MEASURES OF VISUAL CLOSURE

JEAN R. HARBER
University of Maryland

The manual for the Motor-free Visual Perception Test (Colarusso & Hammill, 1972) describes visual closure as a form of visual discrimination which involves "the ability to identify incomplete figures when only fragments are presented" (p. 8). The manual of the Illinois Test of Psycholinguistic Abilities (Kirk, McCarthy, & Kirk, 1968) describes visual closure as the "ability to identify a common object from an incomplete visual presentation" (p. 12).

Although these two definitions of visual closure are similar, careful examination of the two measures indicates several differences. First, the format of the tasks differs. The Motor-free Visual Perception Test items are presented in multiple-choice format and the child points to the one of four choices which would be like the stimulus item if "we finished drawing these figures" (Colarusso & Hammill, 1972, p. 26). On the visual closure subtest of the Illinois Test of Psycholinguistic Abilities the child points to as many hidden objects he can find in pictures containing distracting stimuli. Secondly, the stimulus items are different; the Motor-free Visual Perception Test uses geometric shapes and letters while the Illinois Test of Psycholinguistic Abilities uses common objects, such as shoes and bottles. Thirdly, the latter is timed, while the former is not.

The perception test and the Visual closure subtest of the psycholinguistics test were administered to 54 normal second graders and 55 learning disabled youngsters of comparable chronological age. On the visual closure items of the Motor-free Visual Perception Test the mean score for the normal group was 7.45 (SD, .28); for the learning disabled group the mean score was 5.63 (SD, .28). On the visual closure subtest of the Illinois Test of Psycholinguistic Abilities the mean score for the normal group was 27.20 (SD, 8.34); for the learning disabled group the mean score was 26.53 (SD, 8.71). Their scores on the visual closure items (Items 22 through 32) and the visual closure subtest of the Illinois Test of Psycholinguistic Abilities were correlated. Correlations were .41 for the normal subjects and .43 for the learning-disabled subjects, suggesting that these two measures assess somewhat similar but not precisely the same skills.

REFERENCES


Accepted January 29, 1979.

1Department of Special Education, University of Maryland, College Park, Maryland 20742.

HANDB MOVEMENTS AND NONDOMINANT FLUENCY IN BILINGUALS

LUIS R. MARCOS
New York University School of Medicine

Summary — 16 subordinate bilingual subjects produced 5-min. monologues in their nondominant languages, i.e., English or Spanish. Hand-movement activity manifested during the videotape monologues was scored and related to measures of fluency in the nondominant language. The hand-movement behavior categorized as Gropping Movement was significantly related to all of the nondominant-language fluency measures. These correlations support the assumption that Gropping Movement may have a function in the process of verbal encoding. The results are discussed in terms of the possibility of monitoring central cognitive processes through the study of "visible" motor behavior.

Following Darwin's study of emotions (1929), which established body movement as a subject of scientific interest, the field of movement research has extensively developed. Within the area of human behavior, apart from its "discharge" (Darwin, 1929), "expressive" (Allport & Vernon, 1933; Reich, 1958), and "interpersonal" (Birdwhistell, 1952; Scheflen, 1964; Watzlavick, Beavin, & Jackson, 1967) dimensions, movement has recently been interpreted as a derivative of sensory motor schemata and viewed as having a functional significance in the process of verbal encoding (Holst, 1954; Freedman, 1977). This model suggests that the reafference generated by nonverbal motor behavior helps to maintain the direction of thought and, thereby, facilitates the function of information transmission.

During the past 10 yr. a number of investigators have gathered convincing observations attesting to the central role of movement in the processing of information. Thus, it has been shown that movement during speech persists even when there is no visible object of communication (Hoffman, 1968; Mahl, 1968), at times of verbalization failures (Kraut, 1954), as well as during pauses which appear to be related to syntactic planning (Dittman & Lewellyn, 1969; Dittman, 1972).

