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AUTHOR Lawson, E. D.
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Osgood, Suci, and Tannenbaum in their work with the semantic differential developed a technique with which data from an individual could be represented by a three-dimensional model. The model is derived from distance scores based upon profile ratings of concepts such as mother or self, on subscales such as kind-cruel, weak-strong, etc. Osgood identified three main dimensions for meaning (and models)--evaluation, potency, and activity--which are assumed to be orthogonal. The models are fascinating and useful but involve a great deal of work. This paper describes procedures which yield a good approximate model in 3-5 hours; less time is required with experience. Further, the approximate model can serve as the basis to build the exact model in less time than would have been possible otherwise. The improvements include computer cards which can be used for doing the ratings, FORTRAN computer programs, a special apparatus for use as a frame for building the model, directions, and a template for drawing the model in perspective. Several hundred undergraduate students have completed the models and a few clinical cases have been evaluated. Appendices include administration instructions; sample computer cards, programs, and outputs; and plans for building the model. (Author/CTM)

# An Easy Semantic Differential Technique: Construction of a Three-Dimensional Model



Presented at the 1977 Annual Meeting of the Eastern Psychological Association Meeting

E. D. Lawson
Department of Psychology
State University of New York
College at Fredonia
Fredonia, New York 14063

## ABSTRACT

<u>An Easy Semantic Differential Technique: Construction of a Three-Dimensional Model</u>

E. D. Lawson
State University College
Fredonia, New York 14063

Osgood, Suci, and Tannenbaum in their work with the semantic differential developed a technique with which data from an individual could be represented by a three-dimensional model. The model is derived from distance scores based upon profile ratings of concepts such as MOTHER, or SELF on subscales such as <u>kind-cruel</u>, <u>weak-strong</u>, etc. Osgood identified three main dimensions for meaning (and models): Evaluation, Potency, and Activity which are assumed to be orthogonal. The models are fascinating and useful but involve a great deal of work. This paper describes procedures which yield a good approximate model in 3-5 hours; less time is required with experience. Further, the approximate model can serve as the basis to build the exact model in less time than would have been possible otherwise. The improvements include computer cards which can be used for doing the ratings, computer programs, a special apparatus for use as a frame for building the model, directions, and a template for drawing the model in perspective. Several hundred students have completed models. A few clinical cases have also been evaluated.

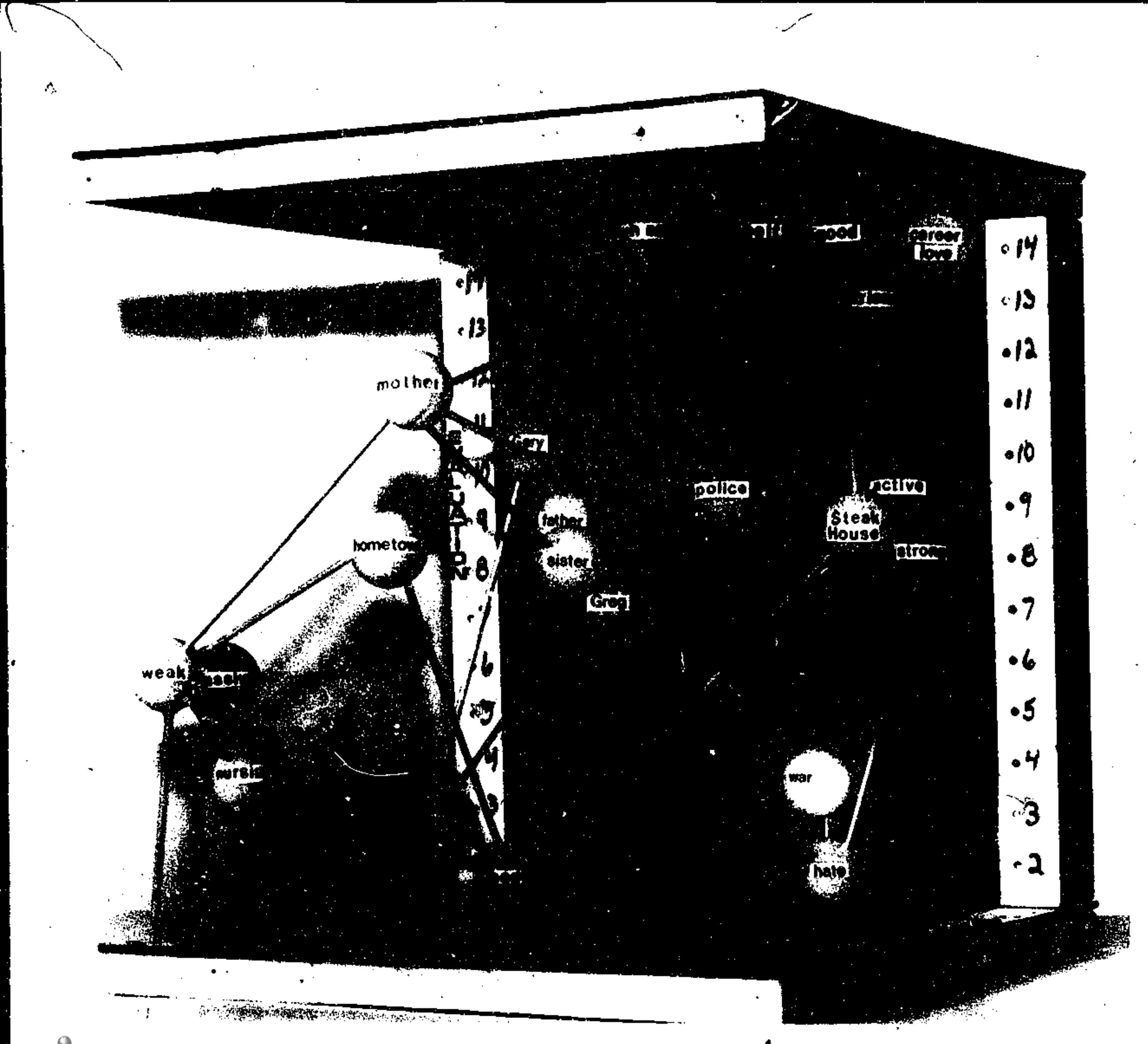






Figure 1. A completed semantic differential model. Data and calculations in text.

# An Easy Semantic Differential Technique: Construction of a Three-Dimensional Model

E. D. Lawson

Osgood, Suci, and Tannenbaum in their work with the semantic differential described a technique (1957, pp. 91-104) by which concepts which had previously been rated on bi-polar scales could be plotted in three-dimensional space. Many investigators in social psychology, personality, and clinical work have found this approach exciting (see Snider and Osgood, 1969). Models have been built which have shown attitudes toward such diverse concepts as political candidates, automobiles, musical instruments, and even APA journals. Of course, substantial work has also been in the clinical area since Osgood and Luria worked with the patient in Three Faces of Eve (1954).

While enthusiastic about the models, the average investigator has been somewhat discouraged in construction of his own models for these reasons: (1) number of computations, a very large number have to be completed; (2) the difficulty in plotting the concepts (the Osgood method gives distances between concepts rather than actual coordinates. This means that the octant for a concept is not known and can only be determined by trial-and-error); (3) amount of time, because of the number of computations, the trial-and-error aspect of construction, the time for construction of a model is at least 20 hours.

With faith that the model approach gave information about attitudes, values, and relationships beyond that of other approaches, efforts were made to improve the procedures for constructing models. These efforts have resulted in changes and modifications which have greatly reduced the time required from 20 hours to 3-5 hours from administration of the measuring instrument to completion of a model. Several hundred undergraduates have completed models as part of a class assignment. Over fifty models for group data have been constructed for research purposes.

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Grateful appreciation is expressed to the following who helped in many ways at State University College: Barbara Metivier and staff of the Computer Center, Ronald Warren of the Instructional Resources Center, Joseph Woloszyn of the Printing Office, Steven Skrzypek who worked on parts of the technique as his directed study project, and Theresa Barber who did manuscript preparation.

The following major improvements have been made:

1. For computations: computer programs have been written: FORTRAN for individual and group data.

2. For construction: a) an apparatus has been designed and built which serves as a framework during construction of the model and b) a slide-cassette program has been developed which can serve as a step-by-step guide during construction.

3. A drawing template: this serves as a guide for the model to be drawn in perspective correctly by a person without any previous experience in drawing.

## Procedure

First, the individual respondent fills out nine conventional semantic differential subscales (kind-cruel, weak-strong, etc.) for each of the concepts being evaluated on preprinted data cards. The cards are then keypunched accordingly (see Appendix B). Through appropriate computer formulas and operations an output is created (SDEPA, see programs and sample data rated in Appendix F) so that for each concept there are three values derived, E, P, and A, from the factor loadings of the subscales. These represent the Osgood Evaluation, Potency, and Activity factors and are used as X, Y, and Z axes.

The EPA values can be derived without the use of a computer and the user may wish to choose his own subscales for the semantic differential. The computer program in the Appendix is set up with the scoring key shown below:

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| (1) | Kind | 1 | 2 | 3 | 4 | 5 | 6 | 7 | Cruel |
| (2) | Weak | 7 | 6 | 5 | 4 | 3 | 2 | 1 | Strong |
| (3) | Fast | 1 | 2 | 3 | 4 | 5 | 6 | 7 | Slow |
| (4) | Cold | 7 | 6 | 5 | 4 | 3 | 2 | 1 | Hot |
| (5) | Large | 1 | 2 | 3 | 4 | 5 | 6 | 7 | Small |
| (6) | Dishonest | 7 | 6 | 5 | 4 | 3 | 2 | 1 | Honest |
| (7) | Happy | 1 | 2 | 3 | 4 | 5 | 6 | 7 | Sad |
| (8) | Delicate | 7 | 6 | 5 | 4 | 3 | 2 | 1 | Rugged |
| (9) | Sharp | 1 | 2 | 3 | 4 | 5 | 6 | 7 | Dull |

Note: Polarity of alternate scales is reversed.

Evaluation = Scores 1+6+7/3
Potency = 2+5+8/3
Activity = 3+4+9/3

For illustrative example please see Appendix C.

Actual construction is done with 1/8" dowel sticks and 1 1/2" styrofoam balls. The apparatus is used to hold the model in place until completion. The slide-cassette program directs the construction step-by-step so that an individual without previous experience has little difficulty. (To obtain the slide-cassette program on loan, contact Reed Library, State University College, Fredonia, New York 14063.)

Additional program outputs provide a matrix of distances based upon EPA values (SD2PTD), a matrix of distances based upon Osgood's D formula (SDGPD), and finally a correlation between the two distance matrices (LRANK). The FORTRAN group program can also test the significance of distances between concepts for group data. After the model is constructed, a drawing in perspective can be easily and accurately completed using the special template.

## Results

With over 500 cases, the correlations between the EPA matrix and the Osgood D matrix have averaged about .95. Only a few correlations were under .87. Examination of the data indicates that in those there was usually a failure to understand directions, poor comprehension of English, or poor choice of concepts. Therefore, it seems fair to assume that the EPA values method yields about the same precision as test-retest would be with the more exact Osgood D method. Indeed, a number of Osgood D models have been built. All show a close resemblance. For the purist who wishes to follow the Osgood procedure, it is actually quicker to build an Osgood D model if one first builds an EPA model since the simple structure is known and the trial-and-error part of construction of the Osgood model is eliminated.

## Discussion

A procedure has been developed where semantic differential data from individuals or groups can be represented by a three-dimensional model. Many feel that this kind of a representation contributes greater understanding of the relationships involved. Actual construction can be accomplished with an economy of time, labor, and materials (a complete kit of materials exclusive of the apparatus is available at less than $3.00 at the Fredonia College Bookstore). Student response to model building has been very enthusiastic in social psychology and personality courses. Many students have reported that they have developed insight about self and family relationships. Some clinical psychologists have indicated that the model tells as much about the patient's perceptions as several hours of interviewing. The procedure is described more fully in the appendices.

For further information on computer programs, contact:

Director
Computer Center
State University College
Fredonia, New York 14063
(716) 673-3393

on slide-cassette program (54 35mm. slides synchronized with tape cassette):

Reed Library
State University College
Fredonia, New York 14063
(716) 673-3183

group data: an additional detailed program is being prepared for use with group data. A general description for group data can be found in Lawson, Golden, and Chmura, 1972.

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## Appendices

A. General Instructions for Administering the Semantic Differential

B. Sample Card for Rating Concepts

C. Directions for Individual Semantic Differential Procedure

D. Computer Cards for Use with Programs

E. Computer Program and Comments

F. Sample Data Output (With Comments)

G. Construction Frame for Building Model (Plans)

H. Template for Diagramming Model

# Appendix A

## General Instructions for Administering the Semantic Differential

We all carry in our minds a "picture" or an image of how certain people look and act. We also have images of other concepts such as institutions, and even abstract ideas. Psychologists have been trying for a long time to find out just what these ideas are. These scales are a new way of getting at these ideas.

Each card presents a concept (such as Eskimo) printed in at the top and a series of scales (such as Beautiful-Ugly) beside each concept. Please rate the concept which appears at the top of the card on each of the seven point scales on the same card.

Thus, if you felt that the concept (e.g., Eskimo) was very closely associated with one end of the scale, you might circle as follows:

Beautiful: (1) : 2 : 3 : 4 : 5 : 6 : 7 Ugly

If you feel that the concept was quite closely related to one end of the scale, you might circle as follows:

Realistic: 1 : 2 : 3 : 4 : 5 : (6) : 7 Idealistic

If you considered both sides equally related you would circle the middle space on the scale:

Clear: 1 : 2 : 3 : (4) : 5 : 6 : 7 Hazy

IMPORTANT: Please (1) never put more than one circle on each scale, (2) be sure to check each item--do not omit any, (3) should you make an error, put an X through the number and circle the correct choice.

The success of this method depends on how accurately you describe your own picture of the concepts. Please be as accurate as possible with your descriptions. Work at fairly high speed, without worrying or puzzling over individual items for long periods, but at the same time be as accurate as you can. Remember to describe your own personal idea. Make each response independently of the others; that is, do not look back and forth through the cards to see how similar responses were made.

## Appendix B

### Sample Card for Rating Concepts

**CONCEPT** ________________

Semantic Differential

Please circle best association for concept.

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| KIND | 1 | 2 | 3 | 4 | 5 | 6 | 7 | CRUEL |
| WEAK | 1 | 2 | 3 | 4 | 5 | 6 | 7 | STRONG |
| FAST | 1 | 2 | 3 | 4 | 5 | 6 | 7 | SLOW |
| COLD | 1 | 2 | 3 | 4 | 5 | 6 | 7 | HOT |
| LARGE | 1 | 2 | 3 | 4 | 5 | 6 | 7 | SMALL |
| DISHONEST | 1 | 2 | 3 | 4 | 5 | 6 | 7 | HONEST |
| HAPPY | 1 | 2 | 3 | 4 | 5 | 6 | 7 | SAD |
| DELICATE | 1 | 2 | 3 | 4 | 5 | 6 | 7 | RUGGED |
| SHARP | 1 | 2 | 3 | 4 | 5 | 6 | 7 | DULL |

Figure 2. The computer card shown above is completed by the respondent on the nine subscales for each concept rated. The concept rated can be filled in at the top in the blank provided or the concepts as a group can be preprinted by computer (see Appendix D).

# Appendix C

## Directions for Individual Semantic Differential Procedure

Item(s):

1. To be read and completed <u>before</u> concepts are rated.

2-5. To be read during construction of model.

6. Final check after completion of model.

1. Filling Out Semantic Differential Scales

You have been given a number of cards for use with the Semantic Differential (SD). Each object (concept) to be rated has a blank space and nine subscales.

