

CRIMINOLOGY RESEARCH COUNCIL

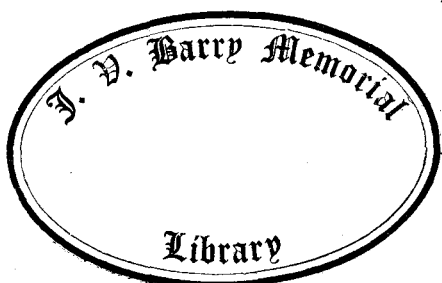
PERSON PERCEPTION AND BEHAVIOUR PATTERNS  
OF YOUNG FEMALE OFFENDERS.

( SUMMARY AND RECOMMENDATIONS )

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1978



EXPLANATORY NOTE

This report, prepared by Ms Patrice B. Cooke of the Institute of Human Development, North Perth, arises from a research project funded by the Criminology Research Council. The views expressed and the recommendations contained herein are the responsibility of the author and are not necessarily those of the Council.

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OF YOUNG FEMALE OFFENDERS

SUMMARY

Attempts at the therapeutic treatment of adolescent delinquents have been invariably disappointing. Despite the research that has been devoted to this problem, adequate diagnostic measures, treatment programs and methods of objectively evaluating relevant change as a result of treatment are still unavailable.

Aims of investigation

The main aims of the research documented in this report were:

- (i) to investigate the manner in which adolescent girls who persistently and seriously offend against the law, perceive their "person world";
- (ii) to identify to what extent, if at all, the offender's mode of perception differed from that of her peers who did not persistently and seriously offend;
- (iii) to investigate the behavioural correlates of specific perceptual patterns;
- (iv) to examine the possibility of using non-metric multi-dimensional analysis (MDS) of the person world of individual offenders as a means of differential diagnosis within a delinquent population and
- (v) to demonstrate the usefulness, or otherwise, of MDS as a means of measuring change in modes of perception during treatment, and as a pretreatment - post-treatment measure.

This research, then, was carried out with a view to exploring the person perception of "delinquent" adolescent girls, making predictions about the behavioural correlates of modes of perceiving and testing those predictions. It was hoped that in so doing the complex issues of differential diagnosis and treatment evaluation in relation to delinquency would be clarified a little.

Previous research by the author (Cooke, 1970) revealed that a group of delinquent adolescent girls, a matched control group of non-delinquents and an adult group of men and women who were attempting to modify the delinquents' behaviour, used the same two principal dimensions to structure their person worlds. Both adolescent groups used these two dimensions obliquely, while the adults used them independently of each other. The adult and non-delinquent adolescent groups clearly differentiated both dimensions, while there was comparative confusion in the way in which the delinquents used them. The dimensions were interpreted as a pleasure-displeasure dimension and a thought-feeling dimension respectively.

Up to this point, group data only had been analysed. In an attempt to find information relevant to differential diagnosis within the delinquent group, individual MDS solutions were investigated. Sixty-seven delinquent and 56 non-delinquent adolescent girls were required to judge 20 photographs on 12 constructs which had been previously elicited from a delinquent group. A modified form of Kelly's (1955) Repertory Grid technique was used to obtain similarity data and the resultant indirect proximities were analysed using a non-metric MDS program, namely the Guttman-Lingoes smallest space analysis (GLSSA-I). It was found that

(i) a two dimensional solution provided a satisfactory fit to individual data, although stress for Map Type II solutions tended to be higher

than that for other map type solutions.

- (ii) individual MDS solutions do permit grouping of subjects into subgroups, each subgroup being characterised by a typical configuration or "map type";
- (iii) the delinquent and non-delinquent samples differ in the relative frequencies of map types represented in each sample, rather than in the presence or absence of subgroups;
- (iv) Map Types I (almost "unidimensional"), II (lacking clear dimensional structure) and III (D-I clearly discriminated but "feeling" pole of D-II poorly differentiated from D-I) accounted for 95.5 per cent of the delinquent sample, as against 35.7 per cent of the non-delinquent group;
- (v) test-retest reliability coefficients for 19 individual MDS solutions were found to be significant for all but 2 subjects. The possibility of Map Type II solutions being produced by poorly motivated individuals responding randomly was considered.

Two trained observers who had been in residence with the delinquent adolescents for a minimum period of two weeks were requested to judge them on scales provided by the experimenter. The observers were not familiar with the map types.

On the basis of Kelly's Personal Construct Theory (Kelly, 1955) and findings of other research workers in delinquency, it was predicted that

- (i) those delinquent adolescents (subjects) who structure their person world in an almost unidimensional manner would show more impulsive behaviour and less insight than those who construe in a way typified by Map Types II and III;
- (ii) subjects who lack clear dimensional structure (Map Type II subjects)

would manifest more highly anxious, explosive, distraught behaviour than those using Map Types I or III solutions; while (iii) subjects who clearly define the "thought" pole but not the "feeling" pole of D-II would engage in manipulative and insightful behaviour but would show little anxiety, impulsivity, explosiveness and empathy.

The empathy and explosive scales did not significantly discriminate between subgroups for either judge. All other scales discriminated in the predicted direction for one or both judges. Interjudge reliabilities for all scales were significant. It was concluded that Map Type II subjects did appear to form a "true" subgroup and were not merely poorly motivated at the time of the test administrations.

The map types were then compared with Quay's (1964) psychopathic, neurotic and subcultural socialised delinquency factors. No significant relationship was found to exist between the map types and the factors. This finding gives indirect support to the results of other research workers which question the construct validity of Quay's Personal Opinion Inventory, a test which is frequently used for classification of delinquents for assessment and treatment purposes and for discriminating delinquents from other groups in research projects.

The final study carried out in this series was an investigation of the Picture Judging Test\* (as the data gathering procedure and non-metric analysis were labelled) as a means of measuring change in the manner individuals construe their person world as they go through a treatment program, and as a pre-treatment - post-treatment measure. The test was administered to delinquent adolescent girls, before, during and at the conclusion of treatment, and the map type solutions obtained

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\* A copyright is currently being taken out on this test and the test prepared for distribution.

in this manner were presented and discussed. Rank order correlations between interpoint distances for successive map solutions obtained for individual girls during the course of treatment were calculated, as were the correlations between interpoint distances for pre-treatment - post-treatment maps. Comparison of the geometrical configurations (maps) and the correlations indicated that the Picture Judging Test does appear to reflect faithfully changes in the individual's judgements about persons and interpersonal events. It was argued that if the map types are associated with specific behaviours, as was shown to be the case, changes in map type construing indicated changes in behaviour.

The results of these studies were discussed in terms of Kelly's Personal Construct Theory and were found generally to support the postulates of that theory. One of the most important findings was that "delinquents" are not particular "kinds of persons" or "personality types" but ordinary humans using inappropriate ways of structuring their person world and coping with social life. This was clearly demonstrated by the fact that the same map types were found in both delinquent and non-delinquent groups and confirmed by the finding that the individuals adopted several modes of construing as they went through treatment. That is, that delinquent behaviour appears to be related to the state of the individual or a "stance" adopted by a person rather than to a particular "personality type", "kind of person" or set of permanent and characteristic traits.

The presence of Map Types V and "Normal" in the delinquent sample suggests that there appears to be an element of choice, for some persons at least, in engaging in persistent deviant behaviour. The relatively high number of Map Type I solutions and the occurrence of Map Type III solutions among the non-delinquent group could be related to the fact that delinquency was legally defined, or alternatively, to the fact that if maladaptive construing was coupled with adverse

environmental factors, the probability of persistent and serious delinquency was greatly increased. The latter interpretation finds support from research showing that families of delinquent subjects are more disrupted and show more conflict between members than those of matched groups of non-delinquents.

It could be expected that similar map types would be manifested in the construct patterns of male adolescents. Map type frequencies could be expected to differ, perhaps, from those obtained with the two female adolescent groups because of cultural expectations for males, child-rearing practices and sex-role typing. Further research is indicated to explore whether the techniques and procedures employed in this investigation could be used productively in the assessment and treatment of adolescent male delinquents and adult offenders.

### Practical Implications

#### Diagnosis

The research appears to indicate that

- (1) For the most part youthful offenders are using inadequate modes of responding to personal threat or anxiety which in view of the research literature is likely to be related to unsatisfactory interpersonal relationships, particularly within the family group.



(ii) three specific and maladaptive modes of viewing one's person world emerged as accounting for the vast majority (95.5 per cent) of the sample of delinquent adolescent girls. The mode characterising the largest subgroup (53.7 per cent) indicated that the findings of the research reported here cast serious doubts upon the validity of case histories, interviews, questionnaires and self-report type data for a purpose of diagnosis. Persons shown in the present research to be confused and distraught but not impulsive and others who were clearly feelingless, insightful and capable of considerable control have been labelled by research workers using the above-mentioned methods of data gathering as highly impulsive. On the other hand persons shown to be highly impulsive have been diagnosed by these same authors as having merely introjected subcultural mores..

Another important conclusion to be drawn from present investigation is that offenders are not "men from Mars", nor are they necessarily different personality types from non-offenders. They are merely ordinary humans using inappropriate ways of structuring their person world and dealing with life. Furthermore, the offender in treatment is likely to loosen and tighten his construct system, perhaps several times, before re-ordering his constructs in an appropriate manner. In doing so, he will experience alternating states of confusion and relative stability as he moves from one mode of perceiving to another. Each time he does so, however, one can expect that if the treatment program or therapy in which he is participating is effective, he will approximate a more adequate mode of perceiving and interacting in social situations each time he loosens and tightens his construct system.