Central to this conceptual framework which considers nonverbal behavior as a component of information-processing mechanisms is the movement-coding system developed by Freedman and collaborators (Freedman & Hoffman, 1967; Freedman, 1972). Utilizing Freedman's coding system, specific categories of hand movements have been linked to measures of cognitive style (Freedman, O'hanlon, Ottem, & Witkin, 1972), aspects of the verbal content of speech (Freedman, Blass, Rifkin, & Quittin, 1972), different language constructions

1This study was supported by National Institute of Mental Health Research Fellowship Award 1F22MH01827-01 and Grant MHE-08618.
2530 First Avenue, New York, N. Y. 10016.
and verbal productivity (Freedman & Steingart, 1975), communication of blind people (Blass, Freedman, & Steingart, 1974), various types of psychopathological states (Grand, Freedman, & Steingart, 1973; Grand, Freedman, Steingart, & Buchwald, 1975), and linguistic paradigms such as schizophrenic bilingual patients (Grand, Marcos, Freedman, & Barroso, 1977), and normal subordinate bilingual individuals (Marcos, 1976a, 1977).

The purpose of this study was to explore the relations between specific types of hand-movement activity and language fluency. The present study seems from our recent findings which showed that subordinate bilingual individuals produced more hand-movement activity in their nondominant language than when speaking in their dominant language (Marcos, 1977). Encoding in a nondominant language, in comparison with the dominant language, implies greater verbal encoding work since the number of words available, the capacity for grammatical ordering, and the articulation facility are poorer (Marcos, 1976a). For this study, the two specific categories of hand activity, i.e., Gropping movement and Speech-primacy movement, which demonstrated a significant increase when subordinate bilingual individuals spoke in their nondominant language, were related to subjects' level of nondominant language proficiency.

Speech-primacy movement activity is composed of short, rhythmic, small movements, which convey a beat quality and are in intimate coordination with the rhythmic aspects of speech. Morphologically, in these movements the hand either traverses an essentially straight vertical path or performs simply a turn of the wrist. These movements contain no representational or content properties.

Empirical studies have suggested some relations between Speech-primacy movement and the process of encoding. Thus, the amount of Speech-primacy movement does not change when the participants in a dialogue are facing away from each other (Hoffman, 1968). Also, more Speech-primacy activity is produced by subordinate bilingual subjects when speaking in a nondominant language (Marcos, 1976a, 1977). These findings suggest that this movement may have a function in the process of verbalization.

Given this background, it was postulated that Speech-primacy movement, an encoding-related motor activity, would be correlated with the level of language proficiency of the subject.

Descriptively, Gropping movements are short movements which occur in outbursts during hesitations in speech. These pauses have been thought to represent the speaker's difficulty either in making a lexical choice or in casting it into the right syntactic form (Lounsbury, 1954). Gropping movements do not have a verbal referent and are not used to represent but rather seem to indicate the individual's struggle to find words. As with Speech-primacy, more Gropping activity was produced by subordinate bilingual individuals when speaking in their nondominant language (Marcos, 1977). Given this finding and the relation of this activity to the silent pauses of the verbalization process, it may be inferred that Gropping movements have also a function in either the lexical or the syntactic planning aspects of the encoding process. Consequently, in this study, it was anticipated that the amount of Gropping movement would be associated with the level of language fluency of the individual.

**METHOD**

**Subjects**

A total of 16 adult subordinate bilinguals were selected for the study. These are bilingual individuals who show a significant language-competence deficit in their nondominant language. All these subjects were part of an ongoing research project aimed at exploring communication patterns in bilinguals. The 16 subjects comprised two groups, each of 8 linguistically opposite bilinguals, eight bilinguals whose dominant language was English, Spanish being their nondominant language, and eight bilinguals who had Spanish as their dominant language and English as their nondominant one. Linguistically opposite bilinguals were selected in order to control for changes in kinesthetic behavior that might be due to the intrinsic characteristics of the language system, i.e., English and Spanish, or to the cultural origin of the subjects, rather than to their level of language proficiency.