First decide what concepts you are going to use. The first six are standard and are:

| Number | Concept |
|---|---|
| 1 | Good |
| 2 | Bad |
| 3 | Strong |
| 4 | Weak |
| 5 | Active |
| 6 | Passive |

This refers to each of the concepts as an abstract idea. In addition to these basic concepts, you are to make a selection of at least 18 more concepts. You may use the list below to get some ideas as to what concepts to use. However, the concepts should be those important to you in some way. You may, of course, use concepts not on the list. It is well to have at least one concept of a more negative nature. Otherwise, the concepts may all cluster together. Assign numbers to each concept for a total of 24.

| General Interest | Individual Interest | Countries |
|---|---|---|
| Self | Vietnam | Canada |
| Mother | United States | Cuba |
| Father | Draft | Mainland China |
| Brother(s) (use different names) | Education | Egypt |
| Sister(s) | Major Field (give name) | Great Britain |
| Husband | Hometown | Israel |
| Wife | Love | Jordan |
| Child(ren) | Hate | Russia |
| Other relatives | Illness | United Nations |
| Career | Crime | United States |
| Religion | Poverty | |
| God | Police | |
| War | Delinquency | |
| Peace | | |
| College | | |
| Fiance(e) | | |

2. Prepare the completed cards for the computer (check with instructor for instructions).

3. Constructing the Personality Model

You will receive a computer printout which shows:

1. Your original ratings in a table.
2. EPA scores.
3. EPA scores doubled.
4. Distance between concepts.
5. Perhaps other scores.

Check the computer scores with your original raw data. It should agree. If not, check with your instructor.

4. Now turn to the EPA scores. In the example below note that each concept has three scores:

| | | E | P | A |
|---|---|---|---|---|
| GOOD | 1 | 6.667 | 6.667 | 5.333 |
| BAD | 2 | 1.000 | 3.333 | 1.000 |

Since we will be working with inches it probably would be best to double the values and round to one place. Actually working with the nearest full inch is usually satisfactory for student projects.

| | | E | P | A |
|---|---|---|---|---|
| GOOD | 1 | 13.333 | 13.333 | 10.667 |
| BAD | 2 | 2.000 | 6.667 | 2.000 |

These will represent the coordinates that will be plotted. This will be done just the way you did X, Y, and Z axes in high school math.

The maximum range you will be working with is 12. (No score is less than 2.) You can use the special masonite frames that we have built. These are located in the lab.

5. Building the Model

A tape-cassette program (54 35mm. slides with narration) has been prepared. It shows step-by-step how to build the model using EPA scores in connection with the special frame and steel rods. Alternate directions are given below.

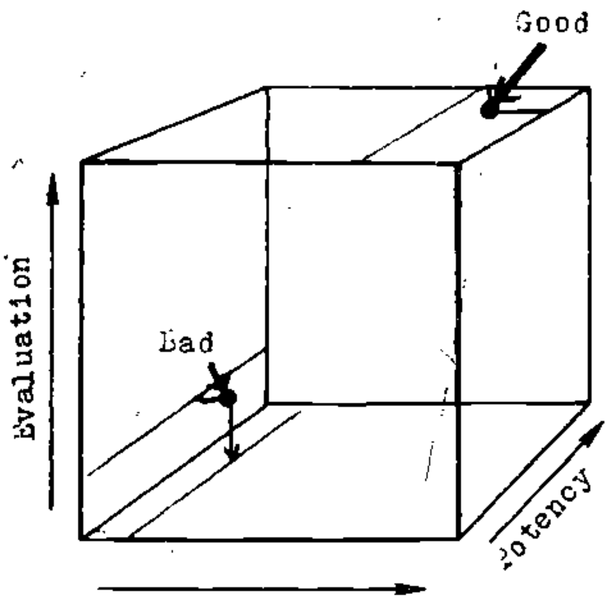
Alternate Directions: Model Construction

Plotting the first concept: The first concept to be plotted will be 01-Good. This virtually always has high scores. The converted EPA scores are 13.3, 13.3, and 10.6, respectively.

These can be rounded to 13, 13, and 11. In the masonite frame starting at the left with 0 count off the 11 units of the Activity score, then the 13 units toward the back for the Potency score. Mark the approximate point these intersect on the base of the frame. The E score is also 13. Mark off 13 units on a dowel stick. Placing one end to the closest spot of the intersection of the Activity and Potency scores and holding the stick straight up gives the approximate location of the Good concept. Then, you will have to sharpen one end of the dowel stick to insert it into a plastic ball. Another stick going horizontally into the side of the masonite wall may serve to anchor the ball a little more. Use of a paper clip helps to anchor the support stick.

After plotting Good, plot Bad (2.000, 6.667, 2.000). In the example, Bad is rounded to 2 units to the right, 7 units away, and 2 units up (at quite a distance from Good). Plot and anchor the location of Bad, then connect the two balls. Other concepts are to be similarly plotted. Use enough dowel sticks to hold each ball in place. Every ball is not to be connected to every other one, just enough to hold your model in place. Continue plotting until all balls are in place. You can check your work by doubling the computer printout showing the distances between concepts.

If your work checks, you can glue the balls to the sticks and fasten the labels.




Free Standing

Some students build models and add 3 or 4 sticks at bottom so the model can stand upright unsupported.

6. Completing the SD Model

Assembly: In making the final assembly place Good at the top, Bad at the bottom, Strong and Active should usually be at the right. Be sure to use plenty of glue and enough sticks so the model holds well.

Labeling: All concepts should be clearly labeled with number and name. This will facilitate checking. Your model should also hear your code name or number and course number. Use two pins on each of the concept labels.

Submission: Include the print-out with your write-up. Include the model, the print-out, and the write-up in the plastic bag.

Report: Should give a brief description of the model. Describe where the concepts place themselves with regard to Good, Bad, Strong, Weak, Active, and Passive and to each other as seems relevant. Does the model make sense? Does it confirm or deny your expectancy? What insights have you gained?

Drawing: A special template has been prepared to aid in drawing your model. This will help in your report. Use lines (just enough) to give some notion of perspective. The template is rotated in comparison with the construction frame. A concept such as Good with high scores on Evaluation, Potency, and Activity would appear in the upper right hand corner and be a large circle.

References: For further information on this technique see Osgood, Suci and Tannenbaum, The measurement of meaning, Univ. of Illinois Press, 1957 or Snider and Osgood, Semantic differential technique, Aldine, 1969, on reserve in the library.

## Semantic Differential Evaluation Sheet

MECHANICS OF PRESENTATION:

___1. Should use more paragraphs.

___2. Basic spelling errors.

___3. Many basic spelling errors.

___4. Apostrophe used incorrectly.

___5. Words incorrectly capitalized.

___6. Other.

FORMAT:

___7. Should have title page, ID, class hour, date, course.

___8. Use regular weight 16 lb. paper, no onionskin.

___9. Clean typewriter and/or use fresh ribbon.

___10. Other (double space).

PRESENTATION:

___11. First describe the model without interpretation, then interpret.

___12. Answer the question "Was the model accurate?"

___13. Answer the question "What did you learn?"

___14. Capitalize each concept referred to, i.e., Good, Bad.

___15. Text hard to follow.

___16. You should have read some of the write-ups in the Library.

___17. Conclude presentation with statement of what you learned from the project.

___18. Other.

DRAWING OF MODEL:

___19. All concepts should be labeled and numbered.

___20. Refer to drawing in text.

MODEL:

___21. All labels should be right-side up and facing one direction, Good at top, Strong at right.

___22. Model needs more sticks for strength.

___23. Sticks need more glue.

___24. All concepts to be labelled <u>and</u> numbered.

___25. Better base needed.

___26. Other.

COMPUTER PRINT-OUT:

___27. Missing.

___28. Some parts missing.

___29. Other.

MISCELLANEOUS:

___30. Unnecessary to include basic data scores in write-ups. Only EPA values (doubled and to one place only) are needed.

___31. Paper is late, penalty grade.

___32. Please see me about this paper.

___33. Excellent presentation!

## Appendix D

### Computer Cards for Use with Programs: Input Deck Format

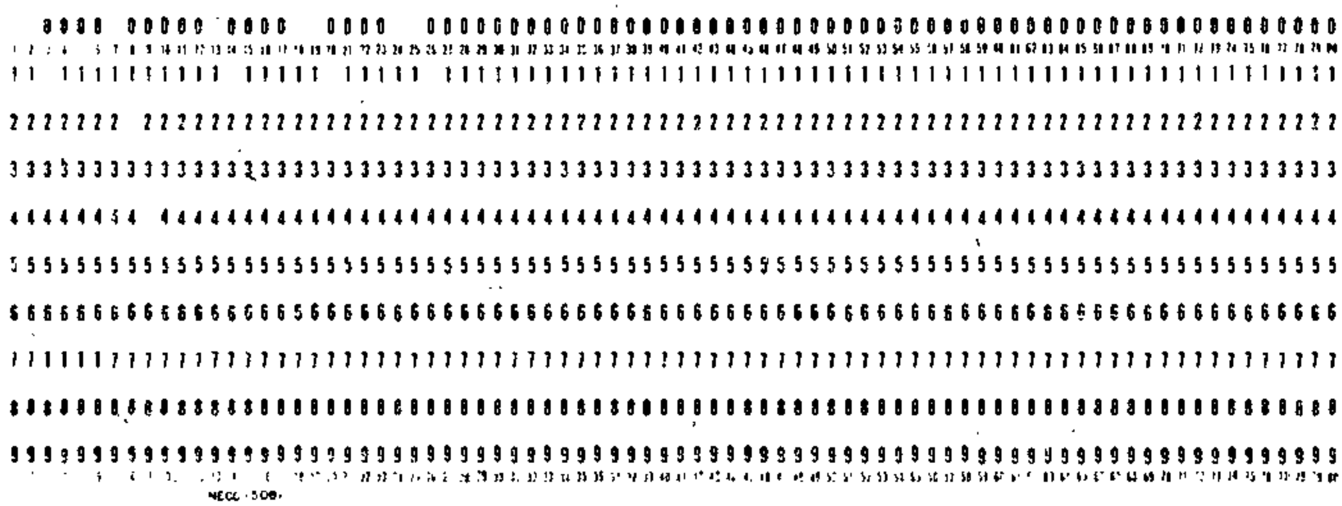
| Card No. | Type | Columns | Contents |
|---|---|---|---|
| 1 | Control Card (local at Fredonia) | 1-15 | ")F90LSD,167810," |
| | | 16-35 | Student's name |
| 2 | Run control card | 1-3 | Number of cases-"001" |
| | | 4-6 | Blank |
| | | 7-9 | Number of concepts-"024" |
| | | 10-12 | Blank |
| | | 13-14 | Print code-"01" |
| | | 15-17 | Blank |
| | | 18-20 | Case identification number-"001" |
| | | 21-23 | Blank |
| | | 24-26 | Case identification number-"001" |
| | | 27-80 | Blank |
| 3 | Run control card | 1-3 | Case identification number-"001" |
| | | 4-80 | Blank |
| 4-27 | Data cards | 1-3 | Case identification number-"001" |
| | | 4-6 | Concept number-integer |
| | | 7-17 | Name of concept-Alpha |
| | | 72-80 | Subscale values |
| 28 | Finish card | 1-3 | Finish card-"-99" |
| | | 4-80 | Blank |

The following pages give examples of the cards.

+F30L ID,167810,

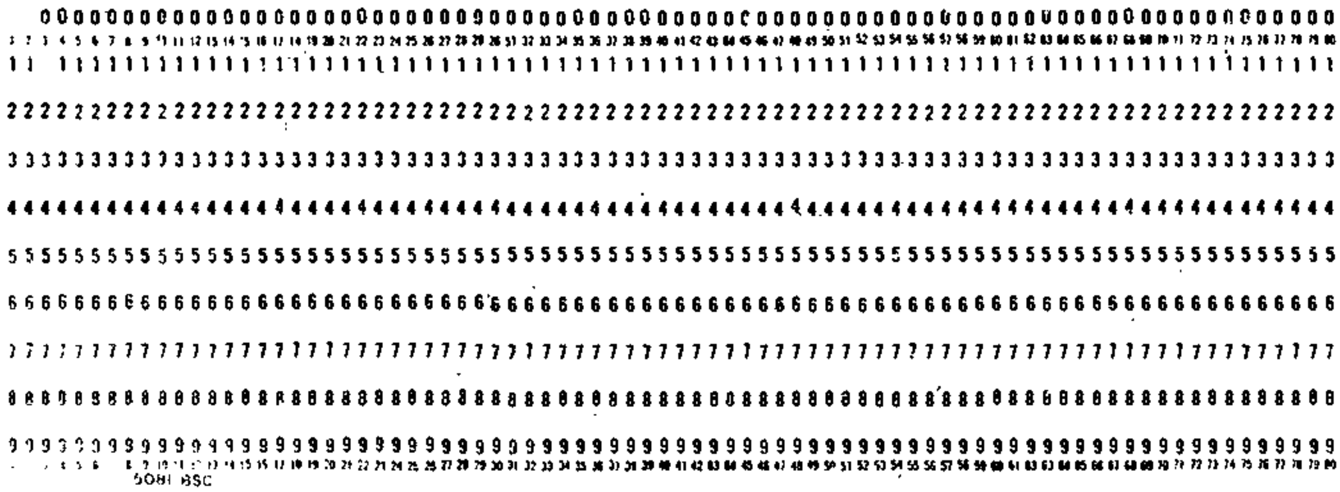
Card 1. Control Card. Local card at Fredonia. Calls the program. Student's name is placed in columns 16-35.

001 024 01 001 001



Card 2. Run Control Card.

J01




Card 3. Run Control Card.

0010010000 CONCEPT 1. Good 171747144

Semantic Differential

Please circle best association for concept.

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| KIND | **(1)** | 2 | 3 | 4 | 5 | 6 | 7 | CRUEL |
| WEAK | 1 | 2 | 3 | 4 | 5 | 6 | **(7)** | STRONG |
| FAST | **(1)** | 2 | 3 | 4 | 5 | 6 | 7 | SLOW |
| COLD | 1 | 2 | 3 | 4 | 5 | 6 | **(7)** | HOT |
| LARGE | 1 | 2 | 3 | **(4)** | 5 | 6 | 7 | SMALL |
| DISHONEST | 1 | 2 | 3 | 4 | 5 | 6 | **(7)** | HONEST |
| HAPPY | **(1)** | 2 | 3 | 4 | 5 | 6 | 7 | SAD |
| DELICATE | 1 | 2 | 3 | **(4)** | 5 | 6 | 7 | RUGGED |
| SHARP | 1 | 2 | 3 | **(4)** | 5 | 6 | 7 | DULL |

Cards 4-27. Data Cards. This card for the concept Good has been filled out by the respondent and then keypunched. Note that the program will reverse the polarity of the odd-numbered scales and will average the selected scales for EPA values. The computer output for these data cards is shown in Appendix E.

001 002 BAD

CONCEPT 2. Bad

714111744

Semantic Differential

Please circle best association for concept.

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| KIND | 1 | 2 | 3 | 4 | 5 | 6 | **7** | CRUEL |
| WEAK | **1** | 2 | 3 | 4 | 5 | 6 | 7 | STRONG |
| FAST | 1 | 2 | 3 | **4** | 5 | 6 | 7 | SLOW |
| COLD | **1** | 2 | 3 | 4 | 5 | 6 | 7 | HOT |
| LARGE | **1** | 2 | 3 | 4 | 5 | 6 | 7 | SMALL |
| DISHONEST | **1** | 2 | 3 | 4 | 5 | 6 | 7 | HONEST |
| HAPPY | 1 | 2 | 3 | 4 | 5 | 6 | **7** | SAD |
| DELICATE | 1 | 2 | 3 | **4** | 5 | 6 | 7 | RUGGED |
| SHARP | 1 | 2 | 3 | **4** | 5 | 6 | 7 | DULL |

001 003STRONG

CONCEPT Strong

471514471

Semantic Differential

Please circle best association for concept.

