Bonham (1988) concludes: "Because field independence/dependence is said to be a broad psychological trait, men and women cannot accurately be compared on the trait if it is measured by a task that is sex-biased" (p. 13).

Typically, all four of these diagnostic instruments, Kolb's Learning Style Inventory, Canfield's Learning Styles Inventory, Myers-Briggs Type Indicator, and the Witkin's Embedded Figures Test, use subject self-report to index respondent preferences to certain bi-polar dimensions which constitute particular learning styles. Collectively, these instruments have contributed a wealth of data about the learning styles of adult populations in a variety of educational and professional contexts. In responding to the issue of the value of these, and other, inventories, Merriam and Caffarella (1991) comment, "Despite the lack of uniform agreement about which elements constitute a learning style, it seems apparent that learning style inventories, unlike most cognitive style instruments, have proved useful in helping both learners and instructors alike become aware of their personal learning styles and their strengths and weaknesses as learners and teachers" (p. 177).

Even if there is a lack of agreement on a common definition of learning styles, education scholars and practitioners do universally agree that an understanding of learning styles differences is fundamental to the teaching-learning equation. A glimpse of the breadth of contemporary research will document the scope and conclusions of studies which examine the learning styles of adult populations.

#### Learning Style Research

The following review of research particular to learning styles has been intentionally limited to some of the more recent studies which used post-secondary student populations. The

decision to exclude a review of studies of the learning styles of elementary and secondary students rests on the generally-accepted conclusion that early chronological age and maturation directly affects learning style. The studies under review only offer a representative explication of research conducted in various academic and professional domains. The aim of this sampling is to provide a sense of how learning style instruments are used. Of particular importance to this present study is the most recent research of adult learning styles in cross-cultural contexts.

#### Learning Style Research in Medical, Nursing, and Occupational Therapy Education

Whitney and Caplan (1978) used Kolb's Learning Style Inventory to measure the self-perceived learning styles of family practice physicians. The study investigated three questions: Do family physicians choosing to attend a refresher course differ in learning styles from those who do not attend? Do family practice physicians who are characterized by a particular learning style prefer different instructional methods than those with different characteristic learning styles? Is the age of the family practice physician related to his/her instructional preference? In comparing the physicians who completed a refresher course and a sampling of physicians who did not attend the refresher course, the results indicate a learning style difference. Also, the age of the physician was found to be related to instructional method preference.

Caplan (1984) used the Word-Shape Sorting Test to examine the cognitive preferences of 42 male and 31 female first-year medical students. The Word-Shape Sorting Test was originally designed by Galin and Ornstein (1974) to study the reflective eye movement of lawyers and ceramicists to verbal and spatial cues. In Caplan's study, the test revealed that a higher percentage of women than men consistently used the spatial strategy. This conclusion challenges previous research findings. Similarly, Caplan's research found that contrary to other studies of hemisphericity, men did not adhere to one particular approach and women did not shift strategic preferences.

In a pair of studies which used Kolb's LSI to index learning styles, Baker, Baker, Cooke, Conroy, Bromley, Hollon, & Alpert (1986, 1987) examined the role of learning style in the



residency training of anesthesiologists. In their initial study, they reported the learning style of 50 anesthesiologist residents was a predictor of success in residency. This study found the accommodator style to be dominant and accommodators were more likely to be considered outstanding students. In the second study, Baker, Cooke, Conroy, Bromley, Hollon, & Alpert (1987) investigated whether other anesthesiology programs exhibited similar style preference distribution patterns. From a compilation of data collected from four comparable training programs, the study found a characteristic distribution of style preferences similar to that reflected in the original study.

Lassen (1984) reported the differences in learning style between registered nursing students and generic nursing students who were enrolled in a degreed nursing program. Using Kolb's LSI to index learning styles, Lassen found the two groups similar in their learning styles throughout the four-year program.

#### Learning Style Research in Social Work Education

In the single descriptive study focusing on social work education, Kruzich, Friesen and Van Soest (1986) reported the learning styles of undergraduate and graduate students, faculty, and field instructors. Kolb's Learning Style Inventory was administered to the various subjects in three schools of social work. Three questions were asked: What are the predominant learning styles of social work students and faculty? Are characteristics such as age, experience, and choice of concentration related to particular learning styles? How can information about the learning styles of students and teachers be used to inform the educational process? The study found that faculty, students, and field instructors all had dominant styles, age and gender differences were pronounced, and recognition of learning styles can enhance the educational experience.

#### Learning Style Research in Adult Education

In a 1985 descriptive study, Willett and Adams focused on the learning style preferences of adult males studying in an external degree program. The researchers used Canfield's (1977) Learning Style Inventory to collect individual learning style preferences. The study found that the

particular external degree program had attracted a group of traditional adult learners whose learning style preferences necessitated a structured, highly-organized learning environment.

Loesch and Foley (1988) compared the learning style preferences of adult learners in a nontraditional undergraduate degree program with adults enrolled in a traditional undergraduate degree program. The Learning Preference Inventory (Rezler & French, 1975) was administered to the students. Results indicated that the students enrolled in each of the two programs differed significantly in their learning preferences. The nontraditional degree program students preferred to organize their own learning experiences while the traditional degree students had a greater preference for teacher-directed learning experiences.

#### Learning Style Research in Vocational, Accounting, and Business Education

Biberman and Buchanan (1986) used Kolb's LSI, in part, to examine learning styles among four business majors (economics, accounting, finance, and marketing). Results indicated that business majors had a propensity for all four major types of learning style (divergers, assimilators, convergers and accommodators). Most significantly, this study's conclusions regarding the presence of a range of learning styles was contrary to previous research which found that business majors had predominately an accommodator learning style.

To facilitate structuring of in-service instruction, Rollins and Yoder (1993) sought to describe the learning style preferences of Pennsylvania State University Cooperative Extension county staff members using the Kolb Learning Style Inventory. Their study also examined the relationship between learning style preferences and variables associated with staff assignments. Based upon 211 completed inventories, Rollins and Yoder determined clear learning preferences for individual staff members and a hierarchy of preferences for the various groups (e.g., agriculture agents, Four-H/Youth, County Directors, family living agents).

As part of a comprehensive study of program outcomes for a performance-based provisional vocational teacher certification program, Walker, Merryman, and Staszkiwicz (1984) used the Hill Education Cognitive Style Interest Inventory to assess the students' cognitive style.

Results from the Inventory were used to determine if, in part, cognitive style characteristics were different for participants classified as mastery or nonmastery students.

Dean and Snell (1991) tested the hypothesis that when learning styles of teachers and students are matched significant increased learning occurs. Two professors and 40 undergraduate student volunteers were administered the Group Embedded Figures Test. In comparing grades for the group of "field independent" students and professor with the other group of "field dependent" students and professor, the study found no significant differences.

Using the MBTI, Cooper and Miller (1991) identified the congruence of student learning and faculty teaching styles, determined that this congruence was related to student evaluations of the course and instructor but was not significantly related to academic performance. They conclude, "the results of this investigation do seem to support the importance of MBTI learning style-teaching style congruence as a potential intervening construct in the learning process" (Cooper & Miller, 1991).

#### Learning Style Research in Teacher Education

As a secondary goal of their research, McAlpine and Taylor (1993) examined the learning style preferences of Cree, Inuit, and Mohawk teachers in remote Canadian districts. The sample population was comprised of 45 aboriginal teachers attending a summer teacher education program. The Canfield LSI was used to index learning preferences. Findings revealed that these teachers did, in fact, have preferences distinct from mainstream teachers. As the authors report, generally the Inuit placed more importance on working with numbers than the Mohawk and nearly half of the Inuit preferred conceptual learning (p. 13).

Matthews and Jones (1994) studied preservice teachers to index their learning styles and determine whether any differences exist between African American and white teacher education students. The Canfield LSI was administered to the 334 students in the sample population. The researchers concluded that African American and white preservice teachers did have some style differences, but there was no significant difference in gender preferences among learning styles.

### Learning Style Research in a Cross-Cultural Context

Recently, Yuen and Lee (1994b) published, "Learning Styles and Their Implications for Cross-Cultural Management in Singapore." This study explored the learning styles of 1,032 undergraduate students who were completing their senior year at a major Singapore university and compared the finding with two previous studies of U.S. students. The Singaporean students were majoring in a range of disciplines including humanities and social sciences, basic sciences, computer science, medicine, law, business administration, and architecture. Kolb's LSI (1985) was used to index learning styles. Results indicated that Singaporean students had a preference for abstract conceptualization and reflective observation, whereas previous studies of U.S. students showed their preference for concrete experience and active experimentation. In comparing student learning style preferences with anecdotal characteristics of Singaporean and American managers, the authors concluded that a similarity in style pervades training and practice. In a second report of the same study, Yuen and Lee (1994a) attribute the students' characteristic responses to the fact that they learn by rote, are part of a traditional culture, look to teachers as authority figures, and learn in a passive manner (p. 544).

The Yuen and Lee study is significant as one of very few studies to attempt to extend research on learning styles to undergraduate students in non-Western cultures. In contrast to the gender study by Mann, Sasanuma, Sakuma, & Masaki (1990), Yuen and Lee (1994b) discover differences between Western and non-Western students. However, the authors do not differentiate between male and female students when reporting results. The Yuen and Lee (1994b) study not only examines the learning styles of non-Western undergraduate students, but extends a comparison of learning styles between Singaporean and American undergraduate students.

On a more limited scale, but relevant to this study, Nah, Lane, & Fuqua, (1990) studied ninth grade South Korean students from one rural and one urban public school. They administered the Learning Styles Profile (LSP) published by the National Association of Secondary School Principals and the Group Embedded Figures test discussed earlier. The study

was designed to determine whether field dependence or field independence correlated with scholastic performance. Their study found that categorization, memory, discrimination, and sequential processing skills were not predictive of their measure of scholastic success, a standardized Korean achievement test that is modified monthly and sold to the schools. Their research concludes that for the Korean students sampled, "a set of cognitive styles are related to differences in achievement performance in various subject areas. Especially the field dependent/independent, analytic, and spatial styles are highly related with the academic achievement" (Nah, Lane, & Fuqua, 1990, p. 145).

### Summary

The review of literature relative to the previous study of learning style reflects a rather robust research agenda. The review exhibits the broad spectrum of research among a variety of academic and professional domains. Specifically, it is clear that research sampled in this review has most often used Kolb's Learning Style Inventory to index learning styles. This inventory derives personality-based preferences rather than perceptual modality preferences which are the focus of this present study. Also, all of the studies under review employ research questions to guide investigation of learning styles.

Notably, the research literature is void of specific cross-cultural investigations of perceptual modalities such as verbal-spatial preference for learning among undergraduate populations.

The primary purpose of this study was to discover if verbal or spatial preferences for learning significantly differed among Asian and American undergraduate students. A secondary purpose was to determine if there was any significant difference across cultures in gender preferences for verbal or spatial learning cues.

Thus, two main problems were examined in this study. The first problem considered was whether an inventory that derived preference for verbal or spatial cues could be useful in determining if Asian and American undergraduate students differed in their preferences as a

function of culture. The second problem considered was whether the same instrument would reveal any significant gender differences across cultures in verbal or spatial preferences for learning.

The subproblem concerned the development of the actual instrument designed to differentiate between verbal and spatial preferences for learning. While the verbal-spatial dimension has been recognized as a distinct cognitive modality, no previously reported study has used the particular instrument employed in this current research project to detect cultural and gender differences in preferences for verbal or spatial cues for learning.

## CHAPTER III

### METHODS

#### Subjects

Originally, the research sample was drawn from three Asian universities and one university in the United States. The three Asian universities were Xiamen University in the People's Republic of China, Kook-min University in the Republic of South Korea, and Tokyo International University in Japan. However, the package of inventories mailed to the contact person at Xiamen University never arrived on campus. Consequently, this study draws the Asian student population from Kook-min University in Seoul, Korea, and Tokyo International University in Kawagoe, Japan, and American students from Willamette University in Salem, Oregon.

A total of 289 students volunteered for the study: 97 South Korean students (61 male, 36 female); 94 American students (38 male, 56 female); and 98 Japanese students (31 male, 67 female). A total of 132 male and 157 female students completed the inventory. Seven inventories were discarded due to noncompletion.

The students were all enrolled in upper division liberal arts courses and ranged in age from eighteen to twenty-four. The courses were typically social science and literature classes. The courses at the two Asian universities were taught in English.

Approval was received by the Institutional Review Boards for the Protection of Human Subjects at the university that sponsored this dissertation (see Appendix A). Although none of the Asian universities or the American university required formal approval for use of human subjects, authorization was solicited from the appropriate institutional representatives.

#### Data Collection

#### Historical Foundation

The original inventory format for discerning verbal-spatial choices by respondents was pioneered by Galin and Ornstein (1974) as the Word-Shape Preference Test. Their test

consisted of 54 “oddity” items. Each item (or set) contained three geometric shapes with a word embedded within each shape. In each trio or set of geometric shapes/words, two of the shapes were similar or fit together and two of the words were similar or fit together. The odd word and odd shape never coincided. Subjects were instructed to work quickly through the items as they chose the odd member of the trio of words or shapes. To interrupt a response set, a forced choice item (only one oddity present) was inserted after every four items. The number of items that were sorted on the verbal oddity was taken as the score for the test. No rationale was given in the original discussion of methodology as to why the verbal response was selected as the scoring determinant. Thus, a score was the respondent’s preference for a verbal or spatial choice.

Following the lead of Galin and Ornstein’s work in 1974, Caplan (1984) constructed a modified version of the original Word-Shape Sorting Test. Caplan’s inventory was composed of 66 trials in which the subject selected the single item from three choices which did not belong with the other two items. Each of the three items in a trial consisted of a line drawing of a geometric shape in which a word was embedded. Two of the item shapes were identical or fit together with a corresponding association of the words. The odd shape and odd word never coincided which forced the subject to decide which words or shapes were compatible based on subject preference for verbal or spatial features alone. Both answers were considered correct. In Caplan’s (1984) study, six of the trials forced a spatial choice and six of the trials forced a verbal choice (54 trials allowed for either a verbal or spatial response).

Thus, for more than twenty years researchers have used instruments with a word-shape template to differentiate learning style preferences among various subject populations. For instance, Galin and Ornstein (1974) reported significant differences on their word-shape test between ceramicists and attorneys. As Galin and Ornstein hypothesized, attorneys gravitated to the verbal properties of each trial while the ceramicists elected spatial properties.

Studies such as Galin and Ornstein (1974) have suggested a preference for verbal cues among female respondents. In elementary school children, girls exhibited a greater preference for verbal cues than did boys based on an adaptation of Galin and Ornstein’s original test (Caplan



and Kinsbourne, 1981). Moreover, Caplan (1984) administered a modified version of the Caplan and Ornstein Word-Shape Sorting Test to a first year medical school class. The researchers found that women at this educational level again tended more often to demonstrate strategic preference and that that preference was for the verbal cues.

Most recently, Caplan and Cushman (1991) used a simplified version of the original Galin and Ornstein Word-Shape Sorting Test to determine whether victims of unilateral stroke would demonstrate a verbal or spatial learning preference. The authors discovered no significant preferences.

### Current Design

The preference inventory used in this study of cognitive learning styles also relied upon a format established to discern verbal and spatial choices. This current study used a new version of the standard Word-Shape Sort Inventory developed by professors Harold Engel and Joanne Engel at Oregon State University (see Appendix C). Their Selection Skills Evaluation was an iteration of the Galin and Ornstein's (1974) design recommendations.

The Engel and Engel Selection Skills Evaluation was designed as a problem solving task to ascertain a respondent's cognitive preference for verbal or spatial cues. The instrument contains two sections. The first section includes the declaration of informed consent and demographic items. The second set is comprised of 25 sets of geometric figures and embedded words.

Language-specific versions of the test were constructed for use at Xiamen, Kook-min and Tokyo International Universities. Two translators collaborated in translating each of the tests into Chinese, Korean and Japanese using back translation as well as offering advice on necessary changes in the embedded words in geometric shapes.

On the instruction page of the questionnaire administered to Asian students the demographics section was changed in three respects: (1) the question of whether the course

was required or an elective was eliminated; (2) the word undergraduate was eliminated from the phrase undergraduate study area; and (3) sex was changed to gender.

Verbal changes to accommodate cultural differences were made in twelve of the sets. Geometric shapes remained unchanged, but cue words were adapted to each Asian culture. The decision to replace embedded words from the English version of the inventory was made to minimize potential cross-cultural confusion (Figure 2).