In each group there were two men and six women ranging in age from 24 to 41 yr. Their schooling averaged 17 yr. and their area of study was within the art field.

**Procedure**

Each subject selected for the study participated in the experiment individually. All the subjects were seen in a sound-proof recording room in which there were two television cameras. The cameras were controlled by a technician who was located in a separate control room. The experimental tasks were recorded on videotape. The television system included two Dage Vidicon solid-state cameras, Model 91, each equipped with 4 lens remote control turret, and a Sony EV 210 video tape recorder. One camera recorded a complete frontal view of the subject, especially the subject's hands and arms, and the second camera recorded the face of the subject as well as a silent digital display clock which counted minutes and seconds and appeared across the very bottom of the screen. The final image, therefore, was provided on a split screen composed of a frontal view of the subject, the subject's face, and the digital clock.

After an adaptation period during which the subject was introduced to the recording room and made comfortable, the subject was given the verbal task. The instructions emphasized the monologue nature of the verbalization, e.g., the research assistant did not have an eye contact with the subject. The material for the present study was obtained by having the subjects elaborate for 5 min. about the topics "the idea of love" or "the idea of friendship" in their nondominant language. The order of the tasks was counterbalanced.
To measure the subject's level of nondominant language fluency, the following battery was administered on an individual basis.

**Subjective estimation.**—This is a group of questions which represents a modified version of the interview used by Fishman and Cooper (1971) in their extensive study on the measurement of language dominance in bilinguals. This questionnaire was given in the subjects' dominant language. Apart from a number of questions concerning biographical, educational, and language acquisition data, the primary measurement in this questionnaire is the subjects' subjective estimation of their level of language proficiency. Specifically the following question is answered by the subject: "If you consider your present fluency or ability to speak in English/Spanish (dominant language) to be excellent, or like 100%, where on the line below would you place your present fluency or ability to speak English/Spanish (nondominant language)?" Bilinguals' own estimation of their nondominant language fluency has been found to be a valid measure of their proficiency (Fishman & Cooper, 1969; Marcos, 1977).

**Word-naming Test.**—This measurement, extensively used to estimate the degree of bilingualism (Macnamara, 1967; Cooper & Greenfield, 1971; Ronch, 1971), requires the subject to name in 1 min. as many different words as possible in their nondominant language, i.e., "Now I'm going to ask you to tell me as many different English/Spanish (nondominant language) words as you can. Any word at all will be O.K. They don't have to be big words. Just any word at all like—cat, table, pen—in Spanish: gato, mesa, lápiz. When I tell you to start tell me as many different English words as you can. I'll tell you when to stop. Any questions? O.K., now—one minute."

**Vocabulary test.**—Each subject was given the Vocabulary subtest of the Wechsler Adult Intelligence Scale in his nondominant language (Wechsler, 1958; Green, 1964). This test has been used effectively in previous work to measure the level of language competence in bilinguals (Marcos, Alpert, Urcuyo, & Kesselman, 1973).

**Assessment of Hand-movement**

A detailed method for the coding of hand-movement activity and the reliability for scoring such behavior have been presented elsewhere (Freedman, 1972; Freedman, et al., 1972). The hand-movement activity was scored by viewing the videotape on the monitor and by playing back any segment of the tape as many times as the coders needed for satisfactory identification of either Speech-primacy or Gropping movements.

The coding of the sample was conducted independently by two bilingual raters. In order to check their reliability, a placement coefficient was computed. This coefficient refers to the concordance between the two judges in identifying the same movement as belonging to each of the two categories studied, divided by the total number of movements assigned by the two raters to the specific category scored. The results of this reliability check demonstrated that the identification of the two different hand movements can be reasonably reliably made. The average category placement coefficient for Gropping movement was .71 and for Speech-primacy movement .75. These coefficients are comparable to those achieved in previous studies that have used the same coding system. Both hand movements are computed in terms of rates that take account of the subject's total word output, i.e., frequency of Speech-primacy or Gropping movements multiplied by 100, divided by total number of words. In the present study, each 5 min. of the nondominant language monologues were coded for analysis.