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| KIND | 1 | 2 | 3 | **4** | 5 | 6 | 7 | CRUEL |
| WEAK | 1 | 2 | 3 | 4 | 5 | 6 | **7** | STRONG |
| FAST | **1** | 2 | 3 | 4 | 5 | 6 | 7 | SLOW |
| COLD | 1 | 2 | 3 | 4 | **5** | 6 | 7 | HOT |
| LARGE | **1** | 2 | 3 | 4 | 5 | 6 | 7 | SMALL |
| DISHONEST | 1 | 2 | 3 | **4** | 5 | 6 | 7 | HONEST |
| HAPPY | 1 | 2 | 3 | **4** | 5 | 6 | 7 | SAD |
| DELICATE | 1 | 2 | 3 | 4 | 5 | 6 | **7** | RUGGED |
| SHARP | **1** | 2 | 3 | 4 | 5 | 6 | 7 | DULL |

Data Cards for Bad and Strong.

001007SELF
CONCEPT Self

154647141

Semantic Differential

Please circle best association for concept.

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| KIND | 1 | 2 | 3 | 4 | 5 | 6 | 7 | CRUEL |
| WEAK | 1 | 2 | 3 | 4 | 5 | 6 | 7 | STRONG |
| FAST | 1 | 2 | 3 | 4 | 5 | 6 | 7 | SLOW |
| COLD | 1 | 2 | 3 | 4 | 5 | 6 | 7 | HOT |
| LARGE | 1 | 2 | 3 | 4 | 5 | 6 | 7 | SMALL |
| DISHONEST | 1 | 2 | 3 | 4 | 5 | 6 | 7 | HONEST |
| HAPPY | 1 | 2 | 3 | 4 | 5 | 6 | 7 | SAD |
| DELICATE | 1 | 2 | 3 | 4 | 5 | 6 | 7 | RUGGED |
| SHARP | 1 | 2 | 3 | 4 | 5 | 6 | 7 | DULL |

Data Card for Concept Self.

001014MOTHER
CONCEPT Mother

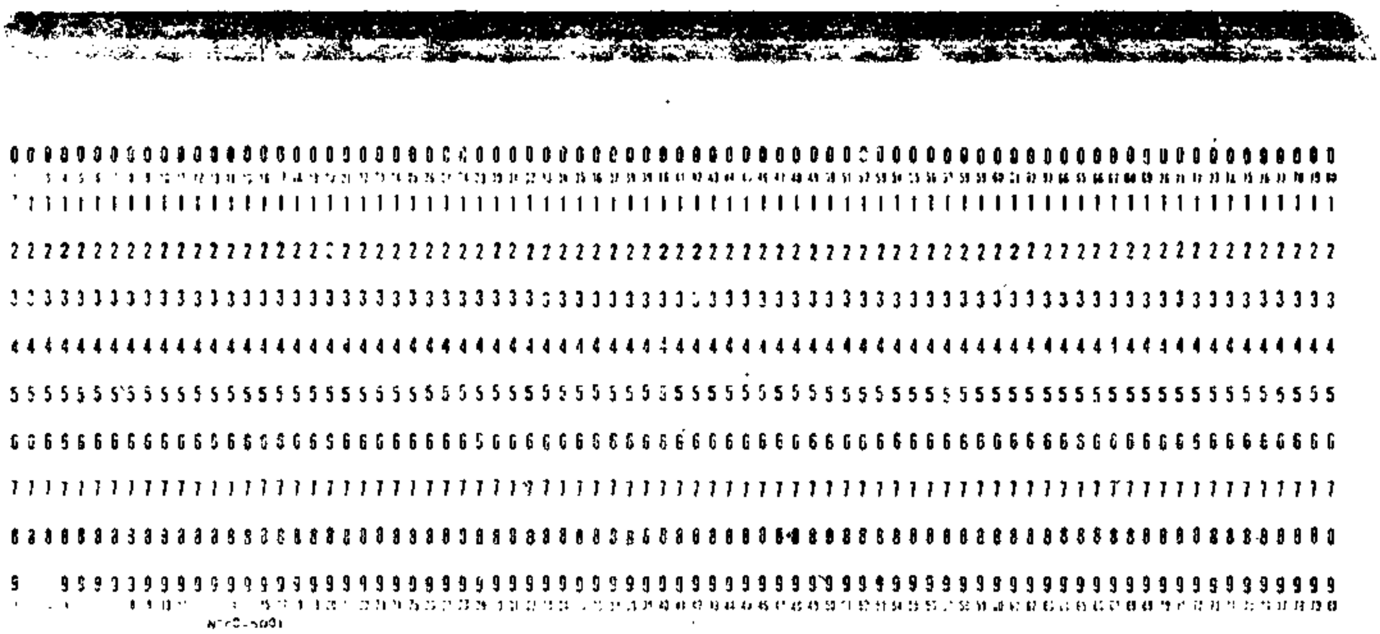
126677626

Semantic Differential

Please circle best association for concept.

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| KIND | 1 | 2 | 3 | 4 | 5 | 6 | 7 | CRUEL |
| WEAK | 1 | 2 | 3 | 4 | 5 | 6 | 7 | STRONG |
| FAST | 1 | 2 | 3 | 4 | 5 | 6 | 7 | SLOW |
| COLD | 1 | 2 | 3 | 4 | 5 | 6 | 7 | HOT |
| LARGE | 1 | 2 | 3 | 4 | 5 | 6 | 7 | SMALL |
| DISHONEST | 1 | 2 | 3 | 4 | 5 | 6 | 7 | HONEST |
| HAPPY | 1 | 2 | 3 | 4 | 5 | 6 | 7 | SAD |
| DELICATE | 1 | 2 | 3 | 4 | 5 | 6 | 7 | RUGGED |
| SHARP | 1 | 2 | 3 | 4 | 5 | 6 | 7 | DULL |

Data Card for Concept Mother.



Card 28. Finish Card.

## Appendix E

### Computer Program and Comments

SDMSM

This program assumes the use of 9 of the bipolar scales from Osgood such as kind-cruel, weak-strong, fast-slow, which have been used to rate the concepts.

SDEPA

In work with the SD, Osgood and others have identified three basic dimensions or factors of meaning: Evaluation (Good vs. Bad), Potency (Strong vs. Weak), and Activity (Active vs. Passive). Williams (1966), Lawson (1970,1971,1973,1974), Lawson and Giles (1973), and Towne (1971) have averaged subscale scores to derive EPA values. These EPA values have been useful in construction of a semantic differential model (EPA model) following somewhat the procedure of Prothro and Keehn (1957) and Towne (1971). The EPA model construction procedure makes the assumption (which some purists may question) that E, P, and A are orthogonal factors and composed of equal units. While the rationale of the procedure may raise doubts with some, about 30 investigations report that models built with EPA averages have closely approximated those built with the more complex Osgood D scores. In building an EPA model, each concept is plotted in three dimensional space using E, P, and A scores as Y, Z, and X dimensions respectively. In actual practice, the EPA scores are doubled and measured in inches. One and one half inch foam balls represent concepts. Dowel sticks (1/8") connect the balls to one another.

Program EPA, then, combines selected subscales to yield average factor loadings on three dimensions: Evaluation, Potency, and Activity. The individual investigator may select those particular subscales which he wishes to use in combining for EPA scores.

Of course, a great deal depends upon the subscale which the investigator chooses to represent the three dimensions. Experience indicates that the more heavily saturated with (and independent the factors the subscales are, the more closely the model will resemble the distance (D) model derived from Osgood D values. The output lists each concept and associated E, P, and A values. Some investigators may wish to vary the program by changing the number of concepts, loadings for EPA values, number of subscales, etc. This can be done by having a programmer make such modifications in the program.

SD2PTD

Those familiar with the Osgood procedure recall that one of the statistics developed was D (Osgood, et al. 1957, p. 91ff), the distance in semantic space between two rated concepts. The Osgood D is obtained by first taking differences on the subscales. The SD2PTD program obtains the distance between concepts another way, by using the generalized distance formula between two points in space:

$$D = \sqrt{(X - X_1)^2 + (Y - Y_1)^2 + (Z - Z_1)^2}$$

and substituting E, P, and A for X, Y, and Z. E, P, and A would represent scores (means) for the first concept being compared, $E_1$, $P_1$, and $A_1$ for the second. Output is a matrix which indicates the distance between each concept and every other. In addition to being used in other programs, it does provide a check in the construction of EPA models.

SDGPD

A major way of looking at SD data is to follow the Osgood technique and to determine the D-values between each concept and every other concept. According to Osgood, D is a measure of profile similarity. Thus, if the concepts GOOD and BAD were each rated on nine subscales, the profiles could be compared. D is an index of the similarity of two profiles and is the square root of the sum of the squared differences between coordinate subscales on the two profiles. The larger the D, the greater the difference in similarity of ratings; the smaller the D, the greater the similarity. From the matrix of D's it is possible to build a semantic differential model (Osgood and Suci, 1952; Osgood, et al. 1957; Lawson, 1970, 1971). Output of program SDGPD is a matrix of distances between each concept and every other.

As mentioned above, a matrix of coordinates was also developed from program SDEPA. Then it was pointed out that it is possible to build a model from those values. The method developed by Osgood is somewhat more difficult. The concepts are plotted by distances between them (the D scores) rather than by X, Y, and Z coordinates. Anyone who has built such a model knows what a confusing and frustrating task it is.

One of the major difficulties of building the Osgood D model directly is confusion over which plane to put the location of the various concepts since the plots are made in distances between the concepts. The first three or four concepts plot rather easily. It is after that that the difficulties begin. However, building an EPA model first or drawing one first will significantly speed up the construction process. The labor time for construction of the D model is also cut down considerably, since the EPA model can be used as a guide. The investigator may also wish to make use of the next program which correlates the distances obtained from Program SD2PTD with those obtained by Osgood's D formula.