Figure 2

## Verbal Changes to Minimize Potential Cross-Cultural Confusion

Set	English	Chinese	South Korean	Japanese
Three	Pathology Anatomy	Aspirin Penicillin	Pathology Anatomy	Pathology Anatomy
Five	Alabama Oregon Japan	California New York China	Texas New York China	Texas California Italy
Nine	Clarinet Saxophone	Trumpet Mouth Organ	Clarinet Saxophone	Clarinet Saxophone
Ten	Oak Maple Elm	Peach Cherry Plum	Oak Maple Pine	Cherry Plum Peach
Eleven	Chevy Wagon Ford	Red Flag Bicycle Ford	LeMans Wagon Sonata	Toyota Wagon Honda
Fifteen	Turkey	Turkey	Duck	Duck
Seventeen	Pasture	Field	Pasture	Pasture
Eighteen	Filbert Cashew	Peanut Chestnut	Peanut Chestnut	Walnut Cashew
Nineteen	Ruby Diamond	Gold Silver	Gold Silver	Ruby Diamond
Twenty	Trot Pace	Walk Run	Walk Run	Trot Pace
Twenty one	Venus	Moon	Venus	Venus
Twenty three	Yale	Stanford	Stanford	Stanford

The inventories designed for the Asian universities were piloted on 30 students from each of the Asian target populations for clarity of instructions and precision of word-symbol and word choice as well as pair congruity by volunteer undergraduate students and translators at Oregon State University.

### Administration

Inventories for each of the two Asian universities were administered by a faculty colleague from Willamette University who conducted a study tour that included Kook-min and Tokyo International Universities. The colleague arranged site approval for administering the inventory and collaborated with the resident course professors in proctoring the introduction and collection of the inventories.

At all sites, a proctor introduced the inventory and briefly explained the nature of the research. Students were reminded that participation was voluntary. After students read the general directions, the proctor injected wait time for necessary clarifications. Proctors from all three sites reported that students did not ask questions or encounter difficulties in understanding directions.

The students were urged to take no more than ten minutes to complete the inventory. All students were able to complete the test in less than the allotted time.

No attempt was made to identify a respondent. If a student wished to know the results of their test, they could place a personal identification code in the upper right hand corner of the instrument. (Only three American respondents took advantage of finding out their score.)

### Coding

The relative score for each respondent was calculated using the following protocol. Of the 25 items on the test, 21 items allowed for a respondent to freely select either a verbal or spatial preference. There were four "choice" items that were forced on the 25-item test: item 4 (spatial); item 10 (spatial); item 14 (verbal); and item 21 (verbal).

Scoring used verbal strategic choice as the baseline score. A "perfect" score, then, was a 23 (responding verbally on all 21 free choice items plus the two forced verbal choice items). The "base" score represented the total number of correct responses (25 total items less the number of incorrect items). The Verbal Strategic Score (VSC) was derived by dividing the verbal score by the number of correct responses.

The scores on this test could range from 8% (2/25) to 92% (23/25) which reflected the percentage of verbal strategic choices. Similarly, the total range for all 25 items could not be from 0% to 100% because four choices were forced. Scores on the sorting task were divided into three ranges (8%-36%, 37%-64%, and 65%-92%), roughly indexing spatial preference, no preference, and verbal preference respectively. The designated ranges for each preference were established by Galin and Ornstein (1974) and Caplan (1984).

A response was designated as incorrect if the respondent failed to select the correct response on a forced choice item or if the respondent gave an "impossible" response on a true trial item. Regardless of the reason, all incorrect responses were dropped from the scoring process. The error rate was derived by dividing the number of incorrect responses by the base score. An absolute score was also calculated for each respondent. The absolute score was derived by dividing the number of correct verbal scores by 23 (the optimal verbal score).

#### Instrument Validity

None of the previous studies which relied on some version of a word-shape sort test to identify learning preferences ever reported instrument validity. Whereas concurrent and predictive validity remain illusive, it can be argued that a selection skills inventory can be a valid measure of respondent preferences.

The preference instrument offered construct validity. As previously reported, individuals do have a dominant perceptual modality as well as secondary perceptual modalities for processing information. It could also be argued that the inventory possessed face validity. It is quite apparent that the test on a prima facie level would allow for a respondent to differentiate a verbal or spatial preference for learning.

## CHAPTER IV

### RESULTS

Two main research questions were of interest in this investigation: (1) Were there any significant differences across cultures in preferences for verbal or spatial learning cues? and (2) Were there any significant differences across cultures in gender preferences for verbal or spatial learning cues?

#### Statistical Analysis

A total of 289 students completed the inventory: 97 South Korean (61 male; 36 female); 94 American (38 male; 56 female); and 98 Japanese (31 male; 67 female). A total of 132 males and 157 females completed the inventory. Seven inventories were discarded because respondents had chosen not (for various reasons) to complete the inventory.

An examination of completed inventories for the three cultures indicated a wide divergence in cell populations. While the three general populations of South Korean, American, and Japanese students were numerically quite similar (99, 94, and 96 respectively), the actual cell disparities occurred within cultural groups but not between gender categories.

Because of cell size disparities, it was not possible to use the standard model for an analysis of variance. Thus, to make full use of the interval-level data, a special two-way (gender, nationality) analytical model which would accommodate unequal cell sizes was employed. A preliminary visual inspection of the cell means strongly suggested that notable differences did, in fact, occur.

In Table 1, the relative and absolute mean scores for verbal strategic choice are reported.

Table 1  
Means for Relative and Absolute Scores Across Nationalities

	American	Japanese	South Korean
Absolute Verbal Mean	950.78	531.41	427.70
Relative Verbal Mean	903.38	546.86	463.36

Using relative scores, the ANOVA model treated individual cell means as original data which sacrificed in-cell variance. Thus, much unique in-cell information was lost. Preliminary analysis of inventory results are reported in the Table 2.

Table 2  
Summary of Two-way Analysis of Variance  
With Unequal Cell Sizes Using Relative Scores

SOURCE	SS	df	MS	F	
Gender	402.90	1	402.90	0.6130102	NS
Nationality	2266.18	2	1133.09	1.7239905	NS
Interaction	706.06	2	353.03	0.5371333	NS
Within cell	18486.80	281	657.2484		
TOTAL		286			

\*p<.05

The level of significance was established at the  $p < .05$  level. According to the table of standard thresholds of significance, there was no significant gender or cultural difference on verbal or spatial preferences for learning. Also, there was no significance in preference scores among or across (interaction) cultural groups. The greater the cell size difference, the greater the likelihood that residual comparisons of variance would be bogus. It can be clearly argued that the

failure to discover any significant differences may be attributable to the gross disparities in cell sizes.

Because of the cell size disparity, a second and third two-way analysis of variance was conducted with equal cell sizes using both relative and absolute scores. (Another analytic option to equalize cell sizes by filling voids with normative data was discarded as an inappropriate tool.)

Since the minimum number of subjects in an intact cell was 31 (Japanese males), that number was selected as the base number for reframing the remaining cell sizes. Two distinct steps were used to discard data by randomly eliminating cases to achieve equal cell sizes. First, it was necessary to determine the sampling interval to achieve the base number. A random start for the count was used on each sample interval, with the starting point from each original cell derived from a table of random numbers. Second, a random walk through each original cell's data was conducted.

An analysis of variance assumes homogeneity of variances; all treatment groups have the same variance. A test of the homogeneity of variance of the three nationality groups was undertaken. The test (Hartley's test) assumes that the data meet the assumptions of the model which underlies the analysis of variance. Hartley's test was chosen because the test is one of the simplest tests to establish homogeneity.

To calculate homogeneity for absolute scores, one must divide the group's largest mean (Americans, 950.78) by the smallest mean (South Korean, 427.70). This number, 2.22, constitutes the base score and is in excess of the 2.07 critical value implying that the mean scores were not homogeneous. In calculating homogeneity for relative scores, the American mean was 903.38 and the South Korean mean was 463.36, given a base score of 1.95. That value is less than the critical value of 2.07, which suggests the means of relative scores share homogeneity. Thus, in contrast the relative data did meet the assumptions underlying the analysis of variance. The foregoing decision procedure assured the integrity of the data within cells of equal size. The protocol did not eliminate all bias, but did control for bias.



Results of the two-way analysis of variance of equal cells using relative scores are reported in Table 3.

Table 3  
Summary of Two-way Analysis of Variance  
With Equal Cell Sizes Using Relative Scores

Source	SS	df	MS	F	Critical F
Gender	230.371	1	230.371	0.352297	3.89364
Nationality	30759.82	2	15379.91	23.51985*	3.046148*
Interaction	708.8065	2	354.4032	0.541974	3.046148
Within cell	117704.1	180	653.9118		
TOTAL	149403.1	185			

\*  $p < .05$

The analysis of relative scores using equal cells reported that gender scores for verbal and spatial preferences were not significant. However, there was a significant difference in cultural preferences for verbal cues (Table 3).

Scheffe's test was then used to identify any significant differences among means for pairs of the three cultural groups in which ANOVA identified a significant effect. The critical value using Scheffe's test was 11.316; this was, then, compared with the difference in means for between paired cultural groups. The average means for each cultural group were: Japanese (160.4839); Americans (133.3548); and South Koreans (97.4495). If the difference between the means of two cultural groups was greater than the critical value, then, the differences are significant. Using this procedure, significant differences were identified across cultures on verbal strategic choice. The strongest verbal preference was made by the Japanese, followed by the Americans and South Koreans.

A third analysis of variance was conducted using even cells with absolute scores. Absolute scores were calculated by subtracting each respondent's verbal strategic score from 23 (the total possible correct verbal scores).

The analysis of variance with even cells and absolute scores was computed like the previous ANOVA. Table 4 reports the findings.

Table 4  
Summary of Two-way Analysis of Variance  
With Equal Cell Sizes Using Absolute Scores

Source	SS	df	MS	F	Critical F
Gender	21.33871	1	21.3387	0.03294	3.89364
Nationality	.69537	2	34768.5	53.6792*	3.046148*
Interaction	1803.7742	2	901.887	1.39243	3.046148
Within cell	116587.68	180	647.709		
TOTAL	187949.79	185			

\* $p < .05$

The ANOVA of even cells using absolute scores indicated no significance for gender preferences of verbal or spatial cues. However, results of this analysis confirmed the findings of the previous test. There were significant differences across all cultures on verbal strategic choice. Again, the strongest verbal preferences were demonstrated by the Japanese followed by the Americans and South Koreans.

#### Reliability

To date, reliability scores of word-shape sort instruments and their variations have not been reported. A task of this current study was to ascertain instrument reliability of the Engel and Engel Selection Skills Evaluation (1990).

The data set for the reliability test was composed of ten randomly-chosen respondents (about every tenth student) from each of the three nationalities. Each student's response to an instrument set was coded. A verbal response was coded as a 1, a spatial or incorrect response was coded as a 0.

The Hoyt procedure based on analysis of variance was employed to calculate reliability. The Hoyt model is similar to the standard Kuder-Richardson test of reliability. Reliability of the Engel and Engel Selection Skills Evaluation is  $r = .94$ .

#### Summary

This chapter reported results of the cross-cultural study of verbal and spatial preferences for learning. The initial analysis of variance using the original scores in unequal cells revealed no significant preferences by gender or across culture. The second and third analysis of variance using configured equal cells with the original relative scores as well as absolute scores indicated no significance differences in gender preferences for verbal or spatial preferences for learning. However, both of the latter two analyses of variance revealed significant differences in cultural groups' preferences for verbal learning cues. Also, both analyses revealed the exact same order of preference strength with the Japanese students ranking first, followed by the American and South Korean students. The final chapter will discuss the conclusions of this study.

## CHAPTER V

### CONCLUSIONS

Examining the learning styles of post secondary students has captivated the attention of educational scholars in recent years. In addition to developing instrumentation which indexes various learning styles, researchers have occasioned to examine the relationship of learning style to a host of other variables such as study habits and performance on examinations. The majority of post-secondary learning style research has focused on medical and nursing education, adult and vocational education, and business education. More recently, some emerging interest has been shown in discerning cultural influences on the learning styles of post secondary students. But this stream of research concentrates almost exclusively on indexing learning style personality types.

To date, research that studies perceptual modalities is, unfortunately, quite sparse. Since no existing research has studied any perceptual modality component of learning styles particular to non-Western undergraduate students, a study designed to index the verbal-spatial learning styles of Asian undergraduate students and compare preferences with American undergraduate students is needed.

#### Summary

The primary purpose of this investigation was to determine if there were any significant differences across cultures in preferences for verbal-spatial modalities for learning. The second purpose was to determine if there were any significant gender differences across cultures in preferences for verbal-spatial learning cues. A selection skills inventory designed to discriminate verbal-spatial preferences for learning was administered to the South Korean, Japanese, and American undergraduate student sample.

Volunteers for this study were 289 undergraduate students: 97 South Korean students (61 male, 36 female); 94 American students (38 male, 56 female); and 98 Japanese students

(31 male, 67 female). An additional seven inventories were discarded because of respondent failure to complete the inventory.

Because of cell size disparities, a special two-way (gender, nationality) analytical model was employed. Two analyses of variance using configured equal cells with the original relative and absolute scores were conducted. Scheffe's test was used to calculate the critical value which was then compared to the difference in mean scores for each pair of the three cultural groups.

Both of the analyses of variance confirmed a significant preference for verbal cues across the three cultures. Results indicated that Japanese students had the strongest preference for verbal cues followed by the American and South Korean students respectively. But, both analyses of variance failed to reveal any significant gender preferences.

#### Discussion

This study implies that there are cultural differences in verbal-spatial modalities for learning that could be of real interest to students of cognitive processing. Further, the study suggests that a fruitful avenue of research comes from expanding our knowledge in the study of cross-cultural preferences for certain perceptual modalities.

#### Research Question One

The first research question asked whether there was any significant difference in preference for the verbal-spatial modality of learning style in the study population of Japanese, South Korean, and American undergraduate students. The finding in this study that significant verbal preferences for learning exist with the strongest strategic preference among the Japanese students, followed by the American students and the South Korean students is particularly perplexing. In the absence of any other predictive research, the results necessitate some speculation to explain the possible reasons.

Certainly, culture plays a significant role in cognitive development and in the consequent development of learning styles. Adams (1992) observes, "cultural style reflects

beliefs, values, and norms that support styles of orientations toward the goal of learning" (p. 12). It follows, then, that culture influences the choice of perceptual modalities. Witkin and Berry (1975) argue that in highly authoritative cultures in which conformity is stressed, students tend to be more field dependent than learners in cultures in which individuality was encouraged. It seems reasonable to expect comparable influence of culture on a perceptual modalities test of cognitive ability. Secondly, if we assume with Unger and Crawford (1992) that verbal and spatial preferences can be modified through training, it would seem reasonable that educational practices would have some correlation with verbal-spatial preferencing.

Japanese education is structured and authoritative, emphasizing rote learning. Teachers assume control of information and students function as information recorders. This particular type of teaching is textual-based and, therefore, emphasizes a verbal modality over a spatial modality. American education, in contrast to Japanese practice, is increasingly more oriented toward discussion, self-discovery, and collaborative learning. These instructional practices train students in interpretation--mapping connections between ideas. Although each student learner may create a different map to connect ideas, the act of map making is a spatial function that might help explain why American students were more inclined than Japanese students to prefer spatial modalities. This speculation would account for the difference between Japanese and American students on the Engel and Engel Selection Skills Evaluation.

However, at this point it is impossible to explain why the South Korean students scored a distant third in verbal preference. One would have assumed the scores of the South Korean students would have, at the very least, closely paralleled the Japanese students. So, the question remains, why were South Korean students less verbal than the Japanese and American students?

### Research Question Two

The second research question asked whether there was any significant difference in gender preference for the verbal-spatial modality of learning style in the study population of Japanese, South Korean, and American undergraduate students.

The lack of any significant difference in gender preference for verbal-spatial cues is not surprising. In fact, it would have been impossible to a priori predict any pattern for the American population let alone the Japanese and South Korean students.

Stereotyping of American male and female differences in cognitive or learning style preferences has been pervasive for years. Such attitudes seem to have been based upon a conventional wisdom which lacked substance. Early cognitive style research seemed to clearly indicate that one ought to expect that any measure of the cognitive abilities of American students would reveal some gendered preferences, at least a preference by women for the verbal strategy.

