DOCUMENT RESUME

ED 129 407 PS 008 757

AUTHOR Vietze, Peter M.; And Others
TITLE Tri-Annual Report, Infant Competence Project, July 31, 1974.
INSTITUTION George Peabody Coll. for Teachers, Nashville, Tenn. Demonstration and Research Center for Early Education.
SPONS AGENCY National Inst. of Education (DHEW), Washington, D.C.
PUB DATE 31 Jul 74
CONTRACT NE-C-00-3-0260
NOTE 98p.; Not available in hard copy due to marginal legibility of Appendix B of original document

EDRS PRICE MF-$0.83 Plus Postage. HC Not Available from EDRS.
DESCRIPTORS *Cognitive Development; Computer Programs; Data Analysis; Data Collection; Infant Behavior; *Infants; *Interaction Process Analysis; *Longitudinal Studies; *Mothers; Observation; Oral Communication; *Parent Child Relationship; Research; Social Development

ABSTRACT

This paper reports on a longitudinal study involving 48 mother-infant dyads that attempts to explore the role of the caregiver-infant interactional environment in determining cognitive functioning as related to an understanding of environmental contingencies. The present report includes (1) a progress report to date of the longitudinal data collection of the Origins of Infant Competence; (2) a description of the inter-observer reliabilities from the pilot study and the first phase of the longitudinal study; (3) description of the data-reduction scheme and computer programs devised to organize the observational data; (4) preliminary results of the pilot observational study that examined the (a) effects of infant state, caretaking setting, and maternal proximity on vocal behavior of infants and mothers; (b) patterns of maternal behavior in intervals antecedent and consequent to infant vocalization onsets; and (c) the temporal structure which characterized alternation of vocal activity between infants and mothers; and (5) a description of the sample for the longitudinal study. Appendices contain the observational code used, a computer program written for the data (56 pages), and materials used in contacting parents. (Author/SB)

TRI-ANNUAL REPORT, INFANT COMPETENCE PROJECT, July 31, 1974

Peter M. Vietze

With the Assistance of: Barbara Strain and Susan Falsey

This research supported by the National Institute of Education, Contract No. NE-C-00-3-0260

Tri-Annual Report, Infant Competence Project, July 31, 1974

Peter M. Vietze

The present report includes 1) a progress report to date of the longitudinal data collection of the Origins of Infant Competence; 2) a description of the inter-observer reliabilities from the pilot study and the first phase of the longitudinal study; 3) description of the data-reduction scheme and computer programs devised to organize the observational data; 4) preliminary results of the pilot observational study; 5) a description of the sample for the longitudinal study; 6) results of the preliminary data analyses obtained from the experimental procedures to assess learning and visual habituation.

I. Progress Report of the Longitudinal Study

Recruitment of the sample: In order to guarantee that data on 48 infants would be available by the end of the study, 54 families were successfully recruited to participate in the study by the beginning of June 1974. By the last week in June, data collection was complete for all 54 infants and mothers for the first phase of the study. However, since completion of this phase, two families, one with a male infant and one with a female infant, have dropped out of the study as a result of their moving out of the area unexpectedly. Thus the sample remains at 52 with 27 females and 25 males.

Phase I

A. Experimental Tasks By the middle of July all the experimental data had been collected, scored and punched on data cards. This was a little bit behind schedule partly as a result of the loss of one of the research assistants in the beginning of June. This data has been subjected to data analyses to evaluate the performance of the sample as a whole on each of the experimental tasks. The results of these analyses will be presented elsewhere in this report. In addition, data reduction schemes are being explored to summarize this experimental data for later inclusion in multi-variate data analyses. Some of the preliminary summary scores have been included in a correlation matrix to explore the relationships between some of these measures and the Bayley Scales variables. Although extreme efforts were made to obtain complete data from all infants in the experimental procedures, approximately 15% of the infants did not complete the laboratory tasks due to fussiness. In every case, several attempts were made to obtain the data by rescheduling laboratory visits up to three times. Attempts to establish some systematic explanation for this subject attrition have not met with any success--ie. no factor which is obvious seems to account for some subjects "refusal to cooperate". It should be mentioned, however, that 15% attrition is extremely low for infants under 9 months--many experimental studies report rates as high as 50% and so we are not too displeased with this rate of missing data.

B. Bayley Testing As anticipated, there are no particular problems which we have encountered in administering the Bayley Scales. Mean D.Q. for the Mental Scale is 110.0 while that for the Motor Scale is 121.47. In addition to the overall scale scores, the items have been clustered by what they are measuring into a social scale, auditory scale and a visual scale. Also, 5 scales used by Yarrow, Rubinstein, Pedersen, and Jankowski (1973) have been used to extract additional clusters: visual attention, visual reaching, gross motor, fine motor, and social. These will be used to establish some construct validity with previous work by Yarrow et. al. When responsiveness measures are available from the observational data, these subscales will be correlated with the measures of maternal responsiveness to evaluate the relationship between maternal style variables and infant performance measures.

C. Maternal Attitude Scale This self-report measure developed by Cohler (Cohler, Weiss & Grunebaum, 1970) was administered to all the mothers during one of their visits to the Infant Laboratory. The 233 items have been transferred to data cards and computer scored by Cohler at the University of Chicago. There are 37 variables derived from this instrument including empirical, theoretical and factor based scores. Thus far, only the five factor based scores have been analyzed with the other data. A preliminary correlation matrix was computed which showed no significant correlations between MAS factor scores and the infant performance measures. This instrument will be administered again when the infant is a year old.

D. Observational Data As mentioned above, all the first phase data has been collected including the observational data. Prior to completion of the Phase I data collection, procedures to transfer the observation interaction data to the computer were initiated. The steps include: 1) decoding the audio tape on which the data is recorded using the Datamyte; 2) correcting machine and observer errors (as these can be detected) on a print-out from the computer terminal; 3) loading the data from paper-punch tape (produced when the audio tape is decoded) to the disk and magnetic tape storage systems of our PDP 11/40 computer; 4) correcting all discernible errors on the disk version of the data; 5) transferring the corrected data to magnetic tape. By the end of July these steps had been completed for all 54 records collected between March and June. During this time, the computer programs which have been written to reduce and analyze the observational data were being revised.

To date these revisions are incomplete. The revisions came about as a result of our experience with the pilot study now completed. Since it was impossible to know exactly what variables might be useful, several extra data reduction steps were included in the programs. These are being deleted and the program made more efficient. It is exptected that the revisions will be finished by the beginning of October and that the observational data will be ready to be run off then. Following this step, dependent variables derived from the initial analysis will be transferred to data cards and incorporated in the multi-variate analyses for the first phase.

Phase II Preparations

A. Experimental Tasks Beginning in May, the experimental procedures for Phase II were finalized. Pilot subjects tested using the previously used "string pulling" response were tested. However, due to unexplainable difficulties, a large number of pilot subjects tested did not complete the sessions due to fussiness. It was decided that a new apparatus and procedure would have to be developed. In consultation with Mr. Harold Stone, the Kennedy Center Apparatus technician, a response system was built in which the infant was able to push either of two levers in order to gain access to either a visual stimulus or an auditory stimulus. This apparatus was tested and proved to be an admirable improvement of the previous "string-pulling" apparatus. The levers are situated below a rear-projection display screen and fastened to an infant feeding table. The infant can operate either lever with a minimum of effort to provide contingent feedback. A picture of a 2 year old child which remains on the screen for 3.5 seconds and a 3.5 second segment of a bluegrass banjo music tape serve as the visual and auditory reinforcers respectively. The experimental design is similar to that used in Phase I.

After the subject is made comfortable in the feeding table, a one minute baseline period followed by 4 minute contingency, 2 minute baseline and another 4 minute contingency period ensue. Observers monitor visual attention, non-distress and distress vocalizations and smiles. If the infant becomes fussy, the session is terminated and another attempt is made after the infant regains its composure. If necessary, the infant is scheduled for another lab session and another attempt is made. In all, three attempts are made to test the infant.

B. Habituation Pilot infants tested in June did not maintain sufficient attention to the checkerboard stimuli used during Phase I and so it was decided that facial stimuli would be utilized in Phase II. Color photographs of a girl smiling and frowning were tested and proved to be attractive enough to infants to warrant their maintaining attention for up to 30 seconds initially. Pilot testing also indicated that some infants looked for less than 10 seconds and so the initial looking criterion was lowered to mean looking time of 8 seconds taken on two consecutive presentations. The same decrement criterion of a 50% reduction in looking time used in Phase I was selected in order to maintain some continuity with the earlier assessment. Again, infants were held by their mothers during the habituation procedure in order to minimize fussing. A similar design was used in order to provide controls for fatigue. Thus, half the infants are being tested with the smiling face and half are being tested with the frowning face with the other stimulus used to test for recovery of attention. In addition, to insure that failure of recovery is not due to the similarity of the stimuli, an upside-down monochrome face is presented at the end of the series for two presentations. In order to provide positive evidence of true habituation, half of the subjects are shown the initial stimulus for two extra trials following their reaching decrement criterion before being presented the second stimulus.

C. Observation of Interaction Prior to the beginning of Phase II, video tapes of 6½ month old infants being fed and entertained by their mothers were made in order to revise the observational code. Initially, the observers attempted to code these tapes using the observational code as it was being used for Phase I. It became evident that two significant changes had taken place in the infant-mother interactions. First, many of the infants were, as expected, becoming mobile. Some crawled, some scooted, some dragged themselves around the room. Secondly, they seemed to be much more adept at handling objects in their immediate environs. They reached, grasped, threw, dropped, mouthed, and otherwise explored and played with objects and toys. In addition, their mothers, having observed this change, encouraged such interactions in various ways. In order to incorporate what we considered to be important changes in behavior, we modified the proximity code so that it was now possible for the infant to initiate proximity changes between itself and the mother. We also elaborated the codes dealing with interaction with objects by expanding the number of third digit codes to indicate the varieties of infant-mother-object transactions. These are presented in Appendix A and can be inserted in the observational manual according to the page numbers. After agreeing on the changes, the observers spent several weeks between the end of Phase I and the beginning of Phase II practicing with several pilot subjects. Once more, high reliability was established for both frequency and duration measures as both levels of these are utilized in data analysis.

D. Carey Scale of Infant Temperament In order to provide a maternal report measure of how the infant deals with every-day occurrences and events, a questionnaire devised by a pediatrician, William Carey (1970) was incorporated into the study. This questionnaire is based on an extensive interview used in the New York Longitudinal Study of the last decades (Thomas, Chess, Birch, Korn, & Hertzig, 1963) and gives some indication of how the mother perceives her infant along several dimensions. The goal is to be able to classify the infants according to activity into "easy", "medium", or "difficult" infants. It is expected that this will give an indication of the match between infant temperament and maternal style. The questionnaire can be self administered and so we are asking the mothers to fill them out and return them by mail. By the end of July, only 4 infants had been completed on Phase II data collection. It is expected that Phase II data collection will be completed by the end of October.

II. Inter-observer Agreement

Three criteria were selected for establishing inter-observer reliability of the observational data: 1) that adequate inter-observer agreement exist on each category in the observation system before data collection begins (Weick, 1968), with a minimum level of agreement set at 85 percent as suggested by Gellert (1955); 2) that checks be made on the maintenance of initial inter-observer agreement during data collection (Gewirtz & Gewirtz, 1969; Patterson and Cobb, 1971; Reid, 1970); and 3) that reliability indices be established on scores which correspond to each form of the dependent variable (e.g. frequency of occurrence, duration, etc.) planned for use in the final data analyses (Frick and Semmel, 1974).

Initial data collection for reliability purposes was planned to continue until acceptable levels of agreement for each behavioral category on six dyads, three with male infants and three with female infants, were reached. Inter-observer agreement checks were made again at the mid-point and near the end of data collection on the 24 dyads in the pilot study and throughout the data collection in Phase I. For the in-process observation visits, both observers collected data on the entire session for reliability purposes but only one observer's data for each visit contributed to the final analyses.

From each of the pairs of observation records done to check reliability, five to fifteen minutes of continuous interaction from the initial, middle and final portions of each approximately 90 minute session. The segments were selected to sample different caretaking settings. A total of 20-30 minutes from each observer's record contributed to the reliability check for each observation session.

Since dependent variables in the form of overall duration of behaviors and antecedent-consequent relationships within 10-second intervals were to be used in data analyses, inter-observer agreement was established on the reliability data for both types of scores. First, to assess the reliability on duration of behavior categories, the records were divided into consecutive 1-minute segments. The duration of each category of maternal and infant behavior was summed per minute. This process was carried out on each observer's record. Pearson product-moment correlation coefficients were calculated between the two observers for each category, using the duration of the category, in seconds, for each 1-minute interval.

Secondly, a standard percentage agreement index to assess agreement between observers in coding the presence or absence of behavioral categories in short consecutive time intervals was applied to the same portions of the reliability records described above. For this purpose, the records were divided into 10-second intervals. A 10-second interval unit was selected to correspond with the time period used to define antecedent and consequent behavioral events in data reduction and analyses (Level II) described in the next section of this report. Each 10-second unit was scored in terms of whether the two observers agreed or disagreed on the common occurrence of each maternal and infant behavior category. The number of agreements was totaled and divided by the sum of the number of agreements and the number of disagreements. Intervals in which the observers agreed that no instance of a category occurred did not contribute to the total number of agreements since this gives deceptively high agreement scores by inflating the actual frequency of occurrence of the event (Bijou, Peterson, Harris, Allen, & Johnston, 1969).

Results of the initial and in-process reliability checks are summarized in Table 1 for the pilot study and the Phase I observations. The correlational index resulting in generally higher levels of agreement. Lowest levels of inter-observer agreement were recorded consistently for maternal and infant smile. Smile was a behavior with relatively low frequency of occurrence, which fact tends to reduce the percentage agreement index level (Frick and Semmel, 1974). Also the occurence of a smile is a more subtle behavior to detect than the onset of auditory or tactile stimulation. Visual attention indices which represent attention of one member of the dyad to any part of the body of the other member, rather than eye-to-eye contact, were consistently high. In general, inter-observer agreement in natural settings seems to be more difficult to establish than in laboratory settings. Often, the recording of a particular maternal or infant behavior is largely dependent on the position of the observer relative to the subjects. It is impossible for two observers to have the same position and so the high reliabilities which are presented here are probably affected by the particular homes in which the checks were done. Often furniture arrangement and space in the setting made it difficult for the observers to find locations which gave equally clear unobstructed

Inter-Observer Reliabilities on Home Observations for Mothers and Infants

	Pre-Pilot		Pilot		Pre 2 1/2 Month		2 1/2 Month	
	Frequency	Duration	Frequency	Duration	Frequency	Duration	Frequency	Duration
MOTHER CATEGORIES								
Looks at infant								
n	6	6	2	2	5	5	6	6
X	99.8	.995	98.7	.994	98.8	.997	96.5	.870
Vocs. to infant								
n	6	6	2	2	6	5	6	6
X	97.4	.925	94.9	.980	98.3	.942	90.8	.820
Smiles at infant								
n	6	6	2	2	6	5	6	6
X	84.4	.936	87.5	.941	88.8	.874	82.7	.813
Touch-Play								
n	6	6	2	2	3	3	3	2
X	91.5	.992	100	.989	73.0	.840	66.0	.745
INFANT CATEGORIES								
Looks at mother								
n	6	6	2	2	6	5	6	6
X	99.0	.983	94.4	.924	91.7	.954	90.8	.937
Nondistress vocal								
n	6	6	2	2	6	5	5	5
X	89.2	.935	88.8	.940	83.5	.852	67.6	.716
Smiles								
n	6	6	1	1	3	3	5	3
X	77.2	.909	79.2	.822	76.3	.953	75.6	.650
Distress vocal								
n	6	6	2	2	3	1	5	5

views of the faces of the infant and mother.

III. Data Reduction Scheme for Observational Data

Following editing of the observational records as described above (in Section 1), the corrected records are transferred to disk for processing. The following will present the scheme used for processing the observational data collected in the pilot study. Revisions of the computer program designed for this purpose, DYAD, will be presented in the next report as DYAD 1.

All data reduction operations were carried out for the unit behavior pattern, a configuration of simultaneously occurring behavior categories, as well as for the more molar unit of behavior category, a single behavior modality (vocalization, visual attention, smile, etc.) summed across all patterns which included the particular behavior modality. Corresponding to the three levels of data analysis, 1) effects of infant state and maternal proximity on infant-mother transactions, 2) antecedent and consequent behavior patterns to vocal behaviors between mother and infant, 3) temporal structure which characterizes the vocal transactions between mother and infant, three general strategies for reducing the continuously coded behavioral data are being carried out for each of the 52 records.

A. Level I Non-interactive Analyses For each maternal behavior pattern and each infant behavior pattern, the absolute frequency of occurrence, total duration, and average duration per occurrence is calculated. As each dyad's observation session varies in length, proportion scores are required for between dyad comparisons. Frequencies, durations, and proportions are reduced according to the caretaking setting, infant arousal state, and maternal proximity context conditions under which they occurred. As the naturally-occuring amount of time spent in each context condition varies for each dyad, dependent variables in Level I are proportion scores representing the duration of the behavior in a particular context relative to the total amount of session time spent in that context. Based on the matrices produced by this level of analysis, particular dependent variables are extracted and entered in analyses of variance in order to determine the effects of proximity, state, sex, or some other variable utilized as an independent variable on the behavior pattern of infant or mother.

B. Level II-Antecedent Consequent Analyses For each onset of an infant vocalization which occurred when the mother was in the same room with the infant, antecedent and consequent maternal behavior patterns are identified. An antecedent maternal pattern is identified as the first maternal behavior pattern which preceded the onset of the infant vocalization in the prior 10-second interval. A consequent maternal behavior pattern is identified as the first maternal pattern which followed each onset of an infant vocalization in the subsequent 10-second interval. A subset of antecedent maternal patterns is identified as continuing behavior, in that the maternal antecedent pattern continued into the 10-second interval following the infant vocalization with no other maternal behavior initiated in the 10-second consequent interval. For Level II analyses the dependent variable for antecedent maternal patterns (or consequent maternal patterns) was a proportion represented by the frequency with which each of the 10 mutually exclusive and exhaustive maternal behavior patterns occurred as an antecedent or consequent pattern relative to the total frequency of infant vocal states. In the same way, the infant's antecedent and consequent behavior patterns can be obtained given a particular maternal behavior or behavior pattern. Since the actual latency between either maternal antecedent to infant response or maternal response to infant consequent behaviors are also obtained, an analyses of the learning potential in the naturalistic setting is possible by analyzing these latency scores. In addition, other infant and maternal responses can be chosen as the focal behavior pattern in order to determine the antecedent and consequent behaviors of the partner in eliciting and consequating particular responses.

C. Level III-Temporal Structure of Infant-Mother Dialogues Level III data reduction is being carried out to allow a conditional probability analysis of the second-by-second alternation of activity between infants and mothers. This level of analysis can be focused on several behavior patterns but will initially be carried out on vocal behaviors as these probably have the greatest significance for later development. Later, similar analyses will be conducted for visual regard of each other.

The inadequacies of a time independent analysis when applied to questions of complex interactive behavior (Collet and Semmel, 1973; Raush, 1965), especially dyadic vocal interactions (Jaffe and Feldstein, 1970), have been pointed out. Yet although continuously recorded and timed behavioral data can be unitized into consecutive fixed-time intervals of any length, there has been no consensus among investigators as to guidelines for selecting the most appropriate fixed-interval length. Collet and Semmel (1973) have suggested selection of a time interval such that "...the coded behavior applies to the entire interval (p. 6)." The internal digital clock on the Datamyte recorded times behavior changes and durations in units of 1-second. A 1-second unit, therefore was the fixed-time interval for which a distinct code could cover the 'entire interval'. To sample the interaction data using a fixed time interval greater than 1-second would require making arbitrary decisions concerning the proportion of an interval which would have to be filled by a certain behavior for that entire interval to be designated as containing that behavior.

Thus, each observational record is divided into consecutive fixed-time intervals of 1-second. Portions of each observational record in which maternal proximity is coded as Out of Room are not included in this reduction. For the remaining portions of the record, one of the following four mutually exclusive dyadic vocal states (for the infant, only non-distress vocalizations qualified) is assigned to each 1-second unit: Simultaneous vocalization, Mother only vocalizing, Infant only focalizing, and Mutual silence. The sequence of states formed from this reduction fits the assumptions of a finite Markov process: (1) the number of steps in the sequence is finite, (2) the sequential transitions are discrete, and (3) the probability of a given event depends only on the last preceding event (Raush, 1973). The Markov process describes "...a certain type of process that moves in a sequence of steps through a set of states...When the process is in state s_i there is probability p_{ij} that the next position will be state s_j. The matrix $P=(p_{ij})$ is called the transition matrix. Its entries are non-negative and its rows have sum 1 (Kemeny and Snell, 1963, p. 128)." This transition matrix is a complete description of a first-order Markov process (Hertel, 1972).

A first order transition matrix is constructed for each dyad giviing the frequency with which a vocal state at time "t" moved in the next 1-second interval (time "t+1") to any vocal state, including itself. From this matrix of transition frequencies, transition probabilities for each cell are derived by dividing the cell frequency by its corresponding row total. The dependent variables formed from Level III reduction, therefore are the conditional or transition probabilities represented in the cells of the matrix constructed for each infant-mother dyad.

Following is a list of the 16 subroutines that make up the program DYAD and a brief description of what each does. The complete program may be found in Appendix B.

DYAD

Preliminary Subroutines

1. ZERSET - Zeros out arrays and matrices used for each subject.

2. SEP - separates the 2 or 3 digit code into 3 separate numbers. If it was a 2 digit code the 3rd number is a 1.

3. ITOJ - takes a behavior pattern and returns a string that contains the categories present in the pattern

Level I

4-5. MATP, MATC - fills in matrices for frequency onsets and durations.

6. STATE - fills in matrices of state by proximity by behavior.

7. WR1 - prints matrices from MATP and MATC, calculates proportions and summaries.

8. WRA - prints matrices from STATE, calculates proportions and summaries.

Levels II and III

9. FILL - creates the matrix that holds 500 seconds of behaviors for mother and infant. (When FILL reaches 500 the following three subroutines operate).

10. IAC - creates antecedent-consequent matrices.

11. MAT - creates transition matrices.

12. REFILL - Zeros out 500 second matrix and resets initial values so next 500 seconds can be collected.

13. WR2 - prints antecedent-consequent matrices, calculates proportions.

14. WR3 - prints distributions of consequent latencies.

15-16. WR4, WR5 - prints transition matrices.

IV. Preliminary Results of the Pilot Observational Study: Early Diaglogues

Much has been written in support of the notion that the early mother-infant interactional environment is the arena in which the infant learns (Lewis & Goldberg, 1969; Gewirtz & Gewirtz, 1969; Yarrow, 1963). The learning which apparently takes place as a result of the infant's experience with the primary caregiver (usually the mother) includes learning to control environmental events learning self-other differentiation, learning to talk, learning to walk, learning about objects presented by the caregiver, etc. The present study is an initial attempt to study the patterns of infant-mother interaction in order to understand the dimensions which might lead to a learning analysis of infant-mother interaction. The broader issue in which this research is embedded is whether the caregiver-infant interactional environment is an important determinant of cognitive functioning as this depends on the understanding of environmental contingencies. That is, does the infant learn which aspects of its environment it can come to control and does this learning relate to the way in which the infant subsequently negotiates its way in its one year old environment. The present study addressed itself to some of the variables which might affect the interactional behavior of 14-week-old infants and their mothers: infant state, maternal proximity, and caretaking setting. In addition, the study was an attempt to develop some data analytic techniques to analyze interactional variables from a learning viewpoint. The study was focused on the vocal interactions of the infants and mothers as they occurred in the context of other behaviors.

A system for continuous, in-home observation of vocal communication patterns embedded in the social interactions was developed and utilized. This procedure was created to be methodologically consistent with a theoretical model of the reciprocal, bidirectional nature of the infant-mother relationship. The purpose of the study was to examine the 1) effects of infant state, caretaking setting, and maternal proximity on vocal behavior of infants and mothers; 2) patterns of maternal behavior in intervals antecedent and consequent to infant vocalization onsets; and 3) the temporal structure which characterized alternation of vocal activity between infants and mothers.

Twenty-four dyads, each composed of a 14 week old infant (12 males and 12 females) and its mother were observed for approximately 90 minutes during 1 waking period including dyadic and solitary play and several caretaking routines. Maternal and infant social behavior recorded as sequences of mutally-exclusive behavior patterns as well as changes in setting, maternal proximity, and infant state were continuously recorded and timed by 1 observer using a portable electro-mechanical keyboard recorder unit (Datamyte, Electro/General). Visits were divided between 2 observers on whom high inter-observer reliabilities were established initially and during the data collection.

No overall sex of infant difference for frequency or duration of vocal behavior was found for infants or mothers. Vocal behavior of infants and mothers occurred most often when the infant was in an active state. Infants vocalized significantly less when being held than when mother was within arms' reach; amount of maternal vocalization did not differ between these two proximities. Infants also vocalized significantly more often when mother was absent than when being held, with females' solitary vocalizations co-occurring with contact with an object significantly more often than for males. No overall sex of infant differences were found for any infant or maternal non-vocal category.

For all dyads, maternal vocal and visual behavior was the most frequent behavioral pattern antecedent to the onset of infant vocalization, with maternal vocal and visual attention also the most frequent response to infant vocalizations. Males vocalized selectively in response to maternal vocal-visual-smile patterns. Moreover, mothers of males responded differentially to infant vocalization with physical play stimulation.

In order to understand the interactional nature of the vocal activity of the dyads, each observational record (when mother was in the room) was divided into consecutive 1 second intervals which were assigned to 1 of 4 dyadic vocal states. These included simultaneous vocalization, solitary mother vocalization, solitary infant vocalization, and mutual silence. This sequence of vocal states fits a finite, Markov process model and could be represented by a first-order transition probability matrix, or state transition diagram as suggested by Stern (1974). As illustrated in Figure 1, transition probability values were quite similar for males and females, and, in fact, the values were strikingly similar for all 24 dyads suggesting a basic temporal rhythm which characterized alternation between vocal states.

Solitary maternal vocalizations dominated solitary infant vocalization by a ratio of 10 to 1 (46.8% to 4.1%), with mutal silence and simultaneous vocalization occurring 39% and 9.6% of the time respectively. Twice as much infant vocalization occurred in simultaneous as in solitary vocal activity. Analyses of transition probability scores indicated mothers were significantly more likely to "break" mutual silences. In contrast to Lewis' (1972) findings, however, vocal initiations by infants as well as mothers were significantly more probable given the occurrence of the partner's vocalization in the preceding interval than if the partner was silent. Mothers were more likely to move from silence to simultaneous vocalization with their infants than were infant to "join in" with their mothers. Furthermore, simultaneous episodes moved more often into solitary mother vocalization than into solitary infant vocalization ($F = 37.04$; $df = 21,22$; $p < .001$).

