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ABSTRACT

A study of learner modality in second language learning conducted at a small, private liberal arts university had as subjects 20 freshmen in a second-semester Spanish course. The students' modality strength (visual, auditory, kinesthetic, or mixed) was correlated with Scholastic Aptitude Test measures, grades, and gender. The findings support previous research studies showing that modalities become integrated as students mature, and also suggest a possible role played by memory strategies, especially chunking, when modalities are measured by the Swassing-Barbe Modality Index (SBMI) among college-age subjects. It is suggested that: (1) teachers consider use of the SBMI for diagnostic purposes when students have difficulty learning, and (2) the mismatch between the teacher's preferred mode of presentation and the students' preferred mode of learning be lessened by reteaching in a different mode and by varying the mode used from day to day. (Author/MSE)

The Integration of Modalities: Research and Instructional Implications[1]

Manuscript by

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ABSTRACT

To date, modality research among post-secondary students has been limited. This article reports the results of a study conducted at a small private midwestern liberal arts university where the Swassing-Barbe Modality Index (SBMI) (1979) was administered to 20 freshmen studying second semester Spanish. The independent variable was the students' modality strength: visual, auditory, kinesthetic, or mixed. Dependent variables were SAT-Math scores, SAT-Verbal scores, course grade in each of two consecutive semesters, and gender. Pearson rho correlation coefficients were calculated and no correlations were found. These findings support the conclusions of Barbe and others (1981), that modalities become integrated as students mature. Results also suggest a possible role played by memory strategies, specifically chunking, when modalities are measured by use of the SBMI among college aged subjects. Three suggestions are made: 1) that teachers consider use of the SBMI for diagnostic purposes when students have difficulty learning; and 2) the mismatch between the teacher's preferred mode of presentation and the students' preferred mode of learning be lessened by reteaching in a different mode and by varying the mode used from day to day.

INTRODUCTION

Among the variables that make individual learners different from each other is modality strength: visual, auditory or kinesthetic. Modality strengths are the sensory "channels that are most effective for processing information" (Barbe and others, 1981). Modality as a learner variable has not been fully explored, and its relationship with teacher modalities has not been established. Neither its value as a predictor of achievement nor its relationship to other accepted predictors has been determined. The issue is one in which researchers are clearly "exploring an emerging theory based on new knowledge of how children actually absorb and retain information and skills" (Dunn and Carbo, 1981).

Some of the skills necessary to learn a second language can be readily associated with modalities: listening comprehension with auditory, reading skills with visual, and speaking and writing skills with kinesthetic. Second language educators have recently turned their attention to theoretical propositions that account for individual differences in the learning styles of students (Omaggio and Birckbichler, 1977). Reinert (1977) cites two case studies in which a relationship between the mode of presentation

matched to assessed modality strength affected achievement. Like Barbe and Milone (1981), he recommends teaching to the modality strength of individuals. Lepke (1977) and Nunney (1977) also suggest ways to match students' preferred mode of learning to method of instruction in second language classes. Corbett and Smith (1984) found that one of the instruments available for use in second language classes, specifically ELSIE (1977), requires further refinement for use in assessing group preference and does not accurately identify students whose preferred modality is listening.

The study described here addresses the first and second points above by reporting the effects of using a prevailing assessment instrument, the Swassing-Barbe Modality Index (SBMI), with post secondary students. Since modality research has been conducted largely with children younger than age 12, the integration of learning modes that occurs in adolescence has not been studied. Second language learners are appropriate subjects for these studies since typically (in the U.S.) second language study begins in adolescence. Further, the results of the study suggest recommendations to second language teachers for use of the instrument and the construct of modality in their classrooms.

REVIEW OF LITERATURE

Barbe and Milone (1981) succinctly summarize what is known about modalities in the following statements:

1) students vary with respect to their modality strengths;

2) modality strength is not a fixed characteristic;

3) there is no clear difference between the modality characteristics of boys and girls;

4) handedness and modality do not seem to be related;

5) there is an interaction between student and teacher modality strengths (pp. 378-379);

6) modality and race are not related.