Unger and Crawford (1992) observed, "For many years the general consensus among psychologists has been that females are superior to males in verbal performance" (p. 91). But, they concluded, the so-called general consensus was circumstantial, at best. One difficulty with the gender studies of cognitive ability is that tests of the spatial dimension do not consistently discriminate among multiple variables contributing to cognition. Females have frequently performed poorly on one kind of spatial test. Poor performance in this area led to speculation that women more naturally chose verbal over spatial modes of perceptual processing. Unger and Crawford, however, argue that "performance on spatial tasks is very responsive to training" (1992, p. 81), and that the differences between males and females in spatial ability is more likely the result of sociocultural factors than any inherent cognitive preference.

According to recent research by Hyde and Linn (1988), female superiority in verbal abilities is presented in textbooks as one of the best-established "facts" of psychology (p. 54) despite recent research significantly challenging these assumptions. As is the case with instruments designed to measure spatial abilities, verbal abilities tests measure multiple

variables contributing to the general area of verbal ability. Hyde and Linn's (1988) meta-analysis of verbal aptitude tests reveals little difference between males and females. When subsets of verbal ability are discovered, the differences seldom correlate with performance; that is, they are not predictive. Unger and Crawford (1992) note that most verbal abilities tests, "focus on abstract tasks devoid of social meaning and context and fail to test *communication skill*" (p. 94).

At best, we might conclude with Bascow (1992) who reviewed cognitive gender difference studies that, the only consistent findings are a small female superiority in verbal abilities and small male superiority in quantitative and visual-spatial abilities (p. 76). Many researchers now believe that if there was once a gap in verbal and math/spatial ability between the sexes due to brain differences and hormonal functioning, this gap has all but disappeared (e.g., Hall, 1967 and Holden, 1991). Sociocultural changes may have made it more acceptable for males and females to practice tasks that were at one time gender-restricted; this practice could alter the learner's abilities on verbal and spatial tests.

Significantly, there is not a clear stream of current research which yields the conclusion that any particular learning mode is generally preferred by male or female students. Recall that Galin and Ornstein (1974), in particular, found a clear strategic spatial preference for women that they commented defied previous findings.

In light of compelling recent research and the erosion of a conventional wisdom that gender differences exist in cognitive processing, this study reveals little basis for arguing that males and females will have clear verbal or spatial preferences. If the Engel and Engel Selection Skills Evaluation successfully measures preferences for verbal or spatial modes of cognitive processing, then subjects in all three countries demonstrated that there are no significant gendered preferences.

The lack of gender preference among American students is consistent with the most recent research. However, one surprising result of the lack of significance in gendered responses to the inventory is that recent research suggests that cognitive processing is influenced by training and cultural variables. Cross-culturally imposed ideological conditions can



influence the results. Unger and Crawford (1992) argue that in cultures where one gender is preferred or valued more highly, gender differences in cognitive abilities exist and at an earlier age; Israel serves as a case for these findings. For example, Safir (1986) discovered that gender differences in cognitive ability are mediated by the cultural context in which children are raised. One might have anticipated, then, that clear gender preferences in South Korea, for example, would have been reflected in the results of the inventory. This did not prove to be the case. The results suggest that a fruitful avenue for further research would be to test for gender differences in cognitive abilities in highly gender-stratified cultures to see whether culture does in fact condition males and females to prefer verbal or spatial modes of processing. The implication of this preliminary research project suggests that the Israeli study (Safir, 1986) may not be predictive of other cross-cultural investigations of cognitive processing.

Given the puzzling results of this study, it is appropriate to consider the role of the inventory used to discriminate a verbal-spatial preference for learning. The rationale for a sorting of modalities using this type of instrument is well-established. Also, there are studies which confirm that a sorting on a modality dimension does, in fact, occur.

But, does this test measure what it was intended to measure? Is there, perhaps, some problem inherent to the instrument? Is the instrument inappropriately biased? The instrument does have validity and reliability. But to confirm diagnostic faith, the instrument should be applied with two or three other instruments to comparable populations. If comparable results occurred, then, it could be confidently concluded that there are cross-cultural differences in the way undergraduate students in different cultures preference verbal-spatial modalities. With increased faith in this instrument, there would also be a reaffirmed conclusion that gender is not a significant predictor of verbal-spatial modality preference in cross-cultural settings.

Culture has a powerful influence on cognitive development and, consequently, perceptual modalities for learning. The overarching goal of this study has been to bolster knowledge about learning styles in cross-cultural contexts. The consequence of such an attempt to blueprint ought not be a crude stereotyping which has characterized some

"knowledge" about the relationship between gender and specific modalities, but rather, the development of more precise pictures of culture-specific learning style preferences. The more we are able to identify legitimate factors which contribute to optimal learning, the greater the likelihood of better mediation in the teaching-learning process.

In conclusion, Adams (1992) challenges, "one can begin to establish as a general principle that a college teacher's explicit and ongoing attention to the cultural assumptions behind many aspects of classroom teaching will facilitate the learning process for students from all cultural traditions" (p. 13).

### Conclusion

Within the scope and limitations of this current study, the following conclusion is drawn:

Based upon the findings of this investigation, it can be concluded that there were significant differences across the three cultures on verbal strategic choice. The strongest verbal preference was made by the Japanese undergraduate students, followed by the American undergraduate students and the South Korean undergraduate students. Secondly, there was no significant difference in gender preferences for verbal or spatial cues for learning within or across the three cultures.

### On Reflection

After almost twenty-five years of college and university teaching, one rather profound awareness remains inescapable, much of what constitutes "good" teaching is a mystery. A candid assessment of what we "know" about teaching would lead to the conclusion that we really do not know as much as we think we know (and should know). However, such an admission ought not be brutally pessimistic because the nature of "good" teaching is more artistry than science. Yes, research does help with on-going attempts to demystify teaching, but much of teaching has always and will remain a largely enigmatic enterprise. As an aside, perhaps we know more about learning than we do about teaching!

So, what are the implications of this present study for the teacher in a multicultural classroom? Like any good research, this study raises more questions than it answers. For instance, can older learners successfully adapt their learning style? How does adaptation occur? Is there a hierarchy of modalities for the adult learner?

This study does not call into question the teaching paradigm itself. Rather, it reinforces the wisdom and necessity of a paradigm shift in thinking about and in the practice of teaching. First, the classroom has always been a multicultural, i.e., heterogeneous, environment. One of grandest academic myths may well involve the supposition about student homogeneity. While any classroom does involve a peculiar culture, no classroom can accurately be called a monoculture. Systems theory tells us that any system (classroom) is an aggregate or composite of subsystems (individual students). Specifically, the principle of partial inclusion suggests that each student brings a part of other systems into the classroom. Therefore, because students differ, there are differences within any classroom; these differences are significant to the teaching-learning equation. Unfortunately, recognizing the implications of such a diverse reality has been a relatively recent phenomenon.

Second, learning style inventories are tools that create awareness in both the student and teacher of the manifest presence of learning style differences. Quite simply, different learners learn differently and, more importantly, we continue to discover exactly what the differences are and how they affect learning. For the teacher, discovery affords an opportunity to review and enhance one's instructional approaches, thereby facilitating a sensitivity to the perceptual needs of the students in the classroom. It is just as vital for students to become aware of their own learning styles. Discovery confers uniqueness and provides an explanation for why they learn how they learn. Discovery is liberating.

Third, this study contributes to the further erosion of some of the conventional wisdom regarding the role of gender and the function of perceptual modalities in the learning process. Gender differences are not as reliable a predictor of learning behavior as once suspected. Also, perceptual modalities seem to be a better barometer of preferences for learning.

Fourth, learning style research directly challenges tendencies to select teaching strategies that are congenial to any teacher's existing teaching style. Too many educators still practice their craft as a function of how they were taught. Often teaching routines are more a product of the power of inertia rather than a consequence of inflexibility in teaching. Routines may seduce students to adapt to ordained teaching styles or shut them out of full participation in the learning endeavor.

Fifth, the study offers a partial apologia for any educator who struggles, but fails, to optimize learning outcomes. Although optimal teaching would be facilitated by a match between learning styles and teaching styles, incongruities are unavoidable. Information processing varies for different individuals. In an ideal world with unlimited resources and a teaching-learning model that necessitates something other than a 1:1 teacher-student ratio, perfect matches are not going to happen. But, resources are always less than infinite and teaching-learning is still a human enterprise. Thus, the ability to confidently index student learning styles as well as teaching style preferences does not, in reality, translate into necessarily better teaching-learning. Teachers ought continue to be aware of processing skill differences and the value of self-critique.

Sixth, and finally, while it is quite acceptable to acknowledge that teaching is a process of mediating between educator and learner, upon whom is the onus for adapting one's style, whether teaching or learning? Quite simply, who is primarily responsible for adaptation in the learning environment? It is inherent in the notion of mediation that successful learning necessitates on-going accommodations between teacher and learner. While learners need instruction in learning how to learn (metacognition), educators also must be continually vigilant in learning how to teach. Educators and learners must possess the requisite attitude and aptitude to engage in flexible teaching-learning styles.

The essential questions remain: What is the goal of teaching? What must a good teacher do? As always, it is the master teacher who acknowledges and validates differences in student preferences for learning and aggressively and creatively accommodates these real

differences among learners in the pursuit of a desired learning outcome. Stripped of unnecessary baggage, teaching is the artistry of mediation between teacher and learner.

#### Recommendations for Further Studies

The following recommendations are suggested for further studies:

1. A replication of the study utilizing different undergraduate student populations from the same cultural groups.
2. A replication of the study utilizing different undergraduate student populations from different cultural groups.
3. A study that compares learning styles of undergraduate students and graduate students from the same and different cultures.
4. A study that compares the perceptual modalities of students who have participated in international study with patterns from their culture to determine if international study modifies perceptual modalities.
5. A study that examines cross-cultural differences in other preferences for other perceptual modalities, e.g., visual-verbal, auditory-visual, et cetera.
6. A study that uses this same instrument or combination of modality instruments to see if Asian-American perceptual patterns correspond to patterns of other Americans.
7. A study that documents instructional practices in South Korean and Japanese educational systems.
8. A longitudinal study of learning style to determine the presence and nature of learning style changes over time.

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APPENDICES

APPENDIX A

Human Subjects Approval Forms



## OREGON STATE UNIVERSITY

Administrative Services A312 • Corvallis, Oregon • 97331-2140  
503-737-3437 • FAX 503-737-3093 • INTERNET scanlanr@ccmail.orst.edu

August 10, 1993

## Principal Investigator:

The following project has been approved for exemption under the guidelines of Oregon State University's Committee for the Protection of Human Subjects and the U.S. Department of Health and Human Services:

Principal Investigator: Joanne B. Engel

Student's Name (if any): Jeffrey Lukehart

Department: Education

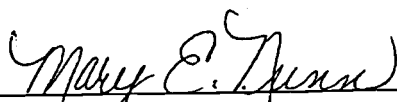
Source of Funding: \_\_\_\_\_

Project Title: Language Skills Criteria Selection: A Cross-Cultural Perspective

Comments: \_\_\_\_\_

\_\_\_\_\_

A copy of this information will be provided to the Chair of the Committee for the Protection of Human Subjects. If questions arise, you may be contacted further.

  
\_\_\_\_\_  
Mary E. Mann  
Sponsored Programs Officer

cc: CPHS Chair

**APPENDIX B**

**Engel and Engel Selection Skills Evaluation**



## SELECTION SKILLS EVALUATION

Course Title and Number \_\_\_\_\_

### Informed Consent Information:

The data collected from this evaluation will be used as part of a research project identifying selection skills of students in various curricula. Your results will be kept anonymous and you have the right not to participate.

If you wish to know the results of your test then place a personal identification code in the upper right hand corner of this page that only you will be able to identify at a future date.

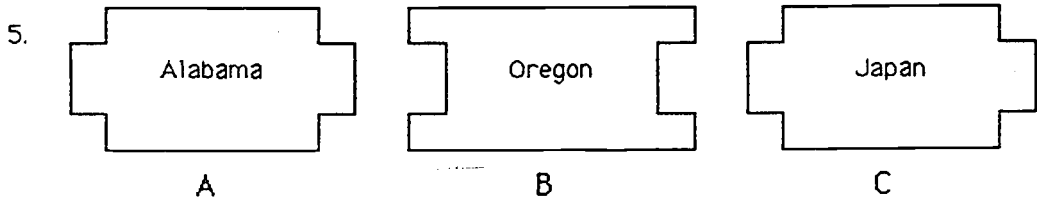
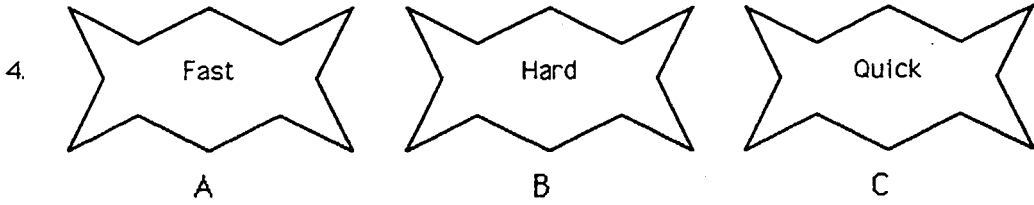
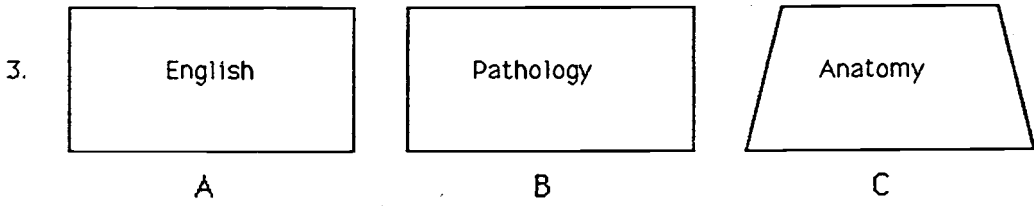
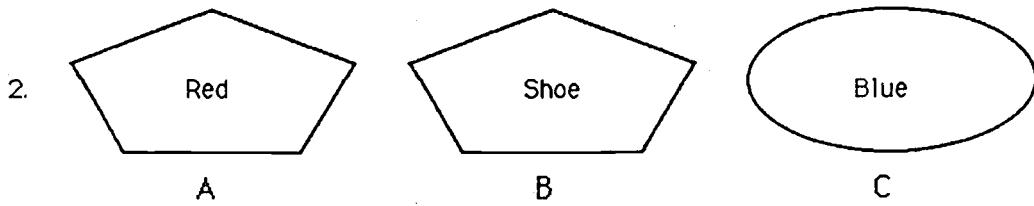
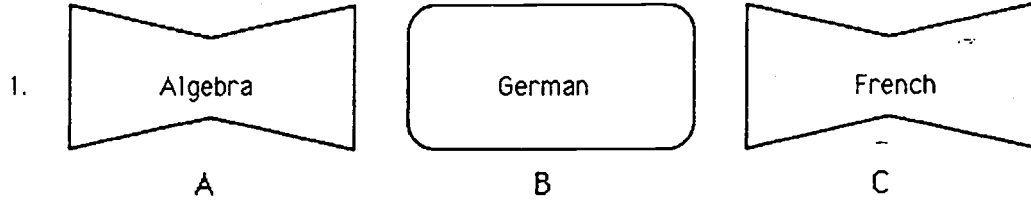
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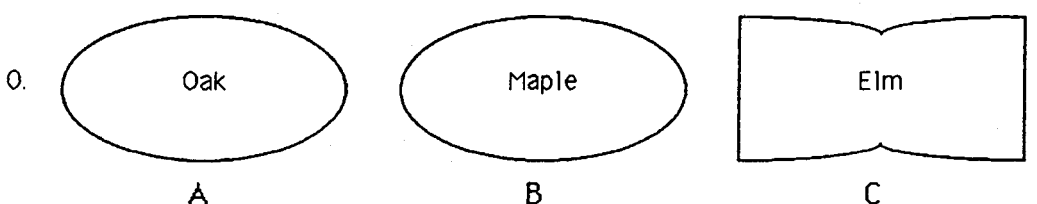
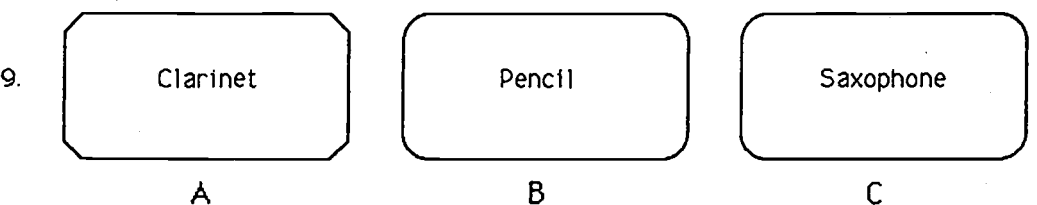
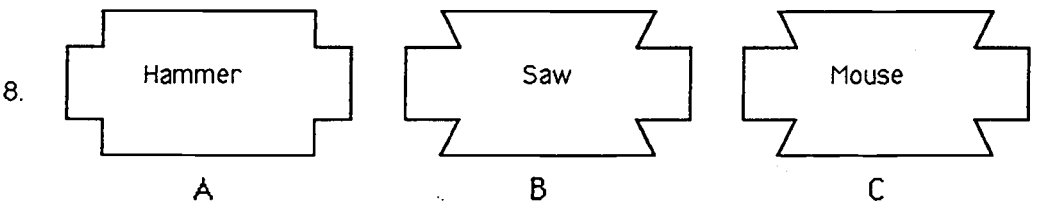
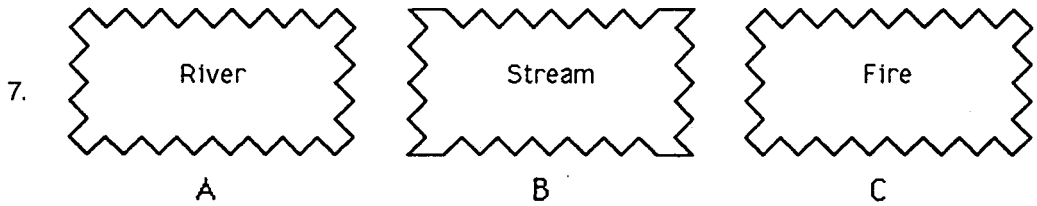
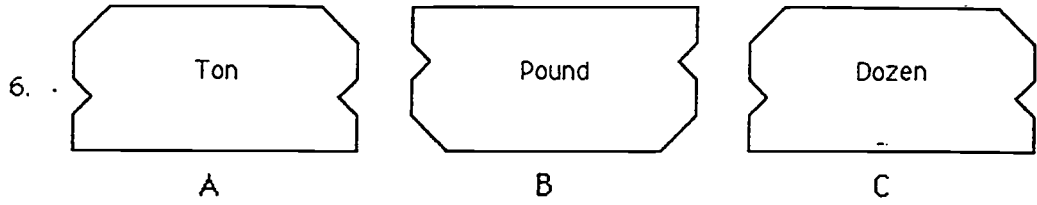
PLEASE CIRCLE ONE RESPONSE FOR EACH OF THE FOLLOWING ITEMS WHICH **BEST** DESCRIBES YOUR SITUATION OR FILL THE THE REQUESTED INFORMATION.