These patterns are quite different from the standard temporal parameters for dialogues among older individuals (Jaffe & Feldstein, 1970). Maternal "joining in" and prolonging simultaneous vocal episodes may have reflected efforts to stimulate prelinguistic sounds or to regulate vocally the degree of dyadic social contact as Stern (1974) suggests. Moreover, further analysis of the observational records indicated significantly more infant vocalization occurred when mother was out of the room than when she was holding the infant. This suggests that perhaps infant vocalization has an important function in addition to social participation. While laboratory investigations have found that maternal vocalization during infant vocalization has the effect of terminating the infant vocalization, a "suppression" of infant focalization effect, (Kagan & Lewis, 1965; Webster, 1969) the present results did not support this notion.

The analyses of the data from the pilot study are not complete but they do indicate that the observational instrument and data reduction and analysis sc[illegible]s a productive one for explicating the fine-grain interactional behavior of mothers and infants. The pilot study suggests a unique and complex structure for early vocal exchanges and the usefulness of an observational methodology consistent with a bidirectional model of early social interaction. Data now being analyzed from the first phase of the longitudinal study will allow for interesting cross sectional comparison between 10 and 14 week old infants and their mothers when taken together with the pilot study briefly reported here. These comparisons probably will be possible by the first report of the second contract year.

V. Description of the Sample for the Longitudinal Study

In order to maximize the changes for obtaining complete data on the desired sample size, N = 48, a predominantly middle-class group was selected to participate in the study. Names of all families to be contacted were selected initially from birth records at the Tennessee State Department of Public Health according to the following criteria: all infants were first-born, full-term singletons with birth weights between 5.5 and 9.5 pounds and were free of significant health complications as indicated on the birth record; parents of these infants were married, with each parent over 20 years of age and at least a high school graduate. All of the information contributing to these criteria is given on each birth record in Tennessee. As part of this research was to be conducted in the home, and additional selection factor involved geographic location. Families living at a distance greater than 20 miles from that part of central Nashville, Tennessee were excluded. In addition, as the initial contact with all parents was by telephone, families who met all other criteria but were without telephone service or who had unlisted phone numbers were not accessible for recruitment.

Parents of infants who met the above criteria were contacted in random order by telephone and the purposes and requirements of the study were introduced by a female research assistant. The standard initial telephone contact procedure is included in Appendix C. Before further information was given, it was determined that the mother was the primary week-day caretaker and that the family would be in the city for the next year. For parents who were interested in possible participation, a letter explaining the details of the study (see Appendix C) and what was required for participation was sent with the understanding that a second phone call a week later would be made to see

TABLE 2

Potential Sample of Families Meeting Selection Criteria

From Birth Records 12/24/73 - 4/18/74

	Total Frequency	%	High Ed.* Frequency	%	Low Ed. Frequency	%
Potential N	213		148		65	
No phone	44	21	27	18	17	26
Never contacted	22	10	19	13	3	5
Contacted by phone	147	69	102	69	45	69
Refused initial contact	44	21	20	14	24	37
Letter sent	103	48	82	55	21	32
Refused after letter	49	23	37	25	12	18
Included in study	54	25	45	30	9	14

* Both parents education $\geqq$ 14 years

if the family was still interested. At the time of the second phone call, if the family was interested in participating in the study, an initial appointment to conduct the observational session was made. Table 2 describes the number of potentially qualifying families selected and those which were located by telephone listing, contacted, sent the letter, and agreed or refused to participate. Since the data had to be collected as the infants were born, it was not possible to randomly select the sample from the population as a whole. However, as much as possible, the families who were included were randomly selected from the ones who were sent letters. The birth rate did not allow completely random selection at any one time. Families were contacted initially when the infant was 8 weeks old in order to allow ample time to recruit the sample for any one week and still see the mother and infant when the infant was 10-11 weeks of age. Table 3 includes the characteristics of participating infants and parents, for infant's age at Phase I, birth weight of infant, weight at time of Phase I, mother's age and education and father's age and education. As can be seen from the data, there are no apparent differences between males and females in the study, with the exception that the boys weighed significantly more than the girls at the beginning of the study ($t = 3.06$; $df = 52$; $p < .01$).

TABLE 3 - Characteristics of Sample

	Males			Females		
	X	Range	S.D.	X	Range	S.D.
Infant Age in days	75.78	69-84	4.22	75.33	69-84	4.03
Birth Weight	121.6	101-142	11.1	119	95-155	13.23
Current Weight	209.6	130-256	25.6	188.7	126-224	23.68
Mother's Age (years)	26.26	24-32	2.44	25.59	21-31	2.78
Mother's Education	15.41	12-18	1.74	15.19	12-18	1.78
Father's Age (years)	28.44	24-42	4.41	27.81	24-34	3.00
Father's Education	16.26	12-19	1.63	16.11	12-18	1.45

VI. This section is found under seperate cover.

References

Bijou, S.W., Peterson, R.F., Harris, F.R., Allen, E., & Johnston, M.S. Methodology for experimental studies of young children in natural settings. The Psychological Record, 1969, 19, 177-210.

Carey, W.B. A simplified method for measuring infant temperament. Journal of Pediatrics, 77: 188, 1970.

Cohler, B., Weiss, J., & Grunebaum, H. Child-care attitudes and emotional disturbance among mothers of young children. Genetic Psychology Monographs, 82, 3-47, 1970.

Collet, L.S., & Semmel, M.I. The analysis of sequential behavior in classrooms and social environments: Problems and proposed solutions. Technical Report 3.23, Center for Innovation in Teaching the Handicapped, Indiana University, Bloomington, Indiana, 1973.

Frick, T., & Semmel, M.I. Observational records: Observer agreement and reliabilities. Paper presented at the meeting of the American Educational Research Association, Chicago, April 1974.

Gellert, E. Systematic observation: A method in child study. Harvard Educational Review, 1955, 25, 179-195.

Gewirtz, H.B., & Gewirtz, J.L. Caretaking settings, background events and behavior differences in four Israeli child-rearing environments: Some preliminary trends. In B.M. Foss (Ed.), Determinants of infant behavior. Vol. 4. London: Methuen, 1969, 229-252.

Hertel, R.K. Application of stochastic process analyses to the study of psychotherapeutic processes. Psychological Bulletin, 1972, 77, 421-430.

Jaffe, J., & Feldstein, S. Rhythms of dialogue. New York: Academic Press, 1970.

Kagan, J. & Lewis, M. Studies of attention in the human infant. Merrill-Palmer Quarterly, 1965, 11, 95-127.

Kemeny, J.G., & Snell, J.L. Mathematical models in the social sciences. New York: Blaisdell, 1963.

Lewis, M. State as an infant-environment interaction: An analysis of mother-infant interaction as a function of sex. Merrill-Palmer Quarterly of Behavior and Devleopment, 1972, 18, 95-121.

Lewis, M., & Goldbert, S. Perceptual-cognitive development in infancy: A generalized expectancy model as a function of the mother-infant interaction. Merrill-Palmer Quarterly, 1969, 15, 81-100.

Patterson, G.R., & Cobb, J.A. A dyadic analysis of "aggressive" behaviors. In J.P. Hill (Ed.), Minnesota Symposia on Child Psychology. Vol. 5. Minneapolis: University of Minnesota Press, 1971. Pp. 72-129.

Raush, H.L. Interaction sequences. Journal of Personality and Social Psychology, 1965, 2, 487-499.

Raush, H.L. Process and change: A Markov model for interaction. Family Process, 1972, 13, 275-298.

Reid, J.B. Reliability assessment of observation data: A possible methodological problem. Child Development, 1970, 41, 1143-1150.

Stern, D.N. Mother and infant at play: The dyadic interaction involving facial, vocal, and gaze behavior. In M. Lewis & L.A. Rosenblum (Eds.), The origins of behavior. Vol. 1. The effect of the infant on its caretaker. New York: Wiley, 1974. Pp. 187-213.

Thomas, A., Chess, S., Birch, H.G., Hertzig, M.E., & Korn, S. Behavioral individuality in early childhood. New York: New York University Press, 1963.

Webster, R.L. Selective suppression of infants' vocal responses by classes of phonemic stimulation. Developmental Psychology, 1969, 1, 410-414.

Weick, K.E. Systematic observational methods. In G. Lindzey & E. Aronson (Eds.), The handbook of social psychology. Vol. 2. (2nd Ed.) Reading, Mass.: Addison-Wesley, 1968. Pp. 357-451.

Yarrow, L.J. Research in dimensions of early maternal care. Merrill-Palmer Quarterly, 1963, 9, 101-114.

Yarrow, L., Rubenstein, J., Pedersen, F., & Jankowski, J. Dimensions of early stimulation and their differential effects on infant development. Merrill-Palmer Quarterly of Behavior and Development, 18, 3, 1972, 205-218.

APPENDIX A

6 1/2 Month Old Revisions of Interactional Code

SETTING (6 month olds)

The Setting code is entered initially and whenever a change occurs in the type of caretaking activity.

NO CARETAKING

Definition: This category indicates any type of interaction between mother and infant which does not involve any of the caretaking routines listed below or not interaction occurring between infant and caretaker. I feeding himself, non-mother initiated = coded no caretaking, not feeding

FEEDING

Definition: Mother initiates feeding of the infant with breast, bottle, cup, spoon, or manually. Feeding begins with first mouthful infant eats and continues through any temporary breaks (getting more food, rearranging baby, etc.) and includes burping routines during or following feeding.

ALL OTHER CARETAKING/PHYSICAL HEALTH NEEDS

Definition: Mother is (1) bathing infant in tub, sink, or sponging infant's entire body, (2) changing infant's diaper, or (3) undressing or redressing infant, (4) grooming infant (cutting fingernails, combing hair), or (5) binding up of wounds (cleaning cuts, bandaging scrapes). Bathing begins with undressing and includes cleaning ears and nose, drying and redressing infant.

PUTTING TO SLEEP

Definition: Mother is preparing infant for sleep: rocking, arranging crib covers, etc. This setting is defined by mother's behavior, not by cues of infant state. Infant may not necessarily go to sleep, but mother is attempting to put infant to sleep.

INFANT RESPONSES DIRECTED TO OBJECTS

Infant is interacting with object if he is looking at the object, reaching for, mouthing, waving, banging or manipulating it alone or with mother. When infant is observed to be interacting with an object, one of 4 possible codes (0-3) is used as a third digit to modify any one of the ten 2-digit infant behavior patterns which might accompany this interaction with object.

Coded as Objects (Examples)

Infant's or Mother's clothing, jewelry
Pets
Mirror (images in mirror)
T.V.
Toys
Household items
Feeding utensils
Food (in other than feeding setting)

Not coded as Objects (Examples)

Undefined spaces, directions
Walls
Ceilings
Infant's or mother's body part (hand, foot)
Food (during feeding setting)

A. Social Play

Definition: Infant is "playing socially with an object" if he is engaged in initiating or continuing a reciprocal activity with his mother which involves an object, i.e., handing object to mother (regardless of mother's reaction) reaching for object held by mother, rolling a ball back and forth to mother, mother and infant holding an object together. (Infant does not have to be aware of mother's also interacting with object and him/her.) The 3rd digit coded for this behavior is a "0" which is used to modify any of the 2-digit patterns which might accompany this social play.

For example:

a. 6-4-0 Infant looks at Mother, vocalizes, and plays socially with an object.

b. 6-8-0 Infant smiles and plays socially with an object.

c. 6-9-0 Infant utters a distress vocalization and plays socially with an object.

Social play may be followed very quickly by solitary manipulation.

B. Manipulation

Definition: Infant is "manipulating an object" if he is touching, holding, mouthing, banging, or waving object. (using hands, feet, or any body part) The 3rd digit code for this behavior is a 1.

For example:

a. 6-1-1 Infant vocalizes and manipulates an object.

b. 6-3-1 Infant looks at mother, smiles, and manipulates an object.

c. 6-5-1 Infant looks at mother, vocalizes, smiles, and manipulates an object.

C. Reach/Approach

Definition: Infant is "reaching for or approaching an object" if he attempts to get an object that is beyond arm's reach. This may include stretching to reach an object, scooting toward an object, crawling to an object, etc. The 3rd digit code for this behavior is a 2. Most likely accompanied by visual attention to object.

For example:

a. 6-2-2 Infant looks at mother and reaches for or approaches an object.

b. 6-6-2 Infant reaches for or approaches an object.

c. 6-7-2 Infant vocalizes, smiles, and reaches for or approaches an object.

D. Looking Only

Definition: Infant is "looking only" if he looks at an object and does not interact with it in any of the above ways, i.e., looking at a mobile without reaching for it. The 3rd digit code for this behavior is a 3.

For example:

a. 6-1-3 Infant vocalizes and only looks at an object.

b. 6-6-3 Infant only looks at an object.

c. 6-8-3 Infant smiles and only looks at an object.

Rules for Object Codes

1. The inanimate object must have definable bounds. Looking at surfaces, walls, ceilings, etc. is not coded.
2. Notice the distinction in coding between examples (a) and (b) below:

(a) If observer cannot judge whether an object held by mother or

<u>mother herself</u> is the focus of the infant's visual attention, code 6-2, infant looks at M rather than 6-6-0, infant looks at object.

(b) If infant is looking at both mother and object, i.e. peek-a-boo with a cloth, code a 6-2-3.

(c) If infant is manipulating an object, is looking at mother, and is not engaged in social play, code 6-2-1.

3. The infant may interact in different ways with 2 objects at the same time, i.e., reaching for one object while manipulating another. A hierarchy has been established to cover these situations. If an infant is engaged in social play code a 0 even if infant is stimultaneously manipulating, reaching for, or looking at another object, i.e., a 0 code takes precedence over a 1, 2, or 3. If an infant is manipulating one object code a 1 even if infant is simultaneously reaching for or looking at another object, i.e., a 1 code takes precedence over a 2 or 3. If an infant is reaching for or approaching an object code a 2 even if infant is simultaneously looking at another object, i.e., a 2 code takes precedence over a 3. Only if an infant is not doing anything else with an object except looking at it is a 3 code used.

For example:

(a) If infant is engaging in social play with an object and is also manipulating another object, code the social interaction (0).

(b) If infant is manipulating one object and looking at another object, code the manipulation.

MATERNAL PROXIMITY TO INFANT

Maternal Proximity is entered initially and again whenever the distance between mother and infant changes.

Definition: This code indicates the existence of one of four mutually exclusive and exhaustive categories of distance between mother and infant. Proximity is entered intially and only when a change in proximity is observed. If the proximity change results from movement by the infant, the new proximity code will have a 6 as the 3rd digit.

Rules:

1. If both mother and infant simultaneously move to cause a proximity change, code the infant as "initiating" this change (that is, use a 6 as the 3rd digit).

HOLDS INFANT/PROVIDES MAJOR POSTURAL SUPPORT

Definition: Mother supports infant's weight either at some distance from her body or close to her body, using both hands and/or her body.

Rules:

1. Includes mother's supporting an infant while holding infant in seated position on her lap, supporting infant on her hip, or supine or prone on her outstretched arms.
2. Includes cuddling, cradling, throwing in air, or simple holding.
3. Includes providing major postural support to infant while infant is in bath tub, on couch, etc.

MOTHER WITHIN ARM'S REACH OF INFANT

Definition: Mother is touching infant or part of infant's body, clothing, or covering or is located such that she can touch the infant by bending, stooping, or reaching out. Arm's reach refers to mother's arm's reach.

