

ARTICLE 29 Factor Dimensions A and R

Factor Analytic Background

A NUMBER of factor analytic studies of the MMPI have now appeared. The populations utilized have included both men and women, college and noncollege, psychiatric and normal subjects. For the most part the nine original clinical scales have been used although in some instances one or more of the validity scales were also included. And in at least one study [598], Drake's Si scale [177 (see IV, 19)] and five of Gough's social scales [236 (see IV, 21), 247 (IV, 23), 241, 259, 258 (IV, 24)] supplemented the regular scales.

Borko [673] has reviewed the following studies: Abrams [2], Cook and Wherry [138], Cottle [144], Little [395], Stout [571], Tyler [598], Wheeler, Little, and Lehner [634], and Winne [660]. In almost all the studies there is essential agreement as to the loadings of two factors although the interpretations and the name assigned to these factors vary. One factor (usually the first) shows very high loadings on scale 7 (Pt) and scale 8 (Sc) with negative loading on K whenever it is used. A second factor shows fairly high loadings on the neurotic triad, especially scale 3 (Hy) and scale 2 (D), with negative loading frequently appearing on scale 9 (Ma).

Unpublished factor studies have been carried out by the present writer on three different populations: 66 VA neuropsychiatric hospital patients, 60 medical ward patients from a VA general medical and surgical hospital, and 100 VA mental hygiene clinic outpatients. All three studies confirm very clearly the factor loading patterns outlined above.

In the present writer's studies as well as in those of others referred to above, however, there has been practically no general agreement as to third and fourth factor patterns when these were extracted.

The remarkable similarity of loadings on these two factors has appeared despite the varying populations employed. Up to this time no attempt has been made to explore systematically the dimensions which may underlie these factors. This paper describes the development and use of two new scales which have been especially designed to make possible an accurate estimate of subjects' positions on these two factors. These scales will be described in detail below.

A Scale of "General Maladjustment"

A previous attempt to assess a general dimension underlying the MMPI clinical scales had been carried out in 1947 at the Minneapolis VA hospital by John Pearson,

Roland Peek, and the present writer. These writers had argued that if any one item appeared on a number of scales it might be related to some general dimension which underlay the scales on which it appeared. To this end a series of items were assembled, all scored in the same direction on three or more clinical scales. A subsequent thirty-four-item revision was carried out using scale 0 (Si) in place of scale 5 (Mf) on the basis of the content of the items as well as the nature of the intercorrelations between the clinical scales and scale 0.

Inspection of the content led to the scale being called Gm for "general maladjustment" or "general malaise." For example, one item is scored on six scales (2, 3, 4, 7, 8, 0), "I find it hard to keep my mind on a task or job"; another, "My daily life is full of things that keep me interested," is scored on five scales (2, 3, 4, 7, 8). Six

Table 1. Item Contribution to Gm of the MMPI Scales and Their Correlations with Gm in a Sample of Neuropsychiatric Patients

Scale	Item Overlap	Percentage of Scale	Gm r
1 (Hs)	12	36	.87
2 (D)	17	28	.60
3 (Hy)	16	26	.67
4 (Pd)	12	24	.60
5 (Mf)	0	0	.31
6 (Pa)	9	23	.91
7 (Pt)	14	29	.75
8 (Sc)	20	26	.91
9 (Ma)	8	17	.60
0 (Si)	5	21	.67
K			-.60
L			-.31
F . . . . .			.81
Total	113		

items appear on four scales and the remaining items in Gm are scored on three. In Table 1 may be seen (a) the number of item overlaps with each scale, (b) these overlaps expressed as a percentage of the scale length, and (c) the correlation of each scale with Gm in a population of sixty-six VA neuropsychiatric hospital patients. It is of interest to note that the mean of the overlap percentages is 25.6; thus, about one fourth of the items on a given scale will be Gm items common to at least two other scales.

The economical advantage of general scales may be argued by considering the item overlap of certain scales. In the three scales 2 (D), 7 (Pt), and 8 (Sc) we find the following relations: 2 and 7 have thirteen items in common, 2 and 8 have eight, and 7 and 8 have fifteen. Indeed, six of these items are common to all three scales. It may well be possible, then, to measure the configuration exemplified by the 278 profile code (see Section III of this book) by a briefer scale rather than the three overlapping scales presently employed.

"Pure" Scales

Along with Gm, a series of keys was developed by eliminating all the positive item overlap from each clinical scale. For example, a "pure" or "prime" key for scale

1 (Hs) was obtained by eliminating not only the twelve Gm items but also all the items overlapping with one other scale. Since there are twelve of these latter items, the thirty-three-item Hs scale reduces to a nine-item "pure" scale. The convention has been adopted of referring to these scoring keys as prime scales and using a prime mark after the designation of such scales to indicate this, i.e., Hs' or 1'. The reader may recall that only 366 of the 550 items on the MMPI are scored and, of these scored items, only 136 are scored primely — that is, uniquely on only one of the nine original scales.

By the use of prime scales it is possible to overcome the objections raised by some factor analysts who point out the difficulty of interpreting the meaning of factors obtained from the intercorrelations of scales with overlapping items. This problem was noted by Wheeler *et al.* [634 (see IV, 28)] but they decided to carry out their analysis using the full-length scales.

A Cluster Analysis

In a previously reported study [688] by the present writer a cluster analysis [r162] on a population of 150 male patients in a VA general medical and surgical hospital was carried out using scores on the Gm scale and the nine prime clinical scales. In general, two dimensions seemed to account for most of the common variance; the first domain showed highest loadings on Gm, 7', and 8' while the second had a high positive loading on 2' and the highest negative loading on 9'.

Special scales were then developed from Gm, 2', and 9' and intercorrelated with the prime scales now including K' and 0'; this matrix was subjected to a regular Thurstone centroid analysis. The special scales were developed in the hope that longer and more statistically stable scales would provide a more adequate measure of the factor dimensions.