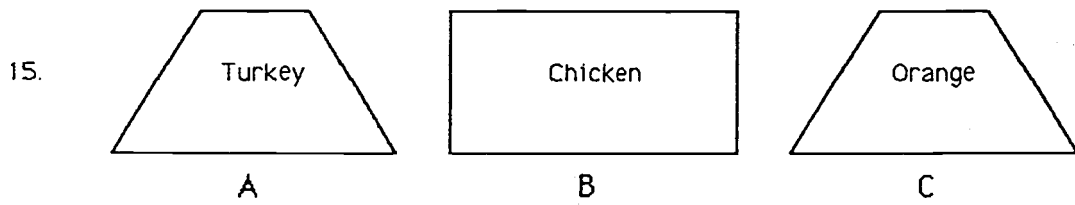
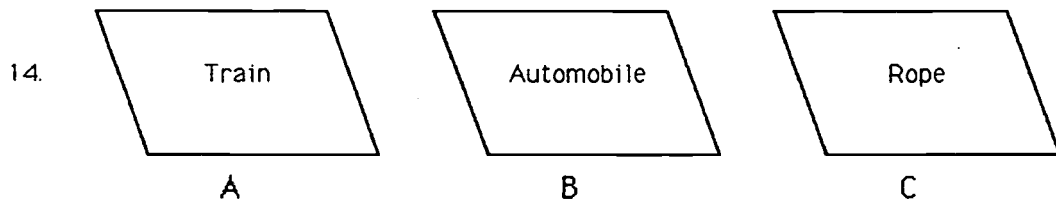
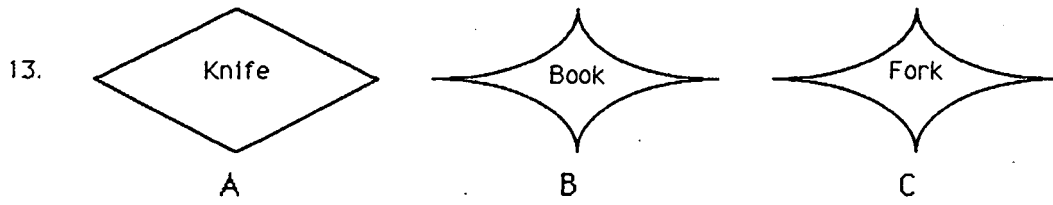
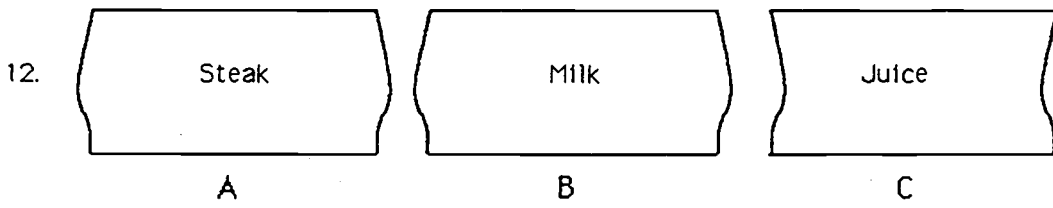
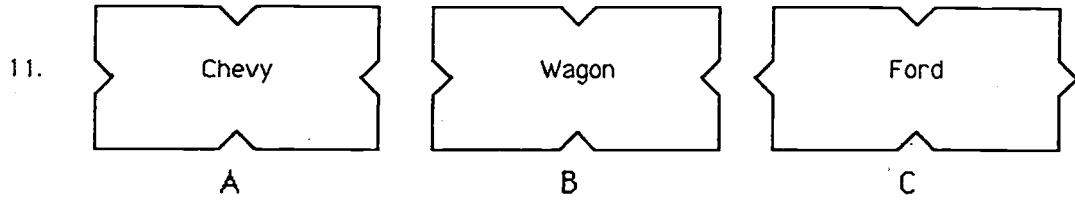
1. THE REASON YOU ARE ENROLLED IN THIS COURSE:
  - A IT IS REQUIRED.
  - B IT IS AN ELECTIVE.
  
2. UNDERGRADUATE STUDY AREA:
  - A UNDERGRADUATE MAJOR \_\_\_\_\_
  - B UNDERGRADUATE MINOR \_\_\_\_\_
  
3. SEX:
  - M MALE
  - F FEMALE
  
4. AGE:
  - A 18 TO 25 YEARS
  - B 26 TO 30 YEARS
  - C 31 TO 35 YEARS
  - D 36 TO 40 YEARS
  - E OVER 40 YEARS

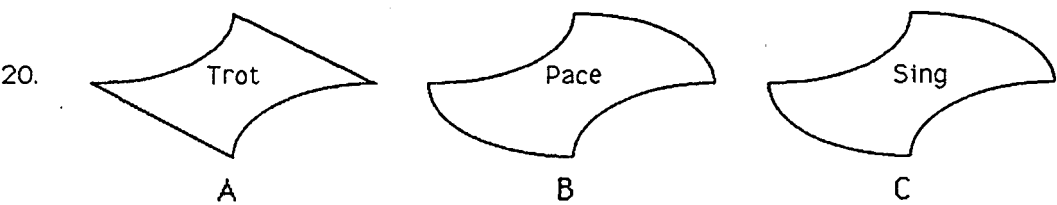
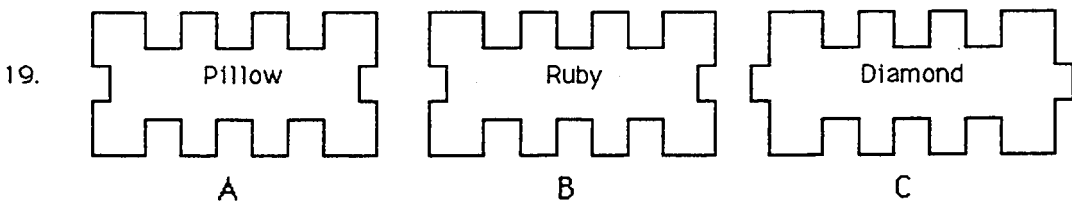
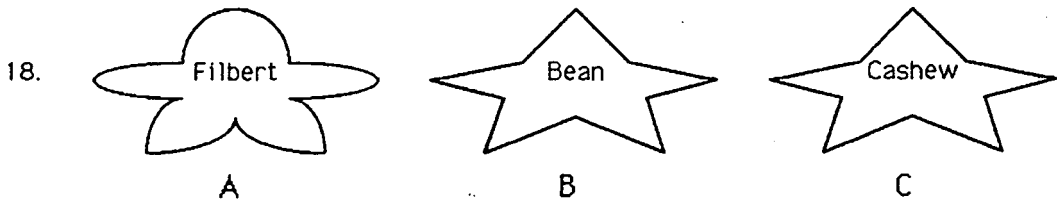
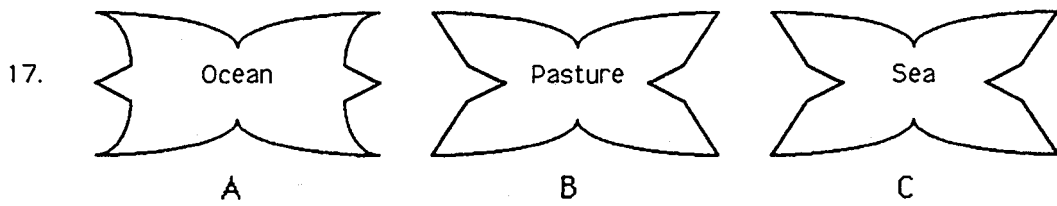
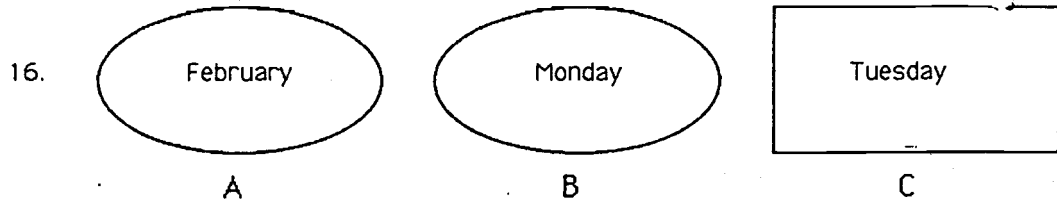
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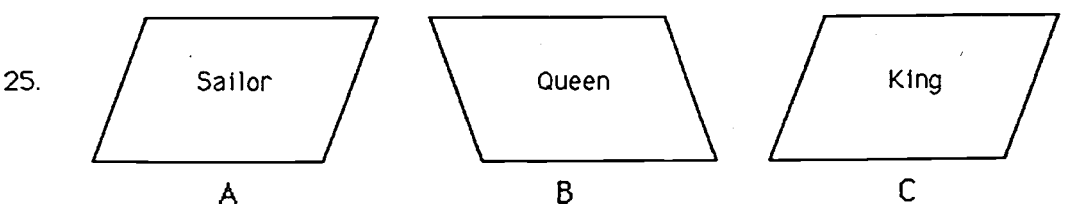
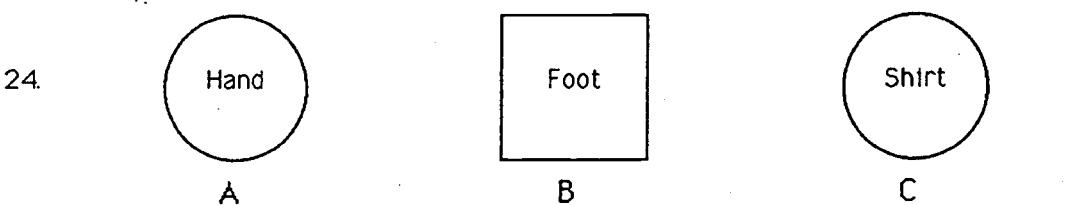
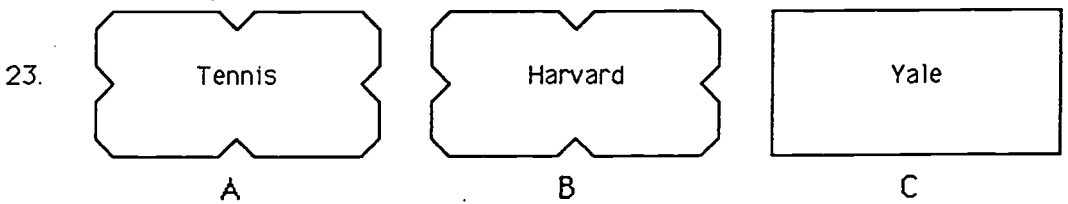
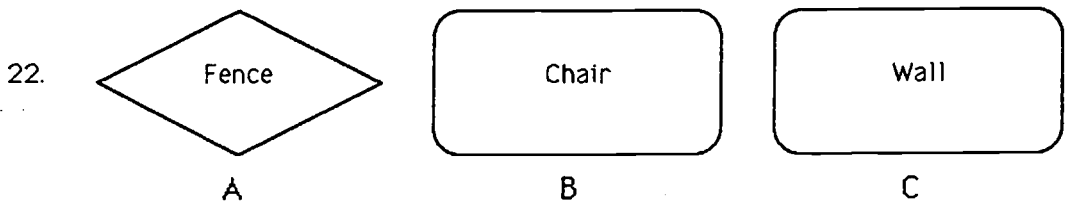
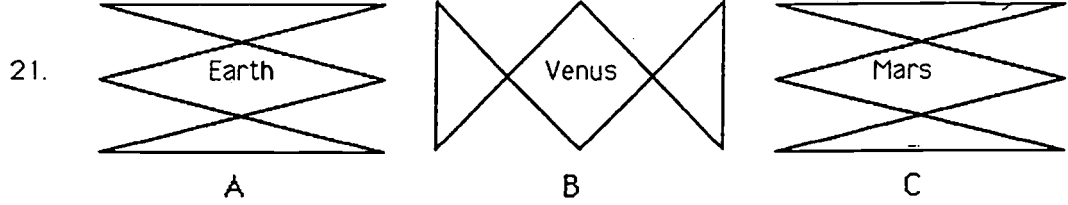
In the following 25 sets, circle either A, B, or C for the member of each trio that does NOT match the others. Depending on the selection criteria, there could be more than one correct response. You should select the odd item whichever is quickest for you to identify or the item that you feel most comfortable in selecting. Speed is of importance and please SELECT ONLY ONE ITEM PER SET.











APPENDIX C

Engel and Engel Selection Skills Evaluation  
Copyright Registration Form

FORM TX  
UNITED STATES COPYRIGHT OFFICE  
REGISTRATION NUMBER



TX TXU  
EFFECTIVE DATE OF REGISTRATION  
Month Day Year

DO NOT WRITE ABOVE THIS LINE. IF YOU NEED MORE SPACE, USE A SEPARATE CONTINUATION SHEET.

TITLE OF THIS WORK

Selection Skills Evaluation

PREVIOUS OR ALTERNATIVE TITLES

none

PUBLICATION AS A CONTRIBUTION If this work was published as a contribution to a periodical, serial, or collection, give information about the collective work in which the contribution appeared. Title of Collective Work

not applicable

If published in a periodical or serial give: Volume Number Issue Date On Pages

NAME OF AUTHOR

Harold N. Engel

DATES OF BIRTH AND DEATH

Year Born Year Died  
1945

Was this contribution to the work a "work made for hire"?  
 Yes  
 No

AUTHOR'S NATIONALITY OR DOMICILE

Name of Country  
OR Citizen of U.S.A.  
Domiciled in

WAS THIS AUTHOR'S CONTRIBUTION TO THE WORK  
Anonymous?  Yes  No  
Pseudonymous?  Yes  No

NOTE

the law... of a made for generally cover em- (see in- inst). For it of this all was for "ing" "yes" in ice pro- give the ver (or person for the work eared) inor" of it, and he space es of birth can blank

NATURE OF AUTHORSHIP Briefly describe nature of the material created by this author in which copyright is claimed.