APPENDIX B

DYAD Computer Program

Written by Susan Falsey

```
C
C       MAJOR VARIABLE AND ARRAY NAMES
C
C         NAME             MEANING
C         FILES(20)        HOLDS NAME (DEVICE:NAME.EXT) OF FILE BEING READ
C                            OBSERVATION RECORD FOR 1 DYAD
C         IHOLD(7)         1-3 CONTAIN CODES FOR SETTING, STATE, AND
C                            PROXIMITY (S,S,P)
C                           4-5 HOLD MOTHER AND INFANT BEHAVIOR CODES
C                           6-7 HOLD OBJECT CODE FOR MOTHER AND INFANT
C         ILAST(7)         SAME POSITIONS AS IHOLD CODES BUT CONTAINS THE
C                            TIME OF LAST CHANGE OF  BEHAV, OBJECT, S,S,OR P
C                            CHANGE
C         LAST(12)         1-6 HOLDS MOTHER (1-3) & INFANT (4-6) TIME
C                            OF LAST BEHV. X S,S, OR P CHANGE
C                            7-12 SAME BUT FOR BEHAV.-OBJ. X S,S, OR P
C         INLAST(2)        HOLDS FOR MOTHER AND INFANT, TIME OF LAST CROSS
C                            TAB CHANGE OF STATE X PROX X BEHAV. X OBJ. CHNG
C         IFREQ(2,500)     HOLDS, FOR MOTHER AND INFANT, 30 ROWS (BEH.(10) X
C                            OBJECT(3-OBJ, NO OBJ., IGNORE OBJ)) X
C                            16 COLUMNS
C                              1ST COL. IGNORES S, S, & P
C                              THEN 5 EACH FOR S, S, AND P (4 CODES + TOT
C                              FOR EACH)
C                          FREQUENCY OF ONSET
C         IDUR(2,500)      SAME AS IFREQ BUT FOR DURATIONS IN EACH CELL
C         KFREQ(15)        S, S, AND P FREQ. OF ONSETS (SAME AS 15 COL. IN
C                            IFREQ- BUT IGNORES BEHAVIOR AND OBJECT)
C         KDUR(15)         SAME AS KFREQ BUT DURATIONS
C         JFREQ(2,240)     SAME AS IFREQ BUT ONLY 15 ROWS (5 CATEGORIES X
C                            3 OBJECT), SAME COLUMNS AS IFREQ
C                          FREQUENCY OF CATEGORY X OBJECT X S, S, OR P ONSET
C         IMIAC(2016)      HOLDS 14 12X12 MATRICES FOR M AND INFANT
C                            ANTECEDENT-CONSEQUENT  BEHAVIORS TO VOCAL OR
C                            CRY ONSETS. FREQUENCIES OF ANT-CONSEQ. PATTERNS
C                          STRUNG OUT INTO  AN ARRAY BECAUSE UNEQUAL NUM.
C                            OF ONSETS FOR MOTHER AND INFANT
C                            MOTHER--5 VOC. PATTERN, 1 CATEGORY VOC ONSET
C                            INFANT-- 4VOC, 2 CRY PATTERN, 1 VOC 1CRY
C                               CATEGORY ONSETS
C                          ALSO STRUNG OUT BECAUSE OF FASTER COMPUTING TIME
C                            FOR COLLAPSING AND INDEXING INTO AN ARRAY
C         LMIAC(2016)      SAME AS IMIAC BUT HOLDS LATENCIES OF CONSEQUENTS
C         INOUT(2,210)     HOLDS FOR MOTHER AND INFANT, STATE X PROX X BEHAV
C                            OBJECT CROSS TAB DURATIONS
C                            FOR MOTHER AND INFANT
C                               30 ROWS (10 BEH X 3 OBJ)
C                               7 COL. 6 FOR STATE (ACT, QUIET) X PROX (IN,
C                                OUT) COMBINATION, TOTALS UNDER EACH STATE
C                                AND 1 OVERALL TOTAL .
C         NOUT(7)          TOTALS FOR STATE X PROX (IGNORES BEHAVIOR-OBJ)
C         ICAT(2,40)       FOR MOTHER AND INFANT..
C                            BY 8'S HOLDS BEHAVIOR CODES ASSOCIATED W/ EACH
C                            OF THE 5 CATEGORIES
C                            2(M-I) X 5(CAT) X 8(BEHAV. ASSOC. W/CAT)
```

```
      C        LHOLD(2,10)     FOR MOTHER AND INFANT    ..
      C                           1ST 5 HOLD 1= PRESENCE OF CATEGORY IN BEHAV
      C                                    0=  ABSENCE OF CATEGORY
      C                           2ND 5 HOLD OBJECT CODE ASSOCIATED W/ EACH OF
      C                             OF THE 5 CATEGORIES 0=OBJ PRES., 1= NO OBJ
      C        JHOLD(2,10)     SAME AS LHOLD, USED TO COMPARE PRESENT BEHAV.
      C                           CODE CONVERTED TO CATEGORIES W/ PREVIOUS ONE
      C        HVOC(2,6)       HOLDS MOTHER AND INFANT VOCAL AND CRY BEHAVIOR
      C                           CODES -USED IN IAC TO DETERMINE VOCAL OR CRY
      C                           ONSETS
      C        ITRA (7,7)      FREQUENCY TRANSITION MATRIX (USED IN MATS)
      C        LTRAN(7,7)      FREQUENCY OF ENTERING AN N TO N+1 CELL  (MATS)
      C        JTRAN(7,7)      FREQUENCY OF REMAINING IN A CELL AFTER ENTERING
      C                           FROM N (USED IN MATS)
      C        SEXT(7,7)       ITRAN SUMMED OVER ALL DYADS IN A RUN
      C        MAG             DEVICE NUMBER FOR FILES
      C        KARDS           DEVICE NUMBER FOR CARD READER
      C        LINES           DEVICE NUMBER FOR LINE PRINTER
      C        ICOL            NUMBER OF OBJECT ROWS (3)
      C        N16           NUMBER OF COLUMNS FOR S, S, AND P + TOTAL IN IFREQ
      C                           ETC.
      C        N48             NUMBER OF COLS. X OBJECT ROWS FOR 1 BEHAVIOR IN
      C                           IFREQ, ETC.
      C        NCAT            NUMBER OF CATEGORIES (5)
      C        NCAT8           MAX. NUMBER OF BEHAVIORS ASSOCIATED W/ A CATEGORY
      C        KKCOL           NUMBER OF COLUMNS (4) FOR A S, S, OR P + IT'S TOT
      C        N, ICL, IDUM,   USED TO DETERMINE PLACEMENT OF CODES IN SUB. FILL
      C         NHALT, IFLOW          , REFILL, MATS,
      C
      C      NAMES USED IN PRINTING HEADINGS --PNAME,CNAME,DNAME,DYAD,TYPE,
      C        OBJ,OUT,TOT,ACTOR
      C
      C     FILES USED
      C        1 HOLDS ANTECEDENT CONSEQUENTS TO MOTHER VOCAL ONSET (SEE IAC)
      C        2  SAME AS 1 BUT FOR INFANT ONSETS
      C       NUM(2) HOLDS RECORD NUMBER FOR EACH FILE
      C     SUBROUTINES REQUIRED : ZERSET, SEP, ITOJ, MATP, MATC,  FILL, STATE
      C        REFILL, MATS, IAC,  FOR COMPUTATION
      C        FOR PRINTING-- WR1, WRA, WR2, WR3, WR4, WR5
      C      ALSO USES  SYSTEM SUBS, SETERR, AND ASSIGN
      C
      C     ARITHMETIC FUNCTION ISUM
      C         STRINGS OUT A ROW AND COLUMN ENTRY FOR A "MATRIX" INTO
      C         1 NUMBER IN AN ARRAY
      C
0001        COMMON IPAGE,LINES,N16,N48,ICOL,IKCOL,KKCOL,NCAT,NCAT8,KPAT(2),
          1 JPAT(2),JTRAN(7,7),ITRAN(7,7),LTRAN(7,7),PNAME(2,40),CNAME(2,20),
          2 DNAME(60),KFREQ(15),KDUR(15),IMAT(2,500),IFREQ(2,500),IDUR(2,500)
          3 ,JFREQ(2,240),IMIAC(2016),LMIAC(2016),LAST(12)
0002        COMMON INOUT(2,210)
0003        DIMENSION ATRAN(7,7), INLAST(2)
0004        DIMENSION ACTOR(4),TYPE(4),OBJ(9),DYAD(2),ICAT(2,40),OUT(4),TOT(4)
          1 ,HVOC(2,6),NUM(2),ILAST(7),IHOLD(7),JHOLD(2,10),LHOLD(2,10),
          2 IROW(2),KCOL(3),CF(2),ADUM(7,7)    ,SEXT(7,7)
0005        BYTE FILES(20)
0006        DATA ACTOR, TYPE, OBJ/'MOTH','ER  ', 'INFA','NT  ','PATT','ERN ','
```

```
      1CATE','GORY','OBJE','CT  ',',    -','O O','BJEC','T   -','OVER',
      2'ALL ',',    -'/
      DATA OUG1,OUG2/'    ','SUMS'/
      DATA ICAT/1,1,4,4,6,5,7,7,9,7,0,2,2,3,3,4,4,6,5,7,10,8,0,9,0,10,0,
     13,3,6,5,8,7,9,8,8,0,7,9,8,10,9,0,10,9,0,5,6,14,0/
      DATA OUT, TOT, MVOC/' MOT','HER ','OUT ','    ',' TOT','ALS ','
     1 ','  ',1,1,4,4,6,5,7,7,9,9,0,10/
      DATA CT/' IPL',' CRY'/
      ISUM(IB,JB,KB) = (IB - 1) * JB + KB
C----  SET COMPUTER TO IGNORE DIVISION BY 0
      CALL SETERR(3,-1)
C----  SET CONSTANTS
      N16 = 16
      ICOL = 3
      ICOL1 = 0
      KKCOL = 5
      IKCOL = KKCOL + ICOL
      NCAT = 5
      NCATS = 8
      KARDS = 8
      JACT = 2
      MAG = 4
      LINES = 5
      IF (LINES .EQ. 5) GO TO 9001
C----  FORCE IN FORMAT ROUTINES THAT ARE USED IN OVERLAYS IN THE
C----    PROGRAM BUT NOT IN THE ROOT SEGMENT
      WRITE(LINES,9000)  ADUM(1,1), I
 9000 FORMAT(2X,F6.3,<J>I3,A4,I3)
 9001 CONTINUE
C----  READ IN NUMBER OF DYADS, OPTIONS FOR PRINTING, AND STEP SIZE
C----    FOR TRANSITION MATRIX-- NS, JAM, NSTEP
      READ(KARDS,300) NS, JAM, NSTEP
  300 FORMAT(5I4)
C----  READ IN PATTERN NAMES FROM CARDS
      READ (KARDS,6) ((PNAME(I,J), J = 1,40), I = 1,2)
    6 FORMAT (20A4)
C----  READ IN CATEGORY NAMES FROM CARDS
      READ(KARDS,6) ((CNAME(I,J), J = 1,20), I = 1,2)
C-----
C----  DO WHOLE PROCESS FOR EACH DYAD
C-----
      DO4400 MSUBS = 1,NS
C----  READ IN NAME OF DISK FILE FOR DYAD
      READ(KARDS,301) (FILES(J),J=1,20)
  301 FORMAT(4X,20A1)
C----  ASSIGN UNIT 4 TO THAT FILE   ....   MAG = 4
      CALL ASSIGN(MAG,FILES,20,IERR)
C----  REDEFINE FILE FOR ANTECEDENT-CONSEQUENT CHART..THEY ARE CLOSED
C----    AFTER AN "ENDFILE" OF ANY FILE OCCURS
      DEFINE FILE 1(1000,17,U,N0)
      DEFINE FILE 2(1000,17,U,JFU)
C----  CALL SUB ZERSET TO 0OUT OR RESET NEEDED MATRICES AND ARRAYS
      CALL ZERSET
C----  RESET VALUES NOT PASSED INTO ZERSET
      DO 2 J = 1,2
    2 NUM(J) = 0
```

```
      ICRYT = 0
      N = 10
      ICUM = 0
      ICL = 10
      IHALT = -500
      IFLOW = -500
C---- NOW WILL BE READING FROM THE ASSIGNED FILE
C---- READ TITLE FOR DYAD
      READ ( A0,5) DYAD
C---- PRINT HEADING FOR LISTING TIME VIOLATIONS IN RECORD
      WRITE(LINES,500)      DYAD
  500 FORMAT('1 30-SECOND VIOLATIONS FOR DYAD NO. ',2A4,' FOLLOW')
      WRITE(LINES,526)
  526 FORMAT(/'     CODE      TIME'/1X,15('-'))
    5 FORMAT (2A4)
C---- READ 1ST ENTRY, (AT UNNEEDED "777" ) ALSO USED TO READ  OVER
C----   AN "999" AFTER A BREAK IN THE RECORD (AN "888")
   10 READ ( A0,25) JUNK
C---- COLLECT 1 TO 5 RECORDS, EITHER AT THE BEGINNING OF AN OBSERVATIO
C----    OR AFTER A HALT (EITHER A STOP OR WHEN "OTHER" REPLACES MOTHER
   20 DO 30 I = 1,5
      READ (A0,25) ICODE, NOW
   25 FORMAT(2I5)
C---- CALL SEP TO SEPARATE A 2- OR 3-DIGIT NUMBER INTO 3 SEP. NUMBERS
   26 CALL SEP(ICODE,I1,I2,I3)
C---- IF "OTHER" (I1=7) GO BACK AND RESTART LOOP, OTHERWISE COLLECT
C----    VALUES FOR IHOLD
      IF (I1 - 7) 27,20,20
C---- I2 CONTAINS THE CODE FOR THE ENTRY DESIGNATED BY THE 1ST DIGIT
   27 IHOLD(I1) = I2
C---- IF I1 = 4 OR 5, 3RD DIGIT CONTAINS THE OBJECT CODE- SO PLACE IT
      IF (I1 .EQ. 4 .OR. I1 .EQ. 5) IHOLD(I1+2) =I3
C---- IF FOUND A MOTHER CODE (I1=4) DURING A "OTHER" HALT (IHALT=3)
C----    BREAK OUT OF THE LOOP AND USE THE VALUES COLLECTED
      IF (I1 .EQ. 4 .AND. IHALT .EQ. 3) GO TO 31
C---- IF "OTHER" HALT KEEP W/IN THE LOOP UNTIL CAN BREAK OUT
      IF (IHALT - 3) 30,20,20
   30 CONTINUE
   31 DO 35 I = 1,7
C---- SET TIME = TIME FOR LAST ENTRY COLLECTED
   35 ILAST(I) = NOW
C---- NLAST- TIME USED FOR FILLING IN IMAT
      NLAST = NOW
      DO 40 J = 1,2
C---- IJLAST-- TIME FOR STATE X PROX X BEHAV-OBJECT MATRIX
      IJLAST(J) = NOW
C---- IROW(2/1) INDEX INTO ROW FOR BEHAVIOR BY OBJECT FOR MOTHER/INFAN
      IROW(J) = ISUM(IHOLD(J+3),ICOL,IHOLD(J+5)+1)
C---- CALL ITOJ TO GET ARRAY OF CATEGORY PRESENCE IN THE BEHV. PATTERN
   40 CALL ITOJ(IHOLD(J+3),IHOLD(J+5),IHOLD,J,ICAT)
C---- KCOL  - INDEX INTO WHICH 3 COLS OF SETTING, STATE, AND PROX COL
C----    ARRAY
      DO 45 I = 1,3
   45 KCOL(I) = ISUM(I,KKCOL,IHOLD(I)+1)
C---- SET TIME FOR CROSS-TAB CHANGES
      DO 46 I = 1,12
```

```
   46 LAST(I) = NOW
C----  RESET HALT TO 0
   47 IHALT = 0
C----
C----  AFTER COLLECTING  FOR WHOLE IHOLD ARRAY- START GETTING CHANGES
C----  READ IN CODE AND TIME
   48 READ (MAG,25) ICODE, NOW
C----  SET  FOR NUMBER OF TIMES TO DEAL WITH THIS TIME ENTRY
C----   GENERALLY DEALT W/ ONCE BUT  FOLLOWING LINES SHOW THE EXCEPTION
      IREDO = 0
      IF (IHOLD(3)) 399,360,399
C----  IF M-OUT (IHOLD(3)=0) THEN CHECK FOR VIOLATION OF THE SETTING
C----  CODE--IF STILL OUT AFTER 60 SEC. SETTING SHOULD BE = 3 (NO CARE)
  360 IF (NOW - LAST(1) .GE. 60 .AND. IHOLD(1) .NE. 3) GO TO 361
      GO TO 399
C----  IF THERE WAS A VIOLATION, 1ST PRINT OUT CODE ENTERED AFTER 60 SEC
C----    ELAPSED. SET IREDO SO WILL GO THROUGH TWICE, AND FORCE IN AN
C----     INTERVENING CHANGE OF CODE 13 (SETTING-NO CARE) 60 SEC.
C----      AFTER MOTHER LEFT; HOLD ACTUAL TIME ENTERED IN ITEMP, (THE
C----      ACTUAL CODE REMAINS IN ICODE AND WILL BE RETRANSLATED LATER)
  361 IREDO = 1
      WRITE(LINES,525) ICODE,NOW
  525 FORMAT(2I6)
      ITEMP = NOW
      NOW = LAST(3) + 60
      I1 = 1
      I2 = 3
C----  GO STRAIGHT TO SETTING CHANGE (NO NEED TO GO THROUGH STATE X ETC.
C----    CROSS TAB BECAUSE SETTING IS NOT CONSIDERED THERE)
      GO TO 403
  399 CONTINUE
C----  IF ENTRY = 888 THERE IS A BREAK IN THE RECORD
   49 IF (ICODE - 888) 50,65,50
C----  IF ENTRY = 000 THEN END OF FILE FOR THIS DYAD
   50 IF (ICODE) 55,66,55
C----  SEPARATE CODE INTO 3 DIGITS
   55 CALL SEP(ICODE,I1,I2,I3)
C----  IF SETTING CHANGE (I1=1) DO NOT CALL STATE
      IF (I1 .EQ. 1) GO TO 403
      IF(IHOLD(2) - 2)400,402,402
C----  IF STATE(IHOLD(2) IS ASLEEP(0) OR DROWSY(1) DO NOT CALL STATE
C----   BUT UPDATE TIME INLAST
  400 DO 401 K = 1,2
  401 INLAST(K) = NOW
      GO TO 403
C----  CALL STATE TO GET CROSS-TAB OF STATE X PROX. X BEHAVIOR
C----  FOR MOTHER AND/OR INFANT
  402 CALL STATE(I1,I2,IHOLD,NOW,INLAST,IHALT)
  403 CONTINUE
C----  IF I1 = 7 THEN "OTHER" HAS REPLACED MOTHER-GO TO 67 TO SET UP
C----    APPRPRIATE HALT CONDITIONS
      IF (I1 - 7) 60,67,67
C----  IF I1<4 THEN ENTRY IS FOR SETTING, STATE, OR PROX, >4 FOR M. / I.
   60 IF (I1 - 4) 90,120,120
C----  W/ TIME BREAK IN RECORD, SET IHALT=1, I1=0 TO GIVE COMPLETE FILL
C----    FOR MOTHER AND INFANT IN SUBROUTINE STATE
```

```
      65 IHALT = 1
         I1 = 0
         CALL STATE(I1,I2,IHOLD,NOW,INLAST,IHALT)
         GO TO 70
C----  W/ END OF RECORD, SET IHALT=2, I1=0 FOR COMPLETE FILL IN STATE
      66 IHALT = 2
         I1 = 0
         CALL STATE(I1,I2,IHOLD,NOW,INLAST,IHALT)
         GO TO 70
C----  "OTHER" REPLACED MOTHER, SET IHALT = 3 (HAS ALREADY BEEN TO STATE
      67 IHALT = 3
C-----
C----   FOR ALL HALTS, A COMPLETE FILL OF THE MATRICES FOR SETTING,
C----    STATE, AND PROX.--MOTHER AND INFANT IS NECESSARY.
C----   SO SET IA AND IB TO GO THROUGH LOOP 3 X, AND JT TO FILL IN
C-----      BEHAVIOR X OBJECT, BEHAVIOR IGNORING OBJECT, AND BEH. ALONE
      70 IA = 1
         IB = 3
         JT = 3
C----   SINCE ON HALT, WILL ALSO HAVE TO FILL IN IMAT
         CALL FILL(NOW,NLAST,IHALT,IFLOW,NHALT,ICL,NSTEP,IHOLD)
C----   CHANGE TIME FROM LAST IMAT FILL
         NLAST = NOW
C----   IF END OF OBSERVATION (IHALT=1), WILL HAVE TO GO TO SUBS THAT
C----      USE IMAT FOR TRANSITIONS (MATS) AND FOR ANTECEDENT-CONSEQUENT
C----        (IAC)--  SO GO STRAIGHT TO 87
         IF (IHALT .EQ. 2) GO TO 87
C----   OTHERWISE, CHECK TO SEE IF IMAT IS FULL--IF SO-- USE IT IN IAC,
C----        AND MATS
      86 IF (IFLOW .LT. 0 .AND. NHALT .LT. 0) GO TO 92
      87 CALL MATS(N,NSTEP,IDUM)
         CALL IAC(NUM,ICAT)
C----   REFILL IMAT THROUGH SUB REFILL
         CALL REFILL(IFLOW,NHALT,ICL,NSTEP,IHALT)
C----   IF AT END OF OBSERVATION, THERE WAS AN OVERFLOW  (START IN IMAT
C----        AFTER 21ST RECORD--ICL>21-- THEN REDO MATS AND IAC W/ REST OF
C----        NEW IMAT
         IF (IHALT .EQ. 2 .AND.ICL .GT. 21) GO TO 87
C----- GO TO 92 TO FILL IN FREQ. AND DURATION MATRICES AND ARRAYS FOR
C----    EVERYTHING
         GO TO 92
C-----
C----   HERE IS A CHANGE IN EITHER SETTING, STATE, OR PROXIMITY (I1<4)
C----   IF ENTRY IS A REPEAT OF THE PREVIOUS IHOLD(I1), GO BACK AND
C----     COLLECT ANOTHER ENTRY-- IGNORE THIS ONE
      90 IF (IHOLD(I1) - I2) 91,48,91
C----   INDEX LOOP TO COVER ONLY THAT CHANGE -- IA AND IB = I1, JT=2 SO
C----    WILL DO FOR BEH IGNORING OBJECT, AND BEH. X OBJECT, NOT BEH.ONLY
      91 IA = I1
         IB = I1
         JT = 2
C----   FILL IN MATS, AND USE IF NECESSARY-- ONLY WHEN CODE IS  A PROX.
C----      (SETTING AND STATE NOT USED IN THESE OPERATIONS)
         IF (I1 - 3) 92,96,96
C----   W/PROXIMITY---ONLY GO IN WHEN CODE FOR MOTHER OUT
      96 IF (IHOLD(I1) .NE. 0 .AND. I2 .NE. 0) GO TO 92
```

```
C----  SAME AS ABOVE
    97 CALL FILL(NOW,NLAST,IHALT,IFLOW,NHALT,ICL,NSTEP,IHOLD)
       NLAST = NOW
       IF (IFLOW .LT. 0 .AND. NHALT .LT. 0) GO TO 92
       CALL MATS(N,NSTEP,IDUM)
       CALL IAC(NUM,ICAT)
       CALL REFILL(IFLOW,NHALT,ICL,NSTEP,IHALT)
C----  NT DO FOR ALL 3 (WHEN A HALT) OR ONLY FOR SPECIFIED I1
    92 DO 101 NT = IA,IB
C----  FIND CORRECT COLUMN FOR SETTING, STATE, OR PROX.
       KOL = KCOL(NT)
C----  GET TOTALS COLUMN FOR SETTING, STATE OR PROX.
       KOLT = ISUM(NT,KKCOL,KKCOL)
C----  ADD FREQUENCIES COUNT
       KFREQ(KOL) = KFREQ(KOL) + 1
       KFREQ(KOLT) = KFREQ(KOLT) + 1
C----  ADD INTO DURATION (PRESENT TIME - LAST TIME THAT CODE CHANGED)
       KDUR(KOL) = KDUR(KOL) + (NOW - ILAST(NT))
       KDUR(KOLT) = KDUR(KOLT) + (NOW - ILAST(NT))
C----  I     DO FOR BOTH MOTHER AND INFANT
       DO 100 I = 1,2
C----  INDEX IN WHICH M/I X SET/STATE/PROX/  TIME TO USE
       NJ = ISUM(I,3,NT)
C----  GOING INTO SUB MATP NEED...
C----      JT= NUM. TIMES TO GO THRU LOOP IN MATP
C----      I  MOTHER OR INFANT
C----      KOL  WHICH SETTING, STATE, OR PROXIMITY COL.
C----      KOLT  TOTAL COL. FOR  GIVEN KOL
C----      ICOL1  1ST COL. OF BEH X OBJECT (IGNORES SET/STATE/PROX.
C----      IROW(I)  WHICH BEHAV. X OBJECT ROW FOR MOTHER OR INFANT
C----      NOW  PRESENT TIME
C----      LAST(NJ+6) TIME OF LAST PARTICULAR M/I X SET/STAT/PROX.
C----         CHANGE ("/" INDICATES ONLY 1 USED)
C----      ILAST(I+5)  TIME OF LAST M/I   X OBJECT CHANGE
C----       (IGNORING SET/STATE/PROX.)
C----      NOTE.-- ICOL1 AND ILAST(I+5) USED ONLY WHEN JT=3 (I.E., A HALT
       CALL MATP(JT, I,KOL,KOLT,ICOL1,IROW(I),NOW,LAST(NJ+6),LAST(NJ+6),
     1ILAST(I+5))
C----  JROW INDEX INTO BEH ROW IGNORING OBJECTS
C----  SAME AS PREVIOUS MATP CALL EXCEPT TIMES ARE FOR IGNORING OBJECT
C----    BEHAVIOR ROW
       JROW = ISUM(IHOLD(I+3),ICOL,ICOL)
       CALL MATP(JT,I,KOL,KOLT,ICOL1,JROW,NOW,LAST(NJ),LAST(NJ),
     1 ILAST(I+3))
C----  CHECK FOR PRESENCE OF EACH CATEGORY AND ADD INTO FREQ. MATRIX
C----   THROUGH SUB MATC (SINCE WORKING ON A HALT OR BACKGROUND CHANGE
C----    BOTH BEH X OBJECT AND BEHAVIOR IGNORING OBJECT ROWS ARE FILLED)
       DO 100 J = 1,5
       IF(JHOLD(I,J)) 100,100,95
    95 JROW = ISUM(J,ICOL,ICOL)
       CALL MATC(JT,I,KOL,KOLT,ICOL1,JROW)
       JROW = ISUM(J,ICOL,JHOLD(I,J+5)+1)
       CALL MATC(JT,I,KOL,KOLT,ICOL1,JROW)
   100 CONTINUE
C----  RESET JT = 2 AFTER 1ST RUN THRU LOOP SO WILL NOT TRIPLE
C----    ENTRIES INTO ICOL1 (JUST BEHVIOR COLUMN -IGNORING SETTING, ETC.
```

```
  131 JT = 2
C----  IF NO HALT (IHALT = 0) GO TO SECTION TO RESET VALUES (110)
      IF (IHALT) 110,110,105
C----  IF IHALT =1-A BREAK IN RECORD-GO TO 19 TO READ "999", THEN
C----    RESTART BY COLLECTING VALUES FOR IHOLD.
C----  IF IHALT = 2 - END OF OBSERVATION- GO TO 235 TO START PRINTING
C----  IF IHALT = 3 -"OTHER" REPLACED MOTHER- GO TO 20 TO READ NEXT
C----    RECORD (IT'S A VALID ENTRY) AND COLLECT IHOLD UNTIL MOTHER
C----    REENTERS (I1=4)
  105 GO TO (19,235,20), IHALT
C----  NO HALT- SO RESET APPROPRIATE COLUMN INDEX TO NEWLY ENTERED VALUE
C----  RESET IHOLD(I1), AND ALL NEEDED TIMES FROM PREVIOUS ENTRY TO NEW
  110 KCOL(I1) = ISUM(I1,KKCOL,I2+1)
      IHOLD(I1) = I2
      DO 111 I = 1,2
      NJ = ISUM(I,3,I1)
      LAST(NJ) = NOW
  111 LAST(NJ+6) = NOW
      ILAST(I1) = NOW
C----  IF IREDO = 0- GO BACK AND READ NEXT RECORD
      IF(IREDO) 47,47,102
C----  IF THERE HAD BEEN A 60-SEC. VIOLATION, RESET TIME TO ONE ENTERED
C----    ORIGINALLY, AND GO BACK, DECODE ICODE, AND COMPLETE
C----     THE PROCEDURE FOR THAT ACTUAL ENTRY
  102 NOW = ITEMP
      IREDO = 0
      GO TO 49
C-----
C----  JJJJJ CHANGE IN MOTHER OR INFANT - BEHAVIOR OR OBJECT CODE
C----  SET IM = 1 OR 2 FROM ORIG 4 OR 5 OF MOTHER OR INFANT, RESPECTIVLY
C----  JT = 3 SO WILL INCLUDE ICOL1 IN CALL TO MATP (AS IN ABOVE)
  120 IM = I1 - 3
      JT = 3
C----  CONVERT PRESENT RECORD INTO CAT. ARRAY JHOLD
      CALL ITOJ(I2,I3,JHOLD,IM,ICAT)
C----  CHECK IF BEHAVIOR CHANGE
      IF (IHOLD(I1) - I2) 130,125,130
C----  IF NOT BEHAVIOR CHANGE, CHECK FOR OBJECT CHANGE
C----   IF NEITHER, IT'S A REPEAT SO READ NEXT RECORD
  125 IF (IHOLD(I1 + 2) - I3) 126,48,126
C----  IT WAS AN OBJECT CHANGE SET = 1 FOR BEH. IOBJ, & CAT. IOB
C----  KST USED LATER FOR CHANGING TIMES, SET SO CHANGE ONLY OBJECT ONES
  126 IOBJ = 1
      IOB = 1
      KST = 7
      GO TO 145
C----  WAS A BEHAVIOR CHANGE
C----  CHECK ALSO FOR OBJECT CHANGE FROM PREVIOUS BEHAVIOR - USED W/
C----    CATEGORY X OBJECT CHANGE
C----  KST = 1 SO START CHANGING TIMES FROM BEHAVIORS AND THEN OBJECTS
  130 IOBJ = 0
      IOB = 0
      IF (IHOLD(I1+2) .NE. I3) IOB = 1
      KST = 1
C----  I DO FOR EACH OF THE SETTING, STATE, AND PROX. COLUMN INDICES
  145 DO 208 I = 1,3
```

```
C----  K = INDEX INTO WHICH SET/STAT/PROX/  TIME TO USE
      K = ISUM(IM,3,1)
C----  GET CODE FOR SET/STATE/OR PROX COLUMN
      KOL = KCOL(I)
C----  TOTAL COL. FOR ABOVE
      KOLT = ISUM(I,KKCOL,KKCOL)
C----  MATP USED SAME WAY AS ABOVE
C----  CALLING MATP TO ADD INTO MATRICES FOR  BEHAVIOR X OBJECT CHANGE
C----    AND FOR THAT ROW TOTAL (ICOL1)
      CALL MATP(JT,IM,KOL,KOLT,ICOL1,IROW(IM),NOW,LAST(K+6),LAST(K+6),
     1ILAST(I1+2))
C----  IF OBJECT CHANGE ONLY- DO NOT CALL MATP FOR BEHAVIOR IGNORING
C----    OBJECT ROW
      IF (IOBJ) 150,150,155
C----  WAS A BEHAVIOR CHANGE-- SO DO CALL MATP FOR THAT ROW
  150 JROW = ISUM(IHOLD(I1),ICOL,ICOL)
      CALL MATP(JT,IM,KOL,KOLT,ICOL1,JROW,NOW,LAST(K),LAST(K),ILAST(I1))
C----  NOW CHECKING FOR CATEGORY CHANGE
  155 DO 200 J = 1,5
C----  IF OBJECT CHANGE AND CATEGORY STILL PRESENT GO TO 195
      IF (IOBJ .EQ. 1 .AND. LHOLD(IM,J) + JHOLD(IM,J) .EQ. 2) GO TO 195
C----  IF CATEGORY ABSENT IN PRESENT CODE BUT WAS PRESENT GO TO 195
      IF (JHOLD(IM,J) .EQ. 0 .AND. LHOLD(IM,J) .EQ. 1) GO TO 195
C----  SKIP OVER THIS CATEGORY
      GO TO 200
C----  195 CALL MATC FOR CATEGORY BY OBJECT ROW
  195 JROW = ISUM(J,ICOL,LHOLD(IM,J+5)+1)
      CALL MATC(JT,IM,KOL,KOLT,ICOL1,JROW)
C----  CHECK FOR CATEGORY CHANGE- IF SO 196 WILL FILL IN MATC FOR CAT
C----    IGNORING OBJECT ROW, OTHERWISE SKIP TO NEXT CATEGORY
      IF (JHOLD(IM,J) .EQ. 0 .AND. LHOLD(IM,J) .EQ. 1) GO TO 196
      GO TO 200
C----  196 CALL MATC FOR CATEGORY CHANGE IGNORING OBJECT ROW
  196 JROW = ISUM(J,ICOL,ICOL)
      CALL MATC(JT,IM,KOL,KOLT,ICOL1,JROW)
  200 CONTINUE
C----  RESET JT TO 2 TO PREVENT TRIPLE ENTRY INTO BEHAVIOR TOTALS ROW
C----    (ICOL1 IGNORING SETTING, STATE, AND PROXIMITY)
  208 JT = 2
C----  PLACE NEW CATEGORY CODES INTO LHOLD (HELD PREVIOUS CATEGORIES)
      DO 202 J = 1,10
  202 LHOLD(IM,J) = JHOLD(IM,J)
C----  IF IT WAS AN OBJECT CHANGE, DON'T FILL IN IMAT
      IF (IOBJ) 201,201,205
C----  BEHAVIOR CHANGE SO FILL IN IMAT, AND SAME PROCEDURES AS USED
C----    ABOVE WITH HALTS
  201 CALL FILL(NOW,NLAST,IHALT,IFLOW,NHALT,ICL,NSTEP,IHOLD)
      NLAST = NOW
      IF (IFLOW .LT. 0 .AND. NHALT .LT. 0) GO TO 205
      CALL MATS(N,NSTEP,IDUM)
      CALL IAC(NUM,ICAT)
      CALL REFILL(IFLOW,NHALT,ICL,NSTEP,IHALT)
C----  CHANGE APPROPRIATE BEHAVIOR X OBJECT ROW
  205 IROW(IM) = ISUM(I2,ICOL,I3+1)
C----  CHANGE APPROPRIATE TIMES  M-BEH SET/STAT/PROX=1-3, I'S 4-6
C----                    M-BEH X OBJ S/S/P =7-9, I'S 10-12
```

```
          K = 1
          IF (KST .EQ. 1) K = 2
          IF (IM .EQ. 2)  KST = KST + 3
          DO 215 I = 1,K
          DO 1217 II = 1,3
          LAST(KST) = NOW
     1217 KST = KST + 1
      215 KST = KST + 3
C----  CHANGE BEHAVIOR X OBJECT CODE IN IHOLD, AND TIME
          IHOLD(I1+2) = 13
          ILAST(I1+2) = NOW
C----  IF IT WAS AN OBJECT CHANGE - GO BACK TO NEXT RECORD
          IF(IOBJ) 216,216,47
C----  IF BEHAVIOR CHANGE- CHANGE BEHAV IHOLD AND TIME
      216 ILAST(I1) = NOW
          IHOLD(I1) = 12
C----  GO BACK AND READ NEXT RECORD
          GO TO 47
C-----
C----  HAVE FINISHED COLLECTING INFORMATION FOR THE DYAD - END OF RECORD
C-----
C----  SET PAGE NUMBER TO 0 AND CHECK FOR PRINTING OPTIONS
      235 IPAGE = 0
C----  IF JAM = 0, ALL INFORMATION WILL BE PRINTED
          IF (JAM) 6001,6001,6008
C----  IF OPTION SPECIFIED- GO TO THAT OPTION
     6008 GO TO (6001,6000,6002,6003,6004), JAM
C----  WR1 FOR  FREQUENCY AND DURATION MATRICES AND ARRAYS FOR M-I
C----    BEHAVIOR-OBJECT  X SETTING, STATE, AND PROXIMITY. ANALYSES BY
C----    PATTERN AND BY CATEGORY, AND A SUMMARY ANALYSIS
     6001 CALL WR1(DYAD,ACTOR,TYPE,OBJ,ICAT,OUT,TOT,MVOC,CT,NUM,OUG1,OUG2)
C----  WRA PRINTS CROSS-TAB OF M-I BEHAVIOR-OBJECT X PROX(IN-OUT) X
C----    STATE(QUIET-ACTIVE), ANALYSES BY PATTERN AND BY CATEGORY
C----    DURATIONS
     6000 CALL WRA(DYAD,ACTOR,TYPE,OBJ,ICAT,TOT)
          IF (JAM .GT. 0) GO TO 4400
C----  WR2 PRINTS MATRICES OF ANTECEDENT-CONSEQUENT BEHAVIORS TO
C----    VOCAL AND CRY ONSETS. FREQUENCIES AND CONSEQUENT LATENCIES,
C----    ANALYSES BY PATTERN AND CATEGORY
     6002 CALL WR2(DYAD,ACTOR,TYPE,OBJ,ICAT,OUT,TOT,MVOC,CT,NUM,OUG1,OUG2)
          IF (JAM .GT. 0) GO TO 4400
C----  WR3 PRINTS OUT MATRICES OF DISTRIBUTION OF LATENCIES TO
C----  VOCAL ONSETS
     6003 CALL WR3(DYAD,ACTOR,TYPE,OBJ,ICAT,OUT,TOT,MVOC,CT,NUM,OUG1,OUG2)
C----  WR5 PRINTS OUT THE TRANSITION MATRICES
     6004 CALL WR5(DYAD,ADUM,NSTEP,SEXT,NS)
C----  CLOSE THE FILE FOR THE DYAD
     4400 ENDFILE MAG
C----  WHEN FINISHED PROCEDURES FOR ALL DYADS, WR5 IS USED TO PRINT
C----    TRANSITION MATRIX COLLAPSED OVER ALL DYADS
C----  ITRAN(1,1) SET TO -1 TO      SET WR5 TO PRINT JUST 1 MATRIX
          ITRAN(1,1) = -50
          CALL WR5(DYAD,ADUM,NSTEP,SEXT,NS)
          CALL EXIT
          END
```