LRANK

This program has been adapted slightly from the LRANK subroutine of the IBM System/360 Scientific Subroutine Package. It computes the Spearman rank correlation between two sets of distance scores on the semantic differential: EPA values-SD2PTD from Program EPA and D values from SDGPD. The higher the correlation, the greater the similarity in the relationship of respective values indicating that the two approaches are more likely to be measuring the same factors.

```
C***********************************************************************
C*                                                                     *
C*        SEMANTIC DIFFERENTIAL F9OLSD = OBJECT FILE                   *
C*                                  F9SLSD = SOURCE FILE               *
C*                                                                     *
C*                                                                     *
C*    THIS PROGRAM CAN PERFORM THE COMPUTATIONS FOR:                   *
C*         1. MEANS AND STANDARD DEVIATIONS ON SUBSCALES               *
C*         2. MEANS AND STANDARD DEVIATIONS ON EVALUATION, POTENCY,    *
C*            AND ACTIVITY FACTORS (EPA SCORES)                        *
C*         3. OSGOOD D VALUES FOR ALL CONCEPTS                         *
C*         4. THE CORRELATION BETWEEN DISTANCE MEASURES OBTAINED       *
C*            FROM EPA SCORES AND OSGOOD'S D                           *
C*         5. TESTS OF SIGNIFICANCE OF DISTANCES OBTAINED WITH         *
C*            OSGOOD D.                                                *
C*                                                                     *
C*    THE PROGRAM READS A CARD FILE (F9LCRD) INTO A DISK FILE          *
C*    (F9LIO1). IT THEN FINDS THE EPA VALUES AND THE DISTANCES         *
C*    BETWEEN CONCEPTS USING THESE EPA'S.  NEXT IT CALCULATES THE      *
C*    MEANS AND THE D VALUES FOR THE SEMANTIC DIFFERENTIAL USING       *
C*    THESE MEANS.  FINALLY IT FINDS THE SPEARMAN RANK COEFFICIENT     *
C*    FOR THESE TWO DISTANCE TABLES.  IT WILL HANDLE ONE CASE WITH     *
C*    UP TO 30 CONCEPTS WITH 9 SUBSCALES PER CONCEPT.                  *
C*                                                                     *
C*    THE INPUT FILE (F9LCRD) AND THE DISK FILE (F9LIO1) HAVE THE      *
C*    FOLLOWING FORMAT:                                                *
C*                                                                     *
C*       RECORD     COL        CONTENTS                                *
C*         1         1-3       NUMBER OF CASES                         *
C*                   4-6       SPACE                                   *
C*                   7-9       NUMBER OF CONCEPTS                      *
C*                  10-12      SPACE                                   *
C*                  13-14      PRINT CODE                              *
C*                             01 - PRINTS MEANS AND MEANS DOUBLED     *
C*                             02 - PRINTS MEANS, MEANS DOUBLED,SUM,   *
C*                                  SUM SQUARES,STANDARD DEVIATION,    *
C*                                  STANDARD ERROR OF THE MEANS        *
C*                  15-17      SPACE                                   *
C*                  18-20      IDENT NUMBER OF 1ST CASE                *
C*                  21-23      SPACE                                   *
C*                  24-26      IDENT NUMBER OF      CASE               *
C*                                                                     *
C*         2         1-3       CASE IDENT NUMBER - NUMERIC             *
C*         3         1-3       CASE IDENT NUMBER                       *
C*                   4-6       CONCEPT IDENT NUMBER - NUMERIC          *
C*                   7-17      CONCEPT NAME - ALPHA                    *
C*                  18-71      SPACE                                   *
C*                  72-80      SUBSCALE SCORES - NUMERIC               *
C*                                                                     *
C*              REPEAT RECORD 3 AS NEEDED - 1 FOR EACH CONCEPT         *
C*              ENDING WITH A FINISH RECORD.                           *
C*                                                                     *
C*      LAST         1-3       -99 - FINISH RECORD                     *
C*                                                                     *
C*                                                                     *
C*    SINCE THIS IS A STUDENT JOB DESIGNED TO RUN UNDER OCL,           *
```

```
C*      THE DISK FILES ARE ALL DEFINED AS WORK FILES WHICH DIS-              *
C*      APPEAR WHEN THE JOB IS FINISHED.                                     *
C*                                                                           *
C*      IF THE NUMBER OF CONCEPTS AS LISTED ON CARD 1 DOES NOT               *
C*      AGREE WITH THE NUMBER OF DATA CARDS (1 PER CONCEPT), FILE            *
C*      F9LD01 WILL NOT BE CREATED AND YOU WILL GET AND ERROR                *
C*      MESSAGE ON THE SPD SAYING THE FILE IS NOT THERE.  AT THAT            *
C*      POINT PLEASE CHECK YOUR INPUT DATA.                                  *
C*                                                                           *
C*      THE PRINT FILES OF THE VARIOUS SUBROUTINES ARE STORED ON DISK        *
C*      AS F9LP02 AND THEN PRINTED OUT BY SUBROUTINE LAPRIN.                 *
C*                                                                           *
C*      THIS PROGRAM WAS DEVELOPED BY G.H.GOLDEN, B.L.METIVIER,              *
C*      F.D.LAWSON, AND K.F.CHMURA AT THE COMPUTER CENTER, STATE             *
C*      UNIVERSITY COLLEGE, FREDONIA, NEW YORK, 14063.                       *
C*                                                                           *
C*      THE FOLLOWING SUBROUTINES WERE REPRINTED BY PERMISSION FROM          *
C*      SYSTEM 1360 SCIENTIFIC SUBROUTINE PACKAGE (360A-CM-03X)              *
C*      VERSION III PROGRAMMER'S MANUAL, COPYRIGHT 1966,1967,                *
C*      1968 BY INTERNATIONAL BUSINESS MACHINES CORPORATION;                 *
C*           RANK    PAGE 71                                                 *
C*           TIE     PAGE 74                                                 *
C*           SRANK   PAGE 73                                                 *
C****************************************************************************
C*                                                                           *
C
C
C
$LST1
IDENT BLMAIN
SEGMENT EXIT!,ZIPMO!,EXP04!,EXIT,READ!,ENDTI!,EXP,ERROR!,EXPD2!,
      1WRITE!,ALOG,EXITF,TIE,SRANK,SQRT,RANK,SDEPA,SD2PTO,
      2SDMSM,SDGPO,LRANK,LAPRIN
SUMMARIZE ALL
FILE  6=F9LPRT,UNIT=PRINTER
FILE  9=F9LCRD,UNIT=READER
FILE  10=F9LI01,UNIT=DISK,RECORD=80,BLOCKING=5,WORKFILE
FILE  11=F9LP01,UNIT=DISK,RECORD=80,BLOCKING=5,WORKFILE
FILE  12=F9LD01,UNIT=DISK,RECORD=80,BLOCKING=5,WORKFILE
FILE  13=F9LP02,UNIT=DISK,RECORD=90,BLOCKING=10,WORKFILE
FILE  14=F9LD02,UNIT=DISK,RECORD=80,BLOCKING=5,WORKFILE
FILE  15=F9LP03,UNIT=DISK,RECORD=90,BLOCKING=10,WORKFILE
FILE  16=F9LD03,UNIT=DISK,RECORD=80,BLOCKING=5,WORKFILE
FILE  17=F9LD04,UNIT=DISK,RECORD=80,BLOCKING=5,WORKFILE
FILE  18=F9LP04,UNIT=DISK,RECORD=110,BLOCKING=10,WORKFILE
FILE  19=F9LP05,UNIT=DISK,RECORD=80,BLOCKING=5,WORKFILE
      DIMENSION ARRAY(80)
C
C
C  READ IN INPUT DATA FROM CARDS INTO DISKPACK FILE, BLTLA1
C
C
  100 READ(9,900,END=200)ARRAY
      WRITE(10,900)ARRAY
      GO TO 100
  200 CALL CLOSE(10,2HF )
```

```
C
C  CALL PROGRAM TO FIND E,P,A VALUES
C
      CALL SOEPA
C
C  CALL PROGRAM TO FIND DISTANCES BETWEEN CONCEPTS
C
      CALL SO2PTD
C
C  CALL PROGRAM TO FIND MEANS
C
      CALL SOMSM
C
C  CALL PROGRAM TO FIND D VALUES FOR SEMANTIC DIFFERENTIAL
C
      CALL SOGPD
C
C  CALL PROGRAM TO FIND SPEARMAN RANK COEFFICIENT
C
      CALL LRANK
C
C  CALL PROGRAM TO PRINT OUT RESULTS
C
      CALL LAPRIN
C
      CALL ICMSTP
      STOP
  900 FORMAT(80A1)
      END
```

```
C
C*******************************************************************
C*                                                                 *
C*                SUBROUTINE SDEPA                                 *
C*                                                                 *
C*                                                                 *
C*      THIS PROGRAM IS FOR THE OSGOOD SEMANTIC DIFFERENTIAL      *
C*      IT COMPUTES EPA SCORES (EVALUATION, POTENCY, ACTIVITY)    *
C*      BASED UPON SCORES OF SELECTED SUBSCALES. SCORES ARE       *
C*      AVERAGED.                                                  *
C*                                                                 *
C*      THE PROGRAM CAN ALSO COMPUTE THE SUM, SUMS OF SQUARES,    *
C*      THE STANDARD DEVIATIONS,STANDARD ERROR OF THE MEAN        *
C*      IF THESE ARE NEEDED. SEE BELOW FIRST RECORD OF INPUT      *
C*      FILE.                                                      *
C*                                                                 *
C*      VARIABLES N1 THRU N9 CONTAIN SUBSCALE NUMBERS OF          *
C*      VARIABLES COMPOSING AVERAGE E-VALUE, P-VALUE, A-VALUE.    *
C*           N1=1ST E SUBSCALE NUMBER                              *
C*           N2=2ND E SUBSCALE NUMBER                              *
C*           N3=3RD E SUBSCALE NUMBER                              *
C*           N4=1ST P SUBSCALE NUMBER                              *
C*           N5=2ND P SUBSCALE NUMBER                              *
C*           N6=3RD P SUBSCALE NUMBER                              *
C*           N7=1ST A SUBSCALE NUMBER                              *
C*           N8=2ND A SUBSCALE NUMBER                              *
C*           N9=3RD A SUBSCALE NUMBER                              *
C*                                                                 *
C*     THE INPUT DATA IS A DISK FILE (F9LI01) CONTAINING           *
C*     THE FOLLOWING INFORMATION:                                  *
C*                                                                 *
C*     RECORD    COL       CONTENTS                                *
C*       1       1-3       NUMBER OF CASES                         *
C*               4-6       SPACE                                   *
C*               7-9       NUMBER OF CONCEPTS                      *
C*              10-12      SPACE                                   *
C*              13-14      PRINT CODE                              *
C*                         01 - PRINTS MEANS AND MEANS DOUBLED     *
C*                         02 - PRINTS MEANS, MEANS DOUBLED,SUM,   *
C*                              SUM SQUARES,STANDARD DEVIATION,    *
C*                              STANDARD ERROR OF THE MEANS        *
C*              15-17      SPACE                                   *
C*              18-20      IDENT NUMBER OF 1ST CASE                *
C*              21-23      SPACE                                   *
C*              24-26      IDENT NUMBER OF LAST CASE               *
C*                                                                 *
C*       2       1-3       CASE IDENT NUMBER - NUMERIC             *
C*       3       1-3       CASE IDENT NUMBER                       *
C*               4-6       CONCEPT IDENT NUMBER - NUMERIC          *
C*               7-17      CONCEPT NAME - ALPHA                    *
C*              18-71      SPACE                                   *
C*              72-80      SUBSCALE SCORES - NUMERIC               *
C*                                                                 *
C*          REPEAT RECORD 3 AS NEEDED - 1 FOR EACH CONCEPT         *
C*                                                                 *
C*     LAST      1-3       -99                                     *
```

```
C*                                                              *
C*                                                              *
C*                                                              *
C*                                                              *
C****************************************************************
C
C
C
C
      SUBROUTINE SDEPA
      REAL MEANS2(30,3)
      REAL IV
      REAL MEANS(30,3) ,NSUM(30,3),NSMSQ(30,3)
      DIMENSION IV(30,9),STDEV(30,3),SEOM(30,3),ALPHA(30,11)
C
      N1=1
      N2=6
      N3=7
      N4=2
      N5=5
      N6=8
      N7=3
      N8=4
      N9=9
      READ(10,75)L,N,IPSW,LTAG1,LTAG2
   75 FORMAT(I3,3X,I3,3X,I2,2(3X,I3))
      WRITE(11,75)L,N,IPSW,LTAG1,LTAG2
C
C          INITIALIZE VARIABLES
C
C
    5 CONTINUE
      RNOP=0
      DO 11 J=1,3
      DO 11 IC=1,N
      NSUM(IC,J)=0
      STDEV(IC,J)=0
      SEOM(IC,J)=0
      MEANS(IC,J)=0
   11 NSMSQ(IC,J)=0
      DO 12 IC=1,N
      DO 12 J=1,9
   12 IV(IC,J)=0
C
C
C
C
C          READ IN ONE CASE IDENT RECORD PLUS N CONCEPT RECORDS
C
C
C
    1 READ(10,91,END=199)  LTAG
   91 FORMAT(I3)
      IF(LTAG.LT.0) GO TO 4
      ITAG =LTAG
      DO 200 K = 1,N
      READ(10,989) IC
```

```
 989  FORMAT(3X,I3)
      REREAD
 88   READ(10,99)(ALPHA(IC,L),L=1,11), (IV(IC,J),J=1,9)
 99   FORMAT(6X,11A1,54X,9F1.0)
      WRITE(11,76)(ALPHA(IC,L),L=1,11),IC,(IV(IC,J),J=1,9)
   76 FORMAT(1X,11A1,2X,I3,3X,9F6.0)
C     REVERSE  EVEN  SCALES
      DO 888 J=1,9,2
 888  IV(IC,J)=8 - IV(IC,J)
      IV(IC,1)=IV(IC,N1)+IV(IC,N2)+IV(IC,N3)
      IV(IC,1)=IV(IC,1)/3.
      IV(IC,2)=IV(IC,N4)+IV(IC,N5)+IV(IC,N6)
      IV(IC,2)=IV(IC,2)/3.
      IV(IC,3)=IV(IC,N7)+IV(IC,N8)+IV(IC,N9)
      IV(IC,3)=IV(IC,3)/3.
  200 CONTINUE
C
C
C         COUNT NUMBER OF CASES
C
C
    3 RNOP=RNOP+1
      DO 10 J=1,3
      DO  10 IC=1,N
C
C     THIS COMPUTES THE SUMS
C
      NSUM(IC,J)=NSUM(IC,J)+IV(IC,J)
C
C     THIS COMPUTES THE SUMS OF THE SQUARES
C
   10 NSMSQ(IC,J)=(IV(IC,J)**2)+NSMSQ(IC,J)
      GO TO 1
    4 DO 13 J=1,3
      DO 13 IC=1,N
C
C     THIS COMPUTES THE MEAN
C
      MEANS (IC,J)= NSUM(IC,J)/RNOP
C
C     THIS COMPUTES THE STANDARD DEVIATION
C
      STDEV(IC,J)=((NSMSQ(IC,J)/RNOP)-(MEANS(IC,J)**2))**.5
C
C     THIS COMPUTES THE STANDARD ERROR OF THE MEANS
C
   13 SEOM(IC,J)=STDEV(IC,J)/((RNOP-1)**.5)
C
C
C
C*********************************************************************
C*                                                                   *
C*        PRINT MEANS AND MEANS DOUBLED AND CREATE OUTPUT FILE       *
C*        (F9LD02) WITH THE FOLLOWING FORMAT:                        *
C*           RECORD      COLS      CONTENTS                          *
C*             1          1-3      NUMBER OF CONCEPTS - NUMERIC      *
```

```
C*              2            1          SPACE                                  *
C*                           2-4        CONCEPT IDENT NUMBER                   *
C*                           5-11       MEAN DOUBLED OF E                      *
C*                           12-18      MEAN DOUBLED OF P                      *
C*                           19-25      MEAN DOUBLED OF A                      *
C*                           26-30      SPACE                                  *
C*                           31-41      CONCEPT NAME - ALPHA                   *
C*          3 - (N+1)                   SAME AS RECORD 2 - ONE FOR EACH        *
C*                                      CONCEPT                                *
C*                                                                             *
C******************************************************************************
C
C
      WRITE(11,97)
   97 FORMAT(/////,1X,'THE MEANS ARE'/7X'E'6X'P'6X'A'/)
      N1=1
      WRITE(12,1001)N,N1,N1
      WRITE(11,100)(IC,(MEANS(IC,J),J=1,3),(ALPHA(IC,K),K=1,11),IC=1,N)
  900 FORMAT(1X,I3,3F7.3,5X,11A1)
  100 FORMAT(1X,I3,'-', 3F8.3,5X,11A1)
      DO 50 J=1,N
      DO 50 M=1,3
C
C
C         CALCULATE MEANS2 - MEANS DOUBLED
C
C
50    MEANS2(J,M)=MEANS(J,M)*2.0
      WRITE(12,900)(IC,(MEANS2(IC,J),J=1,3),(ALPHA(IC,K),K=1,11),IC=1,N)
      WRITE(11,970)
970   FORMAT(///,1X'THE MEANS DOUBLED ARE'/7X'E'6X'P'6X'A'/)
      WRITE(11,100)(IC,(MEANS2(IC,J),J=1,3),(ALPHA(IC,K),K=1,11),IC=1,N)
  102 FORMAT(1X,I3,3F7,3)
1001  FORMAT(3(I3,3X))
      GO TO (301,300) IPSW
C               SUMS
300   WRITE(11,96)
   96 FORMAT(/////,1X,'THE SUMS ARE',/)
      WRITE(11,100) (IC,(NSUM(IC,J),J=1,03),(ALPHA(IC,K),K=1,11),IC=1,N)