The fact that inappropriate construing had been adopted by

many non-offenders (even though the percentage of non-offenders using inadequate perceptual modes was significantly lower than that of the offender group,) indicates that adverse situational factors, particularly unsatisfactory relationships within the individual's primary group are likely to play an important part in heightening the probability that the individual will become a persistent and serious offender against the law.

### Treatment

It is not within the scope of this report to document fully the treatment program based on the foregoing research. However, the program has been used at the treatment centre (referred to in the report) for several years. Although recidivism rates are not an entirely satisfactory measure of the success of a program (for reasons mentioned in the full report ) it is noteworthy that the recidivism rate for girls who have undertaken this program since 1972 is 2.5 per cent.

The program involved

- (i) contracting with the young offenders in a manner which would reverse adverse peer group influences (see section 8.2).
- (ii) identifying the appropriate validational/invalidational experiences for each person in treatment.
- (iii) providing differential treatment for each person in a residential, group setting.
- (iv) providing a stable, consistent relationship with a surrogate parent figure who was trained to carry out the program over a long term.
- (v) long term placements where necessary.

It was considered important that social rather than materialistic

reinforcers be used whenever possible, and that a heavy reliance on reinforcers such as money, tokens or marks for socially acceptable behaviour is likely to increase manipulative and exploitive behaviour and place a "utilitarian" value on social interaction.

Specific treatment aspects aimed at changing the mal-adaptive perception and behaviour of offenders in the domain of social interaction differ for each subgroup of offenders identified in the research. A brief description of the behavioural characteristics of persons in each subgroup and appropriate treatment aspects are as follows:

#### Subgroup I

Persons in this subgroup use Map Type I construing and behave in a highly impulsive manner. They are concretistic in their approach to life, unable to predict the outcome of their actions and markedly lacking in insight. They respond on a displeasure-pleasure dimension and there is a marked absence of "second order" feeling (emotion or affect). They show little self-awareness and are insensitive to feeling in others. They are demanding, immature, present rather than future time-oriented and have a very low frustration tolerance.

Treatment should involve the provision of those conditions which will allow the individual to loosen his construct system. In this way permeability is increased and the reorganization of his constructs and the emergence of the superordinate feeling-thought construct is possible.

The conditions which could be expected to produce loosening are

- a secure environment
- a high degree of consistency
- a mature, well integrated care-taking adult (surrogate parent or therapist)

- a strong, nurturing and secure relationship with the therapist
- long term security seen as a real possibility
- invalidation of impulsive behaviour

These persons are likely to adopt the confused construing characteristic of Subgroup II construers before tightening their construct system into an appropriate pattern.

#### Subgroup II

Persons using Map Type II construing are characterised by highly anxious and distraught behaviour. They are confused in their thoughts and feelings and find it difficult to label their own experience. They are not markedly manipulative nor impulsive but may act aggressively in tense or anxious situations.

Treatment should include

- the reduction of anxiety and tension to tolerable levels to permit the tightening of the construct system.
- a high level of consistency in a controlled social environment
- the provision of long term security
- a strong, affirming and trusting relationship with the therapist
- clear, straight communication between the individual and the therapist and the individual and peers.
- frequent checking to ensure that message sent is message received.

The timing of appropriate validating and invalidating experiences relating to the self-concept and the individual's primary relationships is critical.

#### Subgroup III

Persons using Map Type III construing often engage in manipulative and exploitive behaviour. They are markedly lacking in affect and free from anxiety. These persons are insightful and capable of predicting the outcome of their actions, but they are

defective in paying heed to the delayed adverse consequences of their behaviour. They do not respond to the threat of punishment.

Treatment procedure should include

- the restriction of social contacts to the same group of persons over an appreciable period of time.
- the invalidation by the therapist and peer group members of exploitive and manipulative attempts at social interaction on the part of the individual.

If this procedure is continued over a sufficient period of time, the invalidation thus provided could be expected to produce loosening of the construct system and the consequent permeability which is a necessary condition if change is to ensue. The person in treatment should be encouraged to "experience" and identify the confusion and anxiety brought about by invalidation. With anxiety comes the experience of "second order" feeling (albeit negative feeling) and hopefully, the motivation for change. At this point in treatment validational/invalidational experiences related to the self-concept are critical. The possibility of a stable, long-term and caring relationship with the therapeutic agent must be present.

### Policy

The employment of shift workers, staff mobility, inappropriate short term placement and the "mass handling" of large numbers of offenders work together where they exist in the present services to heighten the possibility of hardening unacceptable behaviour of the offender into a well established pattern, and to increase the probability of recidivism. Most current policies in the area of delinquency sacrifice the person to the organizational needs of bureaucracy in a manner which is extremely counter-productive, not only for the offender, but for society. These policies are inefficient,

ineffectual and very costly.

The personal qualities and level of commitment required to carry out programs such as that outlined above cannot be purchased, nor can they be stipulated on a duty list.

The research literature clearly indicates that disrupted or destructive family relationships appear to be a most important causal factor in the development of serious and persistent anti-social behaviour. More emphasis needs to be placed on services which support and assist families. Children who are placed in residential child-care institutions are extremely vulnerable. Nevertheless, such placements may be in the best interests of the child. The type of caring required by such children, however, usually demands a level of commitment beyond that which is possible for most government employees. However, methods of funding which discriminate against non-government welfare agencies and the lack of adequate government subsidies in this area have worked against the mobilisation of personal resources within the community of the type and quality required. In fact, even where these resources have been organised and co-ordinated by community effort, and organisations have been seen to be providing the essentials of consistent and warm, responsible and "informed" care on a long term basis these resources have been dissipated and organisations have been forced to withdraw their services because of lack of adequate funding. The present practice of requiring that non-statutory agencies be at the mercy of government departments for their share of public moneys has had disastrous effects and valuable and irreplaceable resources have been lost.

#### Recommendations

It is recommended that

- (a) adequate subsidies be provided through legislation which

would encourage community involvement in the area of child care and the treatment of young offenders.

- (b) boards be established in each Australian State comprised of impartial and qualified persons from the community (as opposed to the bureaucracy ) to advise governments on community needs and the allocation of public moneys for both government and "voluntary" welfare programs.
- (c) the present system of "labelling", "processing" and "treating" young offenders be reconsidered.
- (d) further research in this area be actively encouraged and financially supported.
- (e) financial support be forthcoming which will make it possible for research findings to be applied.
- (f) community groups with the necessary expertise to provide services which will assist families to evolve and maintain stable and healthy relationships within the primary group be given the necessary funding through the means outlined in (b) above.
- (g) social welfare training in the areas under discussion be improved, and government funding made available on an impartial basis for the adequate training of persons from both the government and non-government sectors.
- (h) ongoing evaluation of government programs and policies related to this field be carried out by an impartial body and relevant information as to their effectiveness (or ineffectiveness) be available to the public.

In conclusion the unsatisfactory situation existing in Australia in relation to government responsibility to the community was noted by Brown in 1970, when he stated that

"Articulate and thoughtful people are finding the present role of the anonymous public servant and the silent bureaucracy increasingly anomalous. This is particularly true with respect to social affairs. There may be some areas of government where secrecy is necessary. Social development is not one of these. The only reasons I can see for it in social welfare are expedient ones, and therefore, to my mind, self-defeating ones in the long run. The use of welfare services to achieve political advantage, an unwillingness to be frank about policy intentions for fear of being held to account when goals are not achieved, and an inability to handle the admittedly complex task of involving the community - these are probably the most common reasons for a failure to disclose fully the principles of public policy."

Unfortunately, such a situation still exists in 1978.

Furthermore, community groups who by their actions or attitudes  
question this state of affairs can be readily disposed of or effect-  
ively controlled by discriminate funding by government departments.

Until governments relinquish their paternalistic role in welfare  
spheres and permit the community some say in its own welfare and the  
allocation of its resources, thereby encouraging reciprocal  
involvement and responsibility at an effective level, many of our  
present social problems , particuarly those which have been the  
subject of this report, can be expected to flourish.



APPENDIX IROLE TITLES

1. Your mother (or someone who has been a mother to you.)
2. Father (or someone who has been a father to you).
3. Best friend (male).
4. Best friend (female).
5. Yourself.
6. A person you do not like.
7. Someone who makes you happy.
8. Someone who does not like you.
9. Someone you admire.
10. Someone who makes you feel nervous.
11. A grown-up that you like.
12. Your teacher (or a teacher who taught you once).
13. A relative.
14. A popular person.
15. Someone who never seems to understand you.
16. A kind person.
17. Someone who makes you feel angry.
18. Someone for whom you feel sorry.
19. A happy person.
20. Someone who makes trouble.