Designed in collaborative manner the shapes, words, number of items on evaluation.

NAME OF AUTHOR

Joanne B. Engel

DATES OF BIRTH AND DEATH

Year Born Year Died  
1944

Was this contribution to the work a "work made for hire"?  
 Yes  
 No

AUTHOR'S NATIONALITY OR DOMICILE

Name of Country  
OR Citizen of U.S.A.  
Domiciled in

WAS THIS AUTHOR'S CONTRIBUTION TO THE WORK  
Anonymous?  Yes  No  
Pseudonymous?  Yes  No

NATURE OF AUTHORSHIP Briefly describe nature of the material created by this author in which copyright is claimed.

Designed in collaborative manner the shapes, words, number of items on evaluation.

NAME OF AUTHOR

DATES OF BIRTH AND DEATH

Year Born Year Died

Was this contribution to the work a "work made for hire"?  
 Yes  
 No

AUTHOR'S NATIONALITY OR DOMICILE

Name of Country  
OR Citizen of  
Domiciled in

WAS THIS AUTHOR'S CONTRIBUTION TO THE WORK  
Anonymous?  Yes  No  
Pseudonymous?  Yes  No

NATURE OF AUTHORSHIP Briefly describe nature of the material created by this author in which copyright is claimed.

YEAR IN WHICH CREATION OF THIS WORK WAS COMPLETED This information must be given in all cases.  
1990

DATE AND NATION OF FIRST PUBLICATION OF THIS PARTICULAR WORK Complete this information ONLY if this work has been published. Month Day Year (Began to be used in classes) U.S.A. Nation

COPYRIGHT CLAIMANT(S) Name and address must be given even if the claimant is the same as the author given in space 2.

Drs. H.N. and J.B. Engel  
3336 N.W. Countryman Circle Albany, Or. 97321

TRANSFER If the claimant(s) named here in space 4 are different from the author(s) named in space 2, give a brief statement of how the claimant(s) obtained ownership of the copyright.

DO NOT WRITE HERE  
OFFICE USE ONLY  
APPLICATION RECEIVED  
ONE DEPOSIT RECEIVED  
TWO DEPOSITS RECEIVED  
REMITTANCE NUMBER AND DATE

MORE ON BACK Complete all applicable spaces (numbers 5-11) on the reverse side of this page. See detailed instructions. Sign the form at line 10.

DO NOT WRITE HERE  
Page 1 of 2



CHECKED BY \_\_\_\_\_

CORRESPONDENCE Yes

DEPOSIT ACCOUNT FUNDS USED

FOR COPYRIGHT OFFICE USE ONLY

DO NOT WRITE ABOVE THIS LINE. IF YOU NEED MORE SPACE, USE A SEPARATE CONTINUATION SHEET.

**PREVIOUS REGISTRATION** Has registration for this work, or for an earlier version of the work, already been made in the Copyright Office?

Yes  No  If your answer is "Yes," why is another registration being sought? (Check appropriate box) ▾

This is the first published edition of a work previously registered in unpublished form.

This is the first application submitted by this author as copyright claimant.

This is a changed version of the work, as shown by space 6 on this application.

Your answer is "Yes," give: Previous Registration Number ▾ Year of Registration ▾

5

**DERIVATIVE WORK OR COMPILATION** Complete both space 6a & 6b for a derivative work; complete only 6b for a compilation.

**Preexisting Material** Identify any preexisting work or works that this work is based on or incorporates. ▾

This does not incorporate any previous evaluation form. It is based on ideas obtained in a variety of learning styles literature readings.

**Material Added to This Work** Give a brief, general statement of the material that has been added to this work and in which copyright is claimed. ▾

none

See instructions before completing this space

6

—space deleted—

**PRODUCTION FOR USE OF BLIND OR PHYSICALLY HANDICAPPED INDIVIDUALS**

A signature on this form at space 10, and a check in one of the boxes here in space 8, constitutes a non-exclusive grant of permission to the Library of Congress to reproduce and distribute solely for the blind or physically handicapped and under the conditions and limitations prescribed by the regulations of the Copyright Office: (1) copies of the work identified in space 10 in Braille (or similar tactile symbols); or (2) phonorecords embodying a fixation of a reading of that work; or (3) both.

- a  Copies and Phonorecords
- b  Copies Only
- c  Phonorecords Only

See instructions

7

**DEPOSIT ACCOUNT** If the registration fee is to be charged to a Deposit Account established in the Copyright Office, give name and number of Account.

Name ▾ Account Number ▾

**CORRESPONDENCE** Give name and address to which correspondence about this application should be sent. Name/Address/Apt/City/State/Zip ▾

Drs. H.N. and J.B. Engel  
 3336 N.W. Countryman Circle (503)  
 Albany, Or 97321 HN# 503-737-2141 JB= 737-5989 Home 503-928-1087

Be sure to give your daytime phone number

8

9

**CERTIFICATION** I, the undersigned, hereby certify that I am the

Check one ▸

- author (s)
- other copyright claimant
- owner of exclusive right(s)
- authorized agent of

work identified in this application and that the statements made in this application are correct to the best of my knowledge.

Name of author or other copyright claimant, or owner of exclusive right(s) ▾

Signature and printed name and date ▾ If this is a published work, this date must be the same as or later than the date of publication given in space 3.

Drs. H.N. and J.B. Engel (Selection Skills Evaluation) date ▸ 9-3-90

Handwritten signature (X) ▾

10

MAIL TO

Signature to be filed in envelope

Name ▾  
Drs. H.N. and J.B. Engel

Number/Street/Apartment Number ▾  
3336 N.W. Countryman Circle

City/State/ZIP ▾  
Albany, Or 97321

**YOU MUST:**

- Complete all necessary spaces
- Send your application in space 10

**SEND ALL 3 ELEMENTS IN THE SAME PACKAGE:**

1. Application form
2. Non-refundable \$10 filing fee payable to Register of Copyrights
3. Deposit material

**MAIL TO:** Register of Copyrights, Library of Congress, Washington, D.C. 20559

11

U.S.C. 1506(e) Any person who knowingly makes a false representation of a material fact in the application for copyright registration provided for by section 409, or in any written statement filed in connection with the application, shall be fined not more than \$2,500.

**APPENDIX D**

Engel and Engel Selection Skills Evaluation  
Chinese Version

## 选择技巧测试

请提供下列需要统计的资料:

圈出下列最符合你本人状况的答案或根据要求填入所需要的信息

1. 你注册上这门课的原因

A. 必修课

B. 选修课

2. 本科生学习科目的范围

A. 本科生主科 \_\_\_\_\_

B. 本科生付科 \_\_\_\_\_

3. 性别

M. 男性

F. 女性

4. 年龄

A. 18-25岁

B. 26-30岁

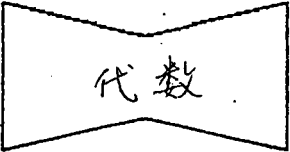
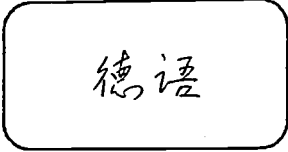
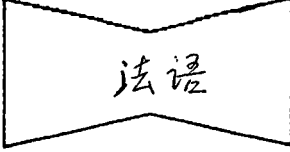
C. 31-35岁

D. 36-40岁

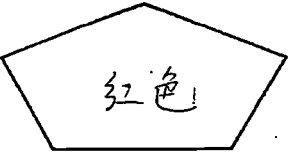
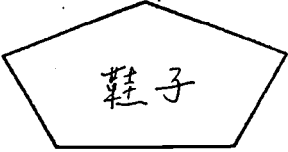

E. 40岁以上

说明:

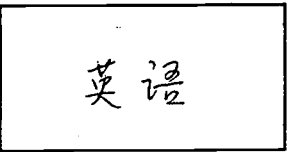
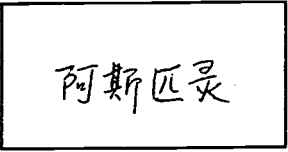
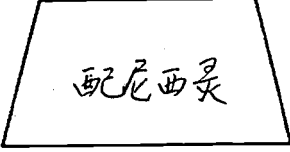
在下列25组选择题中,圈出每一个组中你认为与其它二个不同的A或B或C。根据你选择的标准不同,也许不止有一个正确答案,应选择你能最快辨别出的一个答案或者是你认为的最佳答案,速度要快,每组中只能选一个答案。

1.   

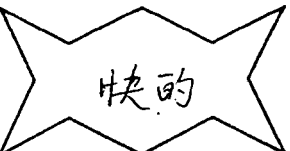


A B C

2.   

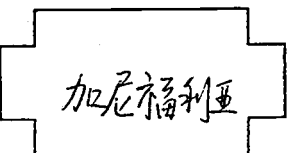
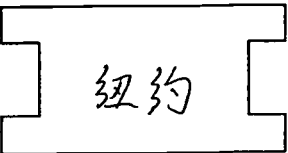
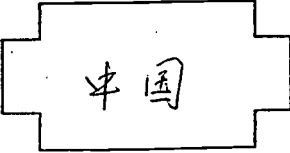
A B C

3.   

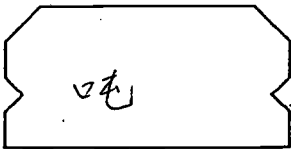
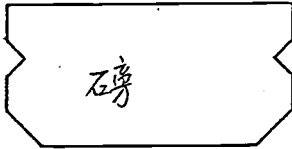
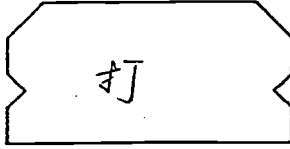
A B C

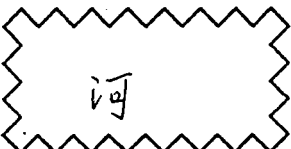


4.   

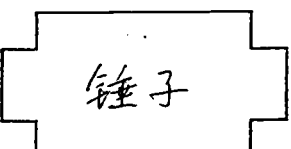
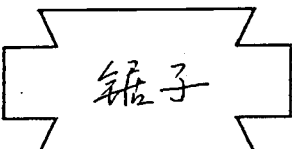
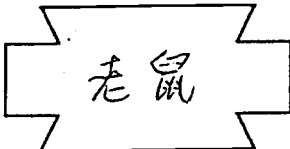
A B C

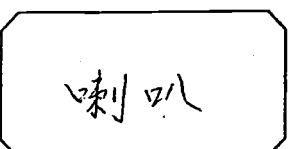
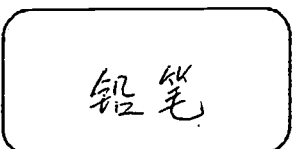
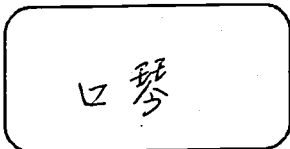
5.   

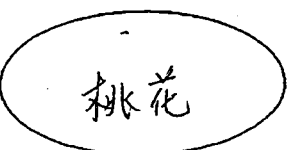
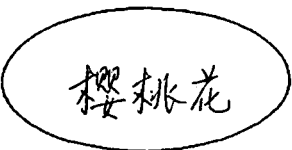
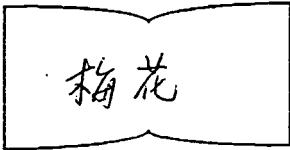
A B C

6.     
A B C

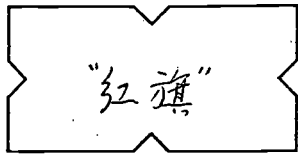
7.     
A B C

8.     
A B C

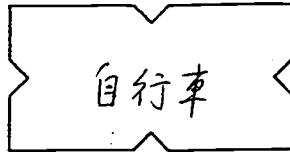
9.     
A B C

10.     
A B C

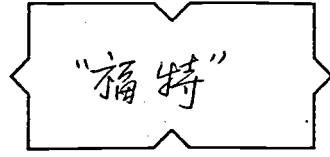
11.



A

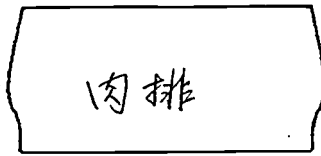


B

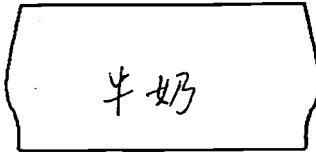


C

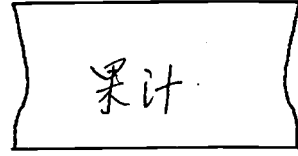
12.



A

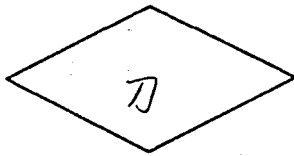


B

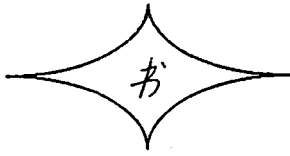


C

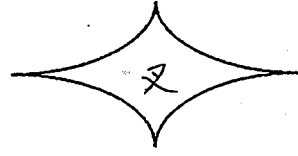
13.



A

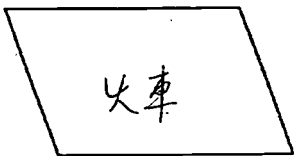


B

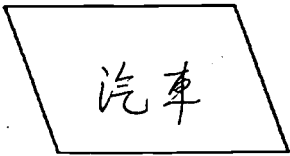


C

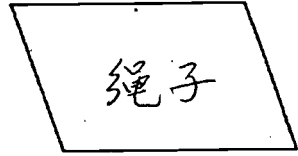
14.



A



B

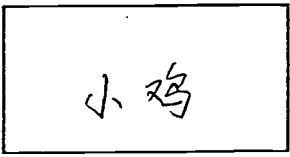


C

15.



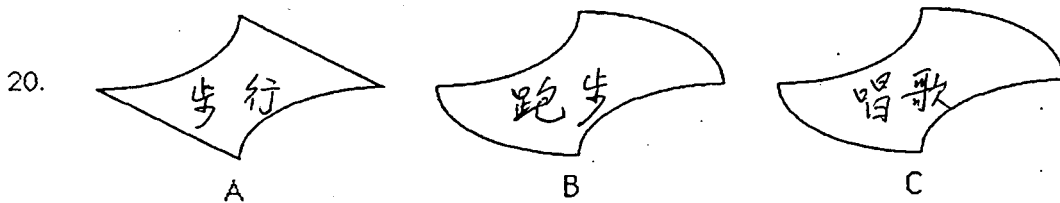
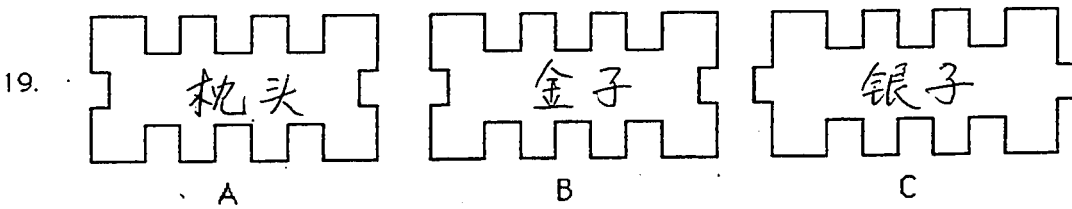
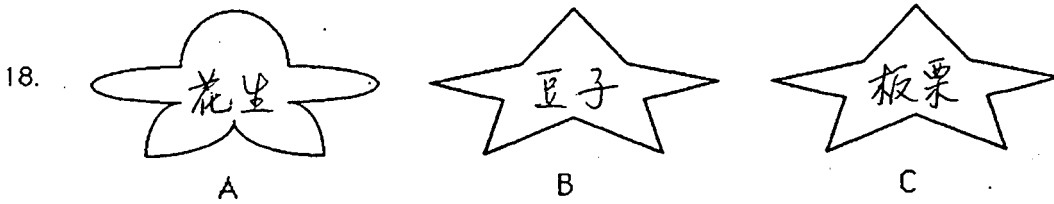
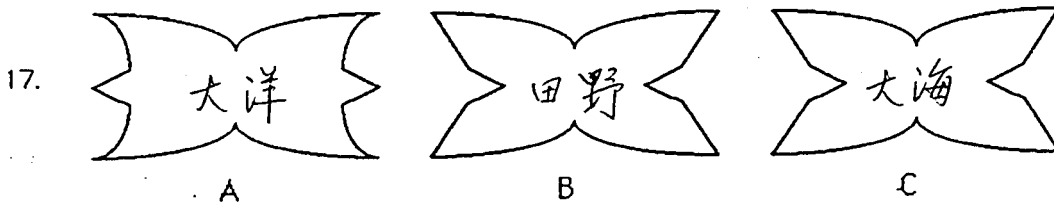
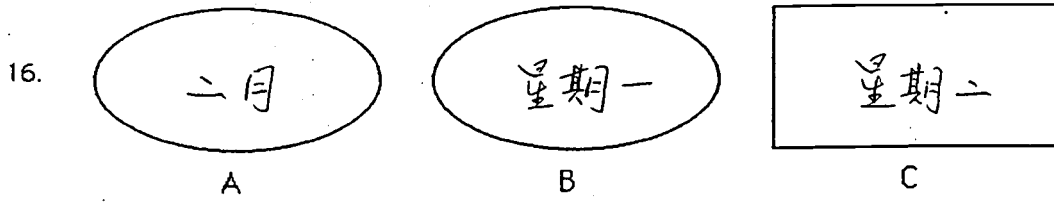
A