Researchers attempted to clarify the relationship between modality and mode of presentation of material (Ysseldyke, 1973) by examining their data for aptitude/treatment interactions (Cronbach and Snow, 1969). Tarver and Dawson (1978) and Kampwirth and Bates (1980) found insufficient evidence to support an A/T interaction between teaching method and modality strength. Still, the findings of Reinert (1977), Corbett and Smith (1984) and Barbe and Milone (1981) suggest that the abandonment of the modality construct at this time may be premature and that attention should be given to these critical issues in modality research:

1. improvement of assessment instruments;

2. examination of the process of integration of modalities beyond elementary school;

3. examination of the modalities used for reception as well as retention and reproduction of material.

Educators and researchers have attempted to explore a relationship between a learner variable and a teacher behavior without fully describing the learner variable. The result is a confusing array of at least three stances on the role of modalities in learning. Some authorities recommend teaching only in the student's strongest modality (Wepman, 1967; Sabatino and Nayden, 1970; and Barbe and Milone, 1981), but Wallace and Kauffman (1973) contend that teaching to strengths widens the gap between ability and disability. Hallahan and Cruickshank (1973) hold a moderate position, i.e., arguing that the strongest modality should be used to develop the deficient modality.

When modality strengths are considered in the context of a classroom, new dimensions of the variable emerge. DeBoth and Dominowski (1978) suggest that the modality preferred for reception of information may not be the same as that preferred for retention or reproduction. Kirk and Kirk (1971) point out that transfer across modes has not been fully explored.

PROCEDURES

Subjects. The study was conducted at a small, private, Midwestern liberal arts university. Twenty freshmen students, eight males and 12 females, ages 16-18, were randomly selected from two second semester beginning Spanish classes. Students of this age group were selected to capitalize on the confluence of beginning second language study and the completed integration of modalities. The subjects had studied first semester beginning Spanish with three different instructors but at the time of the study all were in the class of a fourth instructor.

Methods and Materials. The SBMI was administered to each student individually and to the instructor. The instrument requires that the subject recreate incrementally-increasing sequences of geometric shapes. The sequences were presented first visually, then auditorily, and finally kinesthetically according to the manual prepared by the developers of the SBMI. Each subject's strongest (primary) and second strongest (secondary) modality was labelled as visual, auditory, kinesthetic, or mixed. A mixed, or balanced, modality occurred when all three modalities were within five percentage points of each other. Dependent variables were first and second semester Spanish grade,[2] student's self-

assessment of modality strength, SAT-Math score, SAT-Verbal score, and sex. Self-assessed modality was determined through an open-ended interview in which the student was asked to describe the way s/he learned Spanish best.

Pearson rho correlation coefficients were calculated on the following variables: raw and percent scores for visual, auditory, and kinesthetic modalities on the SBMI, primary, secondary, and mixed modalities, first semester and second semester Spanish grades, student's self-assessment of modality, SAT-Math score, SAT-Verbal score, sex, and teacher's modality.

The null hypotheses stated that there was no significant relationship between the student's modality strength as assessed by the SBMI and

1) first semester Spanish grade
2) second semester Spanish grade
3) SAT-Math scores
4) SAT-Verbal scores
5) student's self-assessed modality
6) student's sex
7) the teacher's modality.

RESULTS

There were no significant relationships between modality as measured by the SBMI and grades in two semesters of college Spanish, SAT scores, self-assessed modality, sex, or the teacher's modality. Table 1 shows the Pearson correlation coefficients for each variable in the study.