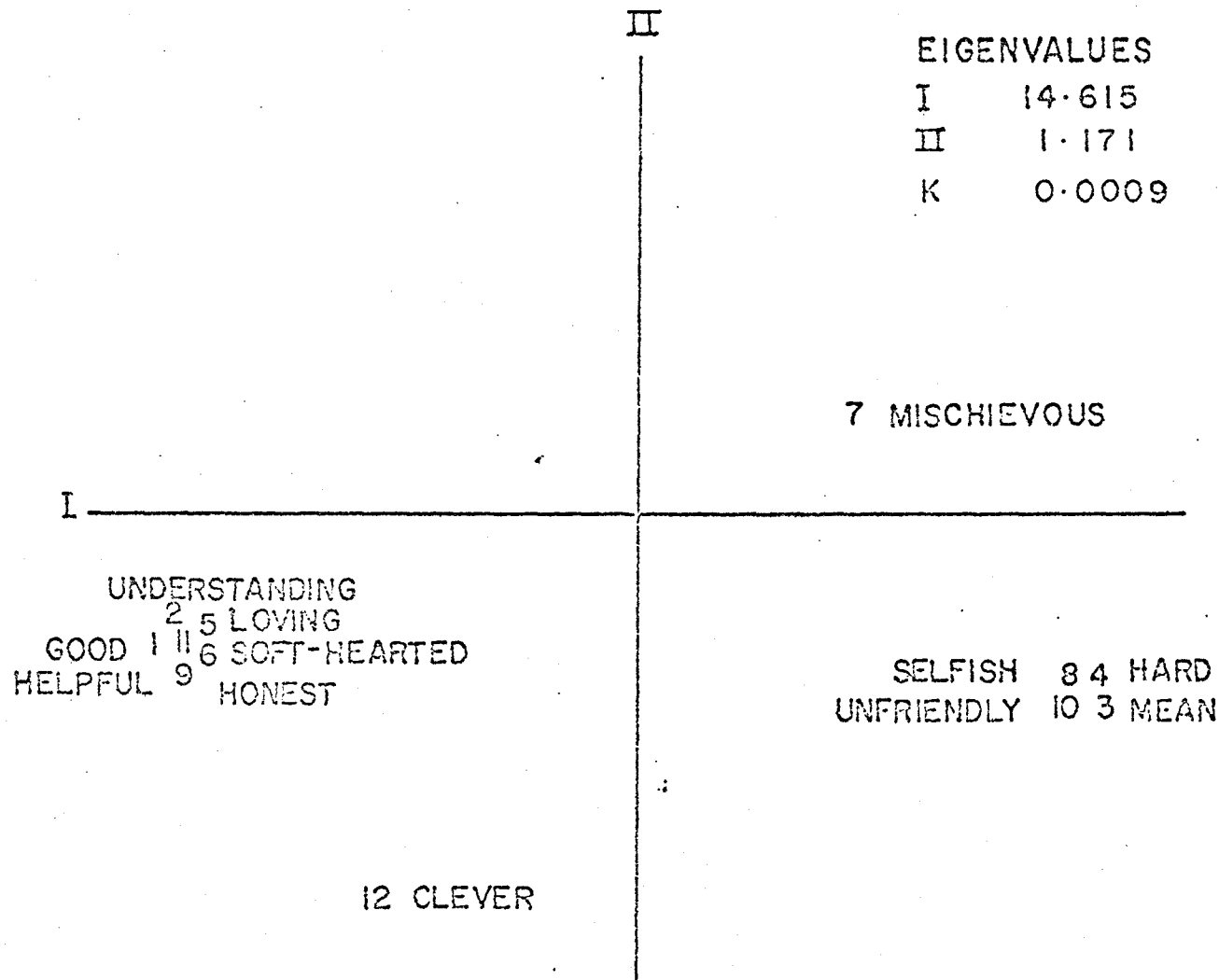
APPENDIX IICONSTRUCTS (PRELIMINARY INVESTIGATION\*)

1. Good
2. Understanding
3. Mean
4. Hard
5. Loving
6. Soft-hearted
7. Mischievous
8. Selfish
9. Honest
10. Unfriendly
11. Helpful
12. Clever

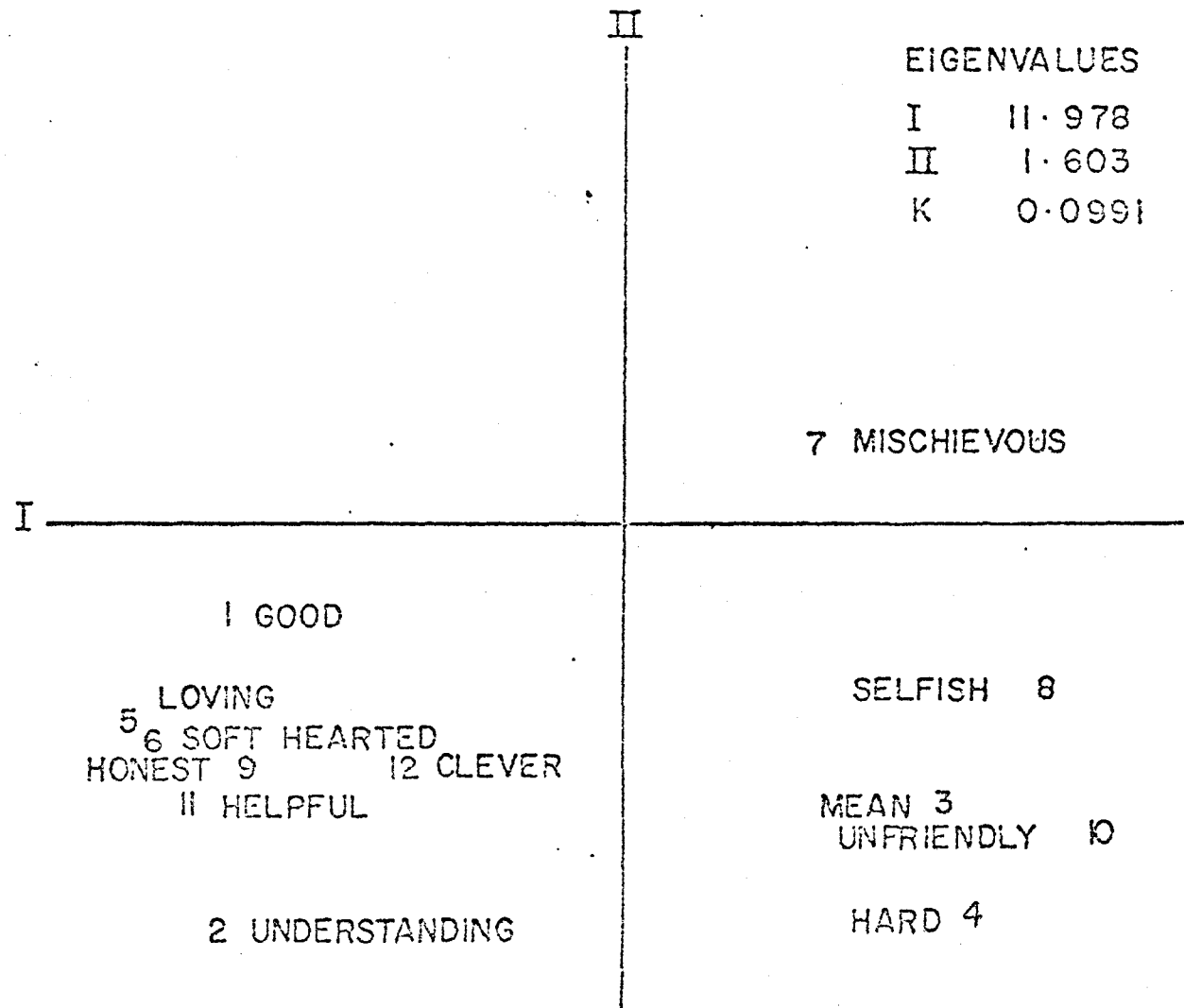
\*This construct set differs from those used in subsequent experiments.

APPENDIX III

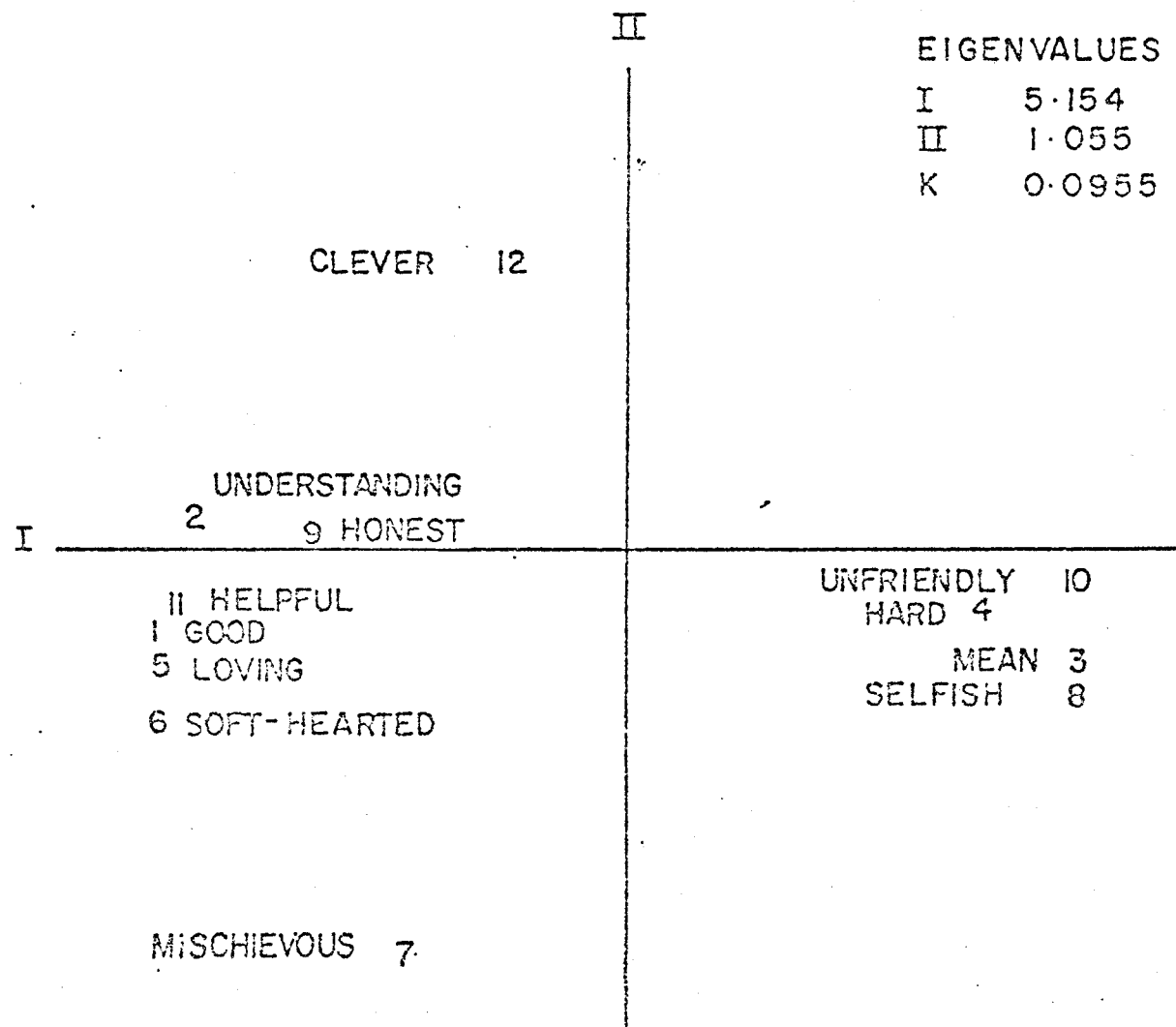
TWO DIMENSIONAL MDS SOLUTIONS OF CONSTRUCTS IN  
ELEMENT SPACE (GROUP DATA)