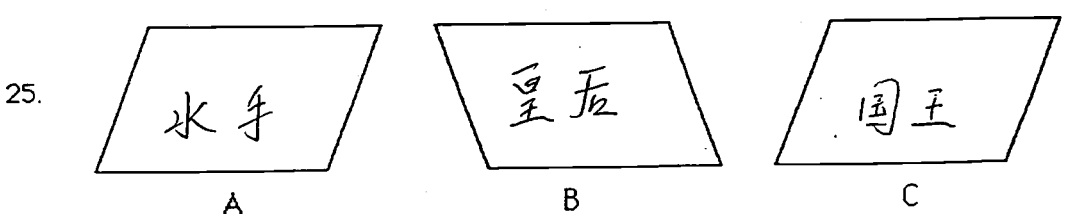
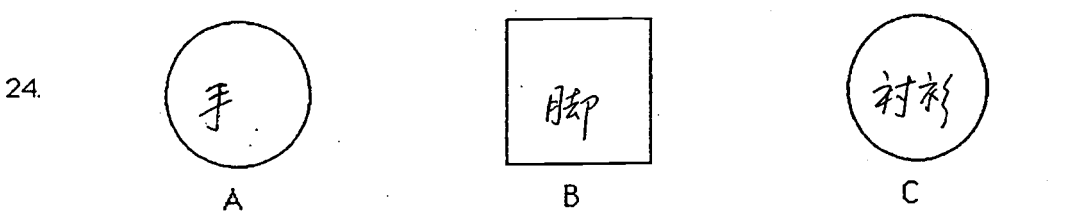
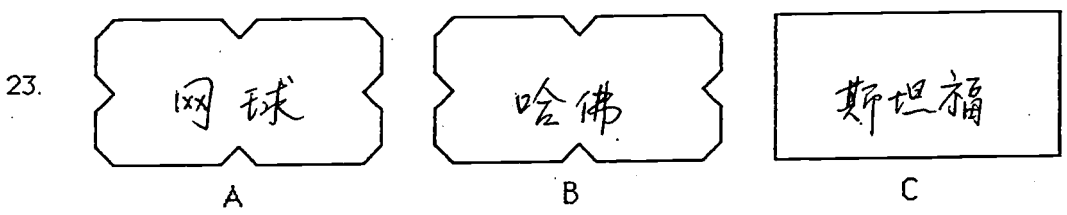
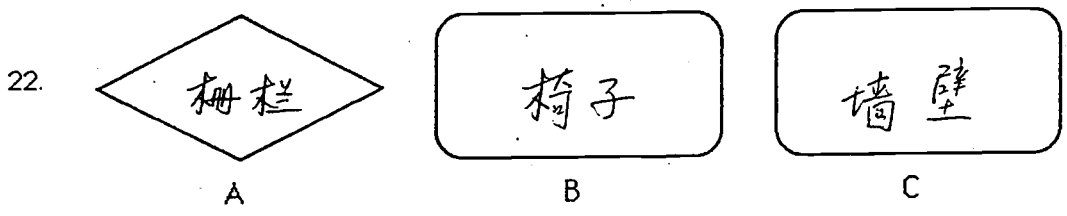
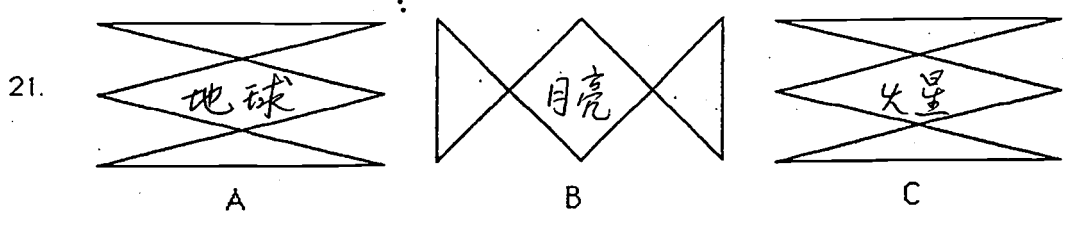


B



C







**APPENDIX E**

**Engel and Engel Selection Skills Evaluation  
South Korean Version**

## 선택 가능 조사

통계상의 질문:

아래의 4가지 문항을 읽고 귀하에게 가장 알맞다고 생각되는 번호에 0으로 표시하거나 필요한 사항을 기록하십시오.

1. 이 과목을 선택한 이유는

A 필수과목 이므로

B 선택과목 이어서

2. 대학의 전공 분야는

A 전공 분야 \_\_\_\_\_

B 부전공 분야 \_\_\_\_\_

3. 성별

A 남

B 여

4. 연령

A 18 - 25 세

B 26 - 30 세

C 31 - 35 세

D 36 - 40 세

E 40 세 이상

설명: 다음의 각 문항은 A, B, C로 구성되어 있습니다.

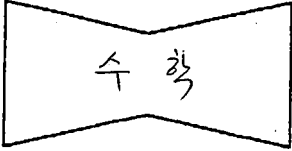
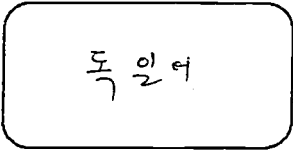
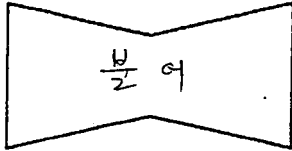
그중 하나만 다른 2개와 잘 맞지 않으니 그 것을 찾아

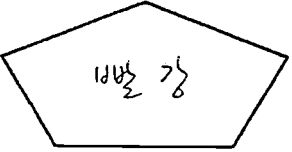
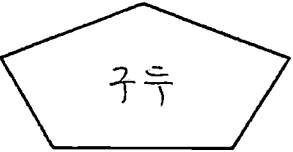

아래에 있는 문자에 0을 하시오. 선택의 기준에 따라

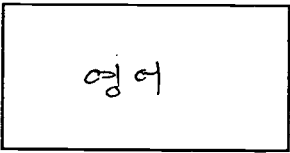
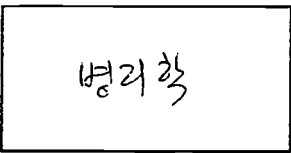
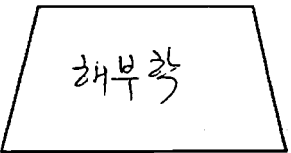
하나 이상의 정답이 있기도 합니다. 직감적으로 이상하다고

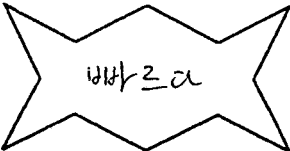
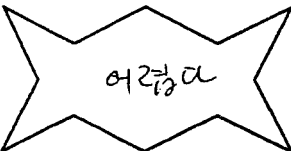
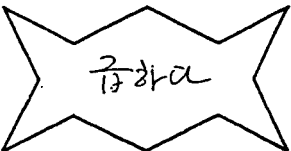
느껴지는 것을 고르거나 선택했을 때 마음이 편안한 것을

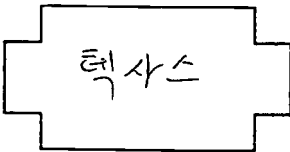
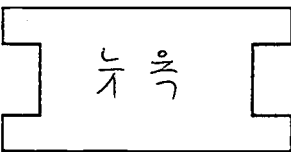
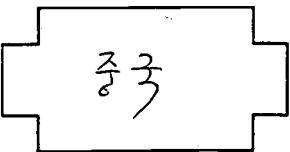
고르시오. 스터드가 좋은 하마, 반드시 하나만 선택해야 합니다

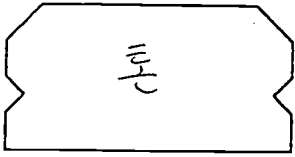
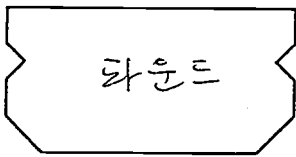
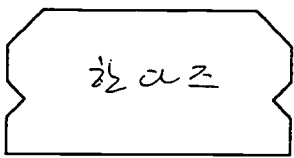
1.  A  B  C

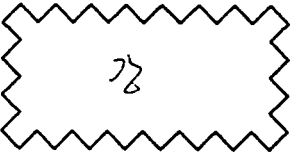
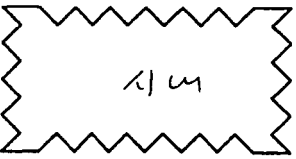

2.  A  B  C

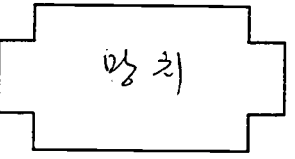
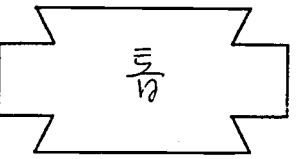
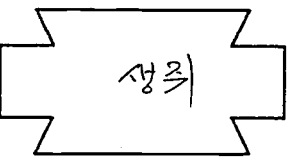
3.  A  B  C

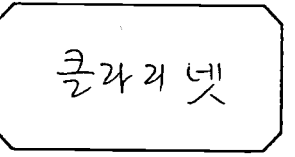
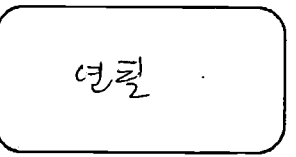
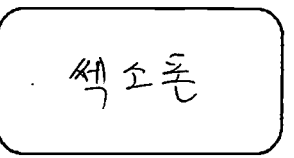
4.  A  B  C

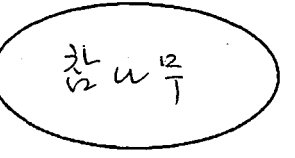
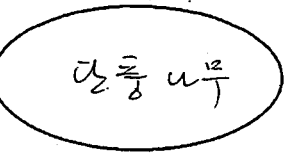
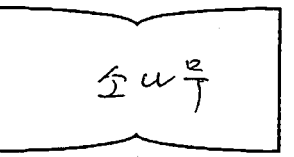
5.  A  B  C

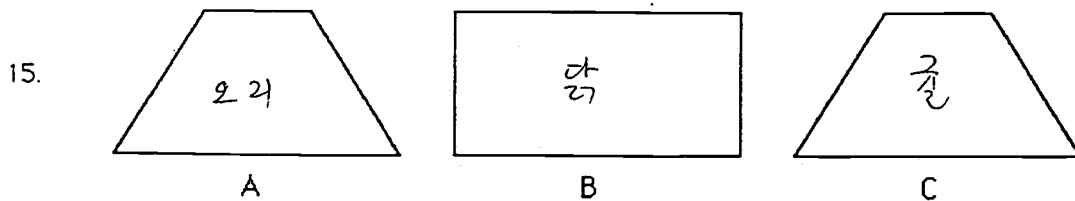
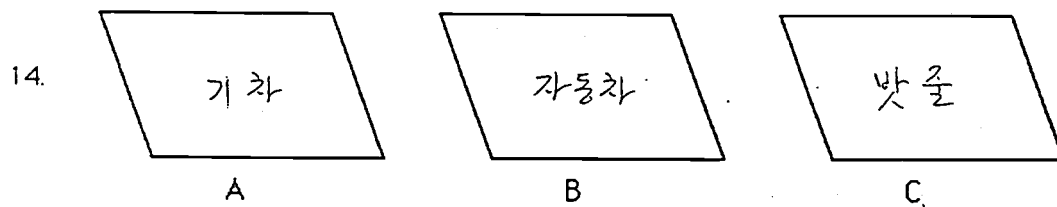
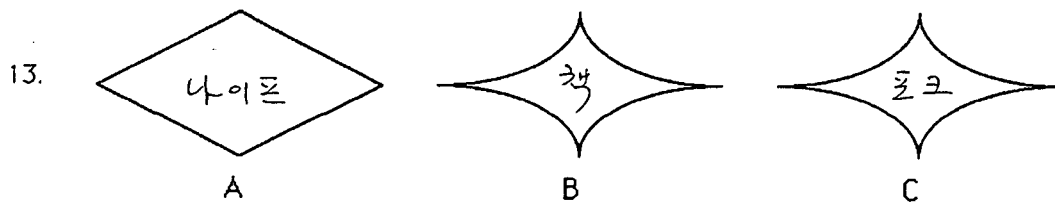
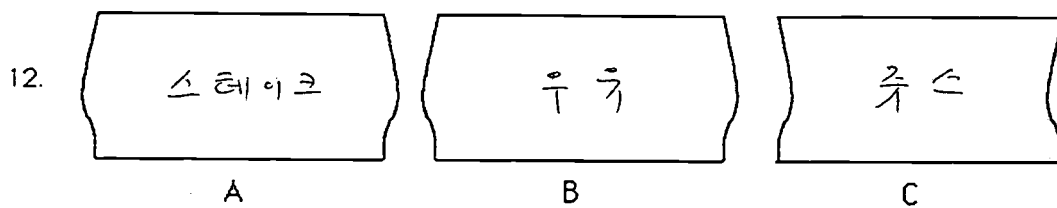
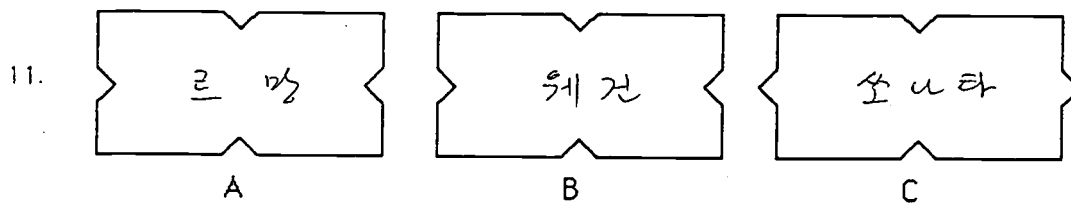
6.  툰 A  타운드 B  할아즈 C

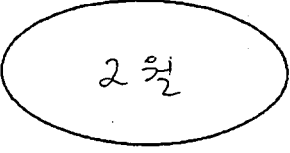
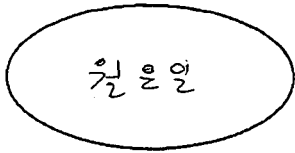
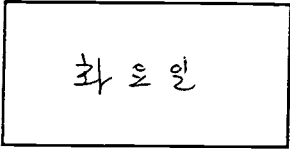
7.  강 A  시너 B  불 C

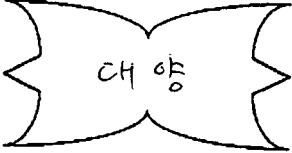
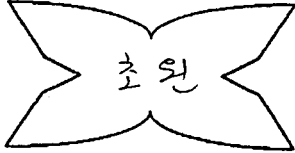
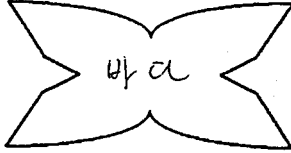
8.  망치 A  툰 B  생쥐 C

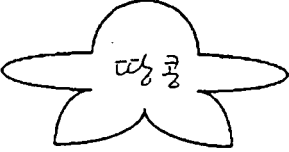
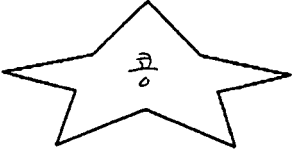
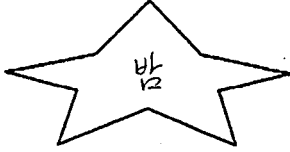
9.  큰가리넷 A  연필 B  색소폰 C


