Cluster analysis of personality disorders

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ABSTRACT

This article aims to investigate the classification of personality disorders and Kato’s model as a basis for international comparison of personality disorder. Three superordinate and ten symptomatic clusters emerged from two cluster analyses of 88 patients with personality disorders. The first cluster analysis showed that borderline personality disorder to be scattered among three clusters and antisocial personality disorder to be included in cluster A, whereas the DSM-III-R (Diagnostic and Statistical Manual of Mental Disorders, third edition revised) included both borderline personality disorder and antisocial personality disorder in superordinate cluster B. The second cluster analysis showed ten clusters; inadequate emotional expression and egocentricity, impairment in social activity, instability in interpersonal relations, irresponsibility, unstable self-image, self-destructive behavior, withdrawal from interpersonal relations and odd behavior, idea of reference, conduct disorder, adult antisocial behavior. These results did not support the concept of the mutual exclusiveness of 11 personality disorders in the DSM-III-R, however they do appear to support Kato’s model.

INTRODUCTION

Since the 1915 report by Kraepelin11), the classification of personality disorders has been continuous problem in psychiatry, with a controversial and chequered history. Despite numerous researchers having tried to find a solution, no perfect classification of personality disorders has been developed. The only categories remaining in the official classification such as the ICD-8, 9, 10 (International Classification of Disease, 8th revision, 9th revision, 10th revision)2, 3, 4), and DSM-III-(R) (Diagnostic and Statistical Manual of Mental Disorders, third edition and its revised version)5, 6), are paranoid, compulsive and hysterical (histrionic), other categories have disappeared as a result of several revisions7).

In the DSM-III-(R) and IV8), there is a comment that personality disorders have been grouped into three superordinated clusters. However this grouping is not based on any particular evidence8, 10). There appear to be only 4 investigations of the validity of these clusters, none of which were carried out in Japan9, 12, 13, 14). Based on this situation, Kato argued that to increase subcategories of personality disorder might reduce reliability, and as a result disqualify studies for international comparison. After examining several theories of per-
sonality disorders, he proposed a theoretical model which can be applied to an international comparison of personality disorder (Appendix 1)\(^{15}\).

The objectives of the present study were to investigate the validity of three clusters which first appeared in the DSM-III and were continued in the DSM-IV, and the mutual exclusiveness of 11 subcategories of personality disorder in the DSM-III-R, and establish the direction for appropriate classification system to verify the Kato hypothesis.

**SUBJECTS AND METHODS**

The 88 subjects included 58 (65.9\%) men and 30 (34.1\%) women with a mean age of 39.0 ± 13.9 years. Sampling was limited to those who did not meet the DSM-III-R criteria for schizophrenia, manic episodes, mental retardation, and organic brain syndrome but who had personality disorder and in whom the duration of treatment was more than three years. However patients with other Axis I disorders, such as psychoactive substance use disorder, major depression, dysthymia, and anorexia nervosa, were not excluded. Clinical diagnosis was made based on the DSM-III-R rules, but if the diagnosis was “personality disorder not otherwise specified”, it was classified according to the previous nomenclature. The distribution of Axis II diagnoses given by clinicians was as follows; paranoid 2, schizoid 3, schizotypal 3, borderline 18, histrionic 7, narcissistic 6, antisocial 13, avoidant 3, dependent 3, compulsive 6, passive-aggressive 1, personality disorder not otherwise specified 23. Patients who were given a diagnosis of “personality disorder not otherwise specified”, included diagnoses according to Schneider’s or Kraepelin’s classical typology; depressive (Depressive) 1, hyperthymic (Hyperthymische) 1, labile (Stimmungs labile) 1, asthenic (Astenische) 1, explosive (Explosible) 3, unstable drifter (Haltlose) 1. Sixty two percent of patients had comitant Axis I diagnoses: psychoactive substance use disorder (mainly alcoholism) 23 (26.1\%), anxiety disorder 11 (12.5\%), dysthymia 8 (9.1\%), major depression 5 (5.7\%), adjustment disorder 5 (5.7\%), anorexia nervosa 2 (2.3\%).

Since the publication of the prototypic DSM-III classification, numerous assessment instruments have been developed. However, none has been demonstrated to be superior to the others, at least in part because for personality disorders there is no validity standard with which an assessment can be compared\(^{10}\). For the present study, Axis II assessment was made by using a 0–3 point rating scale (0 = no traits, 1 = very few traits, 2 = some traits, 3 = completely meets DSM-III-R) for 120 DSM-III-R items of personality disorders, arranged randomly in both English and Japanese to minimize possible halo effects between symptoms. Items of antisocial personality disorder were appended at the end, mainly because the criteria were different from those of other disorders and more related to behavior criteria, such as delinquency, crime, and antisocial behavior. As to the clinical experiences of the 16 evaluating psychiatrists, 4 had more than 10 years of experience, 6 had from 5 to 10, and 6 less than 5 years, with a overall mean of 8.5 years. Nine of the 16 were designated psychiatrists under the Japanese Mental Health Law.

The frequency distribution of rating scores was calculated for each of the 11 personality disorders in the 88 patients. Correlations (Pearson product-movement) among scores were determined. Three cluster analyses were performed in conjunction with a between-subject correlation of 88 cases to measure subject similarity, with between-symptom item correlation of the 120 questions to measure symptom item similarity and between-subject correlation of 88 cases, again to investigate the validity of the first cluster analysis. All correlations were performed using average linkage hierarchical cluster analysis because the definition of personality disorder was not as strict as those of other mental disorders such as depression. In general, a diagnosis of depression or bipolar disorder can be made solely based on symptom patterns according to the individual’s baseline, and personality disorders are diagnosed in an interpersonal context. Thus an intermediary method such as average linkage was optimal. Cluster analysis has been reported to be the most appropriate analysis technique for testing an actual taxonomy\(^{17}\) and has been used in a number of subclassifications of depression. All cluster
analysis was done with the program SPSS\textsuperscript{33}.

RESULTS

1) Frequency distribution

Table 1 shows the frequency distribution of ratings for the 11 DSM-III-R personality disorder categories in the 88 patients. The most commonly diagnosed personality disorder was borderline personality disorder with 11\%, followed by paranoid personality disorder with 9\%. Combining the rating for some traits to meet DSM-III-R, the most commonly diagnosed disorders were in decreasing order, borderline, histrionic, paranoid, and narcissistic personality disorder.

The average number of personality disorders on the DSM-III-R classification (i.e. the number of overlapping comorbid conditions) in each case was 2.40 ± 1.93 when combining "some traits" with "meets DSM-III-R", and 0.53 ± 0.96 when limited to "meets DSM-III-R".

Table 2 shows the inter-correlation matrix of the scale for Axis II personality disorders. The highest correlations were found between paranoid and schizoid ($r = .49$), histrionic and narcissistic ($r = .58$), histrionic and passive-aggressive ($r = .46$), and narcissistic and passive-aggressive ($r = .56$) from among the 18 correlation coefficients showing statistical significance ($p < 0.01$).

2) Cluster analyses of cases and items

a. Cluster analysis of 88 