Development of Special Scales

The general method followed in developing these special scales is a variant of the internal consistency method. Two groups of subjects scoring at opposite extremes on a scale were identified and used to carry out an item analysis of all 550 items in the MMPI. Retained on a final scale were items which showed the maximum difference in frequency of response in a given direction by the two extreme groups. For example, the 150 hospital patients (sample I) who had been scored on Gm were separated into two groups: an upper group of 10 per cent (15 subjects) which had received the highest scores on Gm, and a bottom group falling at the lowest 10 per cent of the distribution of Gm scores.

A second population of 137 male patients seen at a VA mental hygiene clinic (sample II) were also scored on Gm and the upper and lower 10 per cent (14 subjects in each group) used. All items which showed extreme differences — for example, fourteen upper subjects and two lower subjects responding in a given direction — were considered. The final scale, called A, consisted of thirty-nine items which showed at least a 75 per cent separation in both samples. Actually some of the items showed absolute separation, all the subjects in one group and none in the other responding in a given direction. It is apparent that the size of the extreme group and the separation requirements met are considerably more stringent than those usually advocated [r176] in this general type of procedure.

A similar method was followed in developing a scale from 2', subsequently called R, and one from 9' called M. That is, an item analysis of all 550 items using the extreme groups of both samples on 2' and on 9' was carried out. Each of these scales contains forty items and the level of separation, although not so marked as in A, was above 60 per cent for all items.

Table 2 presents the results of the factoring of the matrix with the special scales. The success of the A scale as a dimension can be gauged by the loading of .99 on factor I with inconsequential loadings on II and III. The R scale seems to be the best measure of the second dimension although its loadings are not so striking as

Table 2. Unrotated Centroid Factor Loadings and Communalities of MMPI Scales (Male VA General Medical and Surgical Hospital Patients, N = 150)

Scale	I	II	III	h ²
K'	-.86	.13	.28	.83
1' (Hs') . . . . .	.56	.18	.08	.35
2' (D')	-.36	.39	-.45	.49
3' (Hy')	-.62	.46	.31	.69
4' (Pd')	-.60	.13	.08	.39
5' (Mf') . . . . .	.19	.38	.35	.30
6' (Pa')	-.16	.34	.18	.17
7' (Pt') . . . . .	.87	.05	-.12	.77
8' (Sc') . . . . .	.85	.02	.07	.72
9' (Ma') . . . . .	.56	-.52	.26	.65
0' (Si') . . . . .	.52	.24	-.34	.44
A . . . . .	.99	.11	-.02	.98
Gm . . . . .	.81	.49	.09	.90
Ja . . . . .	.90	.23	.00	.87
M . . . . .	.84	-.45	-.12	.92
R	-.22	.88	-.24	.87

those obtained with A. R shows a loading of .88 on factor II and -.22 on I. With its loadings the M scale lies between the other two special scales. In addition to Gm, described above, from which A was derived, Table 2 shows a scale called Ja. This is a rationally derived scale of anxiety developed by consensus of ten judges [620 (see V, 32)].

The loadings on the prime MMPI scales again support the configuration obtained in all the previous factor studies with full-length scales. On factor I the highest positive loadings are seen on 7' and 8' with an equally high negative loading on K'. For II the greatest positive loading occurs on 3'; 9' shows the greatest negative value. It should be noted that the communalities of the special scales satisfactorily account for practically all the common variance, but the clinical scales, with the exception of K', 7', and 8', show a good deal of unique variance.

Further work has been carried out with this matrix in extracting a fourth factor and deriving scales to measure the third and fourth factors. But since these scales have not yet been adequately explored, they will not be reported here.

Structural Aspects of A and R

Some clue as to the nature of the dimensions assessed by the specially derived scales may be inferred from the configuration of loadings exhibited in Table 2.

Further help in interpretation may be obtained from an examination of the nature of the items of A and R. It should be noted that all the items in A are scored if answered True with the exception of item 20. Every one of the R items is answered False.

The A scale consists solely of "X" items, i.e., items in which the response is opposite to that of the majority of the standardizing Minnesota normals. The R scale, on the other hand, contains twenty-five "X" and fifteen "0" items; in these latter items credit is earned on a scale for an answer in the *same* direction as the majority of the normal group. The reader should consult the *Manual* [305, pp. 8-9] and Meehl and Hathaway [441 (see I, 2)] if the distinction between the "X" and "0" response direction scoring and its meaning are not absolutely clear to him.

Since all the items save one in scale A are answered True and every one of the items in R is answered False, it may be thought that there is merely some response set at work. This is, however, belied by the actual intercorrelations between A and R since in most samples the *r*'s are close to zero (see Table 8). The negative correlations found in some samples, though, would support such a view. Evidence that there must be more than a response set at work is found in a study by Kooser [369]. He administered the 79 items comprising A and R as a separate scale to over 300 college undergraduates. The scores on A and on R for a subsample of 100 were correlated with the total number of the 79 items which had been answered True. The corrected *r*'s are as follows: A = .04 and R = -.13. These values do not differ from each other and both are approximately zero. Thus, the evidence supports the view that subjects who had many "true" responses were no more likely to be high on A than on R.

Content of A Scale

Although the content of the A scale is relatively homogeneous as compared with most of the regular MMPI scales, it is possible to group the items into content clusters. These are listed below. Following each item is the overlap with regular scales in code terms (see Section III on coding).