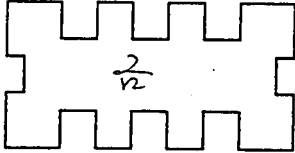
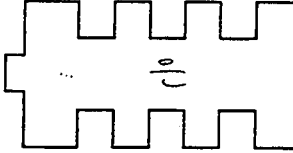
10.  찬우무 A  갈등우무 B  소우무 C


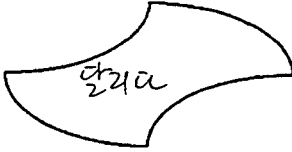
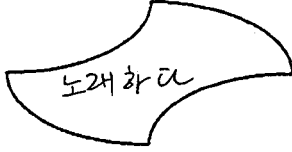


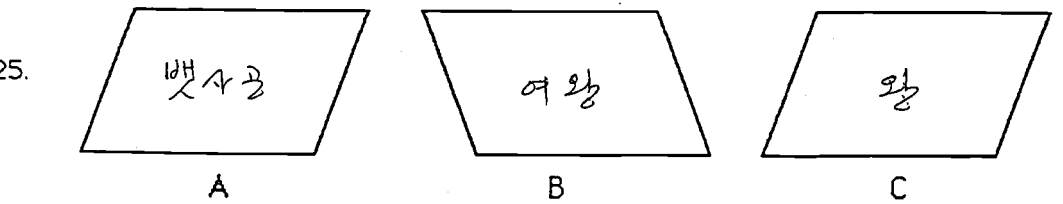
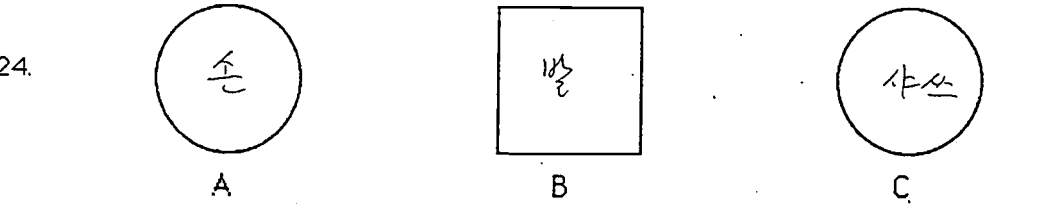
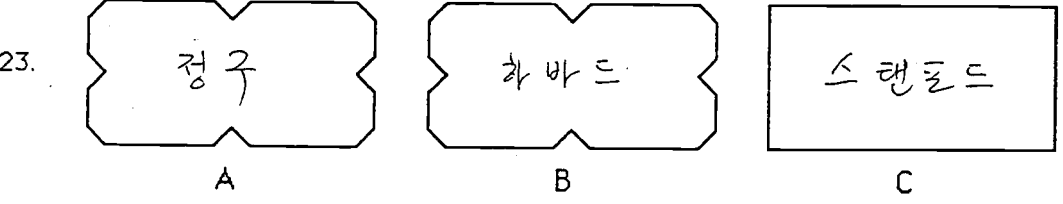
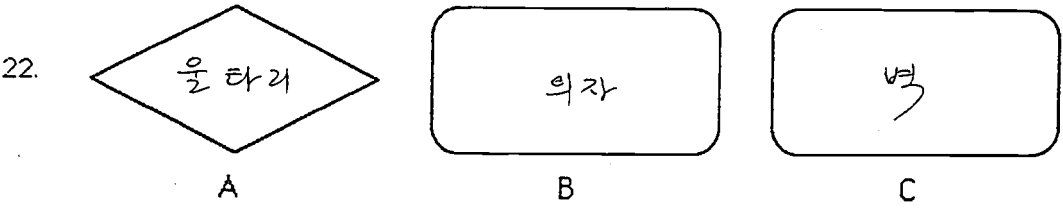
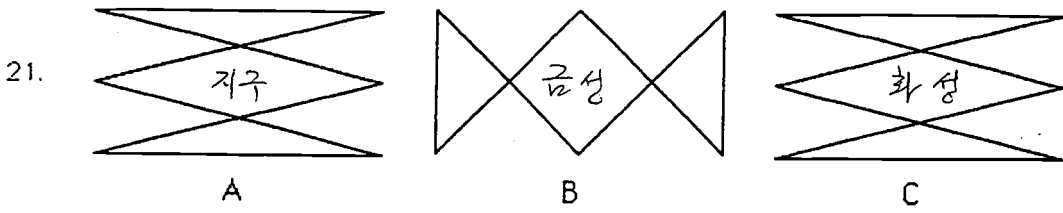
16.  A       B       C

17.  A       B       C

18.  A       B       C

19.  A       B       C

20.  A       B       C



**APPENDIX F****Engel and Engel Selection Skills Evaluation  
Japanese Version**



## 選択技能調査

### 統計上の質問

以下の1から4の各項で、自分にもっともあてはまるものに、  
それぞれ1つだけ〇で囲み、又、必要な事項を書き入れて下さい。

1. このクラスを取っている理由

- A. 必修課目だから。
- B. 選択課目として。

2. 在学研究部門

- A. 大学の専攻部門 \_\_\_\_\_
- B. 大学の准専攻部門 \_\_\_\_\_

3. 性別

- A. 男性
- B. 女性

4. 年齢


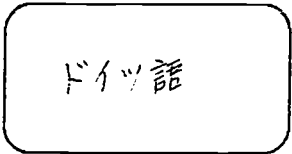
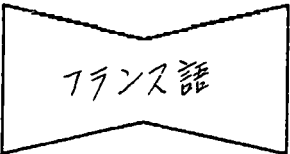


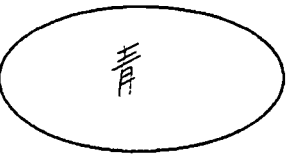
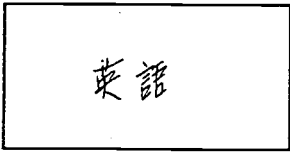
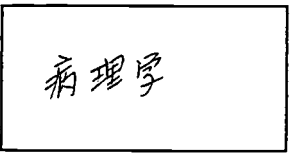
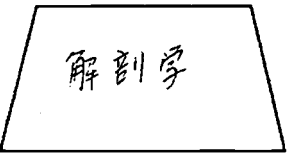

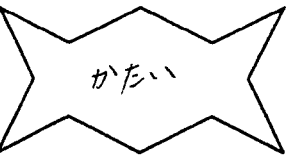
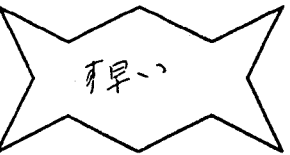
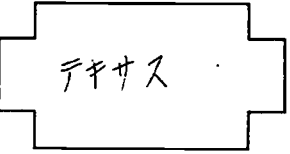
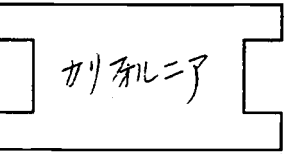
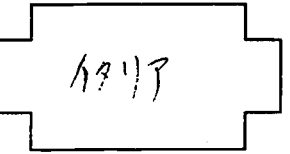
- A. 18～25才
- B. 26～30才
- C. 31～35才
- D. 36～40才
- E. 40才以上

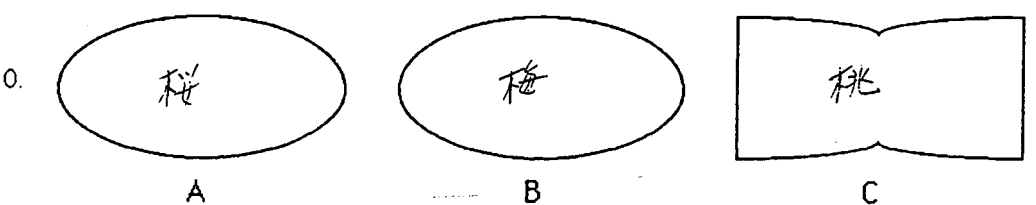
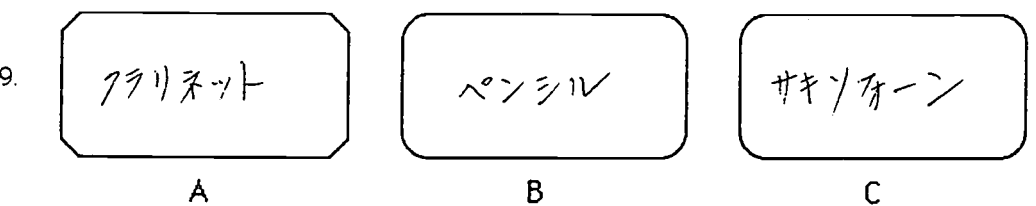
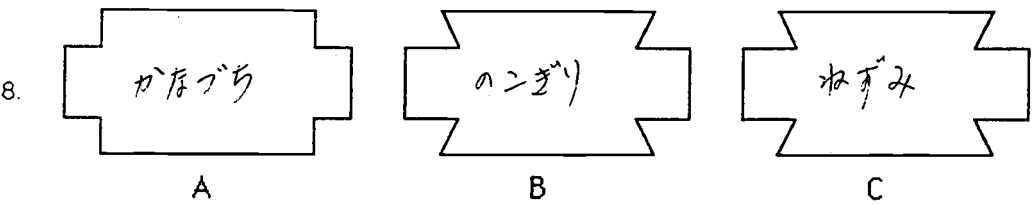
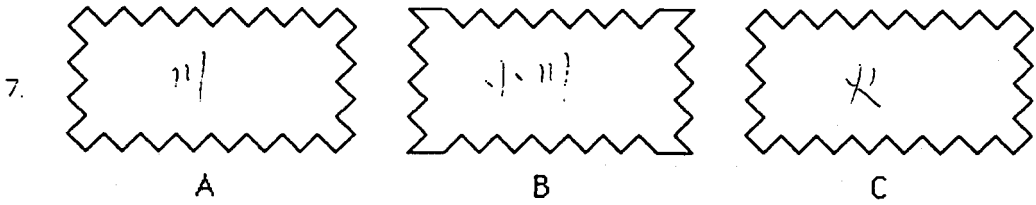
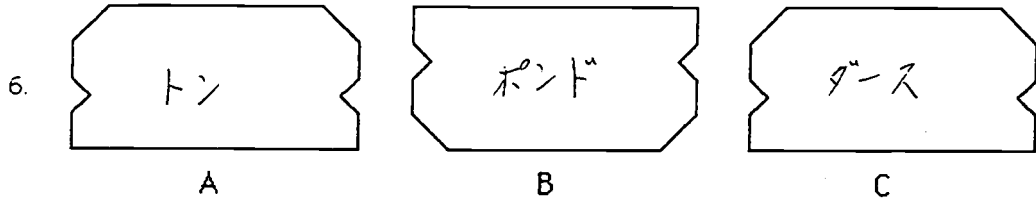
### 説明

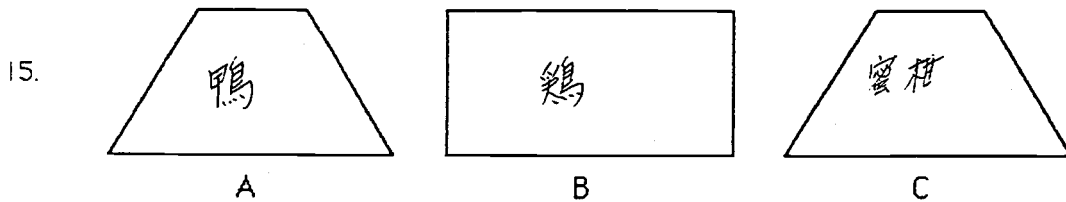
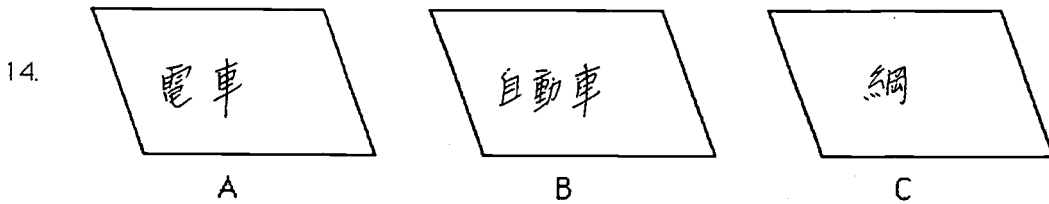
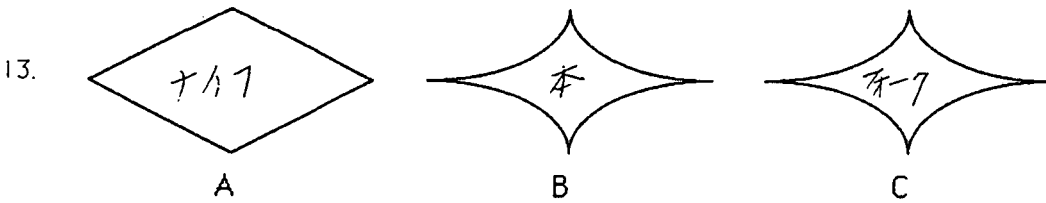
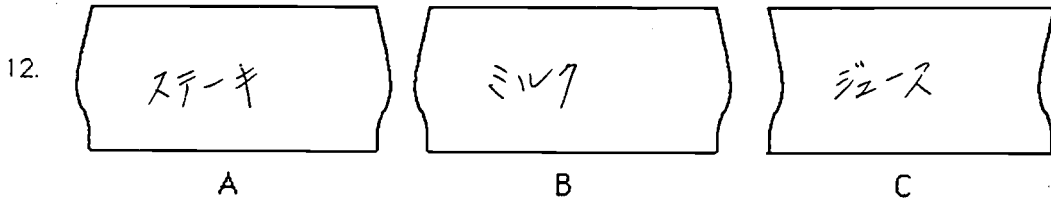
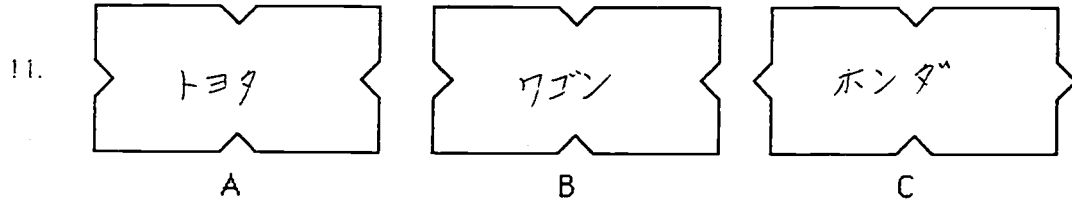
次に25セットの問題があります。各セットABCの3組の内、  
1つだけ、他のものと合わないものに〇をして下さい。



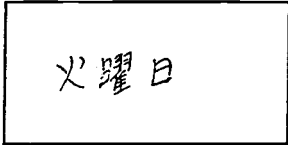
選択基準によって、正しい答は、1つとは限りません。


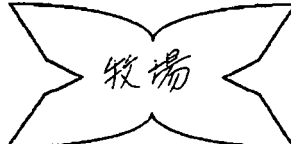
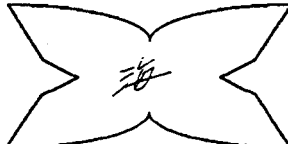
スピードが大切で、これが合わないとも早く感じたものを  
選んで下さい。各項目、1つだけ選んで〇をして下さい。

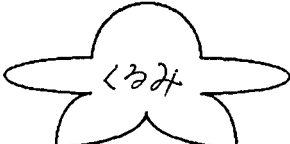


1.  代数 A  ドイツ語 B  フランス語 C
2.  赤 A  靴 B  青 C
3.  英語 A  病理学 B  解剖学 C
4.  速い A  かたい B  早い C
5.  テキサス A  カリフォルニア B  ハワイ C