DISPERSION OF CONSTRUCTS IN ELEMENT-SPACE (NON-DELINQUENTS)



DISPERSION OF CONSTRUCTS IN ELEMENT-SPACE (DELINQUENTS)



DISPERSION OF CONSTRUCTS IN ELEMENT-SPACE (ADULTS)

APPENDIX IV :COORDINATES FOR GROUP MDS SOLUTION:VALIDATION OF DIMENSION II

(NON-DELINQUENTS)

I	II
95.339	-13.512
-86.569	-51.711
-16.058	17.622
-100.000	-34.813
69.281	-86.970
71.321	-97.316
-86.550	-52.827
100.000	-14.689
-30.370	4.690
3.975	-100.000
89.102	10.775
-9.751	23.467

APPENDIX VINDIVIDUAL MDS SOLUTIONS OF 4 SUBJECTS FROM EACH  
OF SUBGROUPS I, II, III, V AND "N".

(GLSSA-I does not produce solutions with a consistent orientation of axes. In the interests of consistency maps presented elsewhere in this report were redrawn if necessary to ensure that constructs I, 8 and II were always presented on the right hand side of the major axis. No attempt has been made to do so in the solutions presented in this appendix.)



COORDINATES: MAP TYPE I SOLUTIONSSUBJECT A

I	II
-90.064	-55.767
93.322	-91.356
-72.263	-42.262
79.925	-35.241
-55.431	-27.046
85.515	-76.768
100.000	-71.589
-100.000	-92.102
-69.183	-63.149
-86.351	-75.475
-82.294	-100.000
-32.917	-83.853

SUBJECT B

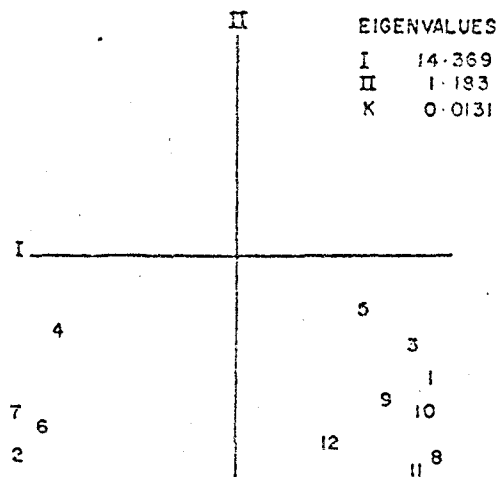
I	II
92.517	-95.284
-100.000	-83.275
94.657	-80.185
-99.290	-87.487
95.920	-100.000
-97.352	-98.829
-98.813	-88.682
95.327	-87.482
91.475	-77.991
96.043	-98.164
100.000	-91.862
90.404	-83.930

SUBJECT C

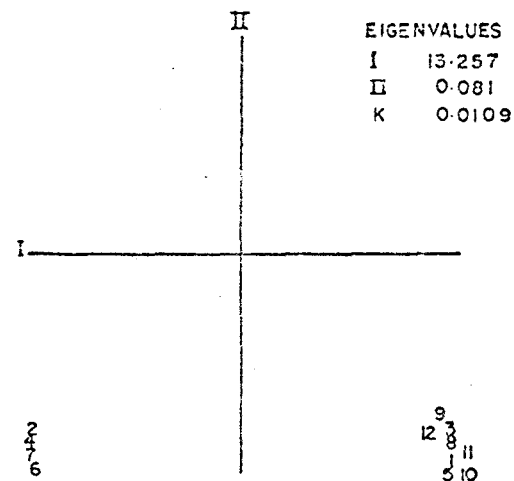
I	II
-100.000	-66.289
98.863	-68.779
-80.602	-76.139
100.000	-74.049
-80.437	-100.000
88.563	-57.455
95.628	-63.892
-92.524	-60.692
-76.800	-63.775
-77.903	-40.042
-89.589	-53.545
-96.536	-70.325

SUBJECT D

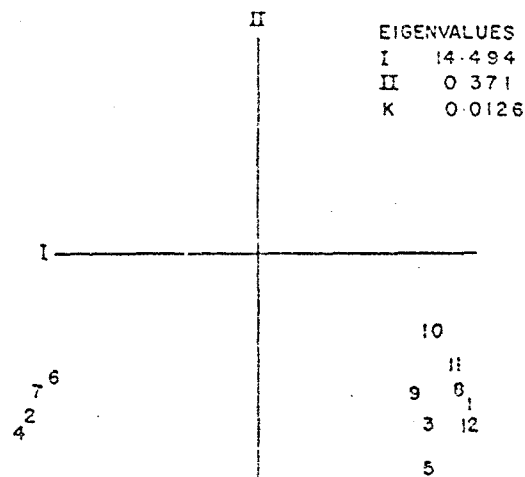
I	II
97.156	-69.227
-78.596	-91.224
95.831	-87.108
-80.591	-73.037
63.521	-53.175
96.724	-68.731
-100.000	-53.128
99.862	-51.024
61.730	-100.000
96.844	-86.353
100.000	-50.986
95.800	-87.020



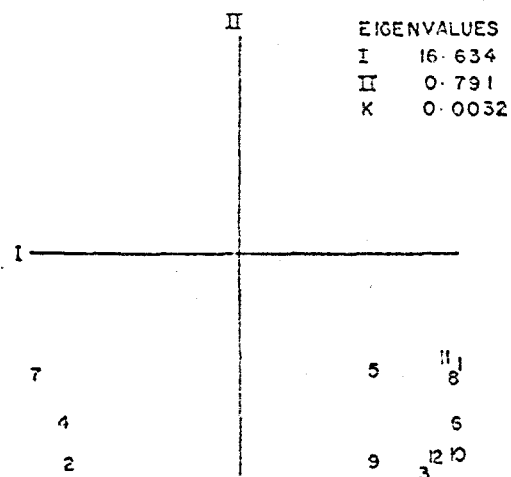
SUBJECT A.



SUBJECT B.



SUBJECT C.



SUBJECT D.

MAP TYPE I SOLUTIONS, 2-D

COORDINATES: MAP TYPE II SOLUTIONSSUBJECT E

I	II
29.228	-100.000
100.000	-30.587
13.671	80.105
-76.256	30.971
-40.306	-22.844
87.744	19.583
-100.000	-28.375
-59.854	-69.079
55.457	6.494
78.846	-76.237
21.893	-39.848
-19.377	-89.623