The first cluster includes ten items which all seem to be related to thinking and thought processes:

1. I find it hard to keep my mind on a task or job. (2, 3, 4, 7, 8, 0) 2. I have more trouble concentrating than others seem to have. (7, 8) 3. At periods my mind seems to work more slowly than usual. (K [scored on K if answered False]) 4. When in a group of people I have trouble thinking of the right things to talk about. (0, K, 3, 4, 9 [scored on K, 3, 4, 9 if answered False]) 5. I have often lost out on things because I couldn't make up my mind soon enough. (0, 3 [scored on 3 if answered False]) 6. I usually have to stop and think before I act even in trifling matters. (7) 7. I have several times had a change of heart about my life work. (Unscored) 8. Sometimes some unimportant thought will run through my mind and bother me for days. (7, 0 [scored on 0 if answered False]) 9. I am apt to take disappointments so keenly that I can't put them out of my mind. (Unscored) 10. I do many things which I regret afterwards (I regret things more or more often than others seem to). (4, 7)

The first two items relate to trouble in concentrating while slowness and difficulty in mentation are stressed in items 3 and 4. The subject admits excessive doubt and

indecision in 5, 6, and 7. Obsessive thinking and rumination are seen in the last three items.

A second cluster consists of items referring to negative emotional tone and dysphoria:

11. I feel anxiety about something or someone almost all the time. (7) 12. I must admit that I have at times been worried beyond reason over something that really did not matter. (Unscored) 13. I wish I could get over worrying about things I have said that may have injured other people's feelings. (Unscored) 14. I worry quite a bit over possible misfortunes. (Unscored) 15. I brood a great deal. (2, 0) 16. I have often felt guilty because I have pretended to feel more sorry about something than I really was. (Unscored) 17. Even when I am with people I feel lonely much of the time. (6, 7, 8) 18. I wish I could be as happy as others seem to be. (2, 4, 7, 0) 19. Most of the time I feel blue. (3, 7, 8) 20. I very seldom have spells of the blues. (Answered False) (Unscored)

The first four items clearly express anxiety and worry, with the added flavor in item 13 of rumination, which is somewhat similar to items in the first cluster. Broodiness, guilt, and loneliness are admitted in items 15, 16, and 17, with rumination again noted in 16. The last three items deal with feelings of unhappiness. It is of particular interest to note that item 20 is both the logical and psychological opposite of 19. This consistency is not found in one pair of items on the second factor scale R.

A third cluster deals with lack of energy and pessimism:

21. Life is a strain for me much of the time. (7, 8) 22. I feel tired a good deal of the time. (Unscored) 23. I have had periods of days, weeks, or months when I couldn't take care of things because I couldn't "get going." (2, 7, 8) 24. I have difficulty in starting to do things. (2, 8) 25. My plans have frequently seemed so full of difficulties that I have had to give them up. (Unscored) 26. I have sometimes felt that difficulties were piling up so high that I could not overcome them. (K [scored on K if answered False]) 27. Often, even though everything is going fine for me, I feel that I don't care about anything. (Unscored)

The first two items indicate directly a lack of energy while 23 and 24 seem to refer to an inability to mobilize one's resources. The subject shows pessimistic feelings in the last three items and admits in 25 and 26 his inability to cope with difficulties.

A fourth cluster of items may be labeled personal sensitivity:

28. I have often felt that strangers were looking at me critically. (5, 0) 29. I am apt to pass up something I want to do because others feel that I am not going about it in the right way. (Unscored) 30. It makes me feel like a failure when I hear of the success of someone I know well. (0) 31. Often I cross the street in order not to meet someone I see. (7) 32. People often disappoint me. (0, K [scored on K if answered False]) 33. I feel unable to tell anyone all about myself. (Unscored) 34. I am easily embarrassed. (7, 0) 35. Criticism or scolding hurts me terribly. (2, 0, K [scored on K if answered False]) 36. At times I think that I am no good at all. (Unscored)

In item 28 a direct and in item 29 an indirect criticism affect the subject. In item 30, again, an unfavorable comparison with others is implied. While personal inferiority is admitted in 31 it must be noted that the subject apparently feels he has reason to be sensitive since item 32 indicates that people disappoint him. Thus the inability

to confide admitted in 33 is consistent with the implied mistrust of others seen in this cluster. Items 34 and 35 deal directly with personal sensitivity and the last item reflects the pessimistic tenor of cluster three.

A final and smaller cluster refers to somewhat more malignant mentation:

37. I sometimes feel that I am about to go to pieces. (Unscored) 38. I often feel as if things were not real. (8) 39. I have a daydream life about which I do not tell other people. (Unscored)

Item 37 is akin to the fear of losing one's mind often expressed by psychiatric patients. It is of interest to note that item 38 which implies psychotic dissociation is the only pure Sc item appearing in this key. The last item may refer to fantasy of a personal nature.

A summary of the item overlap and a general indication of the correlation with clinical scales may be seen in Table 3.

Table 3. Item Overlap of Factor Scales A and R with Regular MMPI Scales and Rounded Average r 's for Representative Samples (Items Scored Oppositely on the Scale Are Enclosed in Parentheses)

Scale	A Item Overlap	r_A	R Item Overlap	r_R
L		-.25		.30
F .....		.55	2 (1)	-.10
K	(5)	-.70	4	.35
1 (Hs) .....		.30	3	.20
2 (D)	6	.60	10	.30
3 (Hy)	2 (2)	.20	4	.30
4 (Pd)	3 (1)	.40		-.05
5 (Mf)	1	M .30 F -.10	5 (3)	M .15 F .00
6 (Pa)	1	.50	2	.05
7 (Pt)	13	.75		.05
8 (Sc)	8	.60	1 (2)	.00
9 (Ma)	(1)	.35	(2)	-.40
0 (Si)	10 (1)	.60	9	.40
Unscored on above scales	15		9	

Content of R Scale

The content of the R scale is much more varied than that of the A scale and yet a certain consistency can be traced through the rational clustering which has been attempted below. Following each item are the code numbers of the regular scales in which these items also occur. Remember that all items on R are scored if answered False.