Sixty percent (n=12) of the students had one primary, or strongest, modality. Of the 20 students tested, six (30%) were kinesthetic, three (15%) were visual and three (15%) were auditory. The relationship between primary and kinesthetic modality (r=0.057, raw; r=0.056, percent) was significant (p=0.009). The remaining eight students (40%) had mixed modalities; that is, their modalities were all within five percentage points of each other. Of the students with mixed modalities, six (30%) showed a slightly stronger score in auditory and two (10%) in visual. Table 2 presents the frequencies of primary and mixed modalities found in the study.

The highest raw score attainable in one modality on the SBMI is 45. Table 3 reports the mean raw and percent scores for each modality. The mean scores were highest in the visual modality (raw = 38.35, percent = 34.65). Next highest scores were in the kinesthetic modality (raw =

38.25, percent = 34.55). The lowest scores were in the auditory modality (raw = 34.25, percent = 31.15). The ranges for visual raw scores were 26, for auditory raw scores R=34, and for kinesthetic raw scores R=32. The clustering of both the percent and the raw scores in the mid-30's indicated that the modalities were fairly well integrated for each student.

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INSERT TABLE 1 ABOUT HERE.

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Finally, there were some significant relationships among the variables of the study that attested to the internal validity of the instruments. For instance, raw scores correlated with percent scores for all three modalities: visual ($r=0.77$, $p=0.001$), auditory ($r=0.596$, $p=0.006$), and kinesthetic ($r=0.88$, $p=0.001$) In addition, there was a significant correlation ($r=0.996$, $p=0.001$) between students' grades for first and second semester Spanish courses despite the change of instructors. The instructor's primary modality was auditory, with visual and kinesthetic of equal secondary strength.

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INSERT TABLE 2 ABOUT HERE.

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INSERT TABLE 3 ABOUT HERE.

Discussion. From the student's point of view, modality strength was neither a hindrance nor an aid to achievement since no modality correlated with any standard measure of achievement. Forty percent of the modalities assessed in the present study were mixed indicating that these college students had learned to use their strengths (visual) to compensate for their weaknesses (auditory), confirming that modalities tend to integrate with maturity.

From a teacher's point of view, the findings point to a very specific pattern of interaction. Teachers must be concerned with the arrangement of materials so that the greatest number of students can grasp and practice it. Implicit in this statement is the assumption that each student can grasp the material more quickly and perhaps in greater depth if the teacher arranges the material in a manner consistent with the student's learning strengths. Teachers, as well as students, have preferred modes of presentation that are consistent with their modality strength. The primary strength of the teacher of the class in the study was in the auditory mode, with visual and kinestehtic of equal secondary strength. She presented

material in an auditory mode, consistent with her strength, but not consistent with that of the students, as shown by the significant negative correlation between the primary modality and the percent scores in the auditory mode. Only three of the students were able to use their primary modality to receive this material. Six were able to engage their mixed (with a slight preference for auditory over others) modalities, so that nine of the 20 students could match their mode of reception to the mode of presentation. The degree of auditory strength among the students ranged widely, and auditory mean scores were the lowest of all three modalities so that even those who could use their auditory strength did so from a position of weakness. While the teacher's chosen auditory presentation was probably most comfortable and logical to her, as a class group the students were weakest auditorily and fewer than half of the students could understand the presentation in their strongest mode.

In order to match her mode of presentation more closely with the strengths of her students, this teacher might rank modalities, as in Table 4. The greatest number of students showing a given modality as primary indicates that more students are strongest in that mode. This is a measure of the students' strength as a class, and was the kinesthetic

mode for the students in this study. The highest score modality is the one in which individual students possessed the greatest degree of strength, visual in this study. This measure could be influenced by very high scores in any one modality by a few individuals. The modality demonstrating the greatest range is the one in which student scores spread from lowest to highest. This is a measure of the diversity of strengths in that mode, and in this class it was auditory. The teacher has several options. She may present material initially in her strongest mode (auditory) and risk the mismatch with her students' strengths. She may then modify and reteach the same material using her equally strong secondary modes (visual and kinesthetic) lessening the difficulties students may have had with her auditory presentation. Since development of the listening skill is an integral part of second language learning, the teacher may feel justified in continuing to use her auditory presentations. Other options are to teach first in the mode that will reach the greatest number of students (kinesthetic) or in the mode that shows the greatest degree of strength (visual). In either of the two latter cases, she will use her secondary modes.