SUBJECT F

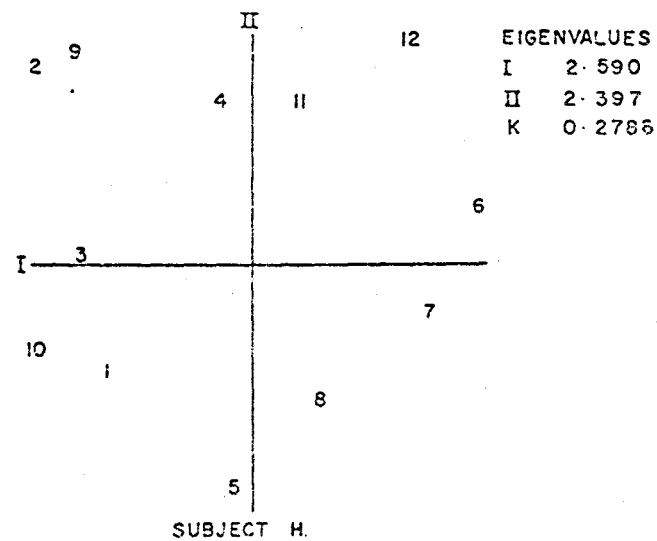
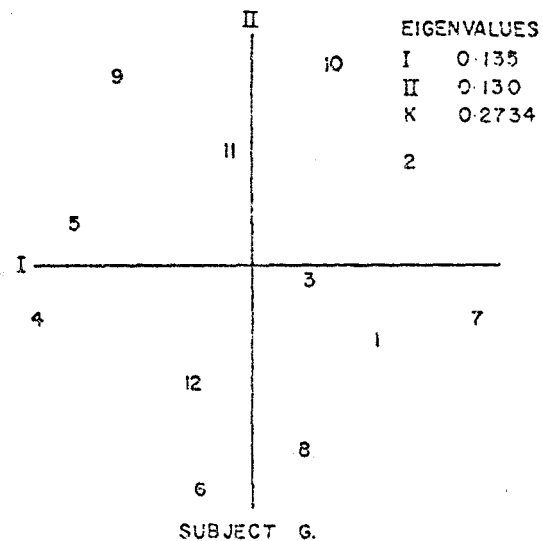
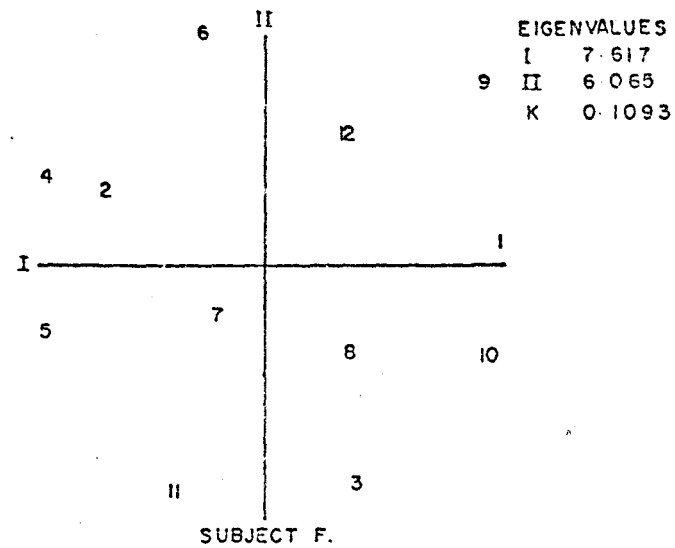
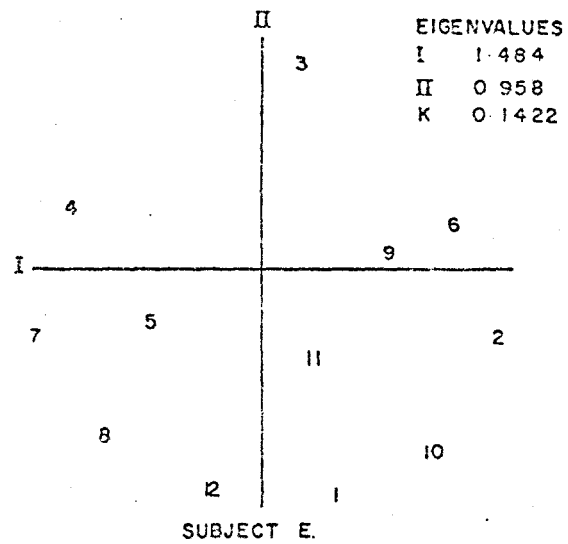
I	II
94.258	6.798
-63.893	32.118
38.530	-95.376
-100.000	39.352
-94.940	-31.874
-21.807	97.499
-15.461	-21.853
32.797	-40.557
90.780	77.975
100.000	-37.176
-36.363	-100.000
37.985	52.986

SUBJECT G

I	II
55.303	-30.765
64.209	45.138
22.651	-1.467
-100.000	-22.415
-74.062	16.933
-27.572	-100.000
100.000	-23.109
18.100	-76.454
-52.089	79.045
25.352	80.519
-6.456	46.722
-25.527	-45.613

SUBJECT H

I	II
-57.036	-42.042
-100.000	84.892
-72.632	-.087
-9.508	71.789
-1.116	-100.000
98.995	25.955
72.847	-19.026
31.750	-51.355
-73.365	90.962
-97.280	-33.752
19.826	75.732
70.035	100.000



MAP TYPE II SOLUTIONS 2-D

COORDINATES: MAP TYPE III SOLUTIONSSUBJECT I

I	II
72.602	8.768
-100.000	-25.962
-1.665	-100.000
-68.126	2.902
47.416	58.115
58.197	-4.504
-95.601	31.660
100.000	-23.677
-2.212	-88.584
94.271	-21.608
35.950	-1.668
17.310	-62.945

SUBJECT J

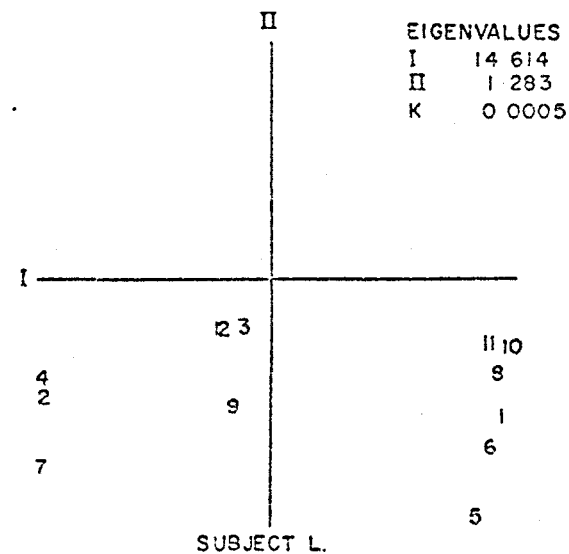
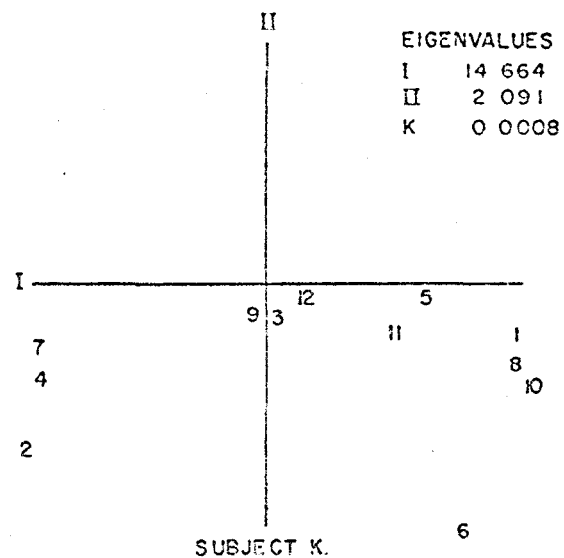
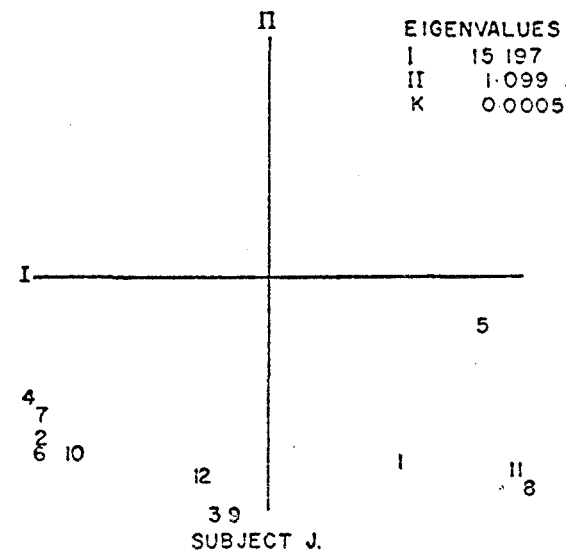
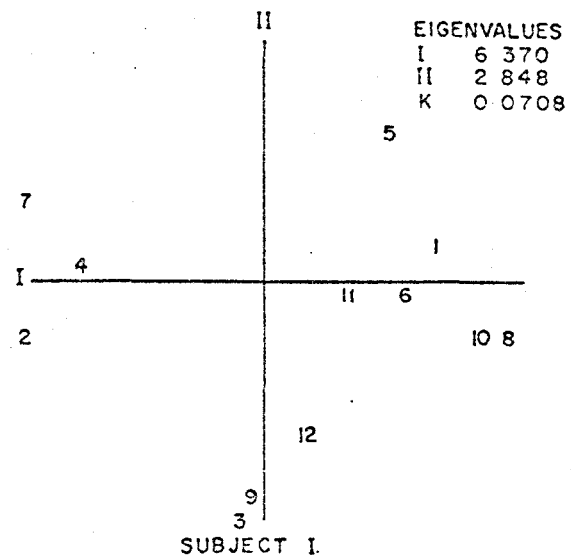
I	II
55.185	-73.415
-94.358	-70.313
-13.754	-100.000
-100.000	-53.843
87.937	-18.349
-95.597	-69.186
-97.905	-54.267
100.000	-81.212
-10.757	-98.979
-83.230	-70.506
99.452	-79.000
-20.820	-83.759

SUBJECT K

I	II
98.914	-19.047
-100.000	-66.780
4.147	-10.229
-90.431	-34.380
59.886	-1.610
82.718	-100.000
-90.813	-20.267
99.871	-29.656
-3.433	-9.338
100.000	-43.647
49.774	-16.213
15.674	-2.405

SUBJECT L

I	II
98.925	-52.546
-95.469	-44.038
-11.953	-18.093
-97.729	-42.408
87.454	-100.000
92.007	-66.796
-100.000	-75.775
98.885	-32.103
-15.084	-51.834
100.000	-25.015
97.329	-25.603
-12.561	-17.367



MAP TYPE III SOLUTIONS 2-D

COORDINATES: MAP TYPE V SOLUTIONSSUBJECT M

I	II
-100.000	10.074
100.000	-36.960
-46.594	4.999
92.783	-6.699
-44.968	-100.000
65.870	87.250
82.248	-41.783
-52.321	-27.405
-18.821	24.372
-63.888	69.524
-74.931	-19.285
14.885	48.614