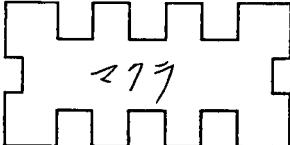





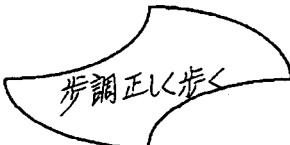



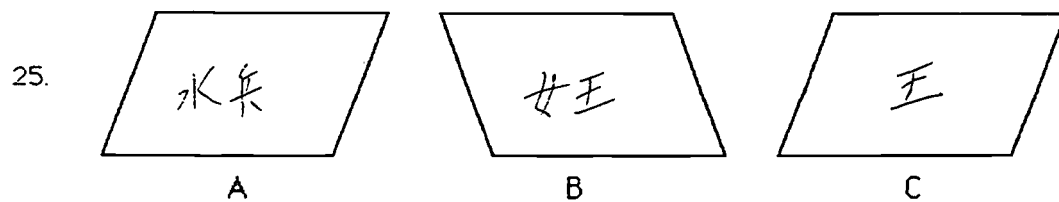
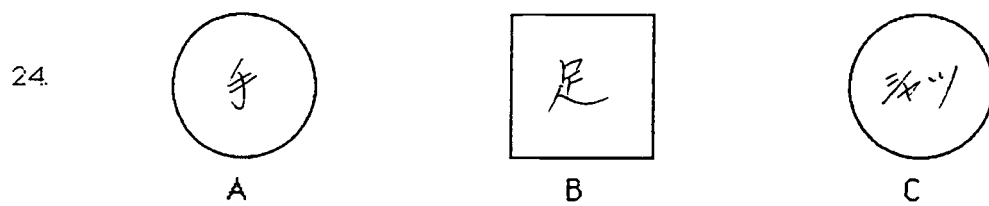
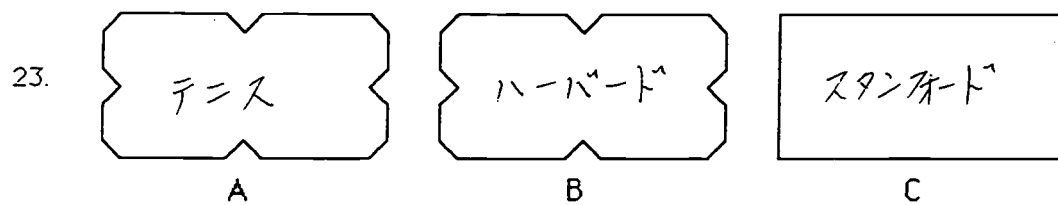
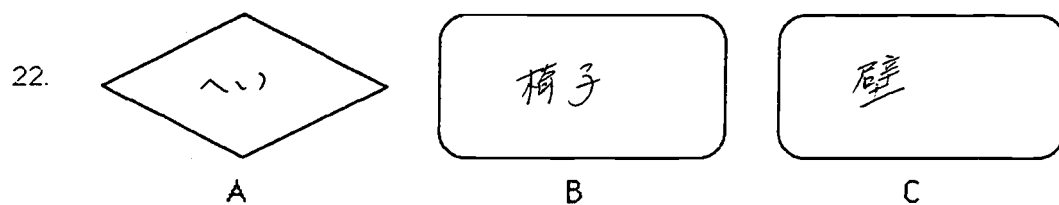
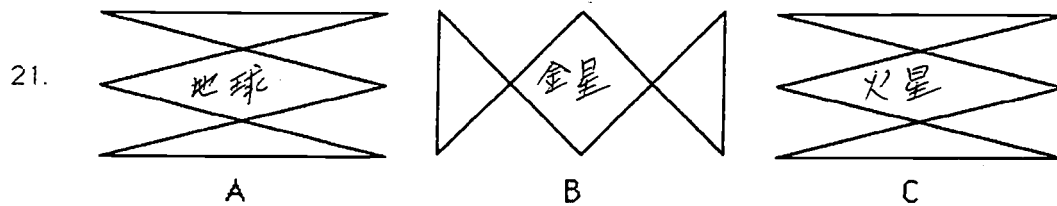
16.     
A B C

17.     
A B C

18.     
A B C

19.     
A B C

20.     
A B C



APPENDIX G

Engel and Engel Selection Skills Evaluation  
Coding Sheet

## SELECTION SKILLS EVALUATION

Course Title and Number \_\_\_\_\_

### Informed Consent Information:

The data collected from this evaluation will be used as part of a research project identifying selection skills of students in various curricula. Your results will be kept anonymous and you have the right not to participate.

If you wish to know the results of your test then place a personal identification code in the upper right hand corner of this page that only you will be able to identify at a future date.

### DEMOGRAPHICS:

PLEASE CIRCLE ONE RESPONSE FOR EACH OF THE FOLLOWING ITEMS WHICH **BEST** DESCRIBES YOUR SITUATION OR FILL THE THE REQUESTED INFORMATION.

1. THE REASON YOU ARE ENROLLED IN THIS COURSE:

- A IT IS REQUIRED.
- B IT IS AN ELECTIVE.

2. UNDERGRADUATE STUDY AREA:

- A UNDERGRADUATE MAJOR \_\_\_\_\_
- B UNDERGRADUATE MINOR \_\_\_\_\_

3. SEX:

- M MALE
- F FEMALE

4. AGE:

- A 18 TO 25 YEARS
- B 26 TO 30 YEARS
- C 31 TO 35 YEARS
- D 36 TO 40 YEARS
- E OVER 40 YEARS

### DIRECTIONS:

In the following 25 sets, circle either A, B, or C for the member of each trio that does NOT match the others. Depending on the selection criteria, there could be more than one correct response. You should select the odd item whichever is quickest for you to identify or the item that you feel most comfortable in selecting. Speed is of importance and please SELECT ONLY ONE ITEM PER SET.



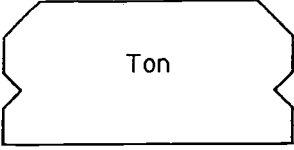
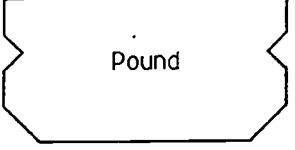
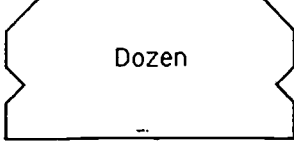
1. Algebra German French  
L A B S C I




2. Red Shoe Blue  
A I B L C S

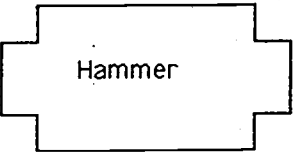
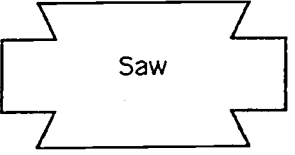
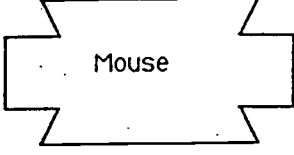
3. English Pathology Anatomy  
A L B I C S

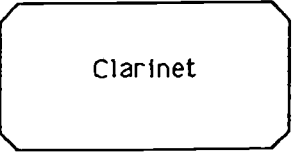
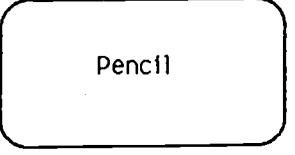
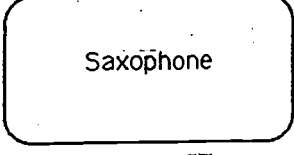
4. Fast Hard Quick  
A I B L C I

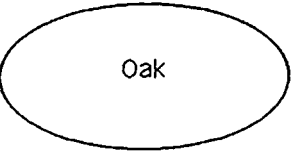
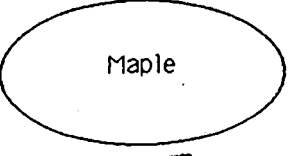
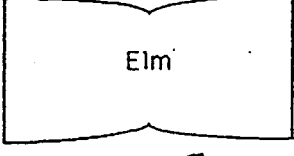
5. Alabama Oregon Japan  
A I B S C L

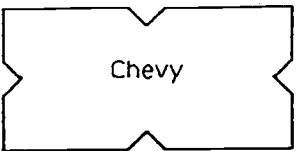
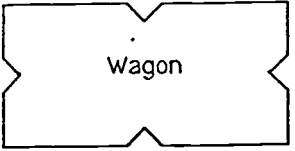
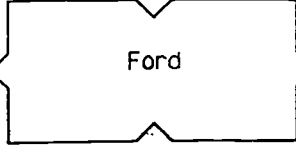
6.  Ton  Pound  Dozen  
A **I** B **S** C **L**

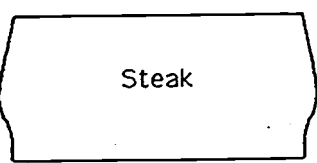

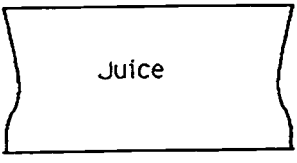
7.  River  Stream  Fire  
A **I** B **S** C **L**

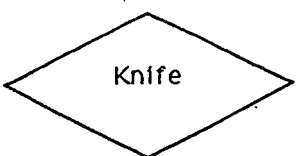
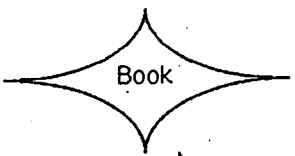
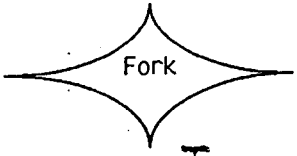
8.  Hammer  Saw  Mouse  
A **S** B **I** C **L**

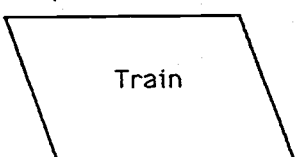
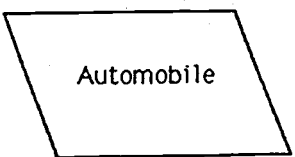
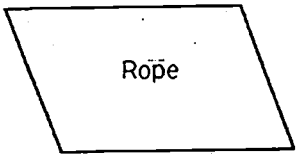
9.  Clarinet  Pencil  Saxophone  
A **S** B **L** C **I**

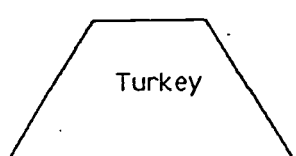
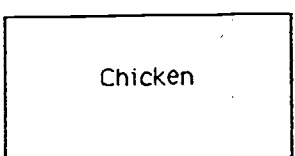
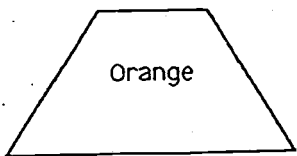
10.  Oak  Maple  Elm  
A **I** B **I** C **S**

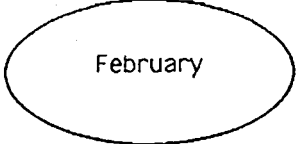
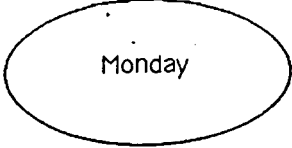
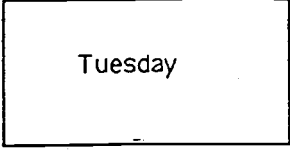
11.  Chevy  Wagon  Ford  
A **I** B **L** C **S**

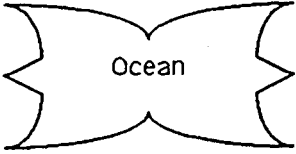
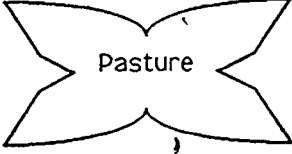
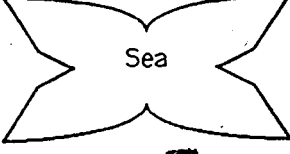
12.  Steak  Milk  Juice  
A **L** B **I** C **S**

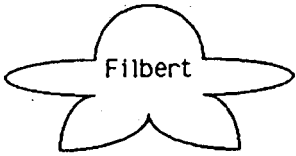
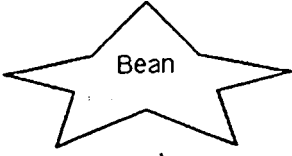
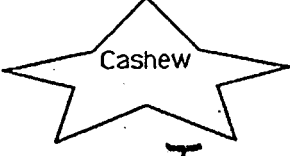
13.  Knife  Book  Fork  
A **S** B **L** C **I**

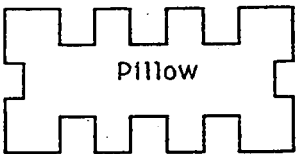
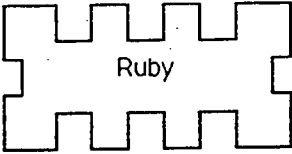
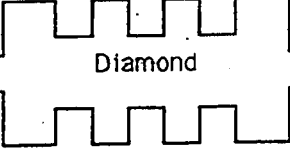
14.  Train  Automobile  Rope  
A **I** B **I** C **L**

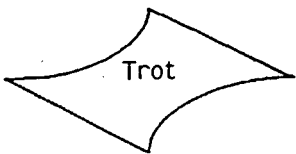


15.  Turkey  Chicken  Orange  
A **I** B **S** C **L**

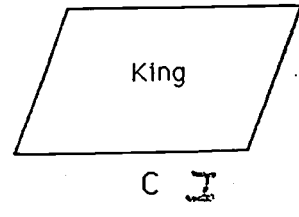
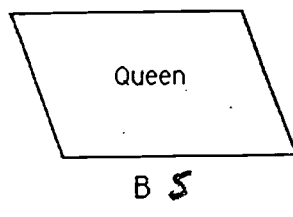
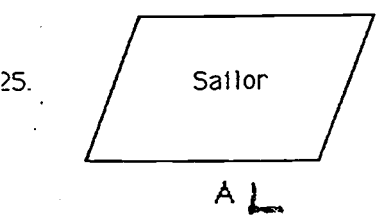
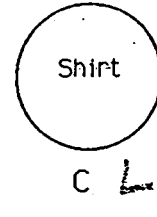
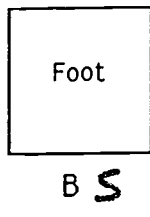
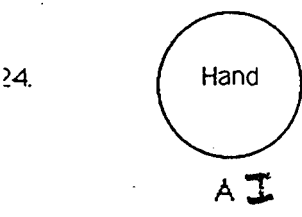
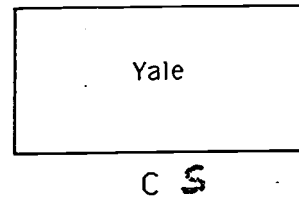
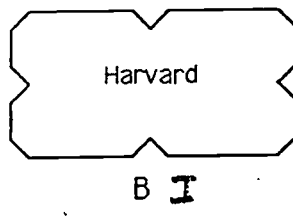
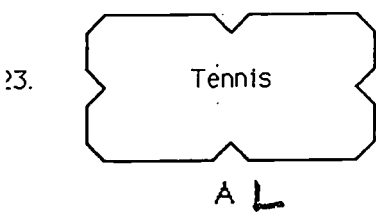
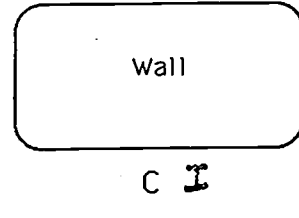
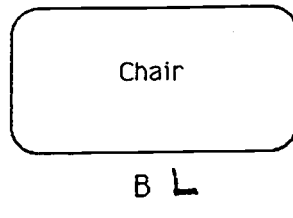
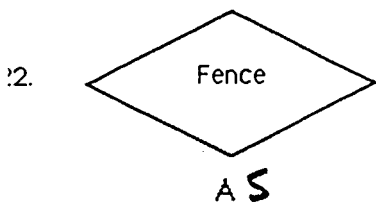
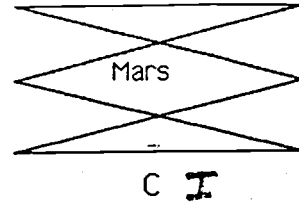
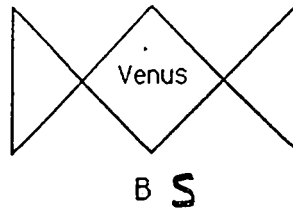
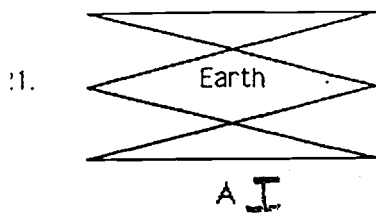
16.  February  Monday  Tuesday  
A L B I C S

17.  Ocean  Pasture  Sea  
A S B L C I

18.  Filbert  Bean  Cashew  
A S B L C I

19.  Pillow  Ruby  Diamond  
A L B I C S

20.  Trot  Pace  Sing  
A S B I C L



APPENDIX H  
Subject Testing Schedule

ENGEL AND ENGEL SELECTION SKILLS EVALUATION INVENTORY  
TESTING SCHEDULE

Xiamen University (Xiamen, People's Republic of China)	instruments not delivered
Kook-min University (Seoul, South Korea)	March 1994
Tokyo International University (Kawagoe, Japan)	April 1994
Willamette University (Salem, Oregon)	March 1994