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INSERT TABLE 4 ABOUT HERE.

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Every second language teacher has experienced the feeling of having taught a lesson that seemed well-organized and clear only to be sharply surprised when students claimed they found the lesson confusing in its presentation and difficult to understand. Some of this disparity is explained in this study by the mismatch of modality strengths between the teacher and the students. Fortunately, students as well as teachers often demonstrate the ability to use more than one modality.

CONCLUSIONS

Results of this study are important to teachers because they show that the anxiety resulting from the mismatch between student and teacher modalities is not a significant factor in learning. Nevertheless, it can be lessened, and learning made less toilsome, if teachers vary the mode of presentation within a lesson and from day to day. Reteaching of similar material in a mode different from the initial presentation, as recommended in the literature, may capitalize on students' strongest modes. Finally, the use of the SBMI as a diagnostic and assessment instrument is reasonable.[3] The SBMI is an individually administered instrument, and it can be used by teachers for students whose difficulties with language learning could be

attributable to the lack of integration among their modalities, or to the mismatch between their modalities and those of the teacher. In addition, the information gathered from individual assessments can also be used to determine the modality preference of the whole class as well.

Table 1. Pearson Correlation Coefficients and Levels of Significance

	RV	RA	RK	PV	PA	PK	PM	SM	IM	TV	1S	2S	SA	S
RV	1.000 p=0.000	0.136 p=0.565	0.1349 p=0.571	0.7771* p=0.001	-0.4179 p=0.067	-0.5029* p=0.024	-0.0016 p=0.995	0.2669 p=0.255	-0.1124 p=0.637	-0.747 p=0.754	0.0872 p=0.714	0.0770 p=0.747	0.1048 p=0.542	0.1938 p=0.413
RA		1.000 p=0.000	0.2346 p=0.319	-0.3494 p=0.131	0.5957* p=0.006	-0.0414 p=0.862	-0.1588 p=0.504	0.4375* p=0.054	-0.2223 p=0.346	-0.1335 p=0.575	0.1417 p=0.551	0.1120 p=0.638	0.0896 p=0.707	0.3351 p=0.149
RK			1.000 p=0.000	-0.6132* p=0.004	-0.3617 p=0.1117	0.8819* p=0.001	0.5712* p=0.009	0.2073 p=0.380	0.1300 p=0.585	0.3667 p=0.112	0.1854 p=0.434	0.1273 p=0.593	-0.0820 p=0.731	-0.0415 p=0.865
PV				1.000 p=0.000	-0.3860 p=0.093	-0.7569* p=0.001	-0.1819 p=0.443	-0.0548 p=0.819	-0.0417 p=0.861	-0.1291 p=0.588	-0.0371 p=0.877	-0.0081 p=0.973	0.1225 p=0.607	0.0239 p=0.920
PA					1.000 p=0.000	-0.2931 p=0.210	-0.4947* p=0.027	0.0464 p=0.846	-0.2201 p=0.351	-0.3159 p=0.175	0.0505 p=0.832	-0.0317 p=0.894	0.0908 p=0.703	0.2236 p=0.343
PK						1.000 p=0.000	0.5589* p=0.010	-0.0005 p=0.998	0.1982 p=0.402	0.3623 p=0.117	0.0640 p=0.789	0.0217 p=0.928	-0.2205 p=0.350	-0.2284 p=0.333
PM										0.4266 p=0.061	0.1607 p=0.477	0.1512 p=0.525	-0.1973 p=0.405	-0.3713 p=0.107
SM								1.000 p=0.000	0.0777 p=0.745	0.0201 p=0.933	0.0055 p=0.982	-0.0270 p=0.91	-0.0865 p=0.717	0.3715 p=0.107
TM									1.000 p=0.000	-0.0024 p=0.992	-0.0304 p=0.899	-0.0382 p=0.873	-0.3093 p=0.185	0.0496 p=0.835
TV										1.000 p=0.000	0.2281 p=0.333	0.2349 p=0.319	-0.1578 p=0.506	-0.4936* p=0.027
1S											1.000 p=0.000	0.9966* p=0.001	-0.1537 p=0.518	0.2045 p=0.387
2S												1.000 p=0.000	-0.1452 p=0.541	0.0179 p=0.467
SA													1.000 p=0.000	0.2822 p=0.228
S														1.000 p=0.000