ROUTINES CALLED:

```
SETERR, ASSIGN, ZERSET, SEP    , ITOJ   , STATE  , FILL
MATS   , IAC    , REFILL, MATP   , MATC   , WR1    , WRA
WR2    , WR3    , WR5    , EXIT

OPTIONS =/ON,/CK,/OP:2

BLOCK        LENGTH
MAIN.    3145    (014222)*
.$$$$.   8494    (041134)

**COMPILER ----- CORE**
   PHASE         USED  FREE
DECLARATIVES 00622 15678
EXECUTABLES  01934 12366
ASSEMBLY     02648 16292
```

```
      SUBROUTINE ZERSET
C---- SUBROUTINE ZERSET ZEROS OUT ELEMENTS AND ARRAYS NEEDED FOR THE
C----  NEXT DYAD. (SEE MAINLINE FOR LISTING OF MAJOR VARIABLES AND
C----  ARRAYS)
      COMMON IPAGE,LINES,NIG,N48,ICOL,IKCOL,KKCOL,NCAT,NCAT8,KPAT(2),
     1 JPAT(2),JTRAN(7,7),ITRAN(7,7),LTRAN(7,7),PNAME(2,40),CNAME(2,20),
     2 DNAME(60),KFREQ(15),KDUR(15),IMAT(2,500),IFREQ(2,500),IDUR(2,500)
     3 ,JFREQ(2,240),IMIAC(2016),LMIAC(2016),LAST(12)
      COMMON INOUT(2,210)
      IPAGE = 0
      DO 1 I = 1,500
      DO 1 J = 1,2
      IMAT(J,I) = 0
      IFREQ(J,I) = 0
    1 IDUR(J,I) = 0
      DO 2 J = 1,2
      KPAT(J) = 0
      JPAT(J) = 66
      DO 2 I = 1,240
    2 JFREQ(J,I) = 0
      DO 3 I = 1,2016
      IMIAC(I) = 0
    3 LMIAC(I) = 0
      DO 4 I = 1,7
      DO 4 J = 1,7
      JTRAN(J,I) = 0
      LTRAN(J,I) = 0
    4 ITRAN(J,I) = 0
      DO 5 J = 1,15
      KFREQ(J) = 0
    5 KDUR(J) = 0
      DO 404 I = 1,2
      DO 404 J = 1,210
  404 INOUT(I,J) = 0
        RETURN
      END

OPTIONS =/ON,/CK,/OP:2

BLOCK        LENGTH
ZERSET  292    (001110)*
.$$$$.  8494   (041134)

**COMPILER ----- CORE**
   PHASE        USED  FREE
DECLARATIVES   00622 13678
EXECUTABLES    01054 13246
ASSEMBLY       01148 17792
```

```
      SUBROUTINE SEP(ICODE,I1,I2,I3)
C---- SUBROUTINE SEP CONVERTS A 2- OR 3-DIGIT NUMBER (ICODE) INTO 3
C----  NUMBERS:
C----    IF 1ST DIGIT = 1-3, INPUT CODE WAS FOR SETTING, STATE, OR
C----       PROXIMITY; VALID 2ND DIGITS = 0-3 (CREATED  3RD DIGIT UNUSED
C----    IF 1ST DIGIT = 5,6,OR 8 INPUT CODE WAS BEHAVIOR CHANGE
C----       1 SUBTRACTED FROM 1ST DIGIT FOR PROPER INDEX INTO ARRAYS
C----      IF 2ND DIGIT = 0, CONVERT TO 10  (BEH. CODES RUN 1-10)
C----      3RD DIGIT: IF ABSENT FRM ICODE FORCE TO =-1 (NO OBJECT)
C----       IF = 0 OBJECT PRESENT
      IF (ICODE .LT. 100) ICODE = ICODE * 10 + 1
      I1 = ICODE/100
      I2 = ICODE/10 - I1*10
      I3 = ICODE - (ICODE/10 * 10)
      IF (I1 - 5) 10,5,5
    5 I1 = I1 - 1
      IF (I2 . EQ. 0) I2 = 10
   10 RETURN
      END
```

```
OPTIONS =/ON,/CK,/OP:2

BLOCK        LENGTH
SEP      107      (000326)*

**COMPILER ----- CORE**
   PHASE        USED  FREE
DECLARATIVES  00622 13678
EXECUTABLES   00783 13517
ASSEMBLY      00943 17997
```

```
FORTRAN V06.13                    10:37:31     26-JUN-74     PAGE     1

0001          SUBROUTINE ITOJ(IH1,IH2,KHOLD,IM,ICAT)
        C---- SUBROUTINE ITOJ CREATES A CATEGORY MATRIX FROM INPUT OF BEH. CODE.
        C----    ROW = MOTHER OR INFANT
        C----    COL. 1-5 1=CATEGORY PRESENT, 0 ABSENT
        C----    COL. 6-10 1 IF CATEGORY AND NO OBJECT, 0 IF CATEGORY AND OBJECT
0002          COMMON IPAGE,LINES,NIE,N48,ICOL,IKCOL,KKCOL,NCAT,NCAT8,KPAT(2),
             1 JPAT(2),JTRAN(7,7),ITRAN(7,7),LTRAN(7,7),PNAME(2,40),CNAME(2,20),
             2 DNAME(60),KFREQ(15),KDUR(15),IMAT(2,500),IFREQ(2,500),IDUR(2,500)
             3 ,JFREQ(2,240),IMIAC(2016),LMIAC(2016),LAST(12)
0003          DIMENSION KHOLD(2,10), ICAT(2,40)
        C----  LOOK FOR BEH. IN CATEGORY ARRAY
0004          DO 25 I = 1,NCAT
0005          KHOLD(IM,I) = 0
0006          KHOLD(IM,I+5) = 0
0007          IJ = (I - 1) * NCAT8
0008          DO 10 J = 1,NCAT8
0009          IJ = IJ + 1
0010          IF (IH1 - ICAT(IM,IJ)) 10,15,10
0011       10 CONTINUE
0012          GO TO 25
        C----  1 FOR PRESENCE OF CATEGORY
0013       15 KHOLD(IM,I) = 1
        C----  IH2 IS OBJECT CODE--0=OBJECT, 1=NO OBJECT
0014          KHOLD(IM,I+5) = IH2
0015       25 CONTINUE
0016          RETURN
0017          END

        OPTIONS =/ON,/CK,/OP:2

        BLOCK       LENGTH
        ITOJ     144     (000440)*
        .$$$$.   8074    (037424)

        **COMPILER ----- CORE**
          PHASE        USED  FREE
        DECLARATIVES  01051 13249
        EXECUTABLES   01023 13277
        ASSEMBLY      01076 17864
```

```
FORTRAN V06.13                 10:45:15     05-JUN-74     PAGE      1

0001          SUBROUTINE MATP(IN,IROW,IA1,IA2,IA3,IB,ITIME,IC1,IC2,IC3)
        C---- SUBROUTINE MATP ADDS INTO FREQUENCY (IFREQ) AND DURATION (IDUR)
        C----    MATRICES FOR A BEHAVIORXOBJECT, OR A BEHAVIOR CHANGE
        C----          IA(N) = APPROPRIATE SETTING, STATE, AND PROX. COLUMNS.
        C----          IB = BEHAVIORXOBJECT, OR BEHAVIOR ROW
        C----          IROW = MOTHER OR INFANT
        C----          ICOL = = CROSS-TAB COLUMN OF  IPXIA(N) + 1 (SHIFT OVER 1
        C----           TO ALLOW FOR 1ST COL. IGNORING BACKGROUND CHANGES)
        C----          IC(N) = PREVIOUS TIME OF CHANGE FOR APPROPRIATE COL.
        C----          IN = NUMBER OF TIMES THROUGH LOOP
        C----          ITIME = PRESENT TIME
0002          COMMON IPAGE,LINES,N16,N48,LCOL,IKCOL,KKCOL,NCAT,NCAT8,KPAT(2),
             1 JPAT(2),JTRAN(7,7),ITRAN(7,7),LTRAN(7,7),PNAME(2,40),CNAME(2,20),
             2 DNAME(60),KFREQ(15),KDUR(15),IMAT(2,500),IFREQ(2,500),IDUR(2,500)
             3 ,JFREQ(2,240),IMIAC(2016),LNIAC(2016),LAST(12)
0003          DIMENSION IA(3), IC(3)
0004          IA(1) = IA1
0005          IA(2) = IA2
0006          IA(3) = IA3
0007          IC(1) = IC1
0008          IC(2) = IC2
0009          IC(3) = IC3
0010          DO 20 I = 1,IN
0011          ICOL = (IB - 1) * N16 + (IA(I) + 1)
0012          IFREQ(IROW,ICOL) = IFREQ(IROW,ICOL) + 1
0013       20 IDUR(IROW,ICOL) = IDUR(IROW,ICOL) + (ITIME - IC(I))
0014          RETURN
0015          END

        OPTIONS =/ON,/CK,/OP:2

        BLOCK         LENGTH
        MATP     168     (000520)*
        .$$$$.   8074    (037424)

        **COMPILER ----- CORE**
           PHASE         USED  FREE
        DECLARATIVES  00622  15678
        EXECUTABLES   01131  15169
        ASSEMBLY      01100  17840
```

```
0001        SUBROUTINE MATC(IN,IROW,IA1,IA2,IA3,IF)
      C----  SUBROUTINE MATC ADDS FREQUENCY (JFREQ) OF CATEGORYXOBJECT, OR
      C----     CATEGORY CHANGE (SEE SUB. MATP FOR VARIABLE DEFINITIONS)
0002        COMMON IPAGE,LINES,N16,N48,LCOL,IFCOL,KFCOL,NCAT,NCAT8,KPAT(2),
           1 JPAT(2),JTRAN(7,7),ITRAN(7,7),LTRAN(7,7),PNAME(2,40),CNAME(2,20),
           2 DNAME(60),KFREQ(15),FDUR(15),IMAT(2,500),IFREQ(2,500),IDUR(2,500)
           3 ,JFREQ(2,240),IMIAC(2016),LMIAC(2016),LAST(12)
0003        DIMENSION IA(3)
0004        IA(1) = IA1
0005        IA(2) = IA2
0006        IA(3) = IA3
0007        DO 20 I = 1,IN
0008        ICOL = (IF - 1) * N16 + (IA(I) + 1)
0009     20 JFREQ(IROW,ICOL) = JFREQ(IROW,ICOL) + 1
0010        RETURN
0011        END

     OPTIONS =/ON,/CK,/OP:2

     BLOCK          LENGTH
     MATC      108      (000330)*
     .$$$.     8074     (037424)

     **COMPILER ----- CORE**
        PHASE          USED  FREE
     DECLARATIVES  00622 15678
     EXECUTABLES   01051 13249
     ASSEMBLY      01064 17676
```

```
      SUBROUTINE STATE(I1,I2,IHOLD,NOW,INLAST,IHALT)
C---- SUBROUTINE STATE FILLS IN DURATION (INOUT)OF CROSS TAB OF:
C----   BEHAVIOR-OBJECT X IN-OUT X QUIET-ACTIVE
C----  FOR MOTHER OR INFANT (IF BEH.-OBJ. CHANGE) OR BOTH (IF HALT IN
C----   RECORD OR BACKGROUND CHANGE--PROX. OR STATE)
      COMMON IPAGE,LINES,N16,N48,LCOL,IKCOL,KKCOL,NCAT,NCAT8,KPAT(2),
     1 JPAT(2),JTRAN(7,7),ITRAN(7,7),LTRAN(7,7),PNAME(2,40),CNAME(2,20)
     2 DNAME(60),KFREQ(15),KDUR(15),IMAT(2,500),IFREQ(2,500),IDUR(2,500
     3 ,JFREQ(2,240),IMIAC(2016),LMIAC(2016),LAST(12)
      COMMON INOUT(2,210)
      DIMENSION IHOLD(7),INLAST(2)
      ISUM(I8,J8,K8) = (I8-1) * J8 + K8
C---- DO ONLY FOR QUIET AND ACTIVE   (IHOLD(2) = 2 OR 3)
      IF (IHOLD(2) .LT. 2) GO TO 6
C---- IF BEHAVIOR CHANGE, THEN CHANGE MATRIX FOR ONLY 1 IN DYAD
      IF (I1 .GE. 4 .AND. I1 .LE. 5) GO TO 3
C---- IF BACKGROUND CHANGE OR HALT, THEN CHANGE MATRIX FOR BOTH M AND
C---- SET TO START LOOP WITH MOTHER
      K = 4
C---- DO LOOP 2 TIMES
    2 IJ = 2
      GO TO 4
C---- DO LOOP ONLY ONCE, FOR APPROPRIATE PERSON (I1)
    3 IJ = 1
      K = I1
C---- IL INDEX  FOR IN(1) / OUT(2) (IN PROX. CODES ARE 1-3,  OUT = 0)
C---- CONVERT TO DICHOTOMY 0 = OUT(2), 1,2,3 = IN (1)
    4 IL = 1
      IF (IHOLD(3) .EQ. 0) IL = 2
C---- INDEX INTO STATE X IN/OUT COL. TO BE USED
      ICOL = ISUM(IHOLD(2)-1,3,IL)
C---- COL. FOR EITHER IN OR OUT TOTAL
      ICOL1 = ISUM(IHOLD(2)-1,3,3)
C---- DO ONCE (BEH. CHANGE) OR TWICE (STATE OR PROX. CHANGE)
      DO 5 L = 1,IJ
C---- M = 1, I = 2  (ACTUAL MOTHER INDEX = 4, INFANT'S = 5)   KK
      KK = K - 3
C---- INDEX INTO BEHAVIOR-OBJECT ROW
      IROW = ISUM(IHOLD(K),3,IHOLD(K+2)+1)
C---- INDEX INTO WHICH "ROW" OF THE ARRAY TO USE
      INSPOT = ISUM(IROW,7,0)
C---- DURATION
      IT = NOW - INLAST(KK)
C---- ADD INTO EXACT CELL
      INOUT(KK,INSPOT+ICOL) = INOUT(KK,INSPOT+ICOL) + IT
C---- ADD INTO BEHAVIOR TOTAL FOR IN OR OUT
      INOUT(KK,INSPOT+ICOL1)=INOUT(KK,INSPOT+ICOL1) + IT
C---- ADD INTO TOTAL IN OR OUT
      INOUT(KK,INSPOT+7)=INOUT(KK,INSPOT+7) + IT
C---- RESET TIME FOR MOTHER OR INFANT
      INLAST(KK) = NOW
    5 K = K + 1
      RETURN
C---- RESET TIME FOR BOTH MOTHER AND INFANT (IF RETURNING  W/OUT
C----   ADDING INTO CELLS (IF STATE WAS SLEEP OR DROWSY)
```

```
FORTRAN V06.15                          10:40:29     28-JUN-74     PAGE    2

          6 DO 10 I = 1,2
         10 INLAST(I) = NOW
            RETURN
            END

        OPTIONS =/ON,/CK,/OP:2

        BLOCK          LENGTH
        STATE    355      (001306)*
        .$$$$.   8494     (041134)

        **COMPILER ----- CORE**
           PHASE          USED  FREE
        DECLARATIVES 01054 15246
        EXECUTABLES  01183 15117
        ASSEMBLY     01288 17652
```

```
      SUBROUTINE WRA(DYAD,ACTOR,TYPE,OBJ,ICAT,TOT)
C----  SUBROUTINE WRA PRINTS OUT MATRIX OF BEHAVIOR-OBJECT X STATE X
C----    PROXIMITY; ALSO CALCULATES PROPORTIONS, ETC, FOR MOTHER AND
C----    INFANT; FOR PATTERNS AND CATEGORIES
      COMMON IPAGE,LINE,N16,N48,LCOL,IKCOL,KKCOL,NCAT,NCATO,KPAT(2),
     1 JPAT(2),JTRAN(7,7),ITRAN(7,7),LTRAN(7,7),PNAME(2,40),CNAME(2,20),
     2 DNAME(60),KFREQ(15),KDUR(15),IMAT(2,500),IFREQ(2,500),IDUR(2,500)
     3 ,JFREQ(2,240),INIAC(2016),LNIAC(2016),LAST(12)
      COMMON INOUT(2,210)
      DIMENSION DYAD(2),ACTOR(4),TYPE(4),ICAT(2,40),TOT(4),OBJ(9)
     1 , NOUT(7)
      DIMENSION JDUM(6), KDUM(6)
      DIMENSION XOUT(16)
      DIMENSION IMATN(1000)
      EQUIVALENCE(IMATN(1),IMAT(1,1))
      ISUM(I8,J6,K6) = (I8-1) * J6 + K6
C----  0 OUT TOTALS ROW
      DO 1 I = 1,7
    1 NOUT(I) = 0
C----  DO FOR MOTHER AND INFANT
      DO 10 K = 1,2
C----  DO FOR EACH DO FOR EACH BEHAVIOR PATTERN
      DO 10 J = 1,10
C----  GET INDEX INTO WHICH BEHAVIOR TO WORK ON
      IROW = ISUM(J,21,0)
C----  INDEX INTO WHICH BEH-IGNORING OBJECT ROW (NEEDS TO BE SUMMED INTO
      IL = IROW + 14
C----  DO FOR BOTH BEH W/ AND W/OUT OBJECT
      DO 10 II = 1,2
C----  INDEX INTO THAT ROW (OBJECT ROW)
      IV = ISUM(II,7,IROW)
C----  DO FOR EACH OF THE 7 COLS. IN THAT ROW
      DO 10 I = 1,7
      M = IV + I
      INOUT(K,IL+I) = INOUT(K,IL+I) + INOUT(K,M)
C----  GET ABSOLUTE ROW TOTALS (COLLAPSED OVER ALL BEHAVIORS)  DO IT
C----    ONLY ONCE BECAUSE IT'S THE SAME FOR MOTHER AND INFANT
      GO TO (5,10), K
    5 NOUT(I) = NOUT(I) + INOUT(K,M)
   10 CONTINUE
C----  ABSOLUTE DURATION = TOTAL
      DUR = NOUT(7)
C----  TIME IN = ACTIVE-IN + QUIET-IN
      JDUM(1) = NOUT(1) + NOUT(4)
C----  QUIET IN
      JDUM(2) = NOUT(1)
C----  ACTIVE -IN
      JDUM(3) = NOUT(4)
C----  TIME OUT = ACT-OUT + QUIET-OUT
      JDUM(4) = NOUT(2) + NOUT(5)
C----  QUIET-OUT
      JDUM(5) = NOUT(2)
C----  ACTIVE OUT
      JDUM(6) = NOUT(5)
C----  DO FOR MOTHER AND INFANT
```

```
          DO 100 K = 1,2
C----     INDEX INTO ACTOR ARRAY
          IS = ISUM(K,2,1)
          IS1 = IS + 1
          I2 = 10
C----     0 OUT ARRAY TEMPORARILY USED TO HOLD CATEGORIES
          DO 20 IJ = 1,105
       20 IMATH(IJ) = 0
C----     GET PATTERN NAMES FOR MOTHER AND INFANT
          DO 25 IJ = 1,40
       25 DNAME(IJ) = PNAME(K,IJ)
C----     DO FOR PATTERNS, THEN CATEGORIES
          DO 90 JT = 1,2
C----     INDEX INTO TYPE ARRAY (PATTERN, CATEGORY)
          IT = ISUM(JT,2,1)
          IT1 = IT + 1
C----     DO ANALYSES INDICATED BY FORMATS 31, 36, AND 38
          DO 85 L = 1,3
          IPAGE = IPAGE + 1
C----     PRINT INITIAL HEADING
          WRITE(LINES,26) IPAGE,DYAD,(ACTOR(JJ),JJ=IS,IS1),(TYPE(JJ),JJ=IT,
         1 IT1)
       26 FORMAT('1   PAGE',I4,'   DYAD NO. ',2A4/5X,2A4,': ',2A4/)
C----     PRINT ANALYSIS HEADING
          GO TO (30,35,37), L
       30 WRITE(LINES,31)
       31 FORMAT('   DURATION')
          GO TO 40
       35 WRITE(LINES,36)
       36 FORMAT('   PROPORTION OF DURATION IN EACH STATE X BEHAVIOR CATEGOR
         1Y')
          GO TO 40
       37 WRITE(LINES,38)
       38 FORMAT('   PROPORTION OF COLUMN DURATION ("TOT" ROW = PROP OF TOTA
         1L)')
C----     COMPLETE HEADING
       40 WRITE(LINES,41)
       41 FORMAT(/25X,'QUIET',15X,'ACTIVE '/19X,16('-'),5X,16('-') /
         1,18X,2('    IN    OUT    TOT - '),' TOTAL '/1X,65('-'))
C----     DO THE 3 ANALYSES FOR TOTAL ROW (MOUT ARRAY)
          GO TO (42,50,44), L
C----     PRINT TOTAL DURATION
       42 WRITE(LINES,43) (MOUT(JJ),JJ=1,7)
       43 FORMAT(' TOTAL',11X,'-',3(3I6,' - '))
          GO TO 55
C----     PROPORTIONS TO PERCENTAGES BY MULTIPLYING BY 100
C----     JJ DO FOR ACTIVE AND QUIET
       50 DO 51 JJ = 1,2
          IV = ISUM(JJ,3,0)
C----     IN EACH- THE IN-OUT ENTRIES ARE DIVIDED BY THE RESPECTIVE ROW
C----        TOTAL FOR IN OR OUT
          DO 51 J1 = 1,2
          XD = MOUT(IV+J1)
       51 XOUT(IV+J1) = XD/MOUT(IV+3) * 100.
C----      THE EITHER ROW TOTALS OF IN OR OUT ARE DIVIDED BY THE ABS
C----     ROW TOTAL
```

```
                DO 52 JJ = 3,6,3
                XD = NOUT(JJ)
             52 XDUM(JJ) = XD/NOUT(7) * 100.
        C----  ABSOLUTE ROW TOTAL IS DIVIDED BY ITSELF, I.E., 100.
                XDUM(7) = 100.
                WRITE(LINES,53) (XDUM(JJ),JJ=1,7)
             53 FORMAT(' TOTAL',11X,'-',3(3F6.1,' - '))
                GO TO 55
        C----  EACH COLUMN IS DIVIDED BY ROW TOTAL
             44 XD = NOUT(7)
                DO 45 JJ = 1,7
             45 XDUM(JJ) = NOUT(JJ) / XD * 100.
                WRITE(LINES,53) (XDUM(JJ),JJ=1,7)
        C----  DO FOR EACH BEHAVIOR (I2=10)  FOR PATTERNS, I2=5 FOR CATEGORIES
             55 DO 60 II = 1,I2
        C----  INDEX INTO BEHAVIOR NAME
                NA = ISUM(II,4,1)
                NB = NA + 3
                WRITE(LINES,56) (DNAME(JJ),JJ=NA,NB)
             56 FORMAT(1X,65('-')/1X ,4A4)
        C----  INDEX INTO WHICH BEHAVIOR (3 ROWS/BEHAVIOR)
                JCOL = ISUM(II,21,0)
        C----   III NO FOR OBJECT, NO OBJECT, AND IGNORING OBJECT
                DO 70 III = 1,3
        C----  INDEX INTO OBJECT PRINTED
                IO = ISUM(III,3,1)
                IO1 = IO + 2
        C----   WHICH CELL TO BEGIN IN
                JCOLA = ISUM(III,7,JCOL+1)
        C----   END CELL FOR ROW
                JCOL1 = JCOLA + 6
        C----  SPLIT ACCORDING TO ANALYSIS
                GO TO (57,60,64), L
        C----  PRINT DURATION
             57 WRITE(LINES,58)(OBJ(JJ),JJ=IO,IO1),(INOUT(K,JJ),JJ=JCOLA,JCOL1)
             58 FORMAT(6X,3A4,3(3I6,' - '))
                GO TO 70
             60 MCOL = ISUM(III,7,JCOL)
        C----  SAME PRINCIPLE AS DO 51 ABOVE--  IN ROW W/7 COLS. THE 1ST 2 COLS
        C----    ARE DIVIDED BY THE 3RD; 4TH AND 5TH / 6TH; 3 & 6 / 7 AND 7/7
                DO 61 JJ = 1,2
        C----  IV = WHICH GROUP OF 2
                IV = ISUM(JJ,3,0)
                DO 61 J1 = 1,2
                XD = INOUT(K,IV+J1+MCOL)
             61 XDUM(IV+J1) = XD / INOUT(K,IV+3+MCOL) * 100.
                DO 62 JJ = 3,6,3
                XD = INOUT(K,MCOL+JJ)
             62 XDUM(JJ) = XD / INOUT(K,MCOL+7) * 100.
                XDUM(7) = 100.
                WRITE(LINES,63)(OBJ(JJ),JJ=IO,IO1),(XDUM(JJ),JJ=1,7)
             63 FORMAT(6X,3A4,3(3F6.1,' - '))
                GO TO 70
        C----  DIVIDE EACH COLUMN BY COLUMN TOTAL
             64 DO 65 JJ = 1,7
                XD = NOUT(JJ)
```

```
              XDUM(JJ) = INOUT(K,JCOLA) / XD * 100.
           65 JCOLA = JCOLA + 1
              WRITE(LINES,63) (OBJ(JJ),JJ=10,101),(XDUM(JJ),JJ=1,7)
C----  NEXT OBJECT ROW
           70 CONTINUE
C----  NEXT BEHAVIOR
           80 CONTINUE
C----  NEXT ANALYSIS
           85 WRITE(LINES,61)
           61 FORMAT(1X,65('-'))
C----  IF JUST FINISHED BY PATTERNS- DO BY CATEGORY; IF FINISHED
C----    CATEGORIES--GO TO SUMMARY SECTION
              GO TO (82,91), JT
C----  CATEGORY ANALYSIS
C----   FOR EACH BEHAVIOR
           82 DO 87 I = 1,10
C----  CHECK TO SEE IF PATTERN MATCHES WITH CATEGORY
              DO 87 J = 1,NCAT
C----  INDEX INTO PATTERN CELL TO BEGIN WITH
              IRO = ISUM(1,21,0)
C----  INDEX INTO CATEGORY CELL TO START WITH
              IR = ISUM(J,21,0)
              IL = ISUM(J,NCAT8,0)
C----  CHECKING FOR MATCH
              DO 84 JJ = 1,NCAT8
              IL = IL+1
              IF ( I - ICAT(K,IL)) 84,85,84
           84 CONTINUE
              GO TO 87
C----  IF MATCH--ADD PATTERN DURATIONS FOR EACH OF THE BEHAVIOR ROWS
C----    INTO THE CATEGORY ROWS
           85 DO 86 JJ = 1,21
              IRO = IRO + 1
              IR = IR + 1
           86 IMATN(IR) = IMATN(IR) + INOUT(K,IRO)
           87 CONTINUE
C----  FORCE CATEGORIES INTO THE OLD PATTERN MATRIX
              DO 88 I = 1,105
           88 INOUT(K,I) = IMATN(I)
C----  CONVERT TO CATEGORY NAMES FOR MOTHER OR INFANT
              DO 89 I = 1,20
           89 DNAME(I) = CNAME(K,I)
C----  I2 = 5 FOR CATEGORY ANALYSIS
              I2 = 5
              GO TO 90
C----  SUMMARY SECTION IIIIII
C----  HERE ONLY DOING FOR TOTAL VOCAL (IGNORING OBJECT ROW)