SUBJECT N

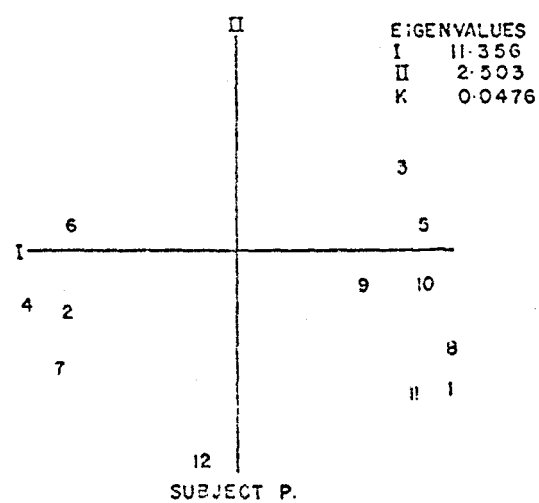
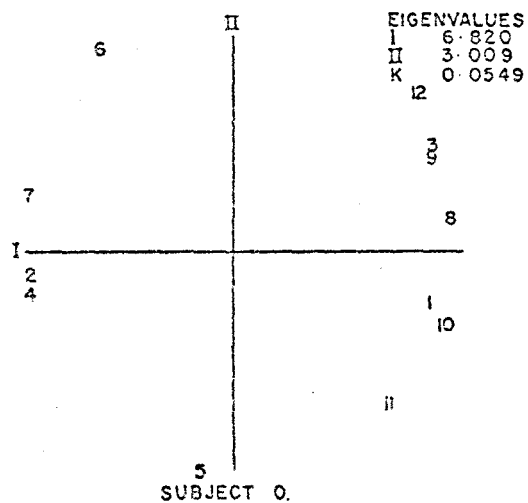
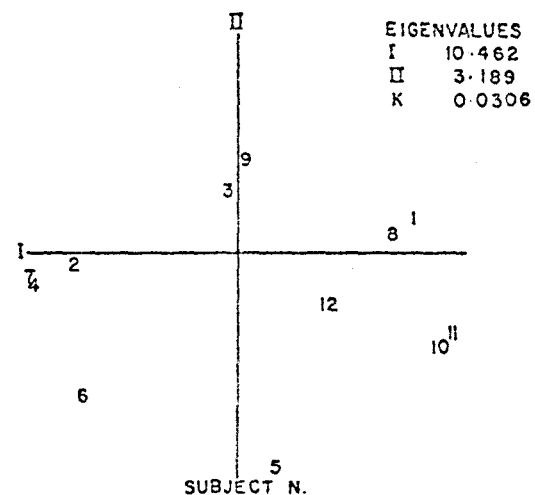
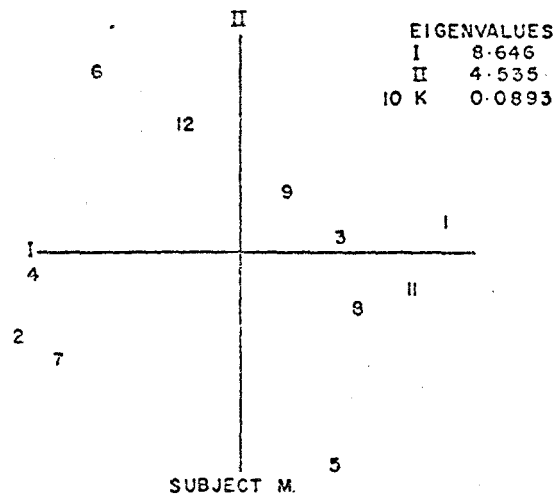
I	II
86.202	16.837
-78.934	-4.571
-3.851	32.860
-100.000	-16.530
26.907	-100.000
-78.891	-70.934
-97.552	-12.397
76.878	12.791
7.135	46.762
97.645	-49.958
100.000	-42.135
39.572	-25.541

SUBJECT O

I	II
87.487	-24.312
-93.375	-11.216
85.417	46.648
-93.967	-16.408
-15.311	-100.000
-58.233	93.349
-100.000	24.702
100.000	9.497
85.122	43.498
92.568	-32.330
69.137	-67.074
81.419	68.934

SUBJECT P

I	II
-96.813	-63.310
82.658	-23.148
-70.626	39.842
100.000	-20.689
-80.444	8.789
83.721	12.612
87.917	-44.117
-100.000	-43.491
-52.874	-10.165
-82.715	-14.780
-76.328	-67.001
19.947	-100.000



MAP TYPE V SOLUTIONS 2-D



COORDINATES: MAP TYPE "N" SOLUTIONSSUBJECT Q

I	II
77.181	-68.309
-99.277	-18.839
55.588	-69.391
-96.849	-19.687
59.986	36.624
-24.105	63.931
-100.000	-18.794
79.520	1.243
-62.961	-43.381
100.000	24.581
98.912	-26.051
20.459	-100.000

SUBJECT R

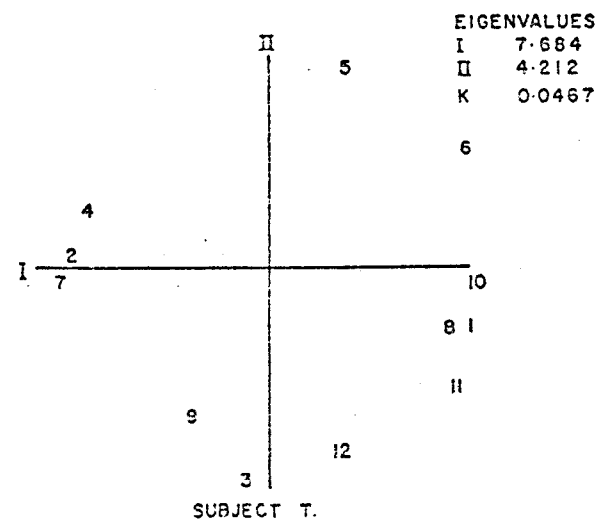
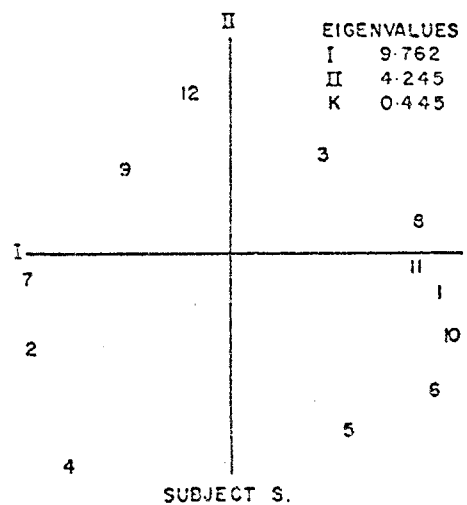
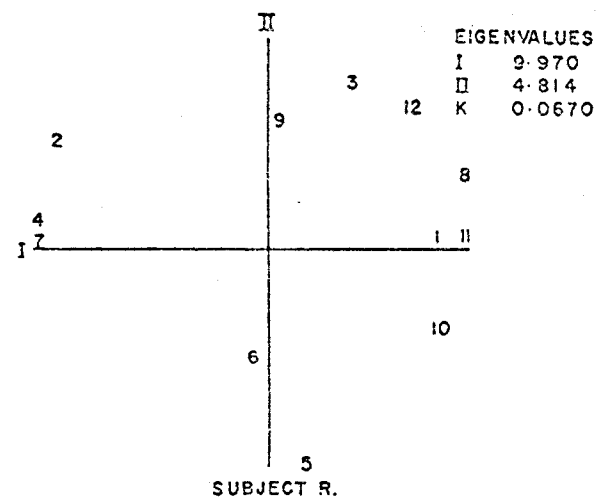
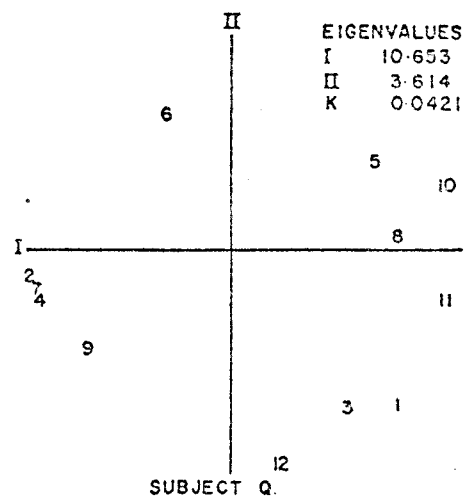
I	II
-75.342	1.012
92.135	51.514
-39.091	76.721
97.792	8.652
-13.695	-100.000
4.580	-48.419
100.000	-.826
-99.521	32.882
-3.539	59.819
-76.489	-37.004
-100.000	-.227
-68.746	67.552

SUBJECT S

I	II
93.015	-18.670
-91.166	-43.614
39.009	42.417
-78.157	-100.000
49.994	-76.967
91.588	-61.512
-100.000	-8.601
77.377	9.357
-47.747	36.939
100.000	-38.262
79.042	-4.649
-13.882	73.093

SUBJECT T

I	II
-89.524	-25.296
94.055	2.555
11.887	-100.000
82.751	31.471
-35.442	95.549
-89.389	55.352
100.000	-4.666
-84.293	-27.168
36.347	-64.490
-100.000	-6.087
-81.427	-57.028
-29.940	-84.040



MAP TYPE "NORMAL" SOLUTIONS 2-D

APPENDIX VI.