  201 FORMAT(1X,I2,'-',3F6.0)
C               SUMS OF THE SQUARES
      WRITE(11,95)
   95 FORMAT(/////,1X,'THE SUMS OF THE SQUARES ARE',/)
      WRITE(11,100)(IC,(NSMSQ(IC,J),J=1,03),(ALPHA(IC,K),K=1,11),IC=1,N)
   90 FORMAT (1X,I2,'-',3F8.0)
C               STANDARD DEVIATIONS
      WRITE(11,94)
   94 FORMAT(/////,1X,'THE STANDARD DEVIATIONS ARE',/)
      WRITE(11,100)(IC,(STDEV(IC,J),J=1,03),(ALPHA(IC,K),K=1,11),IC=1,N)
      WRITE(11,93)
   93 FORMAT(/////,1X,'THE STANDARD ERRORS OF THE MEANS ARE',/)
      WRITE(11,100) (IC,(SEOM(IC,J),J=1,03),(ALPHA(IC,K),K=1,11),IC=1,N)
  199 CALL CLOSF(10,2HF )
      CALL CLOSF(11,2HF )
      CALL CLOSF(12,2HF )
      RETURN

  301 GO TO 5
      END
```

```
C
C*********************************************************************
C*                                                                   *
C*                    SUBROUTINE SD2PTD                              *
C*                                                                   *
C*                                                                   *
C*  THIS PROGRAM IS FOR USE WITH SEMANTIC DIFFERENTIAL PROGRAMS.     *
C*                                                                   *
C*    THE PROGRAM COMPUTES THE DISTANCE BETWEEN TWO CONCEPTS         *
C*    (VARIABLES) AS DEVELOPED IN SUBROUTINE SDEPA.  SDEPA YIELDS    *
C*    THREE VALUES ON THE EVALUATIVE, POTENCY AND ACTIVITY           *
C*    FACTORS OF THE SEMANTIC DIFFERENTIAL.                          *
C*                                                                   *
C*    THIS PROGRAM WAS DEVELOPED BY G.H.GOLDEN,JR., R.L.METIVIER,    *
C*    AND E.D.LAWSON AT THE COMPUTER CENTER, STATE UNIVERSITY        *
C*    COLLEGE AT FREDONIA, NEW YORK, 14063.  THIS PROGRAM WILL       *
C*    HANDLE UP TO 30 CONCEPTS, I.E. CONCEPT N1 TO CONCEPT N2        *
C*    WHERE N2=N1+(N-1) AND CONCEPT K IS FOUND IN RECORD(K+1) IN     *
C*    THE INPUT FILE, F9LD01.  THIS IS A DISK FILE CREATED BY        *
C*    SUBROUTINE SDEPA WITH THE FOLLOWING FORMAT:                    *
C*                                                                   *
C*       RECORD     COL     CONTENTS                                 *
C*         1        1-3     NUMBER OF CONCEPTS                       *
C*         2        1       SPACE                                    *
C*                  2-4     CONCEPT IDENT NUMBER                     *
C*                  5-11    VALUE OF E                               *
C*                 12-18    VALUE OF P                               *
C*                 19-25    VALUE OF A                               *
C*                 26-30    SPACE                                    *
C*                 31-41    CONCEPT - ALPHA                          *
C*                 42-80    SPACE                                    *
C*      3-(N+1)    SAME AS RECORD 2 - ONE RECORD FOR EACH CONCEPT    *
C*                                                                   *
C*                                                                   *
C*    OUTPUT FROM THIS PROGRAM IS A DISK FILE, F9LD02, FOR USE       *
C*    IN LRANK, THE CORRELATION SUBROUTINE.  THE VALUES RE-          *
C*    CORDED WILL BE THE DISTANCES BETWEEN CONCEPT 1 AND 2 TO N      *
C*    IN THE 1ST (N-1) RECORDS, CONCEPT 2 AND 3 TO N IN THE NEXT     *
C*    (N-2) RECORDS, CONCEPT 3 AND 4 TO N IN THE NEXT (N-3)          *
C*    RECORDS, ETC.                                                  *
C*                                                                   *
C*                                                                   *
C*                                                                   *
C*********************************************************************
C
C
      SUBROUTINE SD2PTD
      DIMENSION E(30),P(30),A(30),D(30,29),G(30),ALPHA(30,11)
C
      READ(12,80)N,N1,N2
      WRITE(14,80)N,N1,N2
   80 FORMAT(3(I3,3X))
      M=N-1
C     WRITE(13,108)
  108 FORMAT(1X,"CONC",3X,"E",6X,"P",6X,"A"/" NO."//)
  109 FORMAT(///" THE DISTANCES BETWEEN THE CONCEPTS ARE SHOWN BELOW"/
```

```
     1" FIRST GROUP OF ROWS SHOWS CONCEPT 01 AGAINST 02, 03, 04 ETC."/
     2" SECOND GROUP OF ROWS SHOWS CONCEPT 02 AGAINST 03, 04, 05, ETC."/
     3" THIRD GROUP SHOWS CONCEPT 03 AGAINST  THE OTHERS. FOURTH GROUP=/
     4CONCEPT 04 ETC. =="/
     =1X," 2      3      4      5      6      7      8      9      10     11     1
     =2     13     14     15     ")
      DO 5 I=1,N
      READ(12,10)IC,E(I),P(I),A(I),(ALPHA(I,J),J=1,11)
C     WRITE(13,10)IC,E(I),P(I),A(I),(ALPHA(I,J),J=1,11)
  5   CONTINUE
C
C         WRITE HEADING
C
      WRITE(13,109)
10    FORMAT(1X,I3,3F7.3,5X,11A1)
      DO 15 I=1,M
      DO 15 K=1,N
15    D(K,I)   = 0.0
      DO 20 K=1,M
      L=K+1
      DO 20 J=L,N
      I=J-1
20    D(K,I)=SQRT(((E(J)-E(K))**2)+((P(J)-P(K))**2)+((A(J)-A(K))**2))
      J=0
      DO 110 K=1,M
      DO 100 I=K,M
      J=J+1
      G(J)=D(K,I)
C
C
C         WRITE DISTANCE MATRIX TO DISK FILE (F9,D02)
C
C         PRINT OUT DISTANCE MATRIX
C
C
  100 WRITE(14,601)G(J)
      L2=15
      DO 105 L=1,J,15
      IF(L2.GT.J)L2=J
      WRITE(13,602)(G(J1),J1=L,L2)
  105 L2=L2+15
      WRITE(13,603)
  110 J=0
  601 FORMAT(F6,2)
  602 FORMAT(15F6.2)
  603 FORMAT(1X,//)
      CALL CLOSF(13,2HF )
      CALL CLOSF(14,2HF )
      RETURN
C
      END
```

```
C
C*****************************************************************************
C*                                                                           *
C*                      SUBROUTINE SDMSM                                     *
C*                                                                           *
C*                                                                           *
C*                                                                           *
C*      THIS PROGRAM COMPUTES THE MEAN, THE MEAN DOUBLED, THE SUM,           *
C*      THE SUM OF THE SQUARES, THE STANDARD DEVIATIONS, STANDARD            *
C*      ERROR OF THE MEANS FOR SUB-SCALES 1-9 ON THE OSGOOD SEMAN-           *
C*      TIC DIFFERENTIAL.  IT WILL PROCESS UP TO AND INCLUDING               *
C*      30 CONCEPTS AND WILL PRINT OUT RESULTS ACCORDING TO PRINT            *
C*      CODE DESCRIBED BELOW.                                                *
C*                                                                           *
C*      THE PROGRAM WAS DEVELOPED BY F.D.LAWSON, G.H.GOLDEN, K.F.            *
C*      CHMURA, R.L.METIVIER AT THE COMPUTER CENTER, STATE                   *
C*      UNIVERSITY COLLEGE, FREDONIA, NEW YORK, 14063.                       *
C*                                                                           *
C*      THE INPUT DATA IS A DISK FILE (F9L001) CONTAINING                    *
C*       THE FOLLOWING INFORMATION:                                          *
C*                                                                           *
C*       RECORD      COL          CONTENTS                                   *
C*          1        1-3          NUMBER OF CASES                            *
C*                   4-6          SPACE                                      *
C*                   7-9          NUMBER OF CONCEPTS                         *
C*                  10-12         SPACE                                      *
C*                  13-14         PRINT CODE                                 *
C*                                01 - PRINTS MEANS                          *
C*                                02 - PRINTS MEANS, SUM, SUM SQUARES,       *
C*                                     STANDARD DEVIATION, STANDARD          *
C*                                     ERROR OF THE MEANS                    *
C*                  15-17         SPACE                                      *
C*                  18-20         IDENT NUMBER OF 1ST CASE                   *
C*                  21-23         SPACE                                      *
C*                  24-26         IDENT NUMBER OF LAST CASE                  *
C*                                                                           *
C*          2        1-3          CASE IDENT NUMBER - NUMERIC                *
C*          3        1-3          CASE IDENT NUMBER                          *
C*                   4-6          CONCEPT IDENT NUMBER - NUMERIC             *
C*                   7-17         CONCEPT NAME - ALPHA                       *
C*                  18-71         SPACE                                      *
C
C*                                                                           *
C*              REPEAT RECORD 3 AS NEEDED - 1 FOR EACH CONCEPT               *
C*                                                                           *
C*          REPEAT THIS RECORD GROUP, ONE FOR EACH CASE, ENDING              *
C*          WITH A FINISH RECORD FOLLOWING THE LAST CONCEPT OF               *
C*          THE LAST CASE.  (GROUP=RECORDS 2 AND 3)                          *
C*                                                                           *
C*      LAST         1-3          -99                                        *
C*                                                                           *
C*                                                                           *
C*****************************************************************************
```

```
C
C
      SUBROUTINE SDMSM
      REAL IV
      REAL MEANS(30,9) ,NSUM(30,9),NSMSQ(30,9),MEANS2(30,9)
      DIMENSION IV(30,9),STDEV(30,9),SEOM(30,9),ALPHA(30,11)
C
      READ(10,92)L,N,IPSW
92    FORMAT(I3,3X,I3,3X,I2)
      ASSIGN 1001 TO NUM
      IF(L.EQ.1)ASSIGN 1000 TO NUM
C
C
C         INITIALIZE VARIABLES
C
C
      RNOP=0
      DO 11 J=1,9
      DO 11 IC=1,N
      NSUM(IC,J)=0
      IV(IC,J)=0
      STDEV(IC,J)=0
      SEOM(IC,J)=0
      MEANS(IC,J)=0
      MEANS2(IC,J)=0
   11 NSMSQ(IC,J)=0
C
C
C         READ INPUT DATA
C
C
    1 READ(10,91,END=300)  LTAG
   91 FORMAT(I3)
      IF(LTAG.LT.0) GO TO 4
      DO 200 K = 1,N
      READ(10,989) IC
 989  FORMAT(3X,I3)
      REREAD
 88   READ(10,99)(ALPHA(IC,L),L=1,11), (IV(IC,J),J=1,9)
 99   FORMAT(6X,11A1,54X,9F1.0)
      DO 150 J=1,9,2
  150 IV(IC,J)=8-IV(IC,J)
  200 CONTINUE
C
C         COUNT THE NUMBER OF CASES
C
C
    3 RNOP=RNOP+1
      DO 10 J=1,9
      DO  10 IC=1,N
C     THIS COMPUTES THE SUMS
      NSUM(IC,J)=NSUM(IC,J)+IV(IC,J)
C     THIS COMPUTES THE SUMS OF THE SQUARES
   10 NSMSQ(IC,J)=(IV(IC,J)**2)+NSMSQ(IC,J)
      GO TO 1
    4 DO 13 J=1,9
      DO 13 IC=1,N
C     THIS COMPUTES THE MEAN
      MEANS (IC,J)= NSUM(IC,J)/RNOP
```

```
C     THIS COMPUTES THE STANDARD DEVIATION
      STDEV(IC,J)=((NSMSQ(IC,J)/RNOP)-(MEANS(IC,J)**2))**.5
C     THIS COMPUTES THE STANDARD ERROR OF THE MEANS
   13 SEOM(IC,J)=STDEV(IC,J)/((RNOP-1)**.5)
      WRITE(15,80)
80    FORMAT(1H1,/" COMPUTER PRINTOUT FOR THE SEMANTIC DIFFERENTIAL"//)
      GO TO NUM,(1000,1001)
1000  WRITE(15,970)
970   FORMAT(1H0,"THE SCORES OF THE SUBSCALES ARE"/)
C
C***********************************************************************
C*                                                                     *
C*        WRITE 4 GROUPS OF OUTPUT AND CREATE DISK FILE(F9LD03)        *
C*          WITH THE FOLLOWING FORMAT:                                 *
C*                                                                     *
C*        RECORD     COL     CONTENTS                                  *
C*          1        1-3     NUMBER OF CONCEPTS                        *
C*          2        1       SPACE                                     *
C*                   2-4     NUMBER OF CONCEPTS                        *
C*                   5-11    VALUE OF 1ST MEAN  XXX.XXX                *
C*                  12-18    VALUE OF 2ND MEAN  XXX.XXX                *
C*                  19-67    VALUES OF 3RD THRU 9TH MEANS              *
C*                  68-69    SPACE                                     *
C*                  70-80    CONCEPT - ALPHA                           *
C*          3       SAME FORMAT AS RECORD 2 BUT FOR 2ND CONCEPT        *
C*       4-(N+1)    INFORMATION FOR REMAINING CONCEPTS                 *
C*                                                                     *
C***********************************************************************
C
      GO TO 1002
1001  WRITE(15,97)
97    FORMAT (1H ,"THE MEANS OF THE SUBSCALES ARE "//)
C              MEANS
  101 FORMAT(1X,I3,9F7.3,2X,11A1)
   86 FORMAT(3(I3,3X))
1002  WRITE(15,100)(IC,(MEANS(IC,J),J=1,9),(ALPHA(IC,K),K=1,11),IC=1,N)
      N1=1
      WRITE(16,86)N,N1,N1
      WRITE(16,101)(IC,(MEANS(IC,J),J=1,9),(ALPHA(IC,K),K=1,11),
     1IC=1,N)
  100 FORMAT(1X,I3,"-",9F7.3,5X,11A1)
      IF(IPSW.NE.2) GO TO 199
C THESE STATEMENTS ARE EXECUTED WITH PRESENT CODE 2
C              SUMS
      WRITE(15,96)
   96 FORMAT(/////,1X,"THE SUMS ARE",/)
      WRITE(15,201)    (IC,(NSUM(IC,J),J=1,9),IC=1,N)
  201 FORMAT(1X,I3,"-",9F6.0)
C              SUMS OF THE SQUARES
      WRITE(15,95)
   95 FORMAT(/////,1X,"THE SUMS OF THE SQUARES ARE",/)
      WRITE(15,90)     (IC,(NSMSQ(IC,J),J=1,9),IC=1,N)
   90 FORMAT(1X,I3,"-",9F8.0)
C              STANDARD DEVIATIONS
      WRITE(15,94)
   94 FORMAT(/////,1X,"THE STANDARD DEVIATIONS ARE",/)
```

```
      WRITE(15,102)    (IC,(STDEV(IC,J),J=1,9),IC=1,N)
      WRITE(15,93)
   93 FORMAT(/////,1X,"THE STANDARD ERRORS OF THE MEANS ARE",/)
      WRITE(15,102)    (IC,(SEOM (IC,J),J=1,9),IC=1,N)
  102 FORMAT(1X,I3,"=",9F7.3)
  199 CALL CLOSF(15,2HF )
      CALL CLOSF(16,2HF )
      CALL CLOSF(10,2HF )
      RETURN
  300 STOP
      END

C***********************************************************************
C*                                                                     *
C*                                                                     *
C*                        SUBROUTINE SDGPD                             *
C*                                                                     *
C*                                                                     *
C*    THIS PROGRAM COMPUTES THE D VALUES FOR THE SEMANTIC DIFFEREN-    *
C*    TIAL USING THE GENERALIZED DISTANCE FORMULA:                     *
C*                                                                     *
C*                 D=SQUARE ROOT OF SUM OF D SQUARED                   *
C*                                                                     *
C*                 (SEE OSGOOD, SUCI & TANNENBAUM P.91)                *
C*                                                                     *
C*    DISTANCES ARE COMPUTED BETWEEN EACH CONCEPT AND EVERY OTHER      *
C*    CONCEPT.  THIS PROGRAM WILL HANDLE UP TO 30 CONCEPTS, I.E.       *
C*    CONCEPT N1 TO CONCEPT N2 WHERE N2=N1+N-1 AND CONCEPT K IS        *
C*    FOUND IN RECORD (K+1) IN THE INPUT FILE.                         *
C*                                                                     *
C*    THIS PROGRAM WAS DEVELOPED BY K.J.CHMURA, G.H.GOLDEN, JR., B.    *
C*    L.METIVIER & E.D.LAWSON AT THE COMPUTER CENTER, STATE            *
C*    UNIVERSITY COLLEGE, FREDONIA, NEW YORK, 14063.                   *
C*                                                                     *
C*    DATA INPUT IS THE DISK FILE (F9LD03), CREATED BY SUBROUTINE      *
C*    SDMSM, WHICH IS THE MEANS OF THE SUBSCALES.  IT IS STORED IN     *
C*    THE FOLLOWING FORMAT:                                            *
C*                                                                     *
C*       RECORD     COL      CONTENTS                                  *
C*         1        1-3      NUMBER OF CONCEPTS                        *
C*         2        1        BLANK                                     *
C*                  2-4      CONCEPT IDENT NUMBER - INTEGER            *
C*                  5-11     VALUE OF MEAN OF SUBSCALE 1               *
C*                 12-18     VALUE OF MEAN OF SUBSCALE 2               *
C*                 19-25     VALUE OF MEAN OF SUBSCALE 3               *
C*                 26-32     VALUE OF MEAN OF SUBSCALE 4               *
C*                 33-39     VALUE OF MEAN OF SUBSCALE 5               *
C*                 40-46     VALUE OF MEAN OF SUBSCALE 6               *
C*                 47-53     VALUE OF MEAN OF SUBSCALE 7               *