A cluster of eight items relates to health and physical symptoms:

1. I am in just as good physical health as most of my friends. (1, 2, 3) 2. I am about as able to work as I ever was. (1, 2, 3) 3. I do not worry about catching diseases. (2) 4. I do not often notice my ears ringing or buzzing. (1, 6, 8, 0) 5. I have had no difficulty starting or holding my urine. (0) 6. Sometimes, when embarrassed, I break out in a sweat which annoys me greatly. (2) 7. I have never had a fit or

convulsion. (2) 8. I have had periods in which I carried on activities without knowing later what I had been doing. (F, 8, 9 [scored on F, 8, and 9 if answered True])

In items 1 and 2 there is a denial of health and ability plus an admission of worry about health; in items 4 and 5 physical symptoms are admitted but in item 6 either the symptom or the concern about it is denied. Items 7 and 8 are particularly interesting since they seem to be logical opposites: if item 7 is answered False it implies that the subject *has* had a convulsion and should therefore answer True to item 8 (this is the scored direction for scales F, 8, and 9) but the high R person denies this.

A second cluster refers to emotionality, violence, and activity:

9. Once in a while I feel hate toward members of my family whom I usually love. (5, 8) 10. Some of my family have quick tempers. (Unscored) 11. My mother or father often made me obey even when I thought that it was unreasonable. (6) 12. At times I am full of energy. (K, F, 2) 13. I was fond of excitement when I was young (or in childhood). (Unscored) 14. I am often sorry because I am so cross and grouchy. (Unscored) 15. At times I feel like smashing things. (K, 2) 16. At times I feel like picking a fist fight with someone. (2)

In the first three items (9, 10, and 11) the subject denies hate, temper, and unreasonableness in his family; the negative emotion implied in item 9 is admitted by a True answer for scales 5 (Mf) and 8 (Sc). In the next two items feelings of energy and fondness of excitement are denied. In item 14 the subject either denies that he ever feels cross or that he is sorry for feeling cross. Direct physical and personal violence are disclaimed in items 15 and 16.

A third cluster deals with reactions to other people in a social situation:

17. I enjoy the excitement of a crowd. (0) 18. My worries seem to disappear when I get into a crowd of lively friends. (0) 19. I enjoy social gatherings just to be with people. (0) 20. I try to remember good stories to pass them on to other people. (0)

It is of interest to note that all four items are scored on social introversion, scale 0 (see IV, 19 and 20). In items 17 and 18 the subject again denies enjoyment as previously noted in the second cluster (item 13). The subject in all four items denies that he is stimulated by other people or that he responds socially to them.

A fourth cluster of items relates to social dominance, feelings of personal adequacy, and personal appearance:

21. If given the chance I would make a good leader of people. (0) 22. I have often met people who were supposed to be experts who were no better than I. (K) 23. I frequently find it necessary to stand up for what I think is right. (F, 5) 24. I am often inclined to go out of my way to win a point with someone who has opposed me. (Unscored) 25. I like to let people know where I stand on things. (K) 26. I do not blame a person for taking advantage of someone who lays himself open to it. (2, 9 [scored on 9 if answered True]) 27. I would like to wear expensive clothes. (Unscored) 28. I am very careful about my manner of dress. (Unscored)

Unaggressiveness and a lack of social dominance are clearly implied in the first five items while in item 26 the subject even denies blaming another person who may have been aggressive. Lack of interest in dress and personal appearance is seen in the last two items. Here the high R person disagrees with the Minnesota normals

in not liking expensive clothes but is in agreement with them in denying carefulness in dress.

A fifth cluster of items all refer to personal and vocational interests:

29. I enjoy detective or mystery stories. (3) 30. I like to read newspaper articles on crime. (3) 31. I like to flirt. (2, 0) 32. I am fascinated by fire. (Unscored) 33. I like to attend lectures on serious subjects. (Unscored) 34. I like science. (5) 35. I like mechanics magazines. (5) 36. I like repairing a door latch. (Unscored) 37. I think I would like the work of a building contractor. (5) 38. I think I would like the kind of work a forest ranger does. (5) 39. I like dramatics. (0, 5 [scored on 5 if answered True]) 40. I like to cook. (5 [scored on 5 if answered True])

The first four items seem to reflect a denial of basic, id-like impulses related to hostility and sexuality. This trend was presaged in the second cluster. In items 34 and 35 the subject denies interest even in intellectual pursuits. Nor does he enjoy mechanical and manual activities: 35, 36, 37. Despite the subject's asociality as inferred from cluster three, in item 38 he denies that he would like the solitary work of a forest ranger. Unlike the scale 5 direction the R person does not like dramatics or cooking.

The item overlap is summarized in Table 3 and average intercorrelations of R with the regular scales are presented.

Item Overlap

For A the greatest overlap, thirteen items, and the highest correlation, .75, both occur on scale 7 (Pt). Of these thirteen, four are 7' items. The K scale shows a high negative correlation, —.70, although the two scales have only five items in common. Despite the fact that Gm was the basis for the derivation of A only five of the original thirty-four Gm items survived. Of further interest is the group of fifteen items on A which are unscored on the clinical scales, scale 0 (Si), or the validity scales. These fifteen items represent 38 per cent of the total scale length of A. It is therefore impossible to score for this factor scale on "short-form" records. The prudent MMPI researcher will recognize the folly of saving a few minutes by administering an abbreviated test.

The greatest item overlap for R is found on scale 2 (D) with ten items. But the correlation of R and 2, .30, is no higher than that of scale 3 (Hy) which shares only four items with R. The highest positive correlation is obtained on scale 0 (Si), .40, with a nine-item overlap, while an equally high negative r , —.40, may be seen on scale 9 (Ma) with two oppositely scored items. Seven of the ten items overlapping with scale 2 are 2' items. Of the nine scale 0 (Si) items, seven are 0'. The Gm scale contributes three items to R and nine are unscored on other scales.

Additional meaning of the A and R scales in terms of item overlap may be gained from Table 4. All the special MMPI scales which are included in this volume are listed here together with cross references for the reader's convenience.