COORDINATES AND STRESS FOR TEST-RETEST INDIVIDUAL

MDS SOLUTIONS (RELIABILITY)

APPENDIX VICOORDINATES AND STRESS VALUES FOR TEST-RETESTINDIVIDUAL MDS SOLUTIONS (RELIABILITY)SUBJECT 1

-98.250	-57.162
100.000	-55.282
-96.383	-58.049
98.454	-60.428
-100.000	-50.941
96.689	-68.625
3.865	-19.290
-99.553	-51.558
-93.329	-54.156
-74.195	-100.000
-99.170	-54.117
-95.134	-50.600

K = 0.0038

-94.566	-58.206
54.275	-67.294
-100.000	-64.917
57.120	-41.304
-96.168	-58.311
100.000	-91.072
32.545	-19.434
-97.720	-62.055
-86.151	-33.304
-86.436	-100.000
-74.624	-34.881
-98.959	-64.761

K = 0.006

SUBJECT 2

67.927	-76.533
-78.035	27.220
-48.276	-73.085
-100.000	-9.971
90.626	45.474
40.938	-8.046
-70.635	-45.585
81.951	-39.855
17.221	-100.000
94.885	-29.124
100.000	-22.625
20.249	-92.770

K = 0.0585

-91.183	-30.050
95.091	-50.945
-32.787	7.153
100.000	-57.127
-87.329	-100.000
32.659	2.790
96.469	-14.501
-100.000	-23.957
-48.109	-14.700
-93.170	-31.173
-90.324	-30.959
33.241	-58.874

K = 0.0360

SUBJECT 3

97.830	-29.913
-83.159	-6.371
38.954	53.681
-91.993	-28.288
69.678	-99.244
-68.059	-100.000
-100.000	-16.769
74.892	-6.542
100.000	-6.959
94.045	-83.577
86.905	-20.132
21.015	45.202

K = 0.0410

18.258	-95.854
-100.000	-.697
11.436	-100.000
-98.471	41.321
73.084	52.678
-85.939	-5.501
-95.261	-19.075
100.000	3.980
.823	93.630
96.000	9.062
90.780	16.939
60.095	-39.678

K = 0.0882

SUBJECT 4

44.766	-44.570
-99.455	-35.521
.398	58.014
-75.598	-36.547
94.311	-100.000
-72.803	-93.832
-100.000	-43.746
62.802	10.244
-57.609	22.971
100.000	-50.957
89.713	-7.570
8.122	58.377

K = 0.0209

-15.570	-92.408
94.653	-55.363
33.897	-100.000
84.508	-4.476
-100.000	-21.107
100.000	-10.957
60.151	30.779
-87.188	22.877
80.623	-85.863
-98.824	-71.199
-75.767	-75.221
56.868	-93.097

K = 0.0227

SUBJECT 5

68.421	14.913
-97.954	-82.810
87.603	-98.188
-100.000	-73.934
96.544	-91.183
-98.023	-75.026
-98.678	-63.909
94.268	-100.000
-96.763	-95.715
78.637	-82.277
93.430	-85.393
100.000	-78.578

K = 0.0109

-100.000	-55.876
100.000	-55.945
-62.422	-92.972
83.390	-36.225
-99.059	-55.793
74.618	-60.366
41.757	.451
-86.600	-79.390
89.639	-80.412
-89.355	-31.739
-89.546	-31.555
31.182	-100.000

K = 0.0021

SUBJECT 6

-98.561	-36.038
11.694	7.426
-98.457	-32.742
100.000	-21.007
-84.118	14.746
87.825	-81.258
92.766	-6.461
-80.165	-36.868
82.372	-73.264
-100.000	-59.616
-91.937	-63.077
-47.163	-100.000

K = 0.0377

-100.000	-65.376
.324	-18.515
-98.099	-65.081
62.578	-60.505
-97.831	-83.981
60.337	-100.000
60.830	-79.547
-99.162	-47.253
100.000	-36.562
-99.484	-47.261
-95.283	-64.809
-98.474	-65.117

K = 0.0021

SUBJECT 7

91.918	-48.444
-96.247	-51.960
58.451	-85.599
-100.000	-67.733
72.173	-100.000
-95.180	-76.582
-96.635	-77.868
99.445	-59.404
64.806	-68.271
97.634	-71.719
100.000	-58.700
86.447	-75.861

K = 0.0166

100.000	-61.829
-99.557	-58.471
61.852	-64.335
-100.000	-57.365
43.415	-94.587
-91.878	-90.776
-77.276	-85.905
80.206	-64.238
72.349	-100.000
75.755	-68.215
76.490	-80.342
61.190	-56.658

K = 0.0169

SUBJECT 8

86.031	-69.477
-76.429	38.354
50.901	58.385
-93.636	-7.450
21.123	-37.188
-85.340	-67.300
-100.000	-62.776
53.472	-100.000
88.728	3.134
46.773	-74.811
100.000	-35.473
82.970	14.032

K = 0.0933

100.000	-61.379
-100.000	-72.958
-29.958	-2.912
-94.199	-64.110
76.628	-59.476
-62.942	-97.208
-75.578	-100.000
97.580	-82.067
74.996	20.819
88.887	-75.730
85.479	-93.034
-41.761	40.490

K = 0.0402

SUBJECT 9

-100.000	-35.645
99.663	-47.739
-94.179	-22.956
100.000	-47.954
48.737	-100.000
94.862	-17.095
96.006	-39.110
-99.839	-57.943
96.061	-25.423
-99.898	-35.741
-64.546	-60.801
.192	-14.448

K = 0.0037

SUBJECT 10

68.854	45.763
-55.235	-87.941
-90.462	35.454
-23.745	-100.000
10.613	98.872
-92.192	-35.992
-100.000	-17.958
-28.210	89.451
39.607	-66.060
-67.658	65.750
100.000	-4.754
89.449	-34.904

K = 0.1034

-99.988	-.719
99.661	-20.906
-78.314	-23.898
82.256	-34.006
57.932	16.689
84.732	-2.813
83.381	-2.130
-100.000	-16.329
100.000	-19.890
-78.549	7.934
-99.748	-16.239
-10.171	-100.000

K = 0.0061

-86.342	42.459
82.050	-39.806
-29.728	-40.018
76.677	-96.150
-5.016	75.014
54.018	100.000
-1.502	-100.000
-80.319	4.642
71.165	2.398
-100.000	-22.201
99.763	20.912
-53.571	-66.537

K = 0.0888



SUBJECT 11

-96.450	-83.762
100.000	-80.525
-87.545	-98.000
99.496	-82.872
-100.000	-66.601
99.114	-82.633
98.918	-91.822
-98.549	-70.994
-85.675	-100.000
1.158	-12.311
-95.272	-68.599
-88.254	-86.976

K = 0.0105

-100.000	-11.927
92.043	-40.760
-94.966	-45.964
98.493	-40.575
-93.085	-6.528
82.643	-70.647
100.000	-8.055
-91.805	19.184
-63.461	-100.000
64.100	53.043
-84.020	17.648
-83.020	-74.917

K = 0.0095

SUBJECT 12

-96.918	-61.867
100.000	-53.706
-55.206	-16.385
95.334	-68.880
-80.540	-90.814
69.188	-71.504
86.149	-94.194
-100.000	-60.365
-11.641	30.139
-13.143	-100.000
-99.131	-63.652
69.888	-7.829

K = 0.0194

-99.376	-78.273
93.501	-65.358
-53.787	-74.480
100.000	-48.028
-99.424	-77.703
83.286	-100.000
90.896	-83.374
-100.000	-78.706
-54.253	-60.963
-51.811	-16.158
-99.511	-76.426
-56.586	-92.419

K = 0.0052

SUBJECT 13

-100.000	52.423
100.000	86.905
-98.783	53.056
99.641	87.270
-99.459	51.759
97.885	88.924
99.262	88.131
28.693	-100.000
30.908	-99.246
-98.448	55.129
-99.232	51.496
29.875	-99.999

K = 0.0017

97.827	-58.298
-98.949	-85.786
-19.253	83.389
-100.000	-89.447
100.000	-56.952
-93.610	-100.000
-97.832	-94.412
98.929	-51.403
-41.121	75.331
92.390	-70.375
95.336	-63.635
-30.136	79.778

K = 0.0075

SUBJECT 14

39.554	-100.000
-93.943	22.854
39.823	7.884
-100.000	30.276
60.565	-41.984
-59.338	-99.421
-15.578	-10.165
100.000	-2.605
-73.508	-86.114
-4.539	-60.938
41.432	-6.574
54.423	-8.162

K = 0.0537

-92.878	17.817
82.004	47.862
-83.607	13.762
100.000	33.552
-94.901	53.751
83.670	-47.760
22.171	-92.991
-96.269	-66.130
8.398	83.246
-3.566	-100.000
-100.000	-24.651
-56.787	43.446

K = 0.0167

SUBJECT 15

-100.000	-67.185
96.128	-11.750
-95.992	-57.182
97.404	-17.675
-14.088	41.772
65.474	-95.636
88.741	-36.873
93.752	-81.721
100.000	-37.062
-82.934	-100.000
-87.946	-11.787
-63.815	14.273

K = 0.0401

100.000	-66.010
-64.953	-50.091
99.371	-80.639
-100.000	-78.418
56.830	-100.000
-35.389	8.268
-51.780	-93.994
81.464	-64.181
35.550	.158
98.397	-60.003
91.216	-27.650
94.735	-39.706

K = 0.0266

SUBJECT 16

-91.268	-48.029
97.773	-40.337
-92.137	-47.400
100.000	-71.379
-96.417	-48.283
97.082	-68.585
88.564	-73.835
-95.320	-48.375
-100.000	-54.607
-71.652	-100.000
-90.689	-58.681
74.932	-20.483

K = 0.0094

-88.182	-33.557
98.131	-62.088
-100.000	-75.171
98.039	-63.344
-93.303	-61.804
96.449	-34.610
100.000	-89.951
-94.309	-95.899
-99.854	-77.558
-38.168	-67.232
-95.833	-49.125
31.207	-100.000

K = 0.0009

SUBJECT 17

99.911	-72.142
-100.000	-76.566
29.435	-77.662
-99.899	-76.079
96.859	-100.000
-99.782	-76.377
-99.947	-75.938
99.918	-72.807
99.673	-72.578
100.000	-72.395
99.408	-72.714
34.053	-48.251