*p=.05

Key--
RV=Raw Visual
RA=Raw Auditory
RK=Raw Kinesthetic
PV=Percent Visual
PA=Percent Auditory
PK=Percent Kinesthetic
PM=Primary Modality
SM=Secondary Modality
IM=SAT-Math
IV=SAT-Verbal
1S=First Semester Spanish Grade
2S Second Semester Spanish Grade
SA Self-Assessed Modality
S Sex

Table 2
Frequency of Primary, Secondary and Mixed Modality Strengths

	Primary Modality	Mixed Modality	Totals
Visual	3	2 (visual first)	5
Auditory	3	6 (auditory first)	9
Kinesthetic	6	0 (kinesthetic first)	6
Total	12	8	20

N=20

Table 3
Mean, Standard Deviation, and Range of
Raw and Percentage Modality Scores

	$\bar{X}$	STANDARD DEVIATION	RANGE	
Visual	38.35	6.89	26	
Auditory	34.25	9.85	34	Raw Scores
Kinesthetic	38.25	11.02	32	
Visual	34.65	6.04	26	
Auditory	31.15	9.24	45	Percentage Scores
Kinesthetic	34.55	9.17	30	

N=20

Table 4. Rankings of Modality

Rank	Greatest Number of Students Showing This Modality as Primary	Highest Score	Greatest Range	Teacher's Modalities
First	K	V	A	A
Second	V-A	K	K	V-K
Third		A	V	

A = Auditory
V = Visual
K = Kinesthetic

NOTES

1) Many thanks to Raymond Swassing and Walter Barbe for their assistance in this research project. Swassing, R., & Barbe, W. (1979). The Swassing-Barbe Modality Index. Columbus, OH: Zaner-Blosser, Inc.

2) Although recent efforts in second language learning have focused on proficiency as a measure of student achievement, the ACTFL Proficiency Tests were not used because the integration of all skills could better be reflected in a student's course grade. A grade, at least in these classes, assumes integration of the listening, speaking, reading and writing skills, and is a measure of student progress in the class. It is not intended to serve as an independent measure of proficiency.

3) That 30% of the college freshmen students assessed in the study were kinesthetic is not consistent with findings of researchers who examined young children. The most frequent modalities were visual or mixed in the work of Barbe and others (1979), each accounting for about one third of the population. A possible explanation for the high

frequency of kinesthetic modalities in this sample could be the role of memory devices, specifically chunking, on the part of students taking the SBMI. The order of presentation of the same sequences of shapes in the test is visual first, then auditory, then kinesthetic. When hese college students were required to reproduce the patterns for the third (kinesthetic) time, they had memorized many of the sequences and thus earned higher scores for their kinesthetic assessment. It is suggested that the order be varied in which modality-specific stimulators are presented to college aged subjects, e.g., visual-auditory-kinesthetic, then perhaps kinesthetic-auditory-visual. Such variations in order have been conducted among young children, without revealing significant effects on the validity of the instrument (Barbe and others, 1979). It is argued here that the college aged student has many memory devices that can only be controlled by manipulating the order of presentation. Use of the SBMI for research and diagnostic purposes will require variation in the order of presentation.

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