**Results and Discussion**

To determine the patterning of hand movements in relation to the level of nondominant language fluency, product-moment correlations were computed with the language dominance scores on Subjective Estimation, Word Naming, and Wechsler Vocabulary and the Speech-primacy and Gropping movements produced during the verbalization tasks in the nondominant languages. The means and standard deviations of all the variables involved were as follows: for Subjective Estimation 52 and 17.3, for Word Naming 33 and 8.5, for Wechsler Vocabulary 52.3 and 12.5, for Speech-primacy movement 11.78 and 6.51, and for Gropping movement 57 and .41.

The analysis generated a $3 \times 2$ correlation matrix, containing significant negative correlations for Gropping movement and all the measures of language fluency. These correlations are presented in Table 1. It can be seen that although both Gropping as well as Speech-primacy movements are negatively correlated with the three measures of language fluency, only the Gropping movement reached a statistically significant level. These significant relations support our hypothesis that Gropping movement may have a function in the process of verbal encoding. Thus, the less proficient an individual is in a language, the more gropping activity is produced. Our hypothesis concerning the Speech-primacy movement, however, was not confirmed in this study.

The present study has addressed the conceptualization of kinetic activity as an active participant in central cognitive mechanisms such as the process of verbal

<table>
<thead>
<tr>
<th>Kinesic Category</th>
<th>Measures of Language Fluency</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Subjective Estimation</td>
</tr>
<tr>
<td>Speech-primacy Movement</td>
<td>-2.59</td>
</tr>
<tr>
<td>Gropping Movement</td>
<td>-5.48*</td>
</tr>
</tbody>
</table>

* $p < .025$, † $p < .01$ (one-tailed).
encoding, the major assumption being that definite categories of hand movements, i.e., speech-primacy movement and Gropping movement, have a function in the transformation of idea into words. For this particular research, subordinate bilinguals with an ample range of competence in their nondominant language were utilized as the ideal population to explore the kinetic consequences of different degrees of encoding work. Furthermore, it was important to have a sample of opposite bilinguals, i.e., English-dominant and Spanish-dominant. The possibility that the intrinsic characteristics of the languages or the cultural origins of the subjects could affect the motor activity could not be otherwise ruled out.

The results of this study support the function of Gropping movement in the central processing of information and dispute the notion that this particular behavior may simply have a transmission or communicative value in human communication. The fact that Gropping movement occurs during hesitation pauses and that it is negatively correlated with language fluency measures such as the Subjective Estimation, the Word Naming and the Wechsler Vocabulary may be interpreted in terms of this movement's facilitative function in the process of verbal encoding. One is reminded of the popular saying "Neapolitans can be made mute by tying their hands behind their backs" (Efron, 1941). Interpretations other than encoding facilitation, however, may also be considered. Thus, the negative relation between Gropping activity and language fluency could be explained as a peripheral sign of encoding difficulties or in terms of a motor overflow due to a central effort to encode in a nondominant language. Another possibility is that the increase in Gropping movement associated with lower nondominant language fluency may reflect a specific characteristic of the population of subordinate bilinguals. Our results might, then, be a consequence of this particular group of individuals. The existing literature on this group of bilinguals, however, indicates that subordinate bilinguals encode as monolinguals do (Marcos, 1976b).

At a general level, a major implication of this research is the integration of "central" cognitive processes with "peripheral" nonverbal activity, two phenomena which for a long time have been compartmentalized under separate fields of investigation. This study suggests the viability of studying central "invisible" mental processes, by monitoring specific "visible" kinetic activity. For example, in the areas of basic and developmental research, one central problem has been the identification of those hypothetical constructs which constitute the encoding and decoding components of information processing. By identifying specific peripheral activities such as hand movements with a function in information processing, the investigator of cognitive and language development might be able to infer about the steps involved in those central cognitive processes which otherwise would not be available for study.