C----  KDUM ARRAY SAME PRINCIPLE AS JDUM BUT FOR VOCAL
           91 III = ISUM(3,7,0)
              KDUM(1) = INOUT(K,III+1) + INOUT(K,III+4)
              KDUM(2) = INOUT(K,III+1)
              KDUM(3) = INOUT(K,III+4)
              KDUM(4) =  INOUT(K,III+2) + INOUT(K,III+5)
              KDUM(5) = INOUT(K,III+2)
              KDUM(6) = INOUT(K,III+5)
              WRITE(LINES,101) DYAD, (ACTOR(JJ),JJ=IS,IS1)
```

```
      101 FORMAT('1  DYAD ID. ',2A4/ 3X,2A4//'    SUMMARY FOR STATE X PROXIMI
         1TY MATRIX'//44X'MOTHER-PRES'17X'MOTHER OUT'/40X,18('-'),12X,18('-'
         2))
          WRITE(LINES,102)
      102 FORMAT( 23X'TOTAL'4X'M-PRES'5X'QUIET'4X'ACTIVE'5X'M-OUT'5X'QUIET'
         14X'ACTIVE'/1X87('-'))
          WRITE(LINES,105)DOUT(7),(JDUM(JJ),JJ=1,6)
      105 FORMAT(' DURATION' 11X,        7(I8,2X))
          DO 106 JJ = 1,6
      106 XDUM(JJ) = JDUM(JJ) / DUR * 100.
          WRITE(LINES,107) (XDUM(JJ),JJ=1,6)
      107 FORMAT(' PROP OF TOTAL'16X,6(F8.1,2X))
          JJ = 0
          DO 110 JJJ = 1,4,3
          XD = JDUM(JJJ)
          DO 110 JJJJ = 1,3
          JJ = JJ + 1
      110 XDUM(JJ) = JDUM(JJ) / XD * 100.
          WRITE(LINES,111) (XDUM(JJ),JJ=1,6)
      111 FORMAT(   ' PROP OF M-(IN/OUT)'11X,6(F8.1,2X))
          WRITE(LINES,112) (KDUM(JJ),JJ=1,6)
      112 FORMAT( 'UVOCAL DUR.'19X,6(I8,2X))
          JJ = 0
          DO 114 JJJ = 1,4,3
          XD = KDUM(JJJ)
          DO 114 JJJJ = 1,3
          JJ = JJ + 1
      114 XDUM(JJ) = KDUM(JJ) / XD * 100.
          WRITE(LINES,115)(XDUM(JJ),JJ=1,6)
      115 FORMAT(' PROP OF M-(IN/OUT)',11X,6(F8.1,2X))
          WRITE(LINES,120)
      120 FORMAT(1X,87('-'))
       90 CONTINUE
    C----  DO FOR INFANT
      100 CONTINUE
          RETURN
          END

    OPTIONS =/ON,/CK,/OP:2

    BLOCK          LENGTH
    WRA        2490    (011564)*
    .$$$$.     8494    (041134)

    **COMPILER ----- CORE**
       PHASE          USED  FREE
    DECLARATIVES     01145 13155
    EXECUTABLES      01503 12797
    ASSEMBLY         02260 166[illegible]
```

```
24   3   1
VOCAL (VOC)       VISUAL (VIS)      VIS-SMILE(SMI)    VIS-VOC           NONE
VIS-VOC-SMILE     VIS-VOC-TPLAY     VIS-SMILE-TPLAY   VIS-VOC-SMI-TPL   VIS-TPLAY(TPL)
VOCAL (VOC)       VISUAL (VIS)      VIS-SMILE         VIS-VOC           VOC-VIS-SMILE
NONE              VOC-SMILE         SMILE             CRY               CRY-VIS
    VOCAL             VISUAL            SMILE             TPLAY             NONE
    VOCAL             VISUAL            SMILE             CRY               NONE
    DK2:A01002.EDT
    DK2:A02001.EDT
    DK2:A03001.EDT
    DK2:A04001.EDT
    DK2:A05002.EDT
    DK2:A06001.EDT
    DK2:A07002.EDT
    DK2:A08002.EDT
    DK2:A09002.EDT
    DK2:A10001.EDT
    DK2:A11001.EDT
    DK2:A12002.EDT
    DK2:B01002.EDT
    DK2:B02001.EDT
    DK2:B03001.EDT
    DK2:B04002.EDT
    DK2:B05001.EDT
    DK2:B06002.EDT
    DK2:B07002.EDT
    DK2:B08002.EDT
    DK2:B09001.EDT
    DK2:B10001.EDT
    DK2:B11001.EDT
    DK2:B12001.EDT
```

```
      SUBROUTINE WR1(DYAD,ACTOR,TYPE,OBJ,ICAT,OUT,TOT,MVOC,CT,NUM,OUG1,
     1OUG2)
C----  SUBROUTINE WR1 PRINTS THE MATRIX OF BEHAVIOR X SETTING,STATE,
C----    AND PROXIMITY FOR FREQUENCIES OF ONSETS, DURATIONS, AND
C----    CALCULATES AND PRINTS PROPORTIONS, AVERAGE DURATIONS, ETC.
C----    FOR MOTHER AND INFANT; IN BOTH BEHAVIOR PATTERN AND CATEGORY
C----    FORM
      COMMON IPAGE,LINES,N16,N48,ICOL,IKCOL,KKCOL,NCAT,NCAT8,KPAT(2),
     1 JPAT(2),JTRAN(7,7),ITRAN(7,7),LTRAN(7,7),PNAME(2,40),CNAME(2,20),
     2 DNAME(60),KFREQ(15),KDUR(15),IMAT(2,500),IFREQ(2,500),IDUR(2,500)
     3 ,JFREQ(2,240),IMIAC(2016),LMIAC(2016),LAST(12)
      DIMENSION DYAD(2),ACTOR(4),TYPE(4),ICAT(2,40),OUT(4),TOT(4),CT(2),
     1 OBJ(9),MVOC(2,6),NUM(2),IMATN(1000),NFREQ(1000),XDUR(16)
      DIMENSION JDUM(5), KDUM(5)
C----  SET UP TEMPORARY ARRAYS TO HOLD CATEGORIES FOR MOTHER AND INFANT
C----  DURATIONS
      EQUIVALENCE (IMATN(1),IMAT(1,1)),(IFREQ(1,1),NFREQ(1))
      ISUM(I8,J8,K8) = (I8-1) * J8 + K8
C----  FOR INDEX INTO BEHAVIOR PATTERN (3 ROWS FOR EACH BEH, 16 COL/ROW)
      N48 = ICOL * N16
C----  INDEX INTO BEHAVIOR CATEGORIES
      IL = NCAT + N48
C----  TOTAL DURATION
      DUR = KDUR(15)
C----  TIME IN = TOT. - M-OUT
      JDUM(1) = KDUR(15) - KDUR(11)
C----  FEED
      JDUM(2) = KDUR(2)
C----  NO FEED =  TOT. M-IN - FEED
      JDUM(3) = JDUM(1) - JDUM(2)
C----  CARETAKING = PSLP + FEED + BATH
      JDUM(4) = KDUR(1) + KDUR(2) + KDUR(3)
C----  NO CARE IN = NO CARE - M-OUT
      JDUM(5) = KDUR(4) - KDUR(11)
C----  DO FOR MOTHER AND INFANT
      DO 500 M = 1,2
C----  IA = 10 FOR PATTERN ANALYSIS
      IA = 10
C----  0 OUT ARRAY FOR CATEGORY DURATION SUMS
      DO 240 JJ = 1,IL
  240 IMATN(JJ) = 0
C----  FILL IN WITH PATTERN NAMES FOR  MOTHER OR INFANT
      DO 300 JJ = 1,40
  300 DNAME(JJ) = PNAME(M,JJ)
C----  INDEX INTO ACTOR ARRAY
      IS = ISUM(M,2,1)
      IS1 = IS + 1
C----  DO FOR PATTERNS THEN FOR CATEGORIES
      DO 500 J = 1,2
C----  INDEX INTO TYPE ARRAY (PATTERN OR CATEGORY)
      IT = ISUM(J,2,1)
      IT1 = IT + 1
C----  L ANALYSES PERFORMED BY FORMATS 3073 309, 311, 313, & 2 IN ORDER
      DO 373 L = 1,5
      IPAGE = IPAGE + 1
```

```
C----  WRITE INITIAL HEADING
       WRITE(LINES,305) IPAGE, (DYAD(JJ),JJ=1,2),(ACTOR(JJ),JJ=IS,IS1),
      1 (TYPE(JJ),JJ=IT,IT1)
   305 FORMAT ('1  PAGE',I4,'  DYAD NO. ',2A4/ 3X,2A4,':',' ',2A4,/ )
C----  WRITE ANALYSIS HEADING
       GO TO (306,308,310,312,1), L
   306 WRITE(LINES,307)
   307 FORMAT('   FREQUENCIES')
       GO TO 314
   308 WRITE(LINES,309)
   309 FORMAT ('   DURATION')
       GO TO 314
   310 WRITE(LINES,311)
   311 FORMAT('   AVERAGE DURATION')
       GO TO 314
   312 WRITE(LINES,313)
   313 FORMAT('   PROPORTION OF TOTAL ROW DURATION')
C----  SET TOTAL DURATION OF SESSION
       ITOT = KDUR(KKCOL)
       GO TO 314
     1 WRITE(LINES,2)
     2 FORMAT('   PROPORTION OF TOTAL COLUMN DURATION')
C----  COMPLETE HEADING
   314 WRITE(LINES,315)
   315 FORMAT (6X,'ANALYSIS BY SETTING, STATE, AND PROXIMITY'//37X,'SETTI
      1NG'30X,'STATE',26X,'PROXIMITY'/27X,30('-'),3X,30('-'),3X,30('-'))
       WRITE(LINES,217)
   217 FORMAT(6X,'BEHAVIOR',7X,'TOT',5X,'PSLP',2X,'FEED',2X,'BATH',2X,
      1'DOCA',3X,'TOT'5X,'ASLP',2X,'DRSY',3X,'QUI',3X,'ACT',3X,'TOT',6X,
      2'OUT',4X,'IN',2X,'NEAR',2X,'HOLD',3X,'TOT'/1X,122('-'))
C----  1ST ROW APPLIES TO  SETTING, STATE, AND PROX. (IGNORES BEHV.)
   415 GO TO (420,430,440,450,450), L
C----  FREQUENCY TOTALS
   420 WRITE(LINES,421) (KFREQ(JJ),JJ=1,IKCOL)
   421 FORMAT(' TOTAL',11X,'-',6X,3(' - ',5I6))
       GO TO 516
C----  DURATION TOTALS
   430 WRITE(LINES,422) KDUR(KKCOL),(KDUR(JJ),JJ=1,IKCOL)
   422 FORMAT(' TOTAL'11X,'-',I6,3(' - ',5I6))
       GO TO 516
C----  AVERAGE DURATION
   440 DO 445 JJ = 1,IKCOL
       XD = KDUR(JJ)
   445 XDUR(JJ) = XD / KFREQ(JJ)
       WRITE(LINES,446) (XDUR(JJ),JJ=1,IKCOL)
   446 FORMAT(' TOTAL',11X,'-',6X,3(' - ',5F6.1))
       GO TO 516
C----  PROPORTION OF TOTAL TIME
   450 DO 455 JJ = 1,IKCOL
       XD = KDUR(JJ)
   455 XDUR(JJ) = XD / ITOT * 100.
       WRITE(LINES,446) (XDUR(JJ),JJ=1,IKCOL)
C----  DO FOR EACH BEHAVIOR (IA=10), THEN FOR EACH CATEGORY (IA=5)
C----       THERE ARE 5 ROWS ASSOCIATED W/ EACH IA
   516 DO 370 IBEH = 1,IA
C----  INDEX INTO WHICH NAME OF BEAME IS TO BE PRINTED
```

```
                IO = ISUM(IBEH,4,L)
                IO1 = IO + 3
          C----- PRINT NAME AND LINE
                WRITE (LINES,317) (NAME(JJ),JJ=IO,IO1)
            317 FORMAT(16X,107('-') / 1X,4A4)
          C----- JB = INDEX INTO WHICH BEHAVIOR OR CAT.
                JB = ISUM(IBEH,N48,0)
          C----- KL = WHICH CELL TO START WITH
                KL = JB + 1
          C----- DO FOR OBJECT, NO OBJECT, AND IGNORING OBJECT
                DO 370 IRO = 1,ICOL
          C----- INDEX INTO WHICH OBJECT CATEGORY
                IO = ISUM(IRO,ICOL,1)
                IO1 = IO + 2
          C----- END OF GIVEN BEHAVIOR X OBJECT ROW     KM
                KM = KL + (N16 - 1)
          C----- GO TO PROPER ANALYSIS
                GO TO (340,350,330,320,3), L
          C----- GET 1ST COLUMN AND DIVIDE BY TOTAL DURATION (*100 FOR PERCENT)
              3 JB = JB + 1
                XDUM(1) = IDUR(M,JB)
          C----- DIVIDE REST OF ELEMENTS IN ROW BY TOTAL DURATION OF THAT COLUMN
                XDUM(1) = XDUM(1) / KDUR(KKCOL) * 100.
                DO 4 NCOL = 2,N16
                DIVIS =  KDUR(NCOL-1)
                JB = JB + 1
              4 XDUM(NCOL) = IDUR(M,JB) / DIVIS * 100.
                WRITE(LINES,326) (OBJ(JJ),JJ=IO,IO1),(XDUM(JJ),JJ=1,N16)
                GO TO 370
          C----- GET TOTAL ROW DURATION (1ST COL  IN ROW )
            320 JB = JB + 1
                DIVIS = IDUR(M,JB)
                XDUM(1) = DIVIS/ITOT * 100.
          C----- DIVIDE REST OF ROW BY TOTAL ROW DURATION
                DO 325 NCOL = 2,N16
                JB = JB + 1
            325 XDUM(NCOL) = IDUR(M,JB)/DIVIS * 100.
                WRITE(LINES,326)(OBJ(JJ),JJ=IO,IO1),(XDUM(JJ),JJ=1,N16)
            326 FORMAT(6X,3A4,F6.1,3(' - ',5F6.1))
                GO TO 370
          C----- DIVIDE EACH DURATION ELEMENT BY CORRESPONDING FREQUENCY ELEMENT
            330 DO 335 NCOL = 1,N16
                JB = JB + 1
                XD = IFREQ(M,JB)
            335 XDUM(NCOL) = IDUR(M,JB) / XD
                WRITE (LINES,326)(OBJ(JJ),JJ=IO,IO1),(XDUM(JJ),JJ=1,N16)
                GO TO 370
          C-----    PRINT OUT FREQUENCY ROW AND GO TO 360 TO RESET KL TO 1ST COL
          C-----    OF NEXT ROW
            340 WRITE(LINES,341)(OBJ(JJ),JJ=IO,IO1),(IFREQ(M,JJ),JJ=KL,KM)
            341 FORMAT(6X,3A4,I6,3(' - ',5I6))
                GO TO 360
          C----- PRINT OUT DURATION ROW AND GO TO 360 TO RESET KL TO 1ST COLUMN
          C-----    OF NEXT ROW
            350 WRITE(LINES,341)(OBJ(JJ),JJ=IO,IO1),(IDUR(M,JJ),JJ=KL,KM)
            360 KL=KM+1
```

```
      370 CONTINUE
C----  END EACH MATRIX WITH LINE
      373 WRITE(LINES,371)
      371 FORMAT(1X,122('-'))
C----  SEE IF ON PATTERN OR CATEGORY- IF CAT, GO TO SUMMARY SECTION
          GO TO (380,499), J
C----  IF FINISHED PATTERN - CONVERT TO USE FOR CATEGORIES
C----  IA NOW = 5, (5 CATEGORIES)
      380 IA = 5
C----  CHANGE TO CATEGORY NAMES FOR MOTHER OR INFANT
          DO 385 JK = 1,20
      385 ONAME(JK) = CNAME(M,JK)
C----  SEARCH FOR PRESENCE OF CAT. IN EACH BEHAVIOR PATTERN
          DO 405 L = 1,10
          DO 405 ITEM = 1,NCAT
          JK = ISUM(ITEM,NCATB,0)
          DO 390 NV = 1,NCATB
          JK = JK + 1
          IF (L - ICAT(M,JK)) 390,395,390
      390 CONTINUE
          GO TO 405
C----  IF PRESENT-GET INDEX INTO PATTERN MATRIX (JL) AND INTO CAT.
C----     ARRAY(JK)
      395 JK = ISUM(ITEM,N48,0)
          JL = ISUM(L,N48,0)
C----  ADD DURATION OF PATTERN INTO CATEGORY ARRAY FOR EACH OF 3 ROWS
C----     OF OBJECTS FOR THAT BEHAVIOR (16 COL./ROW)
          DO 400 IKC = 1,N48
          JK = JK + 1
          JL = JL + 1
      400 IMATN(JK) = IMATN(JK) + IDUR(M,JL)
      405 CONTINUE
C----  PUT CAT. FREQ. AND DURATIONS INTO ORIGINAL PATTERN MATRIX
C----  START PROCESS AGAIN, USING CATEGORIES
          DO 410 JL = 1,IL
C----  SUMMARY SECTION JJJJJJJ
C----  SAME PROCESS AS KDUR IN BEGINNING OF SUBROUTINE BUT USING TOTAL
C----     VOCAL (3RD ROW)
          IDUR(M,JL) = IMATN(JL)
      410 IFREQ(M,JL) = JFREQ(M,JL)
          GO TO 500
      499 III = ISUM(3,N16,0)
          KDUM(1) = IDUR(M,III+16) - IDUR(M,III+12)
          KDUM(2) = IDUR(M,III+3)
          KDUM(3) = KDUM(1) - KDUM(2)
          KDUM(4) = IDUR(M,III+2) + IDUR(M,III+3) + IDUR(M,III+4)
          KDUM(5) = IDUR(M,III+5) - IDUR(M,III+12)
          WRITE(LINES,15) DYAD, (ACTOR(JJ),JJ=IS,IS1)
       15 FORMAT('1  DYAD NO. ', 2A4/3X,2A4//3X'SUMMARY DESCRIPTION')
          WRITE(LINES,16)
       16 FORMAT(//50X'MOTHER PRESENT'/40X,38('-')/ 21X'TOTAL'5X'M-PRES'
         16X'FEED'4X'NO FEED'3X'CARE'6X'NO CARE'/ 1X77('-'))
          WRITE(LINES,17) KDUR(15),(JDUM(JJ),JJ=1,5)
       17 FORMAT(' DURATION' 9X,6(I8,2X))
C----  PROPORTION OF TOTAL TIME
          DO 18 JJ = 1,5
```

```
   18 XDUM(JJ) = JDUM(JJ) / DUR * 100.
      WRITE(LINES,19)(XDUM(JJ),JJ=1,5)
   19 FORMAT(' PROP OF TOTAL'14X,5(F8.1,2X))
      XD = JDUM(1)
C----  PROPORTION OF M-IN
      DO 20 JJ = 1,5
   20 XDUM(JJ) = JDUM(JJ) / XD * 100.
      WRITE(LINES,21)(XDUM(JJ),JJ=1,5)
   21 FORMAT(' PROP OF M-PRES'13X,5(F8.1,2X))
C----  VOCAL DUR. M-PRES
      WRITE(LINES,22) (KDUM(JJ),JJ = 1,5)
   22 FORMAT('0VOCAL DUR.(M-PRES)'9X,5(I8,2X))
      XD = KDUM(1)
C----   PROP. VOCAL DURATION -M-PRESENT
      DO 23 JJ = 1,5
   23 XDUM(JJ) = KDUM(JJ) / XD * 100.
      WRITE(LINES,24) (XDUM(JJ),JJ=1,5)
   24 FORMAT(' PROP OF M-PRES'13X,5(F8.1,2X))
      WRITE(LINES,25)
   25 FORMAT(1X,77('-'))
  500 CONTINUE
      RETURN
       END

OPTIONS =/ON,/CK,/OP:2

BLOCK        LENGTH
MR1      2600    (012120)
.$$$$.   8074    (037424)

**COMPILER ----- CORE**
   PHASE        USED  FREE
DECLARATIVES   00622 13678
EXECUTABLES    01553 12747
ASSEMBLY       02288 16652
```

```
      SUBROUTINE FILL(NOW,NLAST,IHALT,IFLOW,NHALT,ICL,NSTEP,IHOLD)
C----  SUBROUTINE FILL FILLS IN IMAT MATRIX FROM LAST BEHAVIOR CHANGE
C----    (OR IF M-OUT) UNTIL NOW--EACH ROW REPRESENTS 1 SEC.
C----      IF M-OUT--10 IS ADDED TO BEH. CODE TO DISCRIMINATE PROXIMITY
C----      LATER IN SUBROUTINE IAC
C----  CHECKS FOR OVERFLOW OF MATRIX BOUND (500):
C----      IFLOW> 1 IF BEHAVIOR OVERFLOW
C----      NHALT>1 IF PLACEMENT OF NSTEP 0'S AFTER  A HALT IN THE
C----        OBSERVATIONAL RECORD
C----      IF IFLOW +/OR NHALT >0  WILL SEND MAINLINE TO  CALCULATION
C----      SUBROUTINES AND THEN TO REFILL
      COMMON IPAGE,LINES,N16,N48,ICOL,IKCOL,KKCOL,NCAT,NCATB,KPAT(2),
     1 JPAT(2),JTRAN(7,7),ITRAN(7,7),LTRAN(7,7),PNAME(2,40),CNAME(2,20),
     2 NNAME(60),KFREQ(15),KDUR(15),IMAT(2,500),IFREQ(2,500),IDUR(2,500)
     3 ,JFREQ(2,240),IMTAC(2016),LMTAC(2016),LAST(12)
      DIMENSION IHOLD(7)
C----  GET LENGTH OF TIME FROM LAST FILL
      IX = NOW - NLAST
C----  CHECK IF FILLING MATRIX FROM ICL (LAST ROW ENTERED) TO IX + ICL
C----    WOULD OVERFLOW 500 LIMIT
      IFLOW = ICL + IX - 500
      IF (IFLOW) 17,17,15
C----  IF IT DOES--FILL ONLY UP TO 500 AND KEEP RECORD OF IFLOW
   15 IX = IX - IFLOW
C----  DO FOR MOTHER AND INFANT
   17 DO 20 J = 1,2
C----  SET TO BEHAVIOR (OR BEH. + 10 IF M-OUT)
      IDUM = IHOLD(J+3)
      IF(IHOLD(3) .EQ. 0) IDUM = IDUM + 10
      IA = ICL
      DO 20 K = 1,IX
C----  1 TO # SECONDS BEHAVIOR LASTED (UNLESS OVERFLOW) -- MOVE UP IN
C----    MATRIX
      IA = IA + 1
   20 IMAT(J,IA) = IDUM
C----  ICL = LAST ROW FILLED
      ICL = IA
C----  IF NO HALT, RETURN
      IF (IHALT) 40,40,25
C----  IF A HALT, CHECK FOR OVERFLOW IN ADDING NSTEP 0'S
   25 NHALT = IFLOW + NSTEP
C----   IF BEHAVIOR OR NHALT OVERFLOW, WAIT UNTIL REFILL TO SET IN BREAK
      IF (IFLOW) 30,30,40
   30 IF (NHALT) 35,35,40
C----   IF IT WON'T OVERFLOW, SET ICL TO SKIP NSTEP ROWS BEFORE NEXT
C----    FILL
   35 ICL = ICL + NSTEP
   40 RETURN
      END

OPTIONS =/ON,/CK,/OP:2

BLOCK      LENGTH
FILL    201    (000622)*
.$$$$.  8074   (037424)
```

```
**COMPILER ----- CORE**
   PHASE        USED  FREE
DECLARATIVES 00622 13678
EXECUTABLES  01131 13169
ASSEMBLY     01164 17776
```

```
      SUBROUTINE MATS(N,NSTEP,IDUR)
C---- SUBROUTINE MATS  CREATES 3 TRANSITION MATRICES:
C----          ITRAN = FREQ. OF TRANSITIONS
C----          LTRAN = FREQ. OF ENTERING AN N TO N+1 CELL
C----          JTRAN = FREQ. OF REMAINING IN  A CELL AFTER ENTERING FROM
C----                N
      COMMON IPAGE,LINES,N16,N48,ICOL,IKCOL,KKCOL,NCAT,NCAT8,KPAT(2),
     1 JPAT(2),JTRAN(7,7),ITRAN(7,7),LTRAN(7,7),PNAME(2,40),CNAME(2,20),
     2 DNAHL(60),KFREQ(15),KDUR(15),IMAT(2,500),IFREQ(2,500),IDUR(2,500)
     3 ,JFREQ(2,240),INIAC(2016),LMIAC(2016),LAST(12)
      DIMENSION IJ(2)
C---- I3 AND I4, SET IN UNUSED PORTION OF IFREQ,  ARE USED TO MAINTAIN
C----    CONTINUITY BETWEEN IMAT CHANGES
      I3 = IFREQ(1,500)
      I4 = IFREQ(2,500)
C---- MOVE BACK 1 STEP TO KEEP CONTINUITY AT STATEMENT 10
    4 N = N - NSTEP
    5 J = 0
C---- BREAK TRANSITION MATRICES IF MOTHER WAS OUT OF ROOM (CODE>10)
      IF (IMAT(1,N) .GT. 10) IDUR = 0
      IF (IDUR) 3,3,6
    3 I3 = 0
      I4 = 0
    6 J = J + 1
   10 N = N + NSTEP
C---- IF WILL EXCEED 500 (BOUND FOR IMAT) THEN STOP
      IF (N - 500) 15,15,80
C---- IF IMAT = 0 THEN A BREAK OCCURRED, GO TO 50 TO RESTART
   15 IF (IMAT(1,N)) 50,50,20
C---- IF > 10 -MOTHER OUT- SO TRY NEXT STEP -- GO TO 5
   20 IF (IMAT(1,N) - 10) 21,21,5
C---- CREATE DICHOTOMY FOR M IM1 = 1-VOCAL, =2-NO VOCAL
   21 IM1 = 2
      MATN = IMAT(1,N)
      GO TO (25,30,30,25,30,25,25,30,25,30), MATN
   25 IM1 = 1
C---- CREATE DICHOTOMY FOR INFANT, IM2 = 1-VOCAL, = 2-NOVOCAL
   30 IM2 = 2
      MATN = IMAT(2,N)
      GO TO (35,40,40,35,35,40,35,40,40,40), MATN
   35 IM2 = 1
      GO TO 40
C---- CONVERT M AND I RESPONSE TO 1 # AND PLACE IN STEP N(J=1) OR
C----         N+1(J=2)
   40 IJ(J) = (IM1-1) * 2 + IM2
C---- IF 1ST STEP-COLLECT 2ND STEP;  IF 2ND CONTINUE
      GO TO (6,45), J
C---- CONVERT N-N+1 TO 1 NUMBER TO CHECK FOR NEW CELL ENTRY (LTRAN)   I
   45 I1 = IJ(1)
      I2 = IJ(2)
      IT = (I1-1) *2 + I2
C---- USE FOR JTRAN (FREQ. OF REMAINING)
      IF (I4 .NE. I2) I3 = I1
      I4 = I2
C---- COLLECT MATRICES
```

```
   47 JTRAN(I3,I4) = JTRAN(I3,I4) + 1
C----  CHECK PREVIOUS CELL ENTRY (IDUM) W/ PRESENT ONE (IT)
      IF (IDUM - I1) 48,49,48
   48 LTRAN(I1,I2) = LTRAN(I1,I2) + 1
      IDUM = I1
   49 ITRAN(I1,I2) = ITRAN(I1,I2) + 1
C---- SAVE N+1(IJ(I)) AS N(IJ(1)) AND GET NEW N+1
      IJ(1) = IJ(2)
      J = 1
      GO TO ..
C----  HALT IN RECORD CYCLE UNTIL A CODE >0,OR STOP IF WOULD BE > 500
   50 IDUM = 0
      DO 60 I = 1,NSTEP
      N = N + 1
      IF (N - 500) 55,55,80
   55 IF (IMAT(1,N)) 60,60,4
   60 CONTINUE
C---- AFTER REACHING 500, RESET N TO START ON 21ST RECORD (1-21 ARE
C----     REPEATS, SET REFILL.
   80 N = 22 - NSTEP
   90 IFREQ(1,500) = I3
      IFREQ(2,500) = I4
      RETURN
      END
```