C*                 54-60     VALUE OF MEAN OF SUBSCALE 8               *
C*                 61-67     VALUE OF MEAN OF SUBSCALE 9               *
C*                 68-69     SPACE                                     *
C*                 70-80     CONCEPT NAME - ALPHA                      *
C*                                                                     *
C*       REPEAT RECORD 2 AS NEEDED - ONE FOR EACH CONCEPT              *
C*                                                                     *
C*       RECORD 2 HAS THE MEANS OF THE SUBSCALES FOR THE 1ST           *
C*       CONCEPT, RECORD 3 FOR THE 2ND CONCEPT, RECORD 4 FOR THE       *
C*       3RD CONCEPT AND SO ON UNTIL ALL CONCEPTS (N1 TO N2) HAVE      *
C*       BEEN INCLUDED.                                                *
```

```
C*                                                                            *
C*     OUTPUT FROM THIS PROGRAM IS A DISK FILE, F9LDO4, FOR USE IN            *
C*     LRANK, THE CORRELATION SUBROUTINE.  THE VALUES RECORDED                *
C*     WILL BE THE DISTANCES BETWEEN CONCEPT 1 AND (2 TO N) IN THE            *
C*     1ST (N-1) RECORDS, CONCEPT 2 AND (3 TO N) IN THE NEXT (N-2)            *
C*     RECORDS, CONCEPT 3 AND (4 TO N) IN THE NEXT (N-3) RECORDS, ETC.        *
C*                                                                            *
C******************************************************************************
C
C
C
C
      SUBROUTINE SDGPD
      REAL MEAN(30)
      DIMENSION BA(30,9),SUM (30,29),ALPHA(30,11)
  108 FORMAT(1H1)
C     M=NUMBER OF CONCEPTS RATED
      READ(16,101)M,N1,N2
      WRITE(17,101)M,N1,N2
  101 FORMAT(3(I3,3X))
      MM=M-1
      DO 4 I=1,M
      DO 4 J=1,MM
      SUM(J,I)=0
4     MEAN(I)=0
C     WRITE(18,102)
C
C
C        READ IN INPUT FILE
C
C
      DO 100 I=1,M
      READ(16,105)IC,(BA(I,J),J=1,9),(ALPHA(I,K),K=1,11)
C     WRITE(18,105)IC,(BA(I,J),J=1,9),(ALPHA(I,K),K=1,11)
  100 CONTINUE
      WRITE(18,112)
  102 FORMAT(1X,"CONC",3X,"1",6X,"2",6X,"3",6X,"4",6X,"5",6X,"6",6X,
     1"7",6X,"8",6X,"9"/" NO."/)
  105 FORMAT(1X,I3,9F7.3,2X,11A1)
      DO 21 K=1,MM
      L=K+1
      DO 21 J=L,M
      I=J-1
      DO 20 NN=1,9
   20 SUM(K,I)=((BA(J,NN)-BA(K,NN))**2) + SUM(K,I)
   21 SUM(K,I)=SQRT(SUM(K,I))
C
C
C        WRITE HEADING
C
C
      WRITE(18,109)
  109 FORMAT(" THE OSGOOD DEES BETWEEN THE CONCEPTS ARE SHOWN BELOW"/
     1" FIRST GROUP OF ROWS SHOWS CONCEPT 01 AGAINST 02, 03, 04 ETC,"/
     2" SECOND GROUP OF ROWS SHOWS CONCEPT 02 AGAINST 03, 04, 05 ETC,"/
     3" THIRD GROUP SHOWS CONCEPT 03 AGAINST THE OTHERS. FOURTH GROUP-/
     4 CONCEPT 04 ETC. **"/
     -16X,"2      3      4      5      6      7      8      9      10     11     1
     -2     13     14     15     16")
      DO 30 K=1,MM
      J=0
```

```
      DO 40 I=K,MM
      J=J+1
   40 MEAN(J)=SUM(K,I)
      L2=15
C
C
C        WRITE DISTANCE MATRIX TO DISK FILE (F9,004)
C
C        PRINT OUT DISTANCE MATRIX
C
C
      WRITE(17,6020)(MEAN(L),L=1,J)
      ICON=N1+K-1
      DO 25 L=1,J,15
      IF(L2.GT.J)L2=J
      WRITE(18,110)ICON,(MEAN(J1),J1=L,L2)
   25 L2=L2+15
      WRITE(18,112)
   30 CONTINUE
      CALL CLOSF(17,2HF )
      CALL CLOSF(18,2HF )
      RETURN
      STOP
6020  FORMAT(F6.2)
  110 FORMAT(1X,"CONC ",I3,3X,15F6.2)
  112 FORMAT(1X,//)
      END
```

```
C
C***********************************************************************
C*                                                                     *
C*                                                                     *
C*                        SUBROUTINE LRANK                             *
C*                                                                     *
C*                                                                     *
C*      THIS PROGRAM RANKS THE D VALUES COMPUTED IN SUBROUTINE         *
C*      SDGPD AND THE EPA DISTANCES COMPUTED IN SUBROUTINE SD2PTD.     *
C*      IT THEN COMPUTES THE SPEARMAN RANK CORRELATION COEFFICIENT     *
C*      FOR THE TWO GROUPS OF DATA.  IT HANDLES A DISTANCE MATRIX      *
C*      FOR UP TO 30 CONCEPTS.                                         *
C*                                                                     *
C*      THE PROGRAM WAS DEVELOPED BY G.H.GOLDEN, R.L.METIVIER AND      *
C*      F.D.LAWSON AT THE COMPUTER CENTER, STATE UNIVERSITY COLLEGE    *
C*      FREDONIA, NEW YORK, 14063,                                     *
C*                                                                     *
C*      DATA IS INPUT FROM 2 DISK FILES:                               *
C*            F9LD02 - CREATED BY SUBROUTINE SD2PTD                    *
C*            F9LD04 - CREATED BY SUBROUTINE SDGPD                     *
C*                                                                     *
C*      BOTH FILES HAVE THE FOLLOWING FORMAT:                          *
C*                                                                     *
C*            RECORD      CONTENTS                                     *
C*            1-(N-1)     DISTANCES BETWEEN THE 1ST CONCEPT AND CONCEPTS *
C*                        2 TO N - XXX.XX                              *
C*            N-(2N-3)    DISTANCES BETWEEN THE 2ND CONCEPT AND CONCEPTS *
C*                        3 TO N - XXX.XX                              *
C*                .                                                    *
C*                .                                                    *
C*            N(N-1)/2    DISTANCE BETWEEN THE (N-1) CONCEPT AND CONCEPT N *
C*                                                                     *
C*      OUTPUT FROM THIS PROGRAM IS A PRINT FILE GIVING THE INDICATED  *
C*      RESULTS PLUS THE 1ST 10 VALUES FROM EACH OF THE ABOVE INPUT    *
C*      FILES,                                                         *
C*                                                                     *
C*      THE PROGRAM USES THE IBM SUBROUTINE RANK, TIE, AND SRANK.      *
C*                                                                     *
C*                                                                     *
C***********************************************************************
C
C
C
      SUBROUTINE LRANK
      DIMENSION A(435),B(435),R(870)
C
C
C        K = K3 = NUMBER OF CONCEPTS TO BE PROCESSED
C        K1= K4 = NUMBER OF 1ST CONCEPT
C        K2= K5 = NUMBER OF LAST CONCEPT
C
C
      READ(14,97)K,K1,K2
      READ(17,97)K3,K4,K5
   97 FORMAT(3(I3,3X))
      WRITE(19,92)K,K1,K2
```

```
   92 FORMAT(1X,3(I3,3X))
      NR=0
      N=(K*(K-1))/2
C
C
C         READ IN INPUT DATA
C
C                     ARRAY A=SD2PTD
C                     ARRAY B=SDGPD
C
C
      DO 100 I=1,N
      READ(14,99) A(I)
  100 READ(17,99) B(I)
   98 FORMAT (I2)
   99 FORMAT (F6.2)
      WRITE(19,96)K,K1,K2
      DO 200 I=1,10
  200 WRITE(19,94)A(I),B(I)
   94 FORMAT(1X,"A(I)=",F6.2,3X,"B(I)=",F6.2)
      CALL SRANK (A,B,R,N,RS,T,NDF,NR)
   96 FORMAT(1X,"NO. OF CONCEPTS= ",I3," CONCEPT NO. ",I3," TO CONCEPT
     1 NO. ",I3)
      WRITE (19,90) RS,T,NDF
   90 FORMAT ("0 SPEARMAN RANK CORRELATION COEFFICIENT=",F5.2/
     -" SIGNIFICANCE=",F8.3/" NUMBER OF DEGREES OF FREEDOM=",I5)
      CALL CLOSE(19,2HF )
      RETURN
      END
```

```
C     SUBROUTINE SRANK
C
C     PURPOSE
C        TEST CORRELATION BETWEEN TWO VARIABLES BY MEANS OF SPEARMAN
C        RANK CORRELATION COEFFICIENT
C
C     USAGE
C        CALL SRANK(A,B,R,N,RS,T,NDF,NR)
C
C     DESCRIPTION OF PARAMETERS
C        A    - INPUT VECTOR OF N OBSERVATIONS FOR FIRST VARIABLE
C        B    - INPUT VECTOR OF N OBSERVATIONS FOR SECOND VARIABLE
C        R    - OUTPUT VECTOR FOR RANKED DATA, LENGTH IS 2*N. SMALLEST
C               OBSERVATION IS RANKED 1, LARGEST IS RANKED N. TIES
C               ARE ASSIGNED AVERAGE OF TIED RANKS.
C        N    - NUMBER OF OBSERVATIONS
C        RS   - SPEARMAN RANK CORRELATION COEFFICIENT (OUTPUT)
C        T    - TEST OF SIGNIFICANCE OF RS (OUTPUT)
C        NDF  - NUMBER OF DEGREES OF FREEDOM (OUTPUT)
C        NR   - CODE, 0 FOR UNRANKED DATA IN A AND B, 1 FOR RANKED
C               DATA IN A AND B (INPUT)
C
C     REMARKS
C        T IS SET TO ZERO IF N IS LESS THAN TEN
C
C     SUBROUTINES AND FUNCTION SUBPROGRAMS REQUIRED
C        RANK
C        TIE
C
C     METHOD
C        DESCRIBED IN S. SIEGEL, "NONPARAMETRIC STATISTICS FOR THE
C        BEHAVIORAL SCIENCES", MCGRAW-HILL, NEW YORK, 1956,
C        CHAPTER 9
      SUBROUTINE SRANK(A,B,R,N,RS,T,NDF,NR)
      DIMENSION A(1),B(1),R(1)
C
      FN=FLOAT(N)
      FNNN=(FN**3)-FN
C
C        DETERMINE WHETHER DATA IS RANKED
C
      IF(NR-1) 5, 10, 5
C
C        RANK DATA IN A AND B VECTORS AND ASSIGN TIED OBSERVATIONS
C        AVERAGE OF TIED RANKS
C
      NS=0
    5 CALL RANK (A,R,N,RS,T,NDF,NS)
      NS=N
      CALL RANK (B,R,N,RS,T,NDF,NS)
      GO TO 40
C
C        MOVE RANKED DATA TO R VECTOR
C
   10 DO 20 I=1,N
   20 R(I)=A(I)
```

```
      DO 30 I=1,N
      J=I+N
   30 R(J)=R(I)
C
C          COMPUTE SUM OF SQUARES OF RANK DIFFERENCES
C
   40 D=0.0
      DO 50 I=1,N
      J=I+N
   50 D=D+(R(I)-R(J))*(R(I)-R(J))
C
C          COMPUTE TIED SCORE INDEX
C
      KT=1
      NS=0
      CALL TIE (R,N,KT,TSA,NS)
      NS=N
      CALL TIE (R,N,KT,TSB,NS)
C
C          COMPUTE SPEARMAN RANK CORRELATION COEFFICIENT
C
      IF(TSA) 60,55,60
   55 IF(TSB) 60,57,60
   57 RS=1.0-6.0*D/FNNN
      GO TO 70
   60 X=FNNN/12.0-TSA
      Y=X+TSA-TSB
      RS=(X+Y-D)/(2.0*(SQRT(X*Y)))
      WRITE(19,97)FNNN,X,Y,D
   97 FORMAT(1X,"FNNN=",G10.4,"   X=",G10.4,"   Y=",G10.4,"   D=",G10.4)
C
C          COMPUTE T AND DEGREES OF FREEDOM IF N IS 10 OR LARGER
C
      T=0.0
   70 IF(N-10) 80,75,75
   75 CONTINUE
      T=RS*SQRT(FLOAT(N-2)/(1.0-RS*RS))
   80 NDF=N-2
      RETURN
      END
```

```
C       SUBROUTINE TIE
C
C       PURPOSE
C          CALCULATE CORRECTION FACTOR DUE TO TIES
C
C       USAGE
C          CALL TIE(R,N,KT,T)
C
C       DESCRIPTION OF PARAMETERS
C          R   - INPUT VECTOR OF RANKS OF LENGTH N CONTAINING VALUES
C                1 TO N
C          N   - NUMBER OF RANKED VALUES
C          KT  - INPUT CODE FOR CALCULATION OF CORRECTION FACTOR
C                   1    SOLVE EQUATION 1
C                   2    SOLVE EQUATION 2
C          T   - CORRECTION FACTOR (OUTPUT)
C                   EQUATION 1    T=SUM(CT**3-CT)/12
C                   EQUATION 2    T=SUM(CT*(CT-1)/2)
C                 WHERE CT IS THE NUMBER OF OBSERVATIONS TIED FOR A
C                       GIVEN RANK
C       REMARKS
C          NONE
C
C       SUBROUTINES AND FUNCTION SUBPROGRAMS REQUIRED
C          NONE
C
C       METHOD
C          VECTOR IS SEARCHED FOR SUCCESSIVELY LARGER RANKS. TIES ARE
C          COUNTED AND CORRECTION FACTOR 1 OR 2 SUMMED.
C
C
C
        SUBROUTINE TIE(R,N,KT,T,NS)
        DIMENSION R(1)
C
C          INITIALIZATION
C
        T=0.0
        Y=0.0
      5 X=1.0E38
        IND=0
C
C          FIND NEXT LARGEST RANK
C
        DO 30 I=1,N
        IF(R(NS+I)-Y) 30,30,10
     10 IF(R(NS+I)-X) 20,30,30
     20 X=R(NS+I)
        IND=IND+1
     30 CONTINUE
C
C          IF ALL RANKS HAVE BEEN TESTED, RETURN
C
        IF(IND) 90,90,40
     40 Y=X
        CT=0.0
```

```
C
C         COUNT TIES
C
      DO 60 I=1,N
      IF(R(NS+I)-X) 60,50,60
   50 CT=CT+1.0
   60 CONTINUE
C
C         CALCULATE CORRECTION FACTOR
C
      IF(CT) 70,5,70
   70 IF(KT-1) 75,80,75
   75 T=T+CT*(CT-1.)/2.0
      GO TO 5
   80 T=T+(CT*CT*CT-CT)/12.0
      GO TO 5
   90 CONTINUE
      RETURN
      END

C         RANK A VECTOR OF VAL
C     USAGE
C         CALL RANK(A,R,N)
C     DESCRIPTION OF PARAMETERS
C         A - INPUT VECTOR OF N VALUES
C         R - OUTPUT VECTOR OF LENGTH N. SMALLEST VALUE IS RANKED 1,
C             LARGEST IS RANKED N. TIES ARE ASSIGNED AVERAGE OF TIED
C             RANKS
C         N - NUMBER OF VALUES
C     REMARKS
C         NONE
C     SUBROUTINES AND FUNCTION SUBPROGRAMS REQUIRED
C         NONE
C     METHOD
C         VECTOR IS SEARCHED FOR SUCCESSIVELY LARGER ELEMENTS. IF TIES
C         OCCUR, THEY ARE LOCATED AND THEIR RANK VALUE COMPUTED.
C         FOR EXAMPLE, IF 2 VALUES ARE TIED FOR SIXTH RANK, THEY ARE
C         ASSIGNED A RANK OF 6.5 (=(6+7)/2)
      SUBROUTINE RANK(A,R,N,RS,T,NDF,NS)
         DIMENSION A(1),R(1)
C
C         INITIALIZATION
      DO 10 I=1,N
   10 R(NS+I)=0.0
C
C         FIND RANK OF DATA
C
      DO 100 I=1,N
C
C         TEST WHETHER DATA POINT IS ALREADY RANKED
C
      IF(R(NS+I)) 20, 20, 100
C
```

```
C        *  DATA POINT TO BE RANKED
C
   20 SMALL=0.0
      EQUAL=0.0
      X=A(I)
      DO 50 J=1,N
      IF(A(J)-X) 30, 40, 50
C        COUNT NUMBER OF DATA POINTS WHICH ARE SMALLER
C
C
   30 SMALL=SMALL+1.0
      GO TO 50
C
C        COUNT NUMBER OF DATA POINTS WHICH ARE EQUAL
C
   4. EQUAL=EQUAL+1.0
         R(NS+J)=-1.0
   50 CONTINUE
C
C        TEST FOR TIE
C
      IF(EQUAL-1.0) 60, 60, 70
C

C        STORE RANK OF DATA POINT WHERE NO TIE
C
   60 R(NS+I)=SMALL+1.0
      GO TO 100
C
C        CALCULATE RANK OF TIED DATA POINTS
C
   70 P=SMALL + (EQUAL + 1.0)*0.5
      DO 90 J=I,N
      IF(R(NS+J)+1.0) 90, 80, 90
   80 R(NS+J)=P
   90 CONTINUE
  100 CONTINUE
      RETURN
      END
```

```
C
C*********************************************************************
C*                                                                   *
C*                        SUBROUTINE LAPRIN                          *
C*                                                                   *
C*                                                                   *
C*     THIS PROGRAM PRINTS OUT THE RESULTS OF THE FOLLOWING          *
C*     SUBROUTINES:                                                  *
C*               SUBROUTINE SOFPA                                    *
C*               SUBROUTINE SO2PTD                                   *
C*               SUBROUTINE SOMSM                                    *
C*               SUBROUTINE SOGPD                                    *
C*               SUBROUTINE LRANK                                    *
C*                                                                   *
C*     THE OUTPUT IS ONE PRINT FILE CONTAINING ALL OF THE PRINT      *
C*     FILES FROM THE ABOVE SUBROUTINES.                             *
C*                                                                   *
C*     THIS PROGRAM WAS DEVELOPED BY B.L.METIVIER AT THE COMPUTER    *
C*     CENTER , STATE UNIVERSITY COLLEGE, FREDONIA, NEW YORK,        *
C*     14063.                                                        *
C*                                                                   *
C*                                                                   *
C*********************************************************************
C
C
C
      SUBROUTINE LAPRIN
      DIMENSION ARRAY(110)
C     READ AND WRITE F9LP01
  100   READ(11,900,END=200)(ARRAY(I),I=1,80)
        WRITE(6,901)(ARRAY(I),I=1,80)
        GO TO 100
C
C     READ AND WRITE F9LP02
  200   READ(13,902,END=300) (ARRAY(I),I=1,90)
        WRITE(6,903)(ARRAY(I),I=1,90)
        GO TO 200
C
C     READ AND WRITE F9LP03
  300   READ(15,902,END=400)(ARRAY(I),I=1,90)
        WRITE(6,903)(ARRAY(I),I=1,90)
        GO TO 300
C
C     READ AND WRITE F9LP04
  400   READ(18,904,END=500)(ARRAY(I),I=1,110)
        WRITE(6,905)(ARRAY(I),I=1,110)
        GO TO 400
C
C     READ AND WRITE F9LP05
  500   READ(19,900,END=600)(ARRAY(I),I=1,80)
        WRITE(6,901)(ARRAY(I),I=1,80)
        GO TO 500
C
C
C     END OF REPORTS - WRITE INSTRUCTIONS
  600   WRITE(6,906)
```

```
C
      RETURN
C
C
C*************************************************************************
C*    FORMAT STATEMENTS                                                  *
C*                                                                       *
  900  FORMAT(80A1)
  901  FORMAT(1X,80A1)
  902  FORMAT(90A1)
  903  FORMAT(1X,90A1)
  904  FORMAT(110A1)
  905  FORMAT(1X,110A1)
  906  FORMAT(///1X,"IF THE CORRELATION IS .90 OR BETTER, YOU CAN BEGIN
     1CONSTRUCTION OF YOUR MODEL."//1X,"IF NOT PLEASE CHECK YOUR DATA CA
     2REFULLY.")
C*                                                                       *
C*                                                                       *
C*************************************************************************
      END
```