Profile Configuration

A different approach to an understanding of the A and R scales is that of profile configuration (see Sections V and VI). A group of 250 K-corrected profiles obtained from the 150 subjects of sample I and 100 of the subjects in sample II were coded

Table 4. Item Overlap of Factor Scales A and R with Special MMPI Scales Referred to in the Present Volume (Items Scored Oppositely on the Scale are Enclosed in Parentheses)

Scale	Reference	A	R
G	I, 2	15	2 (2)
Ds	I, 4	3	
Cn	IV, 27	7	(4)
Pr	IV, 23	1	1 (1)
Ca	IV, 25	8	1 (1)
Do	IV, 24	(5)	
Obvious	IV, 22		
D		6	6
Hy		2	2
Pd		3	
Pa		1	1
Ma			(1)
Subtle	IV, 22		
D			4
Hy		(2)	2
Pd		(1)	
Pa			1
Ma		(1)	(1)
Es	IV, 26	(9)	1 (3)
St	IV, 21	(2)	(1)
Gm	IV, 29	5	3
Ja	V, 32	7	(1)
Lb	VIII, 55	1 (2)	4
At	IX, 56	10	(1)
Pg	IX, 61	5	(2)

and arrayed according to frequently appearing codes. The four groups were (a) all codes in which the first three digits were some combination of 2 (D), 7 (Pt), and 8 (Sc), i.e., 278, 287, 728, 782, 827, and 872; (b) 1 (Hs) and 3 (Hy) codes, i.e., the code had 1 or 3 as the first or second digit: 13, 31, 21, 12, 83, 38, etc.; (c) 4 (Pd) and 9 (Ma) codes with analogous combinations as in (b); and (d) all codes which did not fall into one of the three preceding patterns. For convenience these four groups will be referred to as: 278, 1 and 3, 4 and 9, and "other." The respective N's are 45, 70, 56, and 79.

These three commonly observed types of profile configurations were chosen on the basis of the different psychological properties characterizing them. The 278's display directly anxiety and depressive features. The 13's exhibit somatization and conversion symptoms rather than consciously experienced and directly expressed anxiety. The 49's are the "acting out" character and behavior disorders.

A distribution of the A and R scores was plotted with A on the vertical axis and R on the horizontal axis. This was done separately for the four groups and for the total population. The total scatter plot was cut at approximately the medians and divided into quadrants. For an A score of 15 the split was actually 54/46; for an R score of 17, a 46/54 division was obtained. Each of the four group scatter plots was divided at the same level and the number of cases falling in each quadrant determined. These frequencies were converted to corrected percentages to make comparison easier and are presented in Table 5.

There is a marked tendency for the 278 group to score high on A and to fall into

Table 5. Corrected Proportions and Frequencies of Four Code Groups Falling into Quadrants Determined by Plotting A against R

	I A \geq 15 & R < 17		II A \geq 15 & R \geq 17		A \geq 15	
	%	f	%	f	%	f
278	33.9	17	49.1	22	83.0	39
13	6.2	7	17.4	12	23.6	19
49	37.4	23	7.3	4	44.7	27
Other	27.8	25	30.6	24	58.4	49
Total	25.0	72	25.0	62	50.0	134

	III A < 15 & R < 17		IV A < 15 & R \geq 17		A < 15	
	%	f	%	f	%	f
278	8.3	4	8.6	2	16.9	6
13	25.1	18	51.4	33	76.5	51
49	37.0	21	18.4	8	55.4	29
Other	26.0	21	15.6	9	41.6	30
Total	25.0	64	25.0	52	50.0	116

	R < 17		R \geq 17		Total	
	%	f	%	f	%	f
278	42.2	21	57.7	24	99.9	45
13	31.3	25	68.8	45	100.1	70
49	74.4	44	25.7	12	100.1	56
Other	53.8	46	46.2	33	100.0	79
Total	50.0	136	50.0	114		250

quadrant II (high A, high R). It is clear that the 13's score low on A and cluster in quadrant IV (low A, high R). The 49's do not seem to differ much on A but they fall strikingly low on R. Thus it is apparent that the two factor scales may be related to profile configuration.

Further evidence for the relation of A and R to scales salient in the profile may be seen in detailed consideration of the codes that could not be classified as one of the three common configurations. In Table 6 the number of times a scale appeared in a code is listed for the four quadrants. Although three-digit codes had been used, the total frequency is greater than 237 ($3 \times N$ (79)) since in many cases there were ties for the first, second, or third positions. The frequencies are also expressed as percentages of the total frequency for each scale.

Here again we find scales 2, 7, and 8 much more common above the median of A. Scales 2 and 7 predominate in quadrant II (high A, high R) but scale 8 is more frequent in I (high A, low R). Scale 6 is almost as frequent as 8 in this quadrant but 6 is more frequent than 8 in III (low A, low R). Three scales, 6, 8, and 9, fall more often below the median of R. This is strikingly so in the case of scale 9 where all of the eleven instances fall below the cutting score on R.

It is of interest to note that scale 3 is no longer predominant in IV (low A, high R) but is actually more common in II. Apparently when this scale is not in a 13 type profile, it is actually more common in II along with 2 and 7. This deficiency in IV may also be noted in the case of scale 1 but it seems to be equally distributed over the remaining quadrants.

In pursuing the relation of scales 6 and 8 it was found that there were in the 1 and 3, 4 and 9, and the "others" groups fourteen cases of codes in which both 6 and 8 appeared. Half of these occurred in quadrant I and the rest were equally distributed. Thus when these scales occur together they are related both to A and to R.