OPTIONS =/ON,/CK,/OP:2

BLOCK	LENGTH	
MATS	460	(001630)*
.$$$.	8074	(037424)

COMPILER ----- CORE

PHASE	USED	FREE
DECLARATIVES	00622	13678
EXECUTABLES	01131	13169
ASSEMBLY	01304	17636

```
        SUBROUTINE IAC(NUM,ICAT)
C----   SUBROUTINE IAC   DETERMINES THEN ONSET OF VOCAL OR CRY PATTERNS
C----      AND CATEGORIES FOR MOTHER AND INFANT AND:
C----           1.  SEARCHES THE PRECEEDING 10 SEC.'S FOR VALID BEHAVIOR
C----                 PATTERN  OF OTHER PAIR MEMBER AS ANTECEDENT
C----           2.  SEARCHES THE FOLLOWING 10 SEC.'S FOR A VALID PATTERN
C----                 AS CONSEQUENT
C----           3.  SETS UP ANTECEDENT/CONSEQUENT FREQUENCY MATRIX AND
C----                 A MATRIX OF LATENCIES OF CONSEQUENTS FOR A/C
C----           4.  LISTS EACH ONSET ON A FILE , BY A/C PATTERN AND BY A
C----                 CHART CONVERSION INTO CATEGORIES.
C----    BOTH ARRAYS IMIAC(FREQ) AND LMIAC) CONTAIN 14 12 X 12 MATRICES
C----         1-6 (MOTHER)--5 PATTERN ONSETS, 1 CATEGORY ONSET     VOCAL
C----         7-14 (INFANT)--4 VOCAL PATTERN ONSETS, 2 CRY PATTERN ONSETS,
C----                        1 VOCAL CATEGORY ONSET, 1 CRY CATEGORY ONSET
        COMMON IPAGE,LINES,N16,N48,LCOL,IKCOL,KKCOL,NCAT,NCAT8,KPAT(2),
      1 JPAT(2),JTRAN(7,7),ITRAN(7,7),LTRAN(7,7),PNAME(2,40),CNAME(2,20)
      2 ONAME(60),KFREQ(15),KDUR(15),IMAT(2,500),IFREQ(2,500),IDUR(2,500
      3 ,JFREQ(2,240),IMIAC(2016),LMIAC(2016),LAST(12)
        DIMENSION ICHART(11), IANT(2), IANTL(2), IML(4),NUM(2),ICAT(2,40)
        DIMENSION JROW(2), ICOL(2), IVOC(2,6)
C----   SET JROW AND ICOL(2) AS TOTALS, SET VOCAL BEHAVIORS, LAST 2 FOR
C----      INFANT ARE CRIES
        DATA JROW(2),ICOL(2),IVOC/12,12,1,1,4,4,6,5,7,7,9,9,0,10/
        DATA IX,IB/'X',' '/
        NC = 12
        NR = 12
        NAC = NR * NC
C----   1ST 10 SEC.'S CONTAIN RESPONSES ALREADY SEARCH FOR ONSETS
C----   ONLY UP TO 489 BECAUSE A 10-SEC. FORWARD SEARCH COULD NOT BE
C----   COMPLETED
        DO 100 N = 11,489
C----   IPROX USED TO INDICATE WHETHER MOTHER WAS OUT M-OUT
        IPROX = 0
C----   IF = 0, THERE WAS A BREAK IN THE OBSERVATIONAL RECORD
        IF(IMAT(1,N)) 99,99,5
C----   SET JJ TO INFANT VALUE (2) WHEN WORKING ON MOTHER RECORDS
C----     (WILL BE SWITCHED TO 1 WHEN WORKING ON INFANT) USED AS INDEX
C----       INTO M/I PART OF MATRICES
      5 JJ = 2
C----   DO FOR BOTH MOTHER (1) AND INFANT (2)
        DO 90 J = 1,2
        IF (J .EQ. 2) JJ = 1
        IMV = IMAT(J,N)
C----   IF M-OUT, RECORD WILL BE >10--SET IPROX TO 1, SUBTRACT 10 TO
C----     GET ACTUAL BEHAVIOR CODE
        IF (IMV .GT. 10) IPROX = 1
        IF (IMV .GT. 10) IMV = IMV - 10
C----   CHECK IF BEHAVIOR WAS A VOCAL OR A CRY (FOR INFANT)
        DO 10 I = 1,6
        IF (IMV - IVOC(J,I)) 10,15,10
     10 CONTINUE
C----   IF NOT VOCAL, THEN RESET VOC. PATTERN(JPAT) AND CATEGORY(KPAT)=0
C----   IF WORKING ON INFANT ALSO SET CRY TO 0
        KPAT(J) = 0
```

```
      JPAT(J) = 0
      IF (J .EQ. 2) ICRY1 = 0
      GO TO 90
C---- IF IT WAS A VOC (OR CRY) SET IPAT = CODE FOR VOCALS (IVOC(I))
   15 IPAT = I
C---- IF IT MATCHES PREVIOUS PATTERN W/OUT A BREAK, GO TO 90 TO CHECK
C---- FOR OTHER PERSON
      IF (IPAT - JPAT(J)) 20,90,20
C---- IF NO MATCH OR BREAK OCCURED(JPAT(J)=0)  THEN THIS IS AN ONSET
   20 JPAT(J) = I
      ICRY = 0
C---- IF ON INFANT AND PATTERN CODE > 4, ONSET WAS A CRY
      IF (J .EQ. 2 .AND. I .GT. 4) ICRY = 1
C----
C---- START ANTECEDENT CONSEQUENT SEARCH....
C----
C---- SET BREAK = 0
      IBRK = 0
      K = M
C---- STEPPING THROUGH MATRIX BY 1'S
      ISTEP = 1
C---- SET IANT(1) AND IZ TO GARBAGE SO CAN'T BE USED IN ANTECEDENT RUN
      IANT(1) = 15
      IZ = 0
C---- DO FOR ANTECEDENT IANT(1) AND CONSEQUENT IANT(2)     L
      DO 60 L = 1,2
C---- SET VISUAL ONLY (IVIS) AND NOTHING (I.E., PATTERN = NO BEHAVIOR)
C---- AND 2ND OCCURANCE OF VISUAL AFTER NOTHING(IA) TO 0
      IVIS = 0
      INONE = 0
      IA = 0
C---- DO 10 STEPS
      DO 50 I = 1,10
C---- (BACK--ISTEP=1, OR FORWARD--ISTEP=-1)
      K = K - ISTEP
C---- FOR PERSON J ONSET, LOOKING FOR  OTHER'S (JJ'S) BEHAVIORS JJJJJJJ
      IBEH = IMAT(JJ,K)
C---- IF 0, THERE'S A BREAK--GO TO 99 TO RESET ONSETS TO 0
      IF (IBEH) 99,99,25
C---- IF >10 H-OUT SO SUBTRACT 10 TO OBTAIN BEHAVIOR CODE
   25 IF (IBEH .GT. 10) IBEH = IBEH - 10
C---- IF NO BREAK AND BEHAVIOR IS SAME
C---- (WORKS ONLY FOR CONSEQUENTS)--
C----   AS ANTECEDENT, CONTINUE LOOKING FOR A NEW PATTERN
      IF (IBRK .EQ. 0 .AND. IBEH .EQ. IANT(1)) GO TO 50
C---- IF BEHAVIOR OTHER THAN  VIS ONLY OR NONE AND FAILED THE TEST
C----   ABOVE--THIS IS A VALID A OR C PATTERN-- SO USE IT AND BREAK OUT
      IF (IBEH .NE. 2 .AND. IBEH .NE. JJ+4) GO TO 50
C---- THERE NOW WILL BE A BREAK IF A OR C BEHAVIOR (W/ POSSIBLE
C----     EXCEPTIONS FOR VIS ONLY OR NOTHING--SEE AFTER STATEMENT 30)
C---- IF VISUAL ONLY FIRST FOUND AT THIS STEP , SET IVIS = ABS. STEP #
      IF (IBEH .EQ. 2 .AND. IVIS .EQ. 0) IVIS = I
C---- SAME AS ABOVE BUT FOR NONE, USING INONE
      IF (IBEH .EQ. JJ+4 .AND. INONE .EQ. 0) INONE = I
C---- IF A 2ND VIS ONLY OCCURS AFTER A NONE-KEEP RECORD OF STEP IN IA
C----     IN CASE VIS ONLY WAS THE ANTECEDENT
      IF (IBEH .EQ. 2 .AND. INONE .GT. 0 .AND. IA .EQ. 0) IA = I
```

```
            IBRK = 1
C----   CHECK FOR NEXT STEP
     30 CONTINUE
C----   COMPLETED LOOP W/OUT FINDING VALID A/C--SO NOW WORKING W/ VIS
C----      ONLY, NONE, OR A BEHAVIOR THAT CONTINUED FROM ANTECEDENT
C----   SET STEP TO 0
        I = 0
C----   IF NO BREAK WHEN REACHED HERE, THEN ANTECEDENT CONTINUED FOR
C----   DURATION OF CONSEQUENT SEARCH (ONLY ONE THAT DIDN'T HIT IBRK=1)
C----     SO GO TO 50 W/ 0 LATENCY (I=0) AND CONSEQUENT=ANTECEDENT)
        IF (IBRK) 50,50,35
C----   IF THERE WAS A BREAK--THEN WENT THRU LOOP W/ VIS,NONE, OR BOTH
     35 IBRK = 0
C----   IF IVIS >0, VISUAL TAKES PRECEDENCE OVER NONE , AND CODE = 2 VIS
C----   SET A OR C = VIS CODE AND LATENCY = TIME 1ST HIT VISUAL
        IF (IVIS) 45,45,40
     40 IBEH = 2
        I = IVIS
C----   (FOR CONSEQUENT ONLY)  IF VISUAL WAS LAST CODE ENTERED BEFORE
C----     ONSET (IZ=2), EVEN IF NOT LISTED AS ANTECEDENT, AND A NONE
C----   BROKE UP THE VISUAL CONSEQUENT STREAM, THEN USE 2ND VISUAL ONSET
C----     IA AS LATENCY
        IF (IA .GT. 0 .AND. IZ .EQ. 2) I = IA
C----   IF VISUAL BEFORE OR AFTER > 1 THEN THERE WAS A BREAK, RESET IBRK
        IF (IVIS .GT. 1) IBRK = 1
C----   USE INFORMATION JUST COLLECTED AS A OR C
        GO TO 50
C----   IF NO VISUAL W/OUT BREAK FROM ANTECEDENT, OR NO VIS AT ALL THEN
C----   USE NONE
     45 I = INONE
C----   SET ANT/CONSEQ (L) = BEHAVIOR PATTERN FOUND  AND SET LATENCY = I
     50 IANT(L) = IBEH
C----   SET LATENCY OF A OR C = ABSOLUTE STEP VALUE I
        IANTL(L) = I
C----   RESET K TO ORIGINAL TIME
        K = N
C----   SET ISTEP = -1 TO MOVE FORWARD IN MATRIX (K=K-(-ISTEP))
        ISTEP = -1
C----   IF ON ANTECEDENT (L=1) AND IF THERE WAS A VIS OR NONE BREAK
C----     GETTING A VALID PATTERN--SET IZ=BEHAV.JUST PRECEEDING ONSET
        IF (L .EQ. 1 .AND. IBRK .EQ. 1) IZ = IMAT(JJ,N-1)
C----   IF  IZ > 10, M-OUT SO SUBTRACT 10 TO GET CORRECT CODE
        IF (IZ .GT. 10) IZ = IZ - 10
     60 CONTINUE
C----   END OF A C SEARCH FOR THAT ONSET
C----   MM IS INDEX INTO M OR I LEVEL OF THE ARRAY (1ST 6 "MATRICES"
        MM = IPAT
C----     FOR MOTHER-- IF ON INFANT GET TO 2ND LEVEL
        IF (J .EQ. 2) MM = MM + 6
C----   SET UP FOR CONTINUE COLUMN IF CONSEQUENT = ANTECEDENT (0 LATENCY)
        IF (IANTL(2) .EQ. 0) IANT(2) = 0
C----   IMI GETS ACCESS INTO PROPER M OR I X PATTERN ONSET "MATRIX"
        IMI = (MM - 1) * NAC
C----   ADD 1 TO ROW AND COL. TO ALLOW FOR CONTINUE COL. AND M-OUT ROW
        JROW(1) = IANT(1) + 1
        ICOL(1) = IANT(2) + 1
```

```
      IL = 0
C----  L=1 FOR PARTICULAR A/C CELL, 2 FOR TOTALS
      DO 64 L = 1,2
C----  MACR  ACCESS TO ROW
      MACR = (UROW(L) - 1) * NC
C----  64 LOOP--ROW X COL CELL, ROW X COL TOT, ROW TOT X COL, ROW TOT X
C----     COL TOT
      DO 64 LL = 1,2
      IL = IL + 1
C----  IML ACCESS TO COLUMN
      IML(IL) = MACR + ICOL(LL)
C----  WHICH CELL
      LIM = IMI + IML(IL)
C----  ADD INTO FREQUENCY "MATRIX"
      IMIAC(LIM) = IMIAC(LIM) + 1
C----  ADD LATENCY OF CONSEQUENT INTO LATENCY "MATRIX"
   64 LMIAC(LIM) = LMIAC(LIM) + IANTL(2)
C----  IF M-OUT-- ADD INTO M-OUT ROW
      IF (IPROX) 66,66,62
   62 DO 63 LL = 1,2
C----  USE JUST COLUMN, WILL ALWAYS BE 1ST ROW OF "MATRIX"
      LIM = ICOL(LL) + IMI
      IMIAC(LIM) = IMIAC(LIM) + 1
   63 LMIAC(LIM) = LMIAC(LIM) + IANTL(2)
C----  CHECK IF ONSET WAS ALSO A CATEGORY ONSET (VOC FOR M & I, + CRY-I
   66 GO TO (120,121), J
C----  IF CATEGORY WAS ALREADY PRESENT--IGNORE, IF NOT SET CAT ONSET =1
C----     AND FILL IN "MATRIX"
  121 IF (ICRY) 120,120,128
  120 IF (KPAT(J)) 65,65,78
   65 KPAT(J) = 1
      GO TO 68
C----  IF PREVIOUS BEHAVIOR WAS NOT A CRY, THEN SET TO CRY ONSET
  128 IF (ICRY1) 125,125,78
  125 ICRY1 = 1
C----  MM=6-LEVEL OF ARRAY FOR VOCAL CAT ONSET FOR MOTHER
   68 MM = 6
C----  IF INFANT, 13 = LEVEL FOR VOC ONSET, IF WAS CRY ICRY = 1 SO GET
C----     TO 14TH MATRIX
      IF (J .EQ. 2) MM = 13 + ICRY
C----  IMI = ACCESS TO PROPER "MATRIX"
      IMI = (MM - 1) * NAC
      DO 75 LL = 1,4
C----  USE ROW AND COL. CALCULATIONS FROM LOOP 64
      LIM = IML(LL) + IMI
      IMIAC(LIM) = IMIAC(LIM) + 1
   75 LMIAC(LIM) = LMIAC(LIM) + IANTL(2)
      IF (IPROX) 78,78,76
C----  SAME AS DO 63 LOOP
   76 DO 77 LL = 1,2
      LIM = ICOL(LL) + IMI
      IMIAC(LIM) = IMIAC(LIM) + 1
   77 LMIAC(LIM) = LMIAC(LIM) + IANTL(2)
C----
C----  SET UP ANALYSIS BY CATEGORY CHART
C---- BLANK OUT CHART
```

```
      78 DO 889 LL = 1,11
     889 ICHART(LL) = I0
         DO 82 LL = 1,2
C----- IF CONSEQUENT WAS A CONTINUATION SET CONT. COL. ICHART(6) = "X"
         IF (IANT(LL) .EQ. 0) GO TO 881
C----- DO FOR 1-5 (ANTECEDENTS) AND FOR 7-11 (CONSEQUENTS)
         MM = (LL - 1) * 6
C----- FIND ALL CATEGORIES MATCHING THAT BEHAVIOR PATTERN AND SET PLACE
C----- IN CHART = "X"
         DO 82 JJ = 1,NCAT
         MM = MM + 1
C----- INDEX INTO CATEGORY ROW
         ML = (JJ - 1) * NCAT8
C----- CHECK EACH "ROW" FOR PRESENCE OF THAT BEHAVIOR
         DO 80 II = 1,NCAT8
         ML = ML + 1
         IF (IANT(LL) - ICAT(JJ,ML)) 80,81,80
      80 CONTINUE
         GO TO 82
      81 ICHART(MM) = IX
      82 CONTINUE
         GO TO 86
     881 ICHART(6) = IX
C----- INCREMENT RECORD NUMBER IN APPROPRIATE FILE
      86 NUM(J) = NUM(J) + 1
         IF (IZ) 903,903,900
C----- IF NONE OR VISUAL ONLY WAS THE CONSEQUENT THAT CONTINUED
C----- THROUGHOUT THE SEARCH--BUT WAS ALSO THE BEHAVIOR THAT WAS
C----- PASSED OVER BEFORE REACHING A VALID ANTECEDENT THEN SET IT ALSO
C----- IN THE CONTINUE COLUMN AND SET THE LATENCY TO 0
     900 IF (IZ .EQ. IANT(2) .AND. IANTL(2) .EQ.1) GO TO 901
         GO TO 903
     901 ICHART(6) = IX
         IANTL(2) = 0
     903 CONTINUE
         M = NUM(J)
C----- WRITE ANT. LATENCY, CHART OF ANT. CATEGORIES(ICHART1-5), THE VOC
C----- ONSET PATTERN, CHAT OF CONSEQUENT CATEGORIES(INCL. CONTINUE),
C----- THE CONSEQUENT LATENCY, M-PROXIMITY CODE (0=IN, 1=OUT), AND THE
C----- A/CPATTERNS ONTO DISK FILE J
         WRITE(J'M)IANTL(1),(ICHART(MM),MM=1,5),IVOC(J,IPAT),(ICHART(MM),
        1MM=6,11),IANTL(2),IPROX,IANT
C----- DO SAME FOR INFANT
      90 CONTINUE
         GO TO 100
C----- THERE WAS A BREAK SO WIPE OUT PRESENCE OF VOC & CRY PATTERNS
C----- AND CATEGORIES
      99 DO 98 J = 1,2
         JPAT(J) = 66
      98 KPAT(J) = 0
         ICRY1 = 0
C----- GO TO NEXT SECOND
     100 CONTINUE
         RETURN
         END
```