# Appendix F

## Sample Data Output (With Comments)

This is the output for the data shown in Figure 1 and Appendix D.

| 1 | 24 1 | 1 | 1 | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| GOOD | 1 | 1. | 7. | 1. | 7. | 4. | 7. | 1. | 4. | 4. |
| BAD | 2 | 7. | 1. | 4. | 1. | 1. | 1. | 7. | 4. | 4. |
| STRONG | 3 | 4. | 7. | 1. | 5. | 1. | 4. | 4. | 7. | 1. |
| WEAK | 4 | 4. | 1. | 7. | 1. | 7. | 4. | 7. | 1. | 7. |
| ACTIVE | 5 | 4. | 7. | 1. | 5. | 3. | 4. | 2. | 7. | 1. |
| PASSIVE | 6 | 4. | 1. | 7. | 1. | 7. | 4. | 7. | 4. | 7. |
| SELF | 7 | 1. | 5. | 4. | 6. | 4. | 7. | 1. | 4. | 1. |
| BOYFRIEND | 8 | 1. | 7. | 4. | 6. | 1. | 6. | 1. | 7. | 1. |
| WAR | 9 | 7. | 7. | 6. | 1. | 1. | 2. | 7. | 7. | 1. |
| POLICE | 10 | 3. | 7. | 1. | 3. | 1. | 6. | 5. | 7. | 5. |
| NURSING | 11 | 7. | 1. | 7. | 1. | 2. | 4. | 7. | 1. | 7. |
| HIGH SCHOOL | 12 | 1. | 7. | 4. | 6. | 7. | 7. | 1. | 4. | 4. |
| STEAKHOUSE | 13 | 5. | 7. | 1. | 7. | 3. | 7. | 5. | 4. | 4. |
| MOTHER | 14 | 1. | 2. | 6. | 6. | 7. | 7. | 6. | 2. | 6. |
| FATHER | 15 | 4. | 7. | 5. | 3. | 1. | 7. | 6. | 6. | 6. |
| SISTER | 16 | 4. | 5. | 4. | 3. | 4. | 4. | 3. | 4. | 4. |
| GARY | 17 | 5. | 7. | 7. | 1. | 1. | 7. | 2. | 7. | 4. |
| GREG | 18 | 5. | 4. | 6. | 6. | 2. | 4. | 4. | 5. | 5. |
| CAREER | 19 | 1. | 7. | 1. | 7. | 1. | 7. | 1. | 1. | 1. |
| DEATH | 20 | 7. | 7. | 7. | 1. | 1. | 1. | 7. | 4. | 7. |
| COLLEGE | 21 | 4. | 4. | 3. | 3. | 2. | 4. | 4. | 4. | 4. |
| HOMETOWN | 22 | 3. | 2. | 6. | 4. | 7. | 4. | 5. | 4. | 6. |
| HATE | 23 | 7. | 7. | 1. | 1. | 1. | 1. | 7. | 7. | 1. |
| LOVE | 24 | 1. | 7. | 1. | 7. | 1. | 7. | 1. | 1. | 1. |

Matrix 1. Output showing ratings as made by respondent on each of the subscales.

THE MEANS ARE

| | E | P | A | |
|---|---|---|---|---|
| 1- | 7.000 | 5.000 | 6.000 | GOOD |
| 2- | 1.000 | 4.000 | 3.000 | BAD |
| 3- | 4.000 | 7.000 | 6.333 | STRONG |
| 4- | 3.000 | 1.000 | 1.000 | WEAK |
| 5- | 4.667 | 6.333 | 6.333 | ACTIVE |
| 6- | 3.000 | 2.000 | 1.000 | PASSIVE |
| 7- | 7.000 | 4.333 | 5.667 | SELF |
| 8- | 6.667 | 7.000 | 5.667 | BOYFRIEND |
| 9- | 1.333 | 7.000 | 3.333 | WAR |
| 10- | 4.667 | 7.000 | 4.333 | POLICE |
| 11- | 2.000 | 2.667 | 1.000 | NURSING |
| 12- | 7.000 | 4.000 | 4.667 | HIGH SCHOOL |
| 13- | 4.333 | 5.333 | 6.000 | STEAKHOUSE |
| 14- | 5.333 | 1.667 | 3.333 | MOTHER |
| 15- | 4.333 | 6.667 | 2.667 | FATHER |
| 16- | 4.333 | 4.333 | 3.667 | SISTER |
| 17- | 5.333 | 7.000 | 2.000 | GARY |
| 18- | 3.667 | 5.000 | 3.667 | GREG |
| 19- | 7.000 | 5.000 | 7.000 | CAREER |
| 20- | 1.000 | 6.000 | 1.000 | DEATH |
| 21- | 4.000 | 4.667 | 4.000 | COLLEGE |
| 22- | 4.000 | 2.333 | 2.667 | HOMETOWN |
| 23- | 1.000 | 7.000 | 5.000 | HATE |
| 24- | 7.000 | 5.000 | 7.000 | LOVE |

Matrix 2. EPA values derived from scores.

THE MEANS DOUBLED ARE

| | E | P | A | |
|---|---|---|---|---|
| 1- | 14.000 | 10.000 | 12.000 | GOOD |
| 2- | 2.000 | 8.000 | 6.000 | BAD |
| 3- | 8.000 | 14.000 | 12.667 | STRONG |
| 4- | 6.000 | 2.000 | 2.000 | WEAK |
| 5- | 9.333 | 12.667 | 12.667 | ACTIVE |
| 6- | 6.000 | 4.000 | 2.000 | PASSIVE |
| 7- | 14.000 | 8.667 | 11.333 | SELF |
| 8- | 13.333 | 14.000 | 11.333 | BOYFRIEND |
| 9- | 2.667 | 14.000 | 6.667 | WAR |
| 10- | 9.333 | 14.000 | 8.667 | POLICE |
| 11- | 4.000 | 5.333 | 2.000 | NURSING |
| 12- | 14.000 | 8.000 | 9.333 | HIGH SCHOOL |
| 13- | 8.667 | 10.667 | 12.000 | STEAKHOUSE |
| 14- | 10.667 | 3.333 | 6.667 | MOTHER |
| 15- | 8.667 | 13.333 | 5.333 | FATHER |
| 16- | 8.667 | 8.667 | 7.333 | SISTER |
| 17- | 10.667 | 14.000 | 4.000 | GARY |
| 18- | 7.333 | 10.000 | 7.333 | GREG |
| 19- | 14.000 | 10.000 | 14.000 | CAREER |
| 20- | 2.000 | 12.000 | 2.000 | DEATH |
| 21- | 8.000 | 9.333 | 8.000 | COLLEGE |
| 22- | 8.000 | 4.667 | 5.333 | HOMETOWN |
| 23- | 2.000 | 14.000 | 10.000 | HATE |
| 24- | 14.000 | 10.000 | 14.000 | LOVE |

Matrix 3. EPA values which are used to build model.

Matrix 4. Next page. This shows the distances in three-dimensional space between each concept and every other concept. Scores in Matrix 3 were used to derive this data.

```
THE DISTANCES BETWEEN THE CONCEPTS ARE SHOWN BELOW
FIRST GROUP OF ROWS SHOWS CONCEPT 01 AGAINST 02, 03, 04 ETC.
SECOND GROUP OF ROWS SHOWS CONCEPT 02 AGAINST 03, 04, 05, ETC.
THIRD GROUP SHOWS CONCEPT 03 AGAINST  THE OTHERS. FOURTH GROUP=/CONCEPT 04 ETC. --
  2      3      4      5      6      7      8      9     10     11     12     13     14     15
13.56  7.24  15.10  5.42  14.14  1.49   4.11  13.15  6.99  14.89  3.33   5.37   9.17   9.17   7.21
 9.55  8.14   2.00 15.75   7.24 10.44  12.81   2.00

10.79  8.25  10.95  6.93  13.15 13.89   6.07   9.84  5.21  12.45  9.36   9.87   8.56   6.83  10.73
 5.85 14.56   5.66  6.46   6.90  7.21  14.56

16.18  1.89  14.76  8.14   5.50  8.03   4.22  14.31  9.12   3.46 12.53   7.39   7.57   9.07   6.70
 7.33 12.40   6.60 11.87   6.57  7.33

15.45  2.00  13.98 16.88  13.30 14.13   3.89  12.40 13.50   6.73 12.11   8.94  13.03   9.71  16.49
10.77  9.68   4.71 14.97  16.49

14.14  6.29   4.42  9.07   4.22 14.00   7.39   2.21 11.18   7.39  6.70   8.87   6.29   5.54  12.96
 5.89 10.93   7.92  5.54

13.15 15.52  11.53 12.47   2.40 11.57  12.31   6.63 10.26   7.57 11.22   8.14  15.62   8.94   8.27
 3.94 13.42  15.62

 5.37 13.37   7.57 14.08   2.11  5.73   7.83   9.29  6.67   9.66  7.89   2.98  15.56   6.90   9.38
13.20  2.98

11.64  4.81  15.79  6.36   5.77 11.94   7.63   8.14  7.80   8.25  4.85  14.82   7.83  12.31  11.41
 4.85

 6.96  9.93  13.10  8.69  13.33  6.18   8.06   8.43  6.18  14.08  5.12   7.21  10.83   3.40  14.08
```

| | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 12.17 | 7.63 | 4.76 | 10.93 | 3.46 | 5.54 | 4.85 | 4.67 | 8.14 | 10.11 | 4.90 | 10.00 | 7.45 | 8.14 |
| 12.68 | 12.26 | 8.38 | 9.84 | 7.83 | 11.12 | 7.83 | 16.30 | 6.96 | 8.25 | 5.25 | 11.96 | 16.30 | |
| 6.53 | 6.32 | 8.54 | 5.73 | 8.69 | 7.24 | 5.08 | 14.62 | 6.29 | 7.94 | 13.43 | 5.08 | | |
| 9.29 | 7.18 | 5.08 | 8.89 | 4.90 | 5.73 | 12.09 | 4.27 | 8.99 | 7.72 | 5.73 | | | |
| 10.28 | 5.74 | 11.00 | 7.48 | 10.46 | 13.12 | 6.70 | 3.27 | 14.14 | 10.46 | | | | |
| 5.08 | 2.49 | 4.11 | 10.71 | 7.57 | 4.85 | 8.69 | 8.17 | 10.71 | | | | | |
| 6.60 | 1.89 | 8.64 | 9.17 | 1.15 | 4.52 | 8.94 | 8.64 | | | | | | |
| 6.18 | 11.27 | 9.12 | 6.70 | 9.80 | 10.54 | 11.27 | | | | | | | |
| 9.43 | 7.80 | 1.16 | 5.73 | 7.18 | 9.43 | | | | | | | | |
| 17.09 | 8.51 | 11.81 | 13.27 | 0.00 | | | | | | | | | |
| 8.89 | 10.04 | 8.25 | 17.09 | | | | | | 12.04 | 11.81 | | | |
| 5.37 | 7.86 | 8.51 | | | | | | | 13.27 | | | | |

COMPUTER PRINTOUT FOR THE SEMANTIC DIFFERENTIAL

THE SCORES OF THE SUBSCALES ARE

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 7.000 | 7.000 | 7.000 | 7.000 | 4.000 | 7.000 | 7.000 | 4.000 | 4.000 | GOOD |
| 2 | 1.000 | 1.000 | 4.000 | 1.000 | 7.000 | 1.000 | 1.000 | 4.000 | 4.000 | BAD |
| 3 | 4.000 | 7.000 | 7.000 | 5.000 | 7.000 | 4.000 | 4.000 | 7.000 | 7.000 | STRONG |
| 4 | 4.000 | 1.000 | 1.000 | 1.000 | 1.000 | 4.000 | 1.000 | 1.000 | 1.000 | WEAK |
| 5 | 4.000 | 7.000 | 7.000 | 5.000 | 5.000 | 4.000 | 6.000 | 7.000 | 7.000 | ACTIVE |
| 6 | 4.000 | 1.000 | 1.000 | 1.000 | 1.000 | 4.000 | 1.000 | 4.000 | 1.000 | PASSIVE |
| 7 | 7.000 | 5.000 | 4.000 | 6.000 | 4.000 | 7.000 | 7.000 | 4.000 | 7.000 | SELF |
| 8 | 7.000 | 7.000 | 4.000 | 6.000 | 7.000 | 6.000 | 7.000 | 7.000 | 7.000 | BOYFRIEND |
| 9 | 1.000 | 7.000 | 2.000 | 1.000 | 7.000 | 2.000 | 1.000 | 7.000 | 7.000 | WAR |
| 10 | 5.000 | [illegible] | 7.000 | 3.000 | 7.000 | 6.000 | 3.000 | 7.000 | 3.000 | POLICE |
| 11 | 1.000 | 1.000 | 1.000 | 1.000 | 6.000 | 4.000 | 1.000 | 1.000 | 1.000 | NURSING |
| 12 | 7.000 | 7.000 | 4.000 | 6.000 | 1.000 | 7.000 | 7.000 | 4.000 | 4.000 | HIGH SCHOOL |
| 13 | 3.000 | 7.000 | 7.000 | 7.000 | 5.000 | 7.000 | 3.000 | 4.000 | 4.000 | STEAKHOUSE |
| 14 | 7.000 | 2.000 | 2.000 | 6.000 | 1.000 | 7.000 | 2.000 | 2.000 | 2.000 | MOTHER |
| 15 | 4.000 | 7.000 | 3.000 | 3.000 | 7.000 | 7.000 | 2.000 | 6.000 | 2.000 | FATHER |
| 16 | 4.000 | 5.000 | 4.000 | 3.000 | 4.000 | 4.000 | 5.000 | 4.000 | 4.000 | SISTER |
| 17 | 3.000 | 7.000 | 1.000 | 1.000 | 7.000 | 7.000 | 6.000 | 7.000 | 4.000 | GARY |
| 18 | 3.000 | 4.000 | 2.000 | 6.000 | 6.000 | 4.000 | 4.000 | 5.000 | 3.000 | GREG |
| 19 | 7.000 | 7.000 | 7.000 | 7.000 | 7.000 | 7.000 | 7.000 | 1.000 | 7.000 | CAREER |
| 20 | 1.000 | 7.000 | 1.000 | 1.000 | 7.000 | 1.000 | 1.000 | 4.000 | 1.000 | DEATH |
| 21 | 4.000 | 4.000 | 5.000 | 3.000 | 6.000 | 4.000 | 4.000 | 4.000 | 4.000 | COLLEGE |
| 22 | 5.000 | 2.000 | 2.000 | 4.000 | 1.000 | 4.000 | 3.000 | 4.000 | 2.000 | HOMETOWN |
| 23 | 1.000 | 7.000 | 7.000 | 1.000 | 7.000 | 1.000 | 1.000 | 7.000 | 7.000 | HATE |
| 24 | 7.000 | 7.000 | 7.000 | 7.000 | 7.000 | 7.000 | 7.000 | 1.000 | 7.000 | LOVE |

Matrix 5. Scores. This is Matrix 1 after conversion.