Table 6. Frequency of Occurrence of Scales in Codes for "Others" Group (N = 79)

	I A \geq 15 & R < 17		II A \geq 15 & R \geq 17		A \geq 15	
	%	f	%	f	%	f
1	28.6	12	30.9	13	59.5	25
2	31.4	16	45.1	23	76.5	39
3	20.8	5	33.4	8	54.2	13
4	33.4	6	22.2	4	55.6	10
5	23.5	4	23.5	4	47.0	8
6	40.0	6	13.3	2	53.3	8
7	35.8	14	43.6	17	79.4	31
8	44.2	19	18.6	8	62.8	27
9	54.5	6	0.0	0	54.5	6

	III A < 15 & R < 17		IV A < 15 & R \geq 17		A < 15	
	%	f	%	f	%	f
1	30.9	13	9.6	4	40.5	17
2	21.5	11	2.0	1	23.5	12
3	29.2	7	16.6	4	45.8	11
4	22.2	4	22.2	4	44.4	8
5	35.3	6	17.6	3	52.9	9
6	46.7	7	0.0	0	46.7	7
7	15.4	6	5.0	2	20.4	8
8	27.9	12	9.3	4	37.2	16
9	45.5	5	0.0	0	45.5	5

	R < 17		R \geq 17		Total	
	%	f	%	f	%	f
1	59.5	25	40.5	17	100.0	42
2	52.9	27	47.1	24	100.0	51
3	50.0	12	50.0	12	100.0	24
4	55.6	10	44.4	8	100.0	18
5	58.8	10	41.1	7	99.9	17
6	86.7	13	13.3	2	100.0	15
7	51.2	20	48.6	19	99.8	39
8	72.1	31	27.9	12	100.0	43
9	100.0	11	0.0	0	100.0	11
Total						260

Independent Confirmation

An independent study which indicates the relative orthogonality of A and R and their contribution to the factor structure of the MMPI has been reported by Williams and Lawrence [651]. They used a sample of 100 neuropsychiatric patients in an army hospital and correlated a series of Rorschach scorings, the Wechsler-Bellevue verbal IQ, and the clinical and validating scales of the MMPI plus Barron's Es scale [44 (see IV, 26)] as well as the A and R scales. The third factor showed

the highest positive loadings for R and scale 3 (Hy) and significant negative loadings on scale 9 (Ma). Considering the loadings of both the Rorschach variables and the MMPI scales the authors state that the dimension "may best be labeled 'expressive-repressive'."

The fourth factor is a general MMPI dimension which they consider closely related to the first factor reported in many previous factor studies. (The first factor configuration was discussed earlier in this paper.) It shows the highest positive loadings on A and on scales 7 (Pt) and 8 (Sc) with a high negative loading on Es.

Therapy Study

The use of the A and the R scales to demonstrate therapeutic change has been reported by Welsh and Roseman [625]. Fifteen schizophrenic patients on an insulin coma regime had repeated the MMPI six times during the treatment proper and from one to five times after termination of treatment. Behavioral changes had been evaluated objectively by means of Lorr's Schedule D [r101]. A previous paper by Roseman [684] had reported the relationship between over-all profile changes as evaluated by competent MMPI judges and the behavioral changes.

Since A and R seem to be related to profile configuration it was likely that these scales would reflect the changing pattern which Roseman's judges had noted. Such proved to be the case when the seven or more MMPI records for each of the fifteen schizophrenics were scored for A and R. The changes in profile configuration that had accompanied clinical improvement were strikingly reflected in the factor scale scores. Patients who made the most improvement showed a marked drop in A scores with some tendency for R to be lower. Those who made the least improvement or got worse tended to show a rise in A with R falling either higher or lower. When these data are plotted in graphic form some of the shifts are quite dramatic.

Other Studies

Sherriffs and Boomer [547] utilized the A scale in a study of the effects of the rights minus wrongs formula which is frequently used by educators in an attempt to correct for guessing on examinations. They had given the group form of the MMPI to 450 students and used the A scale to identify "students who lacked self-confidence, especially confidence in their own judgment, who had difficulties in making decisions, and who were easily threatened by ambiguous situations." They explored systematically various relations between test scores and concluded "that students who score on the maladjusted end of the 'A scale' are handicapped by being scored on a 'R - W' basis. This holds true even when the students' knowledge of course material is held constant. The evidence suggests that these students are penalized by their tendency to omit more items, and to omit items the answers to which they know."

Autrey [31] used the A scale to select subjects for a study of communicative efficiency. She hypothesized that anxious subjects would be less effective in responding pertinently to a series of questions than nonanxious subjects. From a group of 307 college undergraduates she selected thirty-six subjects. Half of this group had scored from 24 to 35 on the A scale and were termed "anxious"; the "nonanxious" subjects had scored from 0 to 6 on the scale. The hypothesis was supported at the .025 level. Thus, in this experimental situation, subjects who had scored at the ex-

trêmes of the distribution of the A scale showed marked differences in the appropriateness of their responses to a series of questions that were vague and personal in nature.

Diagnoses

No systematic studies of the relationship between A and R and psychiatric diagnoses have been reported. Some preliminary work has been carried out by the present writer and by John Pearson (reported in a personal communication), and tentative findings will be noted using the quadrant system described above. These are summarized below.

CLUSTERING OF PSYCHIATRIC DIAGNOSES IN A AND R QUADRANTS

I High A, Low R	II High A, High R
Paranoid schizophrenia	Reactive depression
Psychoneurosis, severe	Manic-depressive, depressed
Anxiety states	Anxiety states
III Low A, Low R	IV Low A, High R
Manic-depressive, manic	Psychoneurosis, mild
Alcoholics	Hysteria
Behavior and character disorders	Conversion reactions

It should be borne in mind that the cases in the various diagnostic groups distribute themselves quite generally over the area and only the most obvious clusterings of the largest groups can be reported here. The display is intended to be suggestive of general trends only, which may be investigated by those interested in this type of problem.