OPTIONS =/ON,/CK,/OP:2

```
IAC        1394    (005344)*
.FREE.     8074    (037424)

**COMPILER ----- CORE**
   PHASE          USED  FREE
DECLARATIVES     00622 13678
EXECUTABLES      01451 12849
ASSEMBLY         01832 17108
```

```
0001          SUBROUTINE WR2(DYAD,ACTOR,TYPE,OBJ,ICAT,OUT,TOT,MVOC,CT,NUM,OUG1,
             1OUG2)
      C-----  SUBROUTINE WR2 PRINTS OUT FREQUENCIES AND AVERAGE LATENCIES
      C-----    FOR VOCAL (AND CRY) ONSETS BY MOTHER AND INFANT  BY PATTERN
      C-----    AND BY CATEGORY; AND CALCULATES PROPORTIONS, ETC.
0002          COMMON IPAGE,LINES,N16,N46,ICOL,IKCOL,KKCOL,NCAT,NCAT8,KPAT(2),
             1 JPAT(2),JTRAN(7,7),ITRAN(7,7),LTRAN(7,7),PNAME(2,40),CNAME(2,20),
             2 DNAME(60),KFREQ(15),KDUR(15),IMAT(2,500),IFREQ(2,500),IDUR(2,500)
             3 ,JFREQ(2,240),IMIAC(2016),LMIAC(2016),LAST(12)
0003          DIMENSION DYAD(2),ACTOR(4),TYPE(4),ICAT(2,40),OUT(4),TOT(4),CT(2),
             1 OBJ(9),MVOC(2,6),NUM(2),IMATH(1000),NFREQ(1000),XNUM(16)
0004          EQUIVALENCE (IMATH(1),IMAT(1,1)),(IFREQ(1,1),NFREQ(1))
0005          ISUM(IA,JA,KB) = (IB-1) * JA + KB
      C-----  NCATR 5 CATEGORIES, 1 M-OUT, 1 TOTAL
0006          NCATR = 7
      C-----  NCATC  5 CATEGORIES 1 CONTINUE, 1 TOTAL
0007          NCATC = 7
      C-----  NRC FOR INDEXING INTO ARRAY LEVEL
0008          NRC = NCATR * NCATC
      C-----  ICAT'S UP TO TOTAL ROW OR COLUMN
0009          ICATC = NCATC - 1
0010          ICATR = NCATR - 1
      C-----  NR, NC, SAME AS NCAT'S BUT 10 PATTERNS
0011          NR = 12
0012          NC = 12
0013          NRC = NR * NC
      C-----  NL 6 LEVELS FOR MOTHER (5 VOC. PATTERN, 1 CATEGORY ONSET)
0014          NL = 6
      C-----  NLRC INDEX INTO SUPRA-LEVEL (MOTHER OR INFANT)
0015          NLRC = NL * NRC
      C-----  NPAT- MOTHER 5 PATTERNS
0016          NPAT = 5
      C-----  I1 START W/ 1ST PATTERN
0017          I1 = 1
      C-----  IJL FOR INDEX INTO NAMES OF OTHER MEMBER OF THE DYAD (HERE
      C-----    FOR INFANT NAMES BECAUSE STARTING W/ MOTHER ONSETS)
0018          IJL = 2
      C-----  DO FOR MOTHER AND INFANT
0019          DO 700 I = 1,2
      C-----  IF INFANT ONSETS IJL = 1 FOR INDEX INTO MOTHER NAMES
0020          IF (I .EQ. 2) IJL = 1
      C-----  0 OUT ARRAY TEMPORARILY USED FOR HOLDING SUMS
0021          IJ = NRC * 4
0022          DO 501 JJ = 1,IJ
0023      501 IMATH(JJ) = 0
      C-----  INDEX INTO MOTHER OR INFANT LEVEL TO BEGIN ON
0024          IRO = ISUM(I,NLRC,0)
      C-----  INDEX INTO ACTOR ARRAY
0025          IS = ISUM(I,2,1)
0026          IS1 = IS + 1
      C-----  INFANT HAS 6 ONSET PATTERNS (4 VOC., 2 CRY)
0027          IF (I .EQ. 2) NPAT = 6
      C-----  I2 M. HAS 5 PATTERNS + 1 CAT.; I. HAS 6 PATTERNS + 2 CAT.
0028          I2 = NPAT + I
      C-----  DO FOR REGULAR PATTERN AND CATEGORY ONSETS, THEN FOR SUMS --- DO
```

```
            DO 609 JO = 1,2
      C----  FILL IN NAMES, LEAVING OUT 1ST ONE
            IJ = 4
            DO 505 JJ = 1,40
            IJ = IJ + 1
        505 UNAME(IJ) = PNAME(IJL,JJ)
            DO 506 JJ = 1,4
      C----  PUT 'M-OUT' AS 1ST NAME
            UNAME(JJ) = OUT(JJ)
      C----  PUT 'TOTAL' AS LAST NAME
        506 UNAME(JJ+44) = TOT(JJ)
      C----  DO ANALYSES BY PATTERNS, THEN BY CATEGORIES ---- JT
        510 DO 650 JT = 1,2
      C----  INDEX INTO TYPE ARRAY (PATTERN, CATEGORY)
            IT = ISUM(JT,2,1)
            IT1 = IT + 1
      C----  DO FOR EACH PATTERN OR CATEGORY ONSET      ---- IJ
            DO 600 IJ = 11,12
      C----  1ST SET IR & IC TO PATTERN ROW & COL VALUES
            IR = NR
            IC = NC
            IRC = IR * IC
      C----  GET INDEX INTO M. OR I. SUPRA-LEVEL
            IRO = ISUM(1,NLEC,0)
      C----  IF WORKING ON SUMS (JO=2)--ALWAYS USE 1ST LEVEL
            IF (JO .EQ. 2) IRO = 0
      C----  INDEX INTO WHICH PATTERN OR CAT. ONSET ON WHICH M. OR I. LEVEL
            IRCI = ISUM(IJ,IRC,IRO)
      C----  CHECK FOR WORKING ON ANALYSIS BY PATTERN OR BY CATEGORY
            GO TO (925,565), JT
      C----  IF ON CATEGORY (JT=2) BEGIN CONVERSION
      C----  0 OUT NFREQ (1ST PART HOLDS FREQ., 2ND HOLD LATENCIES FOR CAT.)
        565 L = NRC * 2
            DO 566 JJ = 1,L
        566 NFREQ(JJ) = 0
      C----  COLLAPSE ROW AND COLUMN PATTERNS INTO ROW AND COLUMN CATEGORIES
      C----     (LEAVING OUT 1ST ROW(M-OUT) AND 1ST COL.(CONTINUE))
            DO 595 L = 1,10
            DO 595 IBEH = 1,NCAT
            IQ = ISUM(IBEH,NCAT8,0)
            DO 570 JJ = 1,NCAT8
            IQ = IQ + 1
            IF (L - ICAT(IJL,IQ)) 570,575,570
        570 CONTINUE
            GO TO 595
        575 DO 590 LL = 1,10
            DO 590 LBEH = 1,NCAT
            IQ = ISUM(LBEH,NCAT8,0)
            DO 580 JJ = 1,NCAT8
            IQ = IQ + 1
            IF (LL - ICAT(IJL,IQ)) 580,585,580
        580 CONTINUE
            GO TO 590
      C----  NN = INDEX INTO CELL FOR CATEGORY (+1 TO PASS M-OUT & CNT)
        585 NN = ISUM(IBEH+1,NCATC,LBEH+1)
      C----  INDEX INTO CELL FOR PATTERN (AGAIN +1)      ML
```

```
          ML = ISUM(L+1,NC,LL+1) + IRCT
C-----    ADD FREQUENCIES INTO 1ST LEVEL OF NFREQ
          NFREQ(MM) = NFREQ(MM) + IMIAC(ML)
C-----    ADD LATENCIES INTO 2ND LEVEL OF NFREQ
          NFREQ(MM+MRC) = NFREQ(MM+MRC) + LMIAC(ML)
    590   CONTINUE
    595   CONTINUE
C-----    SUMS FOR CONTINUE AND M-OUT COLUMN AND ROW
          DO 1001 LL = 1,10
          DO 1001 LBEH = 1,NCAT
          IQ = ISUM(LBEH,NCATB,0)
          DO 1000 JJ = 1,NCATB
          IQ = IQ + 1
          IF (LL - ICAT(IJL,IQ)) 1000,1005,1000
   1000   CONTINUE
          GO TO 1001
C-----    M-OUT ROW
   1005   ML = ISUM(LL+1,NC,1) + IRCT
          MM = ISUM(LBEH+1,NCATC,1)
          NFREQ(MM) = NFREQ(MM) + IMIAC(ML)
          NFREQ(MM+MRC) = NFREQ(MM+MRC) + LMIAC(ML)
C-----    CONTINUE COLUMN
          ML = ISUM(1,NC,LL+1) + IRCT
          MM = ISUM(1,NCATC,LBEH + 1)
          NFREQ(MM) = NFREQ(MM) + IMIAC(ML)
          NFREQ(MM+MRC) = NFREQ(MM+MRC) + LMIAC(ML)
   1001   CONTINUE
C-----    M-OUT X CONTINUE CELL
          ML = IRCT + 1
          MM = 1
          NFREQ(MM) = NFREQ(MM) + IMIAC(ML)
          NFREQ(MM+MRC) = NFREQ(MM+MRC) + LMIAC(ML)
C-----    COLUMN TOTALS
          DO 610 I13 = 1,ICATR
          IN = ISUM(I13,NCATC,NCATR)
          IN1 = IN - NCATC
          DO 610 I10 = 1,ICATC
          IN1 = IN1 + 1
          NFREQ(IN+MRC) = NFREQ(IN+MRC) + NFREQ(IN1+MRC)
    610   NFREQ(IN) = NFREQ(IN) + NFREQ(IN1)
C-----    ROW TOTALS (LEAVING OUT 1ST ROW-- M-OUT)
          DO 620 I13 = 1,NCATC
          IN = ISUM(NCATR,NCATC,I13)
          IN1 = I13
          DO 620 I9 = 2,ICATR
          IN1 = IN1 + NCATC
          NFREQ(IN+MRC) = NFREQ(IN+MRC) + NFREQ(IN1+MRC)
    620   NFREQ(IN) = NFREQ(IN) + NFREQ(IN1)
C-----    SET ROWS AND COL. INDICATORS IR, IC, AND IRC FOR CATEGORIES
          IR = NCATR
          IC = NCATC
C-----    SET TO 1ST ARRAY LEVEL ( AS EACH CAT. COMPUTED, IT'S FORCED
C-----       INTO 1ST "MATRIX" FOR PRINTING
          IRO = 0
          IRC = IR * IC
          IRCT = 0
```

```
          DO 658 LL = 1,NRC
          INIAC(LL) = NFREQ(LL)
      658 LMIAC(LL) = NFREQ(LL+NRC)
C----     CHECKING FOR REG. PATTERNS & CAT.  OR SUMS ----- JO
      925 GO TO (515,527), JO
C----     ON SUMS    ... IF ON INFANT, AND IJ WILL BE CRY SUMS
      527 IF (I .EQ. 2 .AND. IJ .GT. 1) GO TO 528
C----     INDEX TO "VOCAL"
          NA = ISUM(1,4,1)
          GO TO 529
C----     INDEX TO "CRY"
      528 NA = ISUM(9,4,1)
C----     END OF SUMS NAME INDEX
      529 NB = NA + 3
C----     INDEX INTO WHICH INITIAL HEADING
          IP = 0
C----     OUG2 = "SUMS"
          OUG = OUG2
C----     INDEX TO TYPE ARRAY FOR PATTERN VS CATEGORY ONSET
          IY = ISUM(1,2,1)
          IY1 = IY + 1
C----     SKIP OVER TO 530 (FOLLOWING FOR JO = 1)
          GO TO 530
C----     HERE FOR JO = 1  IJ DOING REGULAR PATTERN OR CAT ONSETS
C----     IF IJ>NPAT THEN IT'S A CATEGORY ONSET  (IJ LOOP FOR ONSETS)
      515 IF (IJ - NPAT) 516,516,517
C----     IIII CATEGORY ONSET
C----     INDEX INTO HEADING ("CATEGORY" ONSET
      517 IP = 1
C----     INDEX INTO TYPE ARRAY SO "CATEGORY" ONSET
          IY = ISUM(2,2,1)
          IY1 = IY + 1
C----     CHECKING ON INFANT - WHETHER VOCAL OR CRY CATEGORY
C----         IF VOC-IJ=NPAT+1,  IF CRY-IJ=NPAT+2
C----     MOTHER ALWAYS VOCAL CAT ONSET
          IF ( I .EQ. 2 .AND. IJ .GT. NPAT + 1) GO TO 998
C----     VOCAL INDEX FROM NAMES
          NA = ISUM(1,4,1)
          GO TO 997
C----     CRY INDEX FROM NAMES
      998 NA = ISUM(4,4,1)
      997 NB = NA + 3
C----     SKIP TO 530 (FOLLOWING IS REG. PATTERN ONSET)
          GO TO 530
C----     IIII PATTERN ONSET
C----     INDEX  INTO TYPE ARRAY ("PATTERN")
      516 IY = ISUM(1,2,1)
          IY1 = IY + 1
C----     INDEX TO HEADING -- PATTERN ONSET
          IP = 0
C----     OUG1 = "     " (BLANK- WILL NOT PRINT "SUMS")
          OUG = OUG1
C----     INDEX INTO NAME OF PATTERN ONSET
          IE = NVOC(I,IJ)
          NA = ISUM(IE,4,1)
          NB = NA + 3
```

```
C----  IJ PREPARE INDEX INTO SUMMING ARRAY
C----  IA AND IB ARE INDEXES INTO THE TEMPORARY ARRAY TO HOLD SUMS
C----    OVER PATTERN (IMTD ARRAY IMATR)
C----  CHECKING TO DIVIDE INTO VOCAL AND CRY FOR INFANT, MOTHER ALWAYS
C----       VOCAL
      GO TO (525,520), I
  520 IF (IJ .LE. 4) GO TO 525
C----  IJ >4 IT IS A CRY PATTERN SO SKIP INTO 2ND SECTION OF TEMP.
C----    IMAT ARRAY
C----    IMATN ARRAY 2* NELEMENTS FOR FREQ., 3* FOR LATENCIES
      IA = 2 * INC
      IB = 3 * INC
      GO TO 530
C----  VOCAL PATTERN, INTO 1ST FOR FRQ., 2ND FOR LATENCIES
  525 IA = 0
      IB = INC
C----  GET TOTAL FREQ. FOR THE PARTICULAR M-I X ONSET "MATRIX"
  530 JSUM = INCT + INC
      JSUM = INIAC(JSUM)
      N3 = 3
C----  DO 3 ANALYSES ACCORDING TO FORMATS 533,535, AND 537
      DO 561 II = 1,N3
      IPAGE = IPAGE + 1
      IF (IP .NE. 0) GO TO 993
C----  PRINT HEADING FOR A PATTERN OR A SUMS ONSET
      WRITE(LINES,531) IPAGE,DYAD,(ACTOR(JJ),JJ=IS,IS1),OUC,(TYPE(JJ),
     1 JJ=IY,IY1),(PNAME(1,JJ),JJ=NA,NB),(TYPE(JJ),JJ=IT,IT1)
  531 FORMAT('1  PAGE',I4,'   DYAD NO. ',2A4//3X,2A4,': '  ,A4,'   '2A4,'
     1ONSET = '4A4//'    ANALYSIS BY '2A4)
      GO TO 989
C---- PRINT HEADING FOR A CATEGORY ONSET
  993 WRITE(LINES,991) IPAGE,DYAD,(ACTOR(JJ),JJ=IS,IS1),(TYPE(JJ),JJ=IY,
     1 IY1),(CNAME(I,JJ),JJ=NA,NB),(TYPE(JJ),JJ=IT,IT1)
  991 FORMAT('1  PAGE',I4,'   DYAD NO. ',2A4//3X,2A4,': ',2A4,' ONSET = '
     1 4A4//'    ANALYSIS BY ',2A4)
C----  PRINT ANALYSIS HEADING
  989 GO TO (532,534,536), II
  532 WRITE(LINES,533)
  533 FORMAT('   FREQUENCY')
      GO TO 538
  534 WRITE(LINES,535)
  535 FORMAT('   AVERAGE LATENCY')
      GO TO 538
  536 WRITE(LINES,537)
  537 FORMAT('   PROPORTION OF TOTAL FREQUENCY TO EACH ANTECEDENT')
C----  IC'S ARE FOR PRINTING LINE LENGTHS FOR PATTERN OR CATEGORY
  538 ICX = IC - 2
      ICY = IC - 1
      ICL = IC * 7 + 20
       ICZ = ICL - 21
C----  FINISH HEADING
      WRITE(LINES,539) (JJ,JJ=2,ICY)
  539 FORMAT(//32X,'CONSEQUENT'/23X,<ICZ>('-')/2X'ANTECEDENT',13X,
     1'CNT',<ICX>I7,4X,'TOT'/ 1X, <ICL>('-'))
C----  DO FOR THE NUMBER OF ROWS (12 FOR PATTERN, 7 FOR CATEGORY ANALY.
  954 DO 560 III = 1,IR
```

```
      C----   INDEX INTO BEHAVIOR NAME
              IO = ISUM(III,4,1)
              IO1 = IO + 3
      C----   JCOL = 1ST CELL OF ROW
              JCOL = ISUM(III,IC,IRCT) + 1
      C----   JCOL1 = LAST CELL OF ROW
              JCOL1 = JCOL + (IC - 1)
      C----   SPLIT ACCORDING TO ANALYSIS
              GO TO (540,545,550), II
      C----   PRINT FREQUENCY ROW
          540 WRITE(LINES,541) III,(DNAME(JJ),JJ=IO,IO1),(IMIAC(JJ),JJ=JCOL,
             1 JCOL1)
          541 FORMAT(I3,1X,4A4,1X,12I7)
      C----   IF DOING CATEGORY ONSET SKIP OVER PATTERN SUMMING SECTION
          953 IF (IP .NE. 0) GO TO 560
      C----   JO = 1 START COLLECTING SUMS (MAYBE-SEE NEXT IF); JO = 2 SKIP
              GO TO (508,560), JO
      C----   JT = 1 ANALYSIS BY PATTERN SO DO THE SUMMING, IF JT=2 SKIP (IT'S
      C----     ANALYZING BY CATEGORY)
          508 GO TO (542,560), JT
      C----   ADD INTO PATTERN SUMS FOR THAT ROW
          542 DO 543 JJ = JCOL,JCOL1
              IA = IA + 1
              IB = IB + 1
      C----   FREQUENCY
              IMATN(IA) = IMATN(IA) + IMIAC(JJ)
      C----   LATENCY
          543 IMATN(IB) = IMATN(IB) + LMIAC(JJ)
              GO TO 560
          545 JJ = 0
      C----   AVERAGE LATENCY-- DIVIDE   TOTAL LATENCIES BY FREQUENCY
              DO 546 J = JCOL,JCOL1
              JJ = JJ + 1
              XD = LMIAC(J)
          546 XDUM(JJ) = XD / IMIAC(J)
              WRITE(LINES,547) III,(DNAME(JJ),JJ=IO,IO1),(XDUM(JJ),JJ=1,IC)
          547 FORMAT(I3,1X,4A4,1X,12F7.1)
              GO TO 560
          550 J = 0
      C----   PROPORTIONS--DIVIDE EACH FREQ. BY ROW TOTAL
              L = JCOL1 - 1
              DO 551 JJ = JCOL,L
              J = J + 1
              XD = IMIAC(JJ)
          551 XDUM(J) = XD / IMIAC(JCOL1) * 100.
              XD = IMIAC(JCOL1)
      C----   DIVIDE ROW TOTAL BY "MATRIX" TOTAL
              XDUM(J+1) = XD / JSUM * 100.
              WRITE(LINES,547) III,(DNAME(JJ),JJ=IO,IO1),(XDUM(JJ),JJ=1,IC)
      C----   GO TO NEXT ROW
          560 CONTINUE
      C----   GO TO NEXT ANALYSIS
          561 WRITE(LINES,742)
          742 FORMAT(1X,<ICL>('-'))
          600 CONTINUE
      C----   CHECKING FOR PATTERN OR CAT ANALYSIS
```

```
          GO TO (556,650), JI
C----  IF IT WAS PATTERN--CHANGE NAMES TO CATEGORY NAMES
   556 LL = 4
       DO 554 JJ = 1,20
       LL = LL + 1
   554 DNAME(LL) = CNAME(IJL,JJ)
C----  CHANGE LAST NAME TO "TOTAL"
       DO 558 LL = 1,4
   558 DNAME(LL+24) = TOT(LL)
   650 CONTINUE
       GO TO (640,639), JO
C----  IF JO=1, HAVE JUST FINISHED REG PAT. AND CAT., SWITCH MATRICES
C----    TO SEND SUMS THROUGH THE LOOP
C----  CHECK IF ON MOTHER(I=1) OR INFANT(I=2)
   640 IF (I - 2) 652,651,651
C----  IF ON INFANT, NEED TO DO TWICE (FOR VOC & CRY)
   651 I2 = 2
       GO TO 653
C----  IF ON MOTHER--JUST ONCE FOR VOCAL
   652 I2 = 1
   653 IEND = NRC
       DO 654 LL = 1,I2
C----  REFILL MATRICES W/SUMS (VOCAL SUMS USE 1ST LEVEL--2 "MATRICES";
C----    CRY SUMS USE 2ND LEVEL
       JJ = ISUM(LL,2*NRC,0)
       JM = ISUM(LL,NRC,0)
       DO 654 LK = 1,IEND
       JJ = JJ + 1
       JM = JM + 1
C----  JJ'S FOR FREQUENCIES, JJ+NRC'S FOR LATENCIES
       LMTAC(JM) = IMATH(JJ)
   654 LMTAC(JM) = IMATH(JJ+NRC)
   639 CONTINUE
   700 CONTINUE
       RETURN
       END

OPTIONS =/ON,/CK,/OP:2

BLOCK       LENGTH
NR2     2797    (012732)*
.$$$$.  8074    (037424)

**COMPILER ----- CORE**
  PHASE          USED   FREE
DECLARATIVES    00622  13676
EXECUTABLES     01873  12427
ASSEMBLY        02564  16376
```

```
0001          SUBROUTINE WR3(DYAD,ACTOR,TYPE,OBJ,ICAT,OUT,TOT,MVOC,CT,NUM,OUG1,
             1OUG2)
        C----  SUBROUTINE WR3 CALCULATES AND PRINTS THE DISTRIBUTION OF
        C----    LATENCIES FOR EACH VOCAL OR CRY PATTERN ONSET (CATEGORY ONSETS
        C----    ARE LOST BECAUSE THE FILE DOES NOT CONTAIN THAT INFORMATION
        C----    IT READS EACH ONSET FROM A DISK FILE, COMPILES THE "MATRICES"
        C----     (ACTUALLY IT'S A STRONG OUT ARRAY) ; PRINTS FREQUENCIES,
        C----     PROPORTIONS, MEANS AND SD'S, AND GIVES SUMMARY MATRICES
        C----        PATTERN ONSETS .... DOES THIS FOR MOTHER AND INFANT
        C----    PERFORMS ANALYSIS BY PATTERN AND BY CATEGORY
        C----    CALCULATES ONLY ACCORDING TO CONSEQUENT AND OMITS M-OUT ONSETS
0002          COMMON IPAGE,LINES,N16,N48,ICOL,IKCOL,PKCOL,NCAT,NCAT8,KPAT(2),
             1 JPAT(2),JTRAN(7,7),ITRAN(7,7),LTRAN(7,7),PNAME(2,40),CNAME(2,20),
             2 DNAME(60),KFREQ(15),KDUR(15),IMAT(2,500),IFREQ(2,500),IDUR(2,500)
             3 ,JFREQ(2,240),IMIAC(2016),LMIAC(2016),LAST(12)
0003          DIMENSION DYAD(2),ACTOR(4),TYPE(4),ICAT(2,40),OUT(4),TOT(4),CT(2),
             1 OBJ(9),MVOC(2,6),NUM(2),IMATN(1056),NFREQ(1000),XDUM(16)
0004          DIMENSION AM(2), SM(2)
0005          EQUIVALENCE (IMATN(1),LMIAC(1)),(IFREQ(1,1),NFREQ(1))
0006          DATA AM, SM/'MEAN','    ','  SD','    '/
0007          ISUM(I8,J8,K8) = (I8-1) * J8 + K8
        C----  NR       = 11 ROWS (10 CONSEQUENT PATTERNS + 1 TOTAL)
0008          NR = 11
        C----  NCATR  6 ROWS (5 CATEGORIES + 1 TOTAL)
0009          NCATR = 6
        C----  12 COLUMNS (LATENCIES 0-10 + 1 TOTAL)
0010          NC = 12
0011          NRC = NR * NC
        C----    MOTHER HAS 5 VOCAL ONSET PATTERNS
0012          NPAT = 5
        C----  JL USED FOR INDEX INTO PATTERN OR CATEGORY NAMES OF OTHER MEMBER
        C----    OF THE PAIR
0013          JL = 2
        C----  DO FOR MOTHER AND INFANT
0014          DO 3300 J = 1,2
        C----  IF ON INFANT JL TO INDEX MOTHER NAMES
0015          IF (J .EQ. 2) JL = 1
        C----  0 OUT TEMPORARY ARRAY FOR HOLDING UP TO 8 "MATRICES"
0016          DO 3005 M = 1,1056
0017     3005 IMATN(M) = 0
0018          IPAGE = IPAGE + 1
        C----  INDEX INTO ACTOR ARRAY (MOTHER OR INFANT)
0019          IS = ISUM(J,2,1)
0020          IS1 = IS + 1
        C----  PRINT HEADING-- CT(1) = TODAY(FOR MOTHER), (2) = CRY (INFANT)
0021          WRITE(LINES,3006)IPAGE,DYAD (ACTOR(M),M=IS,IS1) ,CT(JL), CT(JL)
0022     3006 FORMAT('1  PAGE',I4,'  DYAD NO. ',2A4/3X,2A4,': LISTING OF VOCAL O
             1NSETS', ' (IF PROX = 1, MOTHER WAS OUT OF ROOM AT ONSET)'//
             215X,'ANTECEDENT',31X,'CONSEQUENT'/4X,32('-'),11X,39('-')/4X,'LATEN
             3CY'2X,'VOC',2X,'VIS'2X,'SMI'1X,A4,1X'NONE'3X'ONSET',5X,'CNT'2X,'VO
             4C'2X,'VIS',2X,'SMI',1X,A4,1X,'NONE'2X,'LATENCY',2X,'PROX'3X,'A-C')
0023          WRITE(LINES,3007)
0024     3007 FORMAT(4X,95('-'))
        C----  N = NUMBER OF RECORDS IN M. OR I. FILE
0025          N = NUM(J)
```

```
C----  DO FOR EACH RECORD
       DO 3020 N = 1,N
C----  READ ANT. LATENCY, ANTECEDENT CATEGORY CHART(SEE SUB IAC),
C----    ONSET PATTERN-KON, CONSEQUENT CATEGORY CHART, CONSEQ. LATENCY,
C----    M-IN -IP=0, OR OUT -IP=1, AND ANT. AND CONSEQ. PATTERN
       READ(J,N)L1,(LAST(I),I=1,5),KON,(LAST(I),I=6,11),L2,IP,(JPAT(I),
      1 I=1,2)
C----  PRINT THIS INFORMATION
       WRITE(LINES,3008)L1,(LAST(I),I=1,5),KON ,(LAST(I),I=6,11),L2,IP,
      1 (JPAT(I),I=1,2)
 3008  FORMAT(9X,I2,5(4X,A1)4X,I2,5X,6(4X,A1),7X,I2,5X,I1,2XI2,'-',I2)
C----  IF MOTHER OUT (IP=1) DO NOT INCLUDE IN COMPUTATION
       IF (IP .EQ. 1) GO TO 3020
C----  I1 = CONSEQUENT, IF=0-BEHAV. CONTINUED--SO USE ANTECEDENT
       I1 = JPAT(2)
       IF (I1 .EQ. 0) I1 = JPAT(1)
C----  INDEX INTO ARRAY LEVEL FOR THIS PATTERN ONSET "MATRIX"
C----    TAKE PATTERN NUMBER AND MAKE IT 1-6
       DO 3015 I = 1,6
       IF(KON - NVOC(J,I)) 3010,3015,3010
 3010  CONTINUE
C----  USING I INDEX, GET INTO PROPER LEVEL = KON
 3015  KON = ISUM(I,NRC,0)
C----  MAT=INDEX INTO CONSEQ. X LATENCY CELL (ADD 1 SO 0-10 = 1-11 INTO
C----    INDEX
       MAT = KON + ISUM(I1,NC,L2+1)
C----  ADD FREQUENCY
       IMATN(MAT) = IMATN(MAT) + 1
C----  ROW TOTAL INDEX AND ADD INTO ROW TOTAL FREQ. CELL
       MAT = KON + ISUM(I1,NC,NC)
       IMATN(MAT) = IMATN(MAT) + 1
C----  GET NEXT RECORD
 3020  CONTINUE
       WRITE(LINES,3007)
       I1 = 1
C----  IF ON INFANT J=2-- INFANT HAS 6 PATTERNS
       IF (J .EQ. 2) NPAT = 6
C----  I2 FOR 3140 LOOP FOR THE NUMBER OF PATTERNS
       I2 = NPAT
C----  NLRC = LEVEL INTO SUMMING
       NLRC = ISUM(NPAT+1,NRC,0)
C----  DO FOR PATTERNS, THEN FOR SUMS ------  JO
       DO 3200 JO = 1,2
C----  PUT IN PATTERNS NAMES FOR THE OTHER MEMBER
       DO 3025 JJ = 1,40
 3025  DNAME(JJ) = PNAME(JL,JJ)
C----  LAST NAME = "TOTAL"
       DO 3289 JJ = 1,4
 3289  DNAME(JJ+40) = TOT(JJ)
C----  DO BY PATTERN, THEN BY CATEGORY ----  JT
       DO 3150 JT = 1,2
C----  INDEX INTO TYPE ARRAY (PATTERN OR CAT.)
       IT = ISUM(JT,2,1)
       IT1 = IT + 1
C----  DO BY NUMBER OF PATTERNS (5 OR 6), OR         SUMS (1 OR 2) FOR
C----    MOTHER AND INFANT, RESPECTIVELY ------      IJ
```

```
              DO 3140 IJ = I1,I2
C----         SET TO PATTERN -- IR,IC, AND MRC INDEX
              IR = NR
              IC = NC
              MRC = MRC
C----         CHECK JT FOR PATTERNS OR CATEGORY
              GO TO(3070,3030), JT
C----         IJJ CATEGORY ANALYSIS
C----         IRC INDEX INTO WHICH "MATRIX" TO CONVERT
         3030 IRC = ISUM(IJ,MRC,0)
C----         0 OUT TEMPORARY CATEGORY ARRAY
              DO 3031 K = 1,NRC
         3031 NFREQ(K) = 0
C----         CONVERT TO CATEGORIES
              DO 3060 MI = 1,10
C----         K1 INDEX INTO PATTERN CELL
              K1 = ISUM(MI,NC,IRC)
              DO 3060 JJ = 1,NCAT
C----         K2 INDEX INTO CATEGORY CELL (ALWAYS ON 1ST LEVEL)
              K2 = ISUM(JJ,NC,0)
              IL = ISUM(JJ,NCATB,0)
              DO 3035 K = 1,NCATB
              IL = IL + 1
              IF (MI - ICAT(JL,IL)) 3035,3040,3035
         3035 CONTINUE
              GO TO 3060
C----         WHEN MATCH FOUND - DO FOR ALL COLUMNS
         3040 DO 3045 K = 1,NC
         3045 NFREQ(K2+K) = NFREQ(K2+K) + IMATN(K1+K)
         3060 CONTINUE
C----         CHANGE NUMBER OF ROWS TO NUMBER OF CATEGORY ROWS
              IR = NCATR
              IRC = IR * IC
C----         PUT CATEGORY "MATRIX" IN 1ST PATTERN "MATRIX"
              DO 3065 K = 1,IRC
         3065 IMATN(K) = NFREQ(K)
C----         SINCE CATEGORY IS ON 1ST LEVEL, KEEP MRC = 0 (LEVEL INDEX INTO
C----            ARRAY)
              MRC = 0
C----         JR FOR ALL ROWS BUT TOTAL
         3070 JR = IR - 1
C----         GET INDEX INTO PROPER LEVEL OF ARRAY FOR "MATRIX"--- IRC
              IRC = ISUM(IJ,MRC,0)
C----         IF DOING SUMS (JO=2) AND ANALYSIS BY PATTERN (JT=1) SKIP COL.
C----            SUMMING SECTION
              IF (JO .EQ. 2 .AND. JT .EQ. 1) GO TO 3076
C----         COLUMN TOTALS
              DO 3075 I13 = 1,NC
              IN = IRC + ISUM(IR,NC,I13)
              IN1 = I13 - NC + IRC
              DO 3075 I9 = 1,JR
              IN1 = IN1 + NC
         3075 IMATN(IN) = IMATN(IN) + IMATN(IN1)
         3076 CONTINUE
C----         IF PATTERN ONSETS (JO=1) SKIP, IF SUMS (JO=2) GET CORRECT HEADING
              GO TO (3090,3080), JO
```

```
C----  INDEX FOR SUMS NAME WILL COME FROM THE PNAME MATRIX
C----  IF ON INFANT(IJ=2) HEADING IS "CRY", ELSE HEADING IS "VOCAL"
 3090 IF(J .EQ. 2 .AND. IJ .GT. 1) GO TO 3085
C----  GET INDEX INTO VOCAL NAME
      NA = ISUM(1,4,1)
      GO TO 3086
C----  GET INDEX INTO CRY NAME
 3085 NA = ISUM(9,4,1)
C----  END OF NAME INDEX
 3086 NB = NA + 3
C----  OUG2="SUMS"
      OUG = OUG2
C----  SKIP PATTERNS SECTION AND GO TO PRINTING
      GO TO 3100
C----  JJJJ REGULAR PATTERN ONSET
C----  OUG1="    " I.E., NOTHING WILL BE PRINTED INSTEAD OF "SUMS"
 3090 OUG = OUG1
C----  INDEX INTO NAME OF PATTERN ONSET
      IE = MVOC(J,IJ)
      NA = ISUM(IE,4,1)
      NB = NA + 3
C----  IA = INDEX INTO LEVEL OF ARRAY FOR SUMS (WILL BE LAST "MATRIX")
 3100 IA = NPAT * MRC
C----  IF PATTERN = INFANT(J=2) AND A CRY(IJ>4), SKIP 1ST SUMS
C----    MATRIX AND GO TO NEXT LEVEL (ADD MRC)
      IF (J .EQ. 2 .AND. IJ .GT. 4) IA = IA + MRC
C----  II DO ANALYSIS INDICATED BY FORMATS 3103, AND 3105
      DO 3130 II = 1,2
      IPAGE = IPAGE + 1
C----  PRINT INITIAL HEADING
      WRITE(LINES,1101) IPAGE,DYAD,(ACTOR(JJ),JJ=IS,IS1),OUG,
     1 (PNAME(J,JJ),JJ=NA,NB),(TYPE(JJ),JJ=II,IT1)
 1101 FORMAT('1  PAGE ',I4,'  DYAD NO. ',2A4//3X,2A4,': ',A4,' PATTERN ON
     1SET = ',4A4//'    ANALYSIS BY ',2A4)
C----  ICL = LENGTH OF LINE TO PRINT
      ICL = 101
      IF (II .EQ. 2) ICL = ICL - 13
C----  PRINT ANALYSIS HEADING
      GO TO (3102,3104), II
 3102 WRITE(LINES,3103)
 3103 FORMAT('  FREQUENCY DISTRIBUTION OF LATENCIES')
      GO TO 3106
 3104 WRITE(LINES,3105)
 3105 FORMAT('  PROPORTION OF FREQUENCY TO EACH CONSEQUENT')
C----  COMPLETE HEADING (AM, & SM USED TO PRINT "MEAN" AND "SD" FOR 1ST
C----     ANALYSIS (II=1)
 3106 WRITE(LINES,3107) (JJ,JJ=1,10),AM(II),SM(II)
 3107 FORMAT(//32X,'LATENCY'//17X,66('-')/2X'CONSEQUENT'10X,'0',10I6,3X'
     1TOT'5X,A4,2X,A4/1X,<ICL>('-'))
C----  JSUM = TOTAL FREQ. CELL, THEN CONTENTS OF THAT CELL FOR GIVEN
C----     "MATRIX"
      JSUM = IR * NC + IRC
      JSUM = IMATH(JSUM)
      AJA = JSUM
C----  III  DO FOR EACH ROW
      DO 3129 III = 1,IR
```

```
C----   INDEX INTO CELL OF BEHAVIOR CONSEQUENT
        IU = ISUM(III,4,1)
        IU1 = IU + 3
C----   JCOL = 1ST CELL OF ROW
        JCOL = ISUM(III,NC,IRC) + 1
C----   JCOL1 = LAST CELL OF ROW
        JCOL1 = JCOL + NC - 1
C----   MCOL = LAST CELL OF ROW (NOT INCLUDING TOTALS)
        MCOL = JCOL1 - 1
C----   IF ON 1ST ANALYSIS, GET MEAN AND SD INFO. (SD OF POPULATION)
        GO TO (3110,3120), II
C----   GET SUMS, AND SUM OF SQUARES
   3110 EX = 0
        EX2 = 0
C----   IMATN HOLDS THE FREQ. AND IZ IS THE SCORE
        IZ = 0
        DO 3115 JJ = JCOL,MCOL
        IF(IMATN(JJ) .EQ. 0) GO TO 3115
        EX = EX +  (IZ * IMATN(JJ))
        EX2 = EX2 + IMATN(JJ) * IZ * IZ
   3115 IZ = IZ + 1
        AN = IMATN(JCOL1)
C----   MEAN
        AMEAN = EX / AN
C----   SD OF POPULATION
        SD = ABS((EX2-AN*AMEAN**2)/(AN-1.))
        SD = SQRT(SD)
C----   PRINT ROW, MEAN, AND SD
        WRITE(LINES,116)(DNAME(JJ),JJ=IU,IU1),(IMATN(JJ),JJ=JCOL,JCOL1),
       1AMEAN,SD
    116 FORMAT(1X,4A4,12I6,F7.2,F6.2)
C----   IF PATTERN ONSETS (JO=1) & ANALYSIS BY PATTERN (JT=1)
C----      COLLECT SUMS
        GO TO (3117,3129), JO
   3117 GO TO (3118,3129), JT
C----   IN SUMMING OVER ALL COLUMNS IN THE ROW
   3118 DO 3119 JJ = JCOL,JCOL1
        IA = IA + 1
   3119 IMATN(IA) = IMATN(IA) + IMATN(JJ)
C----   GO TO NEXT ROW
        GO TO 3129
C----   ANALYSIS BY PROPORTIONS
C----   AN = ROW TOTAL
   3120 AN = IMATN(JCOL1)
        JA = 0
C----   PERCENT OF EACH COL. OF ROW TOTAL
        DO 3125 JJ = JCOL,MCOL
        JA = JA + 1
   3125 XDUM(JA) = IMATN(JJ) / AN * 100.
C----   ROW TOTAL DIVIDED BY "MATRIX" TOTAL *100
        XDUM(JA+1) = IMATN(JJ) / ANA * 100.
        WRITE(LINES,3136)(DNAME(JJ),JJ=IU,IU1),(XDUM(JJ),JJ=1,NC)
   3136 FORMAT(1X,4A4,12F6.1)
C----   GO TO NEXT ROW
   3129 CONTINUE
C----   GO TO NEXT ANALYSIS
```

```
      3130 WRITE (LINFS,3131)
      3131 FORMAT(1X,<ICL>('-'))
C----  GO TO NEXT ONSET
      3140 CONTINUE
C----  CHECK JT  IF = 1 PREPARE FOR SWITCH TO USE CATEGORIES
           GO TO (3132,3150), JT
C----  JJ CATEGORY ANALYSIS
C----  CONVERT TO CATEGORY NAMES
      3132 DO 3133 JJ = 1,20
      3133 DNAME(JJ) = CNAFE(JL,JJ)
C----  LAST ROW OF NAMES = "TOTAL"
           DO 1334 JJ = 1,4
      1334 DNAME(JJ+20) = TOT(JJ)
C----  GO TO CATEGORY ANALYSIS
      3150 CONTINUE
C----  IF JO = 1, HAVE JUST FINISHED PATTERN ONSETS, SO PREPARE FOR
C----     TO SUMS
           GO TO (3155,3200), JO
C----  CHECK IF ON MOTHER (J=1) OR INFANT (J=2)
      3155 IF(J - 2) 3157,3156,3156
C----  INFANT HAS 2 SUMS, SO CONVERT FOR TWO LEVELS (2*NRC), & DO IJ 2X
      3156 IEND = 2 * NRC
           I2 = 2
           GO TO 3158
C----  MOTHER ONLY HAS 1 SUM
      3157 IEND = NRC
           I2 = 1
C----  PUT SUMS (LAST LEVELS OF THE ARRAY) INTO THE 1ST LEVEL AND 2ND(IF
C----     INFANT-- FOR CRY SUMS)
      3158 DO 1159 LL = 1,IEND
      1159 IMATN(LL) = IMATN(LL+NLRC)
C----  GO TO SUMS
      3200 CONTINUE
C----  GO TO INFANT
      3300 CONTINUE
           RETURN
           END

ROUTINES CALLED:
ABS    , SQRT

OPTIONS =/ON,/CK,/OP:2

BLOCK        LENGTH
MR3       2497    (011602)*
..IST.    8074    (037424)

**COMPILER ----- CORE**
  PHASE        USED  FREE
DECLARATIVES  00622 13678
EXECUTABLES   01872 12428
ASSEMBLY      02528 16412
```

```
      SUBROUTINE WR4(LINES,I,IT,ADUM)
C----  SUBROUTINE WR4 PRINTS TRANSITION MATRICES, EITHER INTEGER OR REAL
C----    ACCORDING TO THE ARGUMENTS SENT BY WR5
C----  IT = INTEGER MATRIX
C----  ADUM = REAL MATRIX
C----  I INDICATES WHETER TO USE IT OR ADUM
C----
      DIMENSION IT(7,7),ADUM(7,7), AROW(2,3)
      DATA AROW/' -VO','CAL ',' -NO',' VOC',' -CR','Y   '/
C----  N7 = NUM. OF ROWS AND COLUMNS
      N7 = 5
C----  PRINT HEADING
      WRITE(LINES,1)
    1 FORMAT(/19X,'MOTHER VOCAL',4X,'MOTHER NO VOC'/16X,14('-'),3X,
     114('-')/1X'MOTHER  INFANT-',2('  VOCAL  NOVOC - '),'        TOTAL
     2 ')
      WRITE(LINES,2)
    2 FORMAT(1X,65('-'))
C----  IF I<3, THEN AN INTEGER MATRIX, IF >3 THEN REAL
      IF (I - 3) 4,4,30
    4 DO 15 J = 1,2
C----  WORK ON TWO ROWS AT A TIME-- 1ST VOC, 2ND NO VOC FOR MOTHER
      GO TO (5,7), J
    5 WRITE(LINES,6)
    6 FORMAT(' VOCAL')
      GO TO 9
    7 WRITE(LINES,8)
    8 FORMAT(' NO VOC')
C----  INDEX INTO WHICH 2 INFANT SUBROWS, VOC & NO VOC - UNDER M. ROW
    9 M = (J-1) * 2 + 1
      M1 = M + 1
C----  L INDEX TO INFANT "VOC" OR "NO VOC"-- IN MATRIX AROW
      L = 0
      DO 14 LL = M,M1
      L = L + 1
   14 WRITE(LINES,13)(AROW(K,L),K=1,2),(IT(LL,K),K=1,N7)
   13 FORMAT(7X,2A4,'-',2(2I7,' - '),I7)
   15 WRITE(LINES,87)
   87 FORMAT(7X,55('-'))
C----  PRINT TOTALS ROW
      WRITE(LINES,18) (IT(5,K),K=1,N7)
   18 FORMAT(' TOTAL',9X,'-',2(2I7,' - '),I7)
      WRITE(LINES,2)
      RETURN
C----  SAME AS ABOVE BUT FOR A REAL MATRIX
   30 DO 60 J = 1,2
      GO TO (31,32), J
   31 WRITE(LINES,6)
      GO TO 33
   32 WRITE(LINES,8)
   33 M = (J-1) * 2 + 1
      M1 = M + 1
      L = 0
      DO 64 LL = M,M1
      L = L + 1
```

```
      68 WRITE(LINES,69)(AROW(K,L),K=1,2),(ADUM(LL,K),K=1,N7)
      69 FORMAT(/X,2A4,'=',2(2F7.2,' - '),F7.2)
      50 WRITE(LINES,87)
         WRITE(LINES,59)(ADUM(F,K),F=1,N7)
      59 FORMAT(' TOTAL'9X,'-',2(2F7.2,' - '),F7.2)
         WRITE(LINES,2)
         RETURN
         END

OPTIONS =/ON,/CK,/OP:2

BLOCK         LENGTH
WR4      627     (002346)*

**COMPILER ----- CORE**
   PHASE        USED  FREE
DECLARATIVES  00622 13678
EXECUTABLES   00863 13437
ASSEMBLY      01371 17569
```

```
0001        SUBROUTINE WR5(DYAD,ADUM,NSTEP,SEXT,NS)
     C----   SUBROUTINE WR5 PREPARES THE TRANSITION MATRICES DERIVED FROM
     C----     SUBROUTINE MATS FOR PRINTING IN SUB. WR4. IT ALSO COLLAPSES
     C----     THE TRANSITION MATRIX OF PROBABILITIES (FROM ITRAN) INTO SEXT
     C----     AND WILL PRINT OUT SEXT WHEN ITRAN(1,1) = -1  (OVER ALL DYADS)
     C----
0002        COMMON IPAGE,LINES,N16,N48,ICOL,IKCOL,FKCOL,NCAT,NCAT8,KPAT(2),
           1 JPAT(2),JTRAN(7,7),ITRAN(7,7),LTRAN(7,7),PNAME(2,40),CNAME(2,20),
           2 DNAME(60),KFREQ(15),KDUR(15),IMAT(2,500),IFREQ(2,500),IDUR(2,500)
           3 ,JFREQ(2,240),IMIAC(2016),LMIAC(2016),LAST(12)
0003        DIMENSION DYAD(2),ADUM(7,7),SEXT(7,7)
     C----   K= NUM. OF ROWS, AND COLS, L = NUM. LEAVING OUT THE TOTALS
0004        K = 5
0005        L = K - 1
     C----   CHECK IF TO PRINT ONLY TRANS MAT.         SED OVER DYADS, IF SO
     C----     GO TO 220 TO CALCULATE AND PRINT
0006        IF(ITRAN(1,1) .EQ.-50) GO TO 220
     C----   FORCE DIAGONALS OF JTRAN(FREQ. OF REMAINING) = ITRAN(TRANS MAT)
0007        DO 4021 I = 1,K
0008   4021 JTRAN(I,I) = ITRAN(I,I)
     C----   ROW TOTALS
0009   6004 DO 4010 I = 1,L
0010        DO 4010 J = 1,L
0011        ITRAN(K,J) = ITRAN(K,J) + ITRAN(I,J)
0012        JTRAN(K,J) = JTRAN(K,J) + JTRAN(I,J)
0013   4010 LTRAN(K,J) = LTRAN(K,J) + LTRAN(I,J)
     C----   COLUMN TOTALS
0014        DO 4020 I = 1,K
0015        DO 4020 J = 1,L
0016        ITRAN(I,K) = ITRAN(I,K) + ITRAN(I,J)
0017        JTRAN(I,K) = JTRAN(I,K) + JTRAN(I,J)
0018   4020 LTRAN(I,K) = LTRAN(I,K) + LTRAN(I,J)
     C----   DO 5 ANALYSES, INDICATED BY FORMATS 4037, 4039, 4041, 4043, 4049
0019        DO 4050 M = 1,5
0020        IPAGE = IPAGE + 1
     C----   PRINT INITIAL HEADING
0021        WRITE(LINES,4025) IPAGE,DYAD,NSTEP,NSTEP
0022   4025 FORMAT('1  PAGE', I4,'  DYAD NO. ' 2A4//3X,'TRANSITION MATRIX OF V
           1OCAL STATES,',I3,'-SECOND STEPS (ROWS = N, COLS = N+',I2,')'/)
     C----   PRINT ANALYSIS HEADING
     C----              AND PRINT MATRIX THROUGH WR4, OR  COMPUTE AND THEN USE
     C----                     WR4
0023        GO TO (4036,4038,4040,4042,4044,4047), M
0024   4036 WRITE(LINES,4037)
0025   4037 FORMAT('  FREQUENCIES')
0026        CALL WR4(LINES,M,ITRAN,ADUM)
0027        GO TO 4050
0028   4038 WRITE(LINES,4039)  NSTEP
0029   4039 FORMAT('  FREQUENCY OF ENTERING AN N-D+',I2,' CELL')
0030        CALL WR4(LINES,M,LTRAN,ADUM)
0031        GO TO 4050
0032   4040 WRITE(LINES,4041) NSTEP
0033   4041 FORMAT('  FREQUENCY IN REMAINING IN AN N+',I2,' CELL AFTER ENTERI
           1G FROM N')
0034        CALL WR4(LINES,M,JTRAN,ADUM)
```

```
      GO TO 4050
 4042 WRITE(LINES,4043)
 4043 FORMAT('  TRANSITION PROBABILITIES')
C----  DIVIDE EACH ROW BY ROW TOTAL, DIVIDE ROW TOTAL BY MATRIX TOT.
      DO 3036 I = 1,K
      DO 3036 J = 1,L
      ADUM(I,J) = ITRAN(I,J)
 3036 ADUM(I,J) = ADUM(I,J) / ITRAN(I,K) * 100.
      DO 3037 J = 1,K
      ADUM(J,K) = ITRAN(J,K)
 3037 ADUM(J,K) = ADUM(J,K) / ITRAN(K,K) * 100.
C----  ADD TRANSITION PROB. INTO SEXT (MAT FOR SUMMING OVER DYADS)
      DO 3038 I = 1,K
      DO 3038 J = 1,K
 3038 SEXT(I,J) = SEXT(I,J) + ADUM(I,J)
      CALL WR4(LINES,6,ITRAN,ADUM)
      GO TO 4050
 4044 WRITE(LINES,4049) NSTEP
 4049 FORMAT('  AVERAGE FREQUENCY OF REMAINING IN N+',I2,' AFTER ENTERIN
     1G FROM N')
C----  DIVIDE FREQ OF REMAINING (JTRAN) BY FREQ. OF ENTERING (LTRAN)
      DO 4048 I = 1,K
      DO 4048 J = 1,K
      ADUM(I,J) = JTRAN(I,J)
 4048 ADUM(I,J) = ADUM(I,J) / LTRAN(I,J)
      CALL WR4(LINES,M,ITRAN,ADUM)
 4050 CONTINUE
      RETURN
  220 CONTINUE
      IPAGE = IPAGE + 1
C----  PRINT HEADING FOR COLLAPSED MATRIX
      WRITE(LINES,321) IPAGE,NSTEP,NSTEP
  321 FORMAT('1  PAGE',I4,'  TRANSITION MATRIX COLLAPSED OVER ALL SUBJEC
     1TS.'/ '  VOCAL STATES,',I3,'-SECOND STEPS (ROWS = N, COLS = N+',I2
     3,')'/)
C----  DIVIDE TOTAL SUM (OVER ALL DYADS) BY NUMBER OF DYADS
      DO 320 I = 1,K
      DO 320 J = 1,K
  320 SEXT(I,J) = SEXT(I,J)/NS
      CALL WR4(LINES,7,ITRAN,SEXT)
      RETURN
      END
```

```
ROUTINES CALLED:
WR4

OPTIONS =/ON,/CK,/OP:2

BLOCK        LENGTH
WR5      1025    (004002)*
.$$$$.   8074    (037424)

**COMPILER ----- CORE**
   PHASE         USED  FREE
DECLARATIVES  00622 13678
EXECUTABLES   01131 13169
ASSEMBLY      01552 17368
```