K = 0.0009

-89.952	-63.346
99.627	-33.961
-58.662	7.017
100.000	-33.864
-94.017	-90.519
86.856	-100.000
90.516	-74.549
-100.000	-72.552
-48.298	-8.425
-99.654	-72.277
-95.184	-56.583
-35.495	-23.117

K = 0.0008

SUBJECT 18

100.000	-51.294
-93.448	4.615
-62.929	-56.843
-100.000	-5.124
-67.755	-41.379
79.163	-100.000
-90.482	11.350
78.615	32.317
52.450	41.033
78.487	4.147
79.971	4.817
-20.638	-75.630

K = 0.0398

24.975	-100.000
-94.773	56.228
87.062	58.264
-99.763	44.327
94.423	23.308
-100.000	34.973
-98.807	18.568
99.754	43.180
98.334	37.222
100.000	38.439
69.660	52.006
72.180	26.156

K = 0.0170

## SUBJECT 19

-83.828	-55.515
100.000	-53.461
-79.177	-17.861
88.303	-50.544
-100.000	-37.902
79.670	-40.934
89.052	-47.532
85.785	-65.282
-24.053	-100.000
-49.186	-69.970
-83.276	-83.009
-81.817	-43.148

K = 0.0059

-98.960	-72.943
54.262	21.645
-100.000	-65.571
98.445	-69.419
-81.247	-100.000
100.000	-58.516
93.866	-46.910
97.426	-64.543
-95.909	-83.622
-84.805	2.725
-90.175	-11.490
-84.714	-3.590

K = 0.0070

APPENDIX VIICOORDINATES FOR TREATMENT MAPS

SUBJECT 1Map 1

I	II
-10.688	-70.308
-57.981	12.752
100.000	-9.049
44.733	-45.327
-100.000	33.858
-44.838	-94.780
39.438	33.399
-19.461	18.419
-16.803	87.841
65.625	-100.000
60.485	76.245
-97.923	-49.599

Map 2

I	II
-100.000	-65.953
99.113	-66.170
-16.038	-61.768
80.114	-53.521
-80.683	-53.299
42.042	-80.818
100.000	-64.642
-99.254	-60.626
-8.478	-45.771
-60.355	-36.938
-75.372	-100.000
-5.281	-42.320

Map 3

I	II
64.772	58.919
-63.202	42.281
14.724	-100.000
-77.716	20.696
76.602	49.338
-75.006	-18.046
-100.000	20.291
100.000	24.286
30.777	-86.470
78.682	-67.123
96.513	60.745
29.442	-97.496

Map 4

I	II
100.000	-52.683
-97.001	-19.416
4.485	51.808
-97.859	-17.316
87.312	-39.394
-62.644	-100.000
-100.000	-16.865
99.399	-55.113
-23.504	37.425
-81.343	-90.304
87.287	-39.362
22.293	43.462

SUBJECT 2Map 1

I	II
88.772	-69.756
-76.230	-37.202
-.224	28.425
-100.000	9.251
5.438	-94.870
-96.645	-81.208
-57.275	-100.000
100.000	-48.354
-3.459	39.063
51.708	-79.221
61.805	72.857
-44.967	53.011

Map 2

I	II
81.689	-6.836
-47.841	-18.772
2.182	42.955
-100.000	32.450
15.966	-100.000
-11.562	-89.314
100.000	71.425
-78.702	-47.785
-22.747	12.210
17.360	76.422
79.330	-24.677
91.467	-88.648

Map 3

I	II
85.424	19.708
10.224	94.205
92.347	3.854
-100.000	-12.939
-34.206	18.387
-89.062	27.922
-67.964	-46.125
100.000	-44.830
-49.768	-93.605
-50.042	65.001
95.710	-28.853
-17.223	-100.000

Map 4

I	II
93.315	-15.674
-71.621	-28.195
-10.092	34.979
-100.000	9.719
-14.496	-100.000
-78.890	-76.248
-35.671	-59.739
100.000	-31.714
7.406	37.249
61.732	-69.710
51.864	22.987
-38.549	56.543



SUBJECT 3Map 1

I	II
94.746	-9.513
-64.110	-100.000
-66.221	39.934
-100.000	-12.289
-88.440	-78.105
98.576	-65.767
-98.932	-32.895
100.000	-31.001
92.959	-54.434
98.858	7.618
91.066	-34.868
-10.439	77.797

Map 2

I	II
100.000	13.342
-71.209	-25.698
10.174	-23.184
60.191	-77.616
-35.917	39.879
20.930	59.038
-22.939	1.284
-100.000	.130
-35.037	-66.053
8.303	-100.000
50.192	35.075
70.636	-29.692

Map 3

I	II
100.000	-12.347
-73.468	66.852
1.611	-79.497
-25.227	-48.332
61.037	-26.773
86.530	38.917
-100.000	18.986
89.967	-18.537
-90.121	-47.018
46.953	89.414
55.801	-48.298
11.360	-100.000

SUBJECT 4Map 1

I	II
-99.528	-69.580
100.000	-70.044
-99.648	-69.967
99.327	-85.217
-98.662	-85.442
99.776	-84.844
96.597	-55.576
-94.754	-40.472
-99.622	-70.366
-97.057	-100.000
-97.631	-84.893
-100.000	-70.498

Map 2

I	II
98.996	-67.707
-98.764	-42.252
-44.220	-100.000
-76.345	-61.737
99.204	-72.072
-100.000	-66.663
-97.792	-38.298
73.872	.751
-3.258	-25.262
-99.185	-17.473
99.343	-72.180
100.000	-22.199

Map 3

I	II
64.239	48.103
-61.501	19.357
-45.186	95.134
22.716	-100.000
-77.250	61.186
64.422	-43.678
79.168	100.000
-100.000	-32.546
-22.381	-15.039
- .517	80.894
18.292	16.909
91.805	12.190

Map 4

I	II
-97.621	-85.208
74.150	-17.498
-66.959	-23.861
99.572	-60.338
-79.082	-100.000
90.952	-94.861
69.063	-60.710
-100.000	-57.087
1.896	14.441
100.000	-51.557
-96.725	-39.355
-67.291	-22.409

Map 5

I	II
-95.607	-51.651
69.383	24.269
-58.642	-2.158
95.341	-51.172
-66.058	-69.476
100.000	-6.938
66.004	-48.801
-96.152	-38.764
.095	38.218
29.805	-100.000
-100.000	-7.025
-66.044	14.555

Map 6

I	II
81.781	-1.075
-100.000	-16.601
-16.739	-100.000
-98.241	-22.561
71.771	59.631
-83.184	50.340
-85.020	16.698
81.977	-2.342
11.566	83.597
100.000	-32.036
68.285	-34.042
-7.884	-62.701

SUBJECT 5Map 1

I	II
86.460	-100.000
-94.121	-81.507
82.622	-71.051
-99.179	-84.853
100.000	-85.114
-90.123	-98.144
-100.000	-84.491
87.868	-94.988
84.711	-76.187
91.231	-96.440
89.669	-93.476
81.256	-76.460

Map 2

I	II
88.256	-100.000
-94.849	-69.591
82.795	-53.410
-98.929	-82.604
100.000	-96.845
-85.258	-86.674
-100.000	-82.471
96.037	-73.682
86.595	-64.895
90.604	-86.815
90.022	-85.761
77.237	-73.804

Map 3

I	II
93.586	-81.257
-97.244	-56.388
44.206	-96.894
-100.000	-71.675
92.274	-44.199
-94.249	-79.239
-93.093	-63.739
100.000	-100.000
20.094	-81.650
99.693	-66.042
93.395	-69.171
78.376	-23.996

Map 4

I	II
71.018	-48.176
-60.904	-36.330
42.161	-83.584
-92.006	-15.236
49.026	39.424
-38.236	53.029
-100.000	-45.407
100.000	-29.014
76.616	30.085
98.488	2.773
76.970	-9.504
57.102	-100.000

Map 5

I	II
-100.000	-29.942
98.927	-62.604
15.682	47.231
98.147	-82.756
-89.118	-100.000
90.464	-30.318
100.000	-82.731
-98.761	-26.156
51.623	23.285
-77.251	-88.417
-97.123	-26.670
-3.202	49.879

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SUBJECT 6

Map 1

I	II
-29.986	48.118
-28.464	86.747
100.000	-12.081
67.918	-19.253
-59.576	-85.085
-100.000	-39.326
-91.272	58.825
-87.239	-18.756
-72.434	-59.683
-45.802	-69.560
25.787	-100.000
22.677	30.535

Map 2

I	II
94.874	-35.418
-100.000	-51.200
85.839	-70.785
-96.309	-75.852
79.251	-20.122
-50.018	79.438
-98.354	-100.000
88.001	-43.697
87.727	-45.455
100.000	-48.796
95.657	-67.725
88.811	-53.411

Map 3

I	II
-41.817	73.378
-45.652	-100.000
-71.930	14.688
35.534	-74.114
-61.269	-29.423
-11.104	-63.197
29.275	34.585
-100.000	-15.245
-27.068	39.593
-2.033	-28.142
100.000	3.142
2.234	10.334

Map 4

I	II
96.316	6.175
-100.000	6.102
16.549	87.535
-82.836	-59.788
77.330	-77.409
-63.381	-100.000
-74.615	-58.241
81.590	-64.977
67.632	64.630
35.095	-87.939
100.000	-52.423
-59.171	66.723

Map 5

I	II
70.649	-6.872
-100.000	-26.430
6.049	100.000
-83.954	-56.164
80.626	-29.737
71.709	-43.069
-26.371	-63.385
94.198	-22.077
57.506	54.367
25.265	-100.000
87.999	-18.216
-74.247	46.599