Normal Group

Some interesting findings have been related (in a personal communication) by Harrison Gough on the use of the A and the R scales with a group of normal subjects. The highest correlations with A for regular MMPI variables are K, -.71; L, -.37; Hy, -.32; Si, .45; F, .34; and Ma .30. Some of the variables on Gough's California Psychological Inventory, the CPI [257], show significant negative correlations: social responsibility (Re), -.41; tolerance (To), -.59; intellectual efficiency (Ie), -.46; academic achievement (Ac), -.50; psychological interests (Psy), -.60; a scale (Gi) designed to see whether or not the subject is trying to place himself in a favorable light, -.56. Positive correlations are found on a dissimulation scale (Ds), .59, and impulsivity (Im), .47. The Ds scale is described in an earlier article reprinted in the present volume [255 (see I, 4)]. The correlation of -.46 with Es is consistent with that found by Williams and Lawrence as noted above. The Strong Vocational Interest Blank [r156] key for specialist level was negatively related, -.31. Descriptive adjectives and phrases about subjects who scored high on A tended to reflect slowness of personal tempo, pessimism, vacillation, hesitancy, and inhibitedness.

In the same sample a number of positive correlations with the regular MMPI scales and R occurred: K, .53; L, .38; D, .44; and Hs, .41. A negative relation with Ma was found, -.44. On the CPI positive relations may be noted on some scales:

tolerance (To), .32; femininity (Fe), .33; and good impression (Gi), .43. Other CPI scales showed negative correlations: impulsivity (Im), -.64; self-acceptance (Sa), -.41; and social participation (Sp), -.35.

Table 7. Test-Retest Data Supplied by Stevens

Administration	Mean	SD	r_{11}
First (N = 71)			
A	14.5	6.7	
R	17.1	3.9	
Second (N = 60)			
A	13.1	7.6	.70
R	17.6	4.2	.74

Consistency and Stability of Scales

Some data relating to the consistency of the A and R scales have been reported by Kooser [369] incidental to the main purpose of his investigation. For 108 college undergraduates a split half (odd-even) corrected correlation on A was .88; the comparable value for R was .48. These findings are in accord with the nature of the content of the two scales. It was noted earlier in the present paper that the A scale content was much more homogeneous than the R scale. But this does not mean that the R scale is less stable than the A scale. The 79 items comprising A and R had been given to a class of 71 college sophomores by Phyllis Stevens (reported in a personal communication). Sixty of these same subjects repeated the scales after a four-month interval. The product-moment correlations reported for the test-retest scores are A, .70; R, .74. It is important to note that these correlations were obtained despite the fact that the group showed much less variability than is usually found (see Table 8 below). These data are summarized in Table 7.

In Table 8 data for thirty different representative groups are listed. The means, standard deviations, and correlations where available for A and R are given. These data are arranged in order of the magnitude of the mean A score. It can be seen that the ten general psychiatric samples listed all fall above the normal groups. There is, however, a wide range of means for these normal groups from 14.5 in an eastern state teachers college all the way down to 6.0 for air force officers. Five of the ten psychiatric samples also average higher on R. The lowest scores on R occur with hospitalized chronic alcoholics, high school boys, and air force officers.

Twenty-five of the samples are separated for sex: 15 male samples and 10 female. If the cutting scores given in the quadrant arrangement previously suggested in this paper (A of 15, R of 17) are used, it is found that there is some tendency for the female groups to average higher than the comparable male groups on R. This is summarized in Table 9.

Summary and Conclusions

Two special MMPI scales, A and R, have been described. They were especially derived to measure dimensions of the MMPI which had been consistently noted in factor studies carried out by many investigators using diverse populations. An independent study has confirmed the relative orthogonality of these scales and their consistency in factor identification.

Table 8. Data on Scales A and R for 30 Representative Groups^a

Group	N	Mean		SD		r
		A	R	A	R	
1. Psychiatric intake I, female	51	20.8	18.2	8.7	4.3	-.05
2. VA mental hygiene clinic I, male	99	20.7	17.4	9.2	4.9	.09
3. VA mental hygiene clinic II, male	100	20.4	16.0	10.6	5.6	.34
4. Psychiatric intake II, female	140	20.1	18.5	9.5	4.3	-.10
5. VA mental hygiene clinic III, male	105	19.8	17.1	10.3	4.5	
6. Psychiatric intake III, female	136	19.0	18.9	9.1	4.2	-.25
7. Psychiatric intake I, male	73	17.9	16.2	9.3	4.5	-.06
8. Psychiatric intake II, male	30	17.1	18.1	10.1	4.6	-.46
9. Naval hospital (NP), male	101	17.1	16.5	15.0	5.6	-.04
10. Psychiatric intake III, male	89	17.1	17.9	9.4	5.1	-.20
11. High school I, female	131	16.3	16.2	8.9	4.1	
12. High school II, female	98	15.4	17.1	8.4	3.7	-.29
13. VA general medical and surgical hospital I, male	150	15.3	16.9	10.8	5.8	.00
14. College sophomores	71	14.5	17.1	6.7	3.9	
15. Dermatoses, female	54	14.3	17.2	9.3	3.8	-.32
16. College I, female	36	14.3	16.1	8.4	4.0	
17. College undergraduates	307	14.2	15.9	7.4	4.4	.11
18. State prison, male	180	13.9	15.4	8.0	4.5	-.34
19. High school I, male	151	13.7	14.1	8.0	4.5	
20. High school II, male	123	13.3	16.4	7.3	4.7	-.15
21. Dermatoses, male	51	13.2	16.7	9.4	4.6	-.27
22. College I, male	65	13.2	15.9	7.4	4.0	
23. Weight reduction, female	98	12.9	18.0	8.2	3.9	-.26
24. VA general medical and surgical hospital II, male	52	12.3	17.4	8.9	4.9	
25. Chronic alcoholics	64	12.0	12.0	8.8	5.2	
26. Graduate school, male	40	11.5	16.5	7.3	3.6	
27. College undergraduates	425	10.1	15.5 ^b	8.0	3.9 ^b	-.36
28. College II, female	96	9.7	17.4	6.9	3.5	
29. College II, male	132	8.7	15.2	7.7	4.7	
30. Air force officers, male	153	6.0	14.6	7.1	4.1	-.29

^a Data for this table were supplied as follows: O. R. Autry, group 17; D. S. Boomer, group 27; A. N. Button, group 25; H. G. Gough, groups 11, 12, 19, 20, 26, 28, 29, 30; E. deT. Kooser, groups 16, 22; R. LaForge, groups 1, 4, 6, 7, 8, 10, 15, 21, 23; F. B. Price, group 9; R. E. Smith, group 18; P. W. Stevens, group 14; and P. L. Sullivan, groups 2, 5.