Another potential implication of this study falls in the field of language disorders. It is important to remember that clinicians in this area have often related movement to speech. In fact, Critchley (1939) already distinguished the gestures that may accompany speech from the pantomime which seeks to represent and to convey meaning. Specifically in the area of aphasias this study has interesting implications. Thus, although aphasic disturbances are often associated with muscular deficit, when possible, the examination of hand activity might offer the researcher cues as to which area of the encoding process has been affected. For example, it may be speculated that aphasics with faulty syntactic or lexical encoding, e.g., syntactic aphasia, will show an increase in the production of Gropping movement.

Concerning further research, an immediate goal should be to study the nature of the association movement-encoding. Also, the specific relations between the different categories of kinetic behavior and the components of the encoding process, e.g., lexical, syntactic, phonetic, etc. For this purpose, more refined measures of both movement and encoding constructs should be developed.

REFERENCES


Bliss, T., Freedman, N., & Steinberg, I. Body movement and verbal encoding in the congenitally blind. Perceptual and Motor Skills, 1974, 39, 275-293.


Freedman, N. Hand, words, and mind: on the structuralization of body movements during discourse and the capacity for verbal representation. In N. Freedman & S. Grand (Eds.), Communicative structures and psychic structures. New York: Plenum, in press.


FRUSTRATION, FANTASY AGGRESSION, AND THE EXERCISE OF COERCIVE POWER

JAMES T. TEDESCHI
State University of New York at Albany

Summary.—The influence of frustration and aggression in fantasy on a source’s exercise of coercive power was investigated. Half of the 46 female subjects were frustrated and half were not; further, half of each of these two groups were given the opportunity to express aggression in fantasy via a TAT and half were not. All subjects were then given coercive power in an interaction with a defiant target. Frustration caused subjects to establish higher credibility for their threats, and the opportunity to express aggression in fantasy had an accommodative effect on the use of coercive power.

Frustration often heightens the probability of aggressive behavior (Bekovitz, 1970). Analogously, a favorite hypothesis of political scientists is that frustration with domestic problems increases the probability that a nation will seek out international conflicts as a means of distracting public opinion. It might therefore be expected that frustration would encourage a person to exercise more coercive power and particularly would affect the degree of harm administered to the target when the latter performs noncompliant actions. Feshbach (1955) found that the expression of aggression in fantasy reduced aggressive behavior, but Hokanson and Burgess (1962) found no cathartic-like effect of fantasy aggression. Hence, it is not known whether the expression of aggression in fantasy can lessen the aggressiveness of a source of coercive power.

The present study investigated the influence of frustration and fantasy aggression on a source’s exercise of coercive power. Subjects were given the ability to threaten a simulated target within the context of a Prisoner’s Dilemma game. When the simulated target did not comply to the subject’s demands, the latter had an opportunity to punish the former. Half of the subjects were frustrated prior to the power interaction and half were not. Each of these two groups were further sub-divided into those given an opportunity to express fantasy aggression in a Thematic Apperception Test (TAT) and those who were not. The hypotheses were that (1) frustrated subjects will punish noncompliant actions by the target more frequently than will nonfrustrated subjects and (2) subjects given an opportunity to express fantasy aggression will use their coercive power less than those not given prior TAT experience.

**METHOD**

A total of 47 females participated to satisfy course requirement.\(^7\)

---

\(^{7}\) Send requests for reprints to J. T. Tedeschi, State University of New York at Albany, Department of Psychology, 1400 Washington Ave., Albany, N.Y. 12222.

\(^{8}\) One subject was dropped from the study because her mother had recently died and her emotional depression probably invalidated the results. The frustration-TAT condition had 10 subjects and all other conditions had 12.