APPENDIX C

First Phone Contact:

Your Name
Peabody College
Dr. Vietze
Infant Laboratory
Kennedy Center

Dr. Vietze has been involved with infant research in Nashville for the past three years. We understand you have a son (or daughter).

Dr. Vietze is presently involved in a study of how babies learn about their environment in their first year of life. I'd like to tell you briefly now what the study involves and, if you are still interested, I'd like to send you a letter explaining about it in more detail. We are seeing each baby at 3 ages: when (he, she) is 2 1/2, 6 1/2 and 12 1/2 months old. At each age, we see the baby three times: once in the home and twice in our infant laboratory. We would like you to know about this study in more detail and would like to send you a letter explaining more about it, if you think you might be interested in participating. We would like to call back next week after you have a chance to read the letter, get your reaction to it, and answer any questions you may have. Then, if you are still interested, set up an appointment.

FIND OUT:

Do you plan to be in Nashville during the next year?
Are you planning to work during this time?
Check Address!

GEORGE PEABODY COLLEGE FOR TEACHERS

NASHVILLE TENNESSEE 3720 3

THE JOHN F. KENNEDY CENTER FOR RESEARCH
ON EDUCATION AND HUMAN DEVELOPMENT

RATION AND RESEARCH
FOR EARLY EDUCATION

BOX 151
TELEPHONE 615 - 327-8236

Dear Parent,

Thank you for expressing interest in our research with infants here at Peabody College. We would like to explain a little more about this research project. During the past three years several hundred families with young infants have participated in infant research programs sponsored by the Demonstration and Research Center for Early Education (DARCEE), a component of the John F. Kennedy Center. This research is supported by Peabody College and by both Federal and State grants.

Because the first year of life is an extremely important one, a year marked by rapid growth and many developmental changes, we have focused our attention on the young infant. Until relatively recently we knew very little about what young babies could do. In fact, many persons still believe that newborn babies cannot see and do not learn. However, our research and that of others around the country is showing that even very young infants are sensitive and responsive to changes in their world and are capable of learning. Here at the Kennedy Center we have been looking at early learning, attentional, and socio-emotional processes in young babies.

The purpose of this research program is to examine the relationship between a cluster of important measures: infant learning and attention in the laboratory; infant behavior in the home setting; infant sensory-motor development; and parents' ideas and beliefs about young children. We are especially interested in how these relationships change during the first year of life. We are interested in working with normal, healthy infants and their mothers. In this study, we are interested in first born infants whose mothers are and will be the primary weekday caretaker for the length of the study. Because this is a longitudinal study, we need people who expect to be in Nashville for the next eleven months.

If you agree to be a family in our study, we would like to see your baby when he or she is 2 1/2 months old, 6 1/2 months old, and 12 1/2 months old. At each age we would like to come to your home to observe your baby in the normal home environment. We are interested in observing a bath, a feeding, and some playtime. We would like to watch your baby for 90 minutes at a time when only the Mother and baby would be there. Also, at each age we would like you to bring your baby to the Peabody Infant Laboratory twice--about a week apart. During these visits we will do three things. First, we will show your baby some pictures and watch to see how much he looks at them. Second, we will give your baby the opportunity to make a response (turning his head, pulling a string) which will cause something interesting to happen (a mobile will turn, a picture will appear on a screen). We will record the amount of time the baby looks at the object, his vocalizations and smiles, and the number of times he responds. Third, we will measure your baby's sensori-motor development with a scale that has been developed for this purpose. Also we will ask you to complete a short questionnaire for parents during your visit to the Infant Lab. Each visit should take from one to two hours.

Because this study is funded by a grant from the National Institute of Education, the Department of Health, Education, and Welfare requires that we obtain written consent from the parents of babies who participate in our study. If you agree to participate, we will be bringing a consent form to your home on our first visit.

We will be contacting you within the next week or two to answer any questions you may have and to find out if you would be willing to help us in this important and exciting research project. If you have any immediate questions, please feel free to contact us here at Peabody. The number is 327-8237 and Donna Burns, Mary Lou Ashe, or I will be happy to answer your questions.

Sincerely,

Peter M. Vietze, Ph.D.
Research Associate Professor of Psychology
Executive Officer, DARCEE

PV/pwg

Second Phone Contact:

Your Name
Peabody College
Infant Laboratory

Have you received our letter yet... and, have you had a chance to read it and think about it?

Do you think you would be interested in helping us out with our study?

Any questions?

We need to schedule you for the first visit - that will be the visit in your home where an observer will come to your home to see the baby for an hour and a half. We want to include a feeding, a bath, and some playtime, but won't interrupt your normal routine.

What day would be best for your? What time?

We'll call you on that day to confirm the time...

We'd also like to set up the first lab visit at this time. Best day? Time?