^b Statistics on R based on a smaller subsample.

Table 9. Frequency of Occurrence in A and R Quadrants of Means for 25 Samples Where Sexes Are Differentiated

	Low R	High R	Total
High A			
Male	(I) 3	(II) 3	6
Female	2	4	6
Low A			
Male	(III) 8	(IV) 1	9
Female	1	3	4
Total			
Male	11	4	15
Female	3	7	10

Table 10. T Scores for Scales A and R

Raw Score	Male		Female		Raw Score	Male		Female		
	A	R	A	R		A	R	A	R	
40	101		102	19	.....	59	57	55	53
39	84	99	78	18	.....	57	55	54	51
38	82	97	77	17	.....	56	53	53	48
37	81	95	76	16	.....	55	51	51	46
36	80	93	75	15	.....	54	49	50	44
35	79	91	74						
34	77	89	73	14	.....	52	47	49	41
33	76	86	71	13	.....	51	45	48	39
32	75	84	70	12	.....	50	43	47	36
31	74	82	69	11	.....	49	40	46	34
30	72	80	68	10	.....	47	38	44	32
29	71	78	67	9	.....	46	36	43	29
28	70	76	66	8	.....	45	34	42	27
27	69	74	64	7	.....	44	32	41	25
26	67	72	63	6	.....	42	30	40	22
25	66	70	62	5	.....	41	28	38	20
24	65	68	61	4	.....	40	26	37	18
23	64	66	60	3	.....	38	24	36	15
22	62	63	58	2	.....	37	22	35	13
21	61	61	57	1	.....	36	20	34	11
20	60	59	56	0	.....	35	17	33	8

A description of the scales was given in terms of item content and by means of the overlap of items and the intercorrelations with regular MMPI scales. The item overlap with certain other scales was also indicated. Further clarification of the meaning of the scales was noted by listing covariation in a group of normal subjects of various test scores and behavioral correlates. Within psychiatric populations the relation of A and R to diagnosis was summarized.

Two studies have used the A scale independently. In one it was used to identify students who were handicapped in examinations by self-doubt. In another study subjects scoring high on A were shown to exhibit less efficient communication than low scorers.

The use of both scales together, however, may prove more effective. This was demonstrated in a study relating profile shifts to therapeutic changes: a plot of the A and the R scores together graphically illustrated the value of their simultaneous employment. Further evidence for the conjoined relation of the scales to profile configuration was examined by noting profile codes appearing frequently in psychiatric populations. Among diagnostic groups, for example, anxiety states fall high on A; but of those with high A scores who are also high on R, depression will be seen primarily, while those low on R will show schizoid features.

It is clear that high A scores are related to disability of a dysthymic and dysphoric nature in which anxiety is prominent. The disorders exhibited by high R scorers are characterized by repression and denial; low R accompanies externalized and "acting-out" behavior. Although it is not argued that A is a direct measure of anxiety and R of repression, the use of these two scales concurrently may lead to more adequate specification and definition of these concepts.

For the convenience of workers who may wish to utilize A and R in experimental or clinical studies, the item numbers for both the individual and the group forms of the MMPI are listed below. In Table 10 T scores are listed which will make it possible to compare the relative elevations of A and R directly with the clinical scales. These scores have been computed from data very kindly supplied by Dr. S. R. Hathaway. These data are based on a new and improved sample of Minnesota normals which is comparable to the original standardizing samples. The appropriate statistics are given below:

	Males (N = 226)		Females (N = 315)	
	A	R	A	R
M	12.20	15.57	14.78	17.74
SD	8.00	4.78	8.50	4.25

It is of interest to note that the sex differences previously pointed out are also found in this normal sample, that is, the mean scores for females are higher than those for males. In addition, the statistics for A follow the trend for normal subjects to score lower on this scale than psychiatric patients.

Item Lists									
A Scale									
Booklet (Group) Form					Box (Individual) Form				
True Items					X Items				
32	259	344	389	465	C-19	F-17	F-47	G-45	I-29
41	267	345	396	499	C-22	F-34	F-48	G-51	I-31
67	278	356	397	511	C-25	F-35	F-49	H-2	I-35
76	301	359	411	518	E-43	F-36	F-54	H-29	I-36
94	305	374	414	544	E-50	F-42	G-1	I-15	I-54
138	321	382	418	555	E-52	F-43	G-5	I-17	J-4
147	337	383	431		F-4	F-44	G-36	I-23	J-13
236	343	384	443		F-16	F-45	G-42	I-27	
False Item: 379									
R Scale									
Booklet (Group) Form					Box (Individual) Form				
False Items					X Items				
1	126	219	415	462	A-2	C-2	D-39	F-20	I-28
6	131	221	429	468	A-18	C-17	E-29	F-32	I-46
9	140	271	440	472	A-36	C-40	E-30	G-23	I-50
12	145	272	445	502	B-22	C-43	E-32	H-43	J-5
39	154	281	447	516	B-54	D-31	E-47	I-22	J-35
51	156	282	449	529	O Items				
81	191	327	450	550	A-19	C-42	D-49	G-46	J-11
112	208	406	451	556	B-4	C-48	G-31	I-49	J-14
					C-10	D-40	G-32	J-7	J-24