THE OSGOOD DFES BETWEEN THE CONCEPTS ARE SHOWN BELOW
FIRST GROUP OF ROWS SHOWS CONCEPT 01 AGAINST 02, 03, 04 ETC.
SECOND GROUP OF ROWS SHOWS CONCEPT 02 AGAINST 03, 04, 05 ETC.
THIRD GROUP SHOWS CONCEPT 03 AGAINST THE OTHERS. FOURTH GROUP=/ CONCEPT 04 ETC. --

| | | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CONC | 1 | 14.07 | 7.62 | 13.75 | 6.48 | 13.42 | 4.80 | 6.16 | 13.60 | 7.48 | 14.53 | 4.36 | 5.74 | 9.64 | 9.11 | 7.14 |
| CONC | 1 | 10.34 | 8.66 | 5.20 | 14.07 | 7.75 | 10.05 | 13.08 | 5.20 | | | | | | | |
| CONC | 2 | 10.30 | 9.00 | 11.22 | 8.49 | 12.92 | 13.27 | 7.68 | 10.20 | 6.08 | 14.32 | 11.36 | 12.12 | 9.75 | 7.94 | 10.91 |
| CONC | 2 | 7.94 | 14.39 | 7.35 | 6.48 | 9.11 | 7.94 | 14.39 | | | | | | | | |
| CONC | 3 | 14.32 | 2.83 | 13.34 | 7.68 | 5.66 | 7.94 | 5.10 | 13.38 | 9.54 | 6.08 | 12.61 | 7.68 | 6.71 | 8.66 | 7.55 |
| CONC | 3 | 8.19 | 11.14 | 6.00 | 11.09 | 6.56 | 8.19 | | | | | | | | | |
| CONC | 4 | 14.18 | 3.00 | 12.57 | 15.07 | 12.57 | 12.69 | 5.83 | 11.92 | 12.49 | 6.93 | 10.77 | 8.49 | 12.33 | 9.49 | 15.30 |
| CONC | 4 | 9.95 | 9.00 | 5.10 | 14.07 | 15.30 | | | | | | | | | | |
| CONC | 5 | 13.19 | 6.56 | 5.29 | 9.11 | 6.16 | 13.96 | 7.94 | 6.40 | 12.29 | 8.66 | 6.08 | 8.66 | 7.81 | 7.94 | 12.00 |
| CONC | 5 | 6.32 | 10.54 | 7.94 | 7.94 | | | | | | | | | | | |
| CONC | 6 | 12.21 | 14.14 | 11.45 | 11.58 | 6.56 | 11.53 | 12.12 | 7.14 | 9.75 | 7.94 | 11.18 | 8.66 | 15.59 | 9.49 | 8.49 |
| CONC | 6 | 4.12 | 13.08 | 15.59 | | | | | | | | | | | | |
| CONC | 7 | 4.80 | 12.17 | 8.77 | 13.42 | 4.69 | 7.48 | 8.72 | 9.27 | 6.32 | 9.06 | 7.75 | 5.66 | 13.82 | 7.14 | 8.94 |
| CONC | 7 | 12.81 | 5.66 | | | | | | | | | | | | | |
| CONC | 8 | 10.82 | 7.35 | 14.80 | 7.42 | 8.06 | 11.87 | 8.43 | 7.55 | 7.81 | 7.94 | 6.86 | 13.27 | 7.75 | 11.27 | 11.45 |
| CONC | 8 | 6.86 | | | | | | | | | | | | | | |
| | 9 | 9.00 | 10.68 | 13.42 | 10.77 | 14.07 | 8.12 | 8.25 | 8.00 | 8.49 | 13.93 | 6.86 | 7.94 | 11.31 | 5.10 | 13.93 |

| | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CONC 10 | 11.87 | 9.22 | 5.92 | 11.27 | 4.58 | 6.40 | 7.42 | 7.55 | 9.43 | 9.90 | 5.48 | 10.05 | 8.06 | 9.43 |
| CONC 11 | 13.93 | 12.00 | 10.00 | 9.49 | 8.72 | 10.95 | 8.25 | 15.03 | 7.42 | 8.06 | 8.12 | 12.41 | 15.03 | |
| CONC 12 | 7.62 | 7.87 | 9.38 | 6.63 | 9.80 | 8.60 | 8.00 | 13.67 | 8.43 | 8.12 | 14.00 | 8.00 | | |
| CONC 13 | 9.59 | 6.78 | 6.63 | 9.70 | 6.93 | 7.35 | 11.36 | 6.40 | 9.59 | 10.10 | 7.35 | | | |
| CONC 14 | 9.80 | 8.12 | 12.17 | 8.25 | 11.75 | 12.85 | 8.77 | 4.69 | 15.30 | 11.75 | | | | |
| CONC 15 | 6.32 | 5.48 | 6.00 | 10.77 | 7.68 | 5.92 | 8.83 | 9.59 | 10.77 | | | | | |
| CONC 16 | 6.78 | 4.69 | 8.83 | 8.31 | 2.65 | 5.66 | 8.83 | 8.83 | | | | | | |
| CONC 17 | 7.35 | 11.58 | 9.11 | 7.28 | 10.30 | 10.49 | 11.58 | | | | | | | |
| CONC 18 | 10.10 | 7.94 | 4.58 | 6.32 | 10.10 | 10.10 | | | | | | | | |
| CONC 19 | 15.00 | 8.66 | 12.57 | 13.42 | 0.00 | | | | | | | | | |
| CONC 20 | 8.12 | 10.05 | 9.00 | 15.00 | | | | | | | | | | |
| CONC 21 | 6.71 | 7.94 | 8.66 | | | | | | | | | | | |

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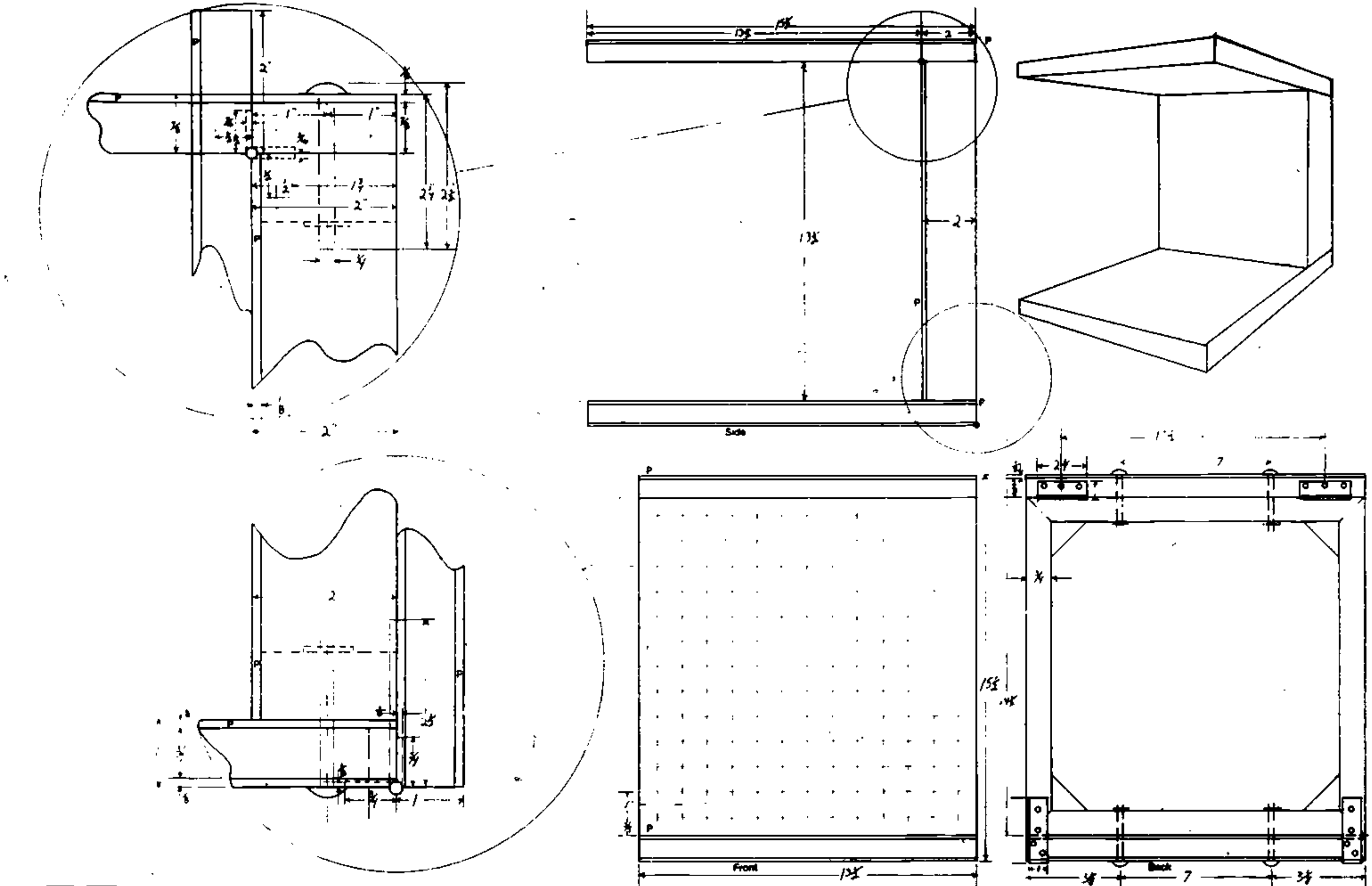
```
CONC  22    12.57 12.57


CONC  23    13.42


 24      1      1
NO. OF CONCEPTS=  24 CONCEPT NO.    1 TO CONCEPT    NO.    1
A(I)= 13.56    B(I)= 14.07
A(I)=  7.24    B(I)=  7.62
A(I)= 15.10    B(I)= 13.75
A(I)=  5.42    B(I)=  6.48
A(I)= 14.14    B(I)= 13.42
A(I)=  1.49    B(I)=  4.80
A(I)=  4.11    B(I)=  6.16
A(I)= 13.15    B(I)= 13.60
A(I)=  6.99    B(I)=  7.48
A(I)= 14.89    B(I)= 14.53
FNNN=0.2102E+08  X=0.1752E+07  Y=0.1752E+07  D=0.1413E+06
0 SPEARMAN RANK CORRELATION COEFFICIENT= 0.96
SIGNIFICANCE=  56.513
NUMBER OF DEGREES OF FREEDOM=  274


IF THE CORRELATION IS .90 OR BETTER, YOU CAN BEGIN CONSTRUCTION OF YOUR MODEL.
```




**CONSTRUCTION FRAME FOR SEMANTIC DIFFERENTIAL MODELS**

E. D. Lawson

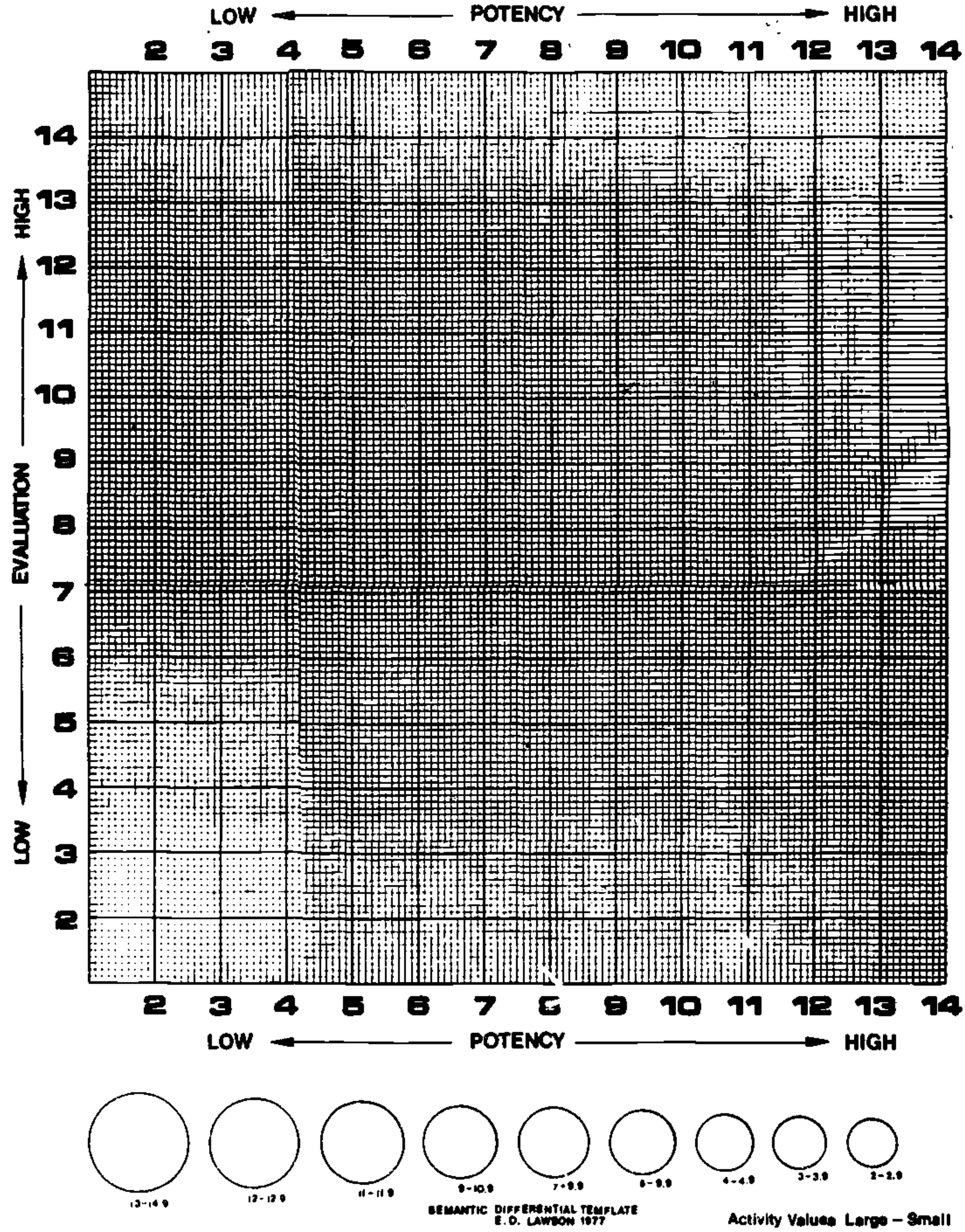
Drawn by Steve Skrzypek

Appendix G

Construction Frame for Building Model (Plans)

Appendix H

Template for Diagramming Model




Reduced--actual scale 15 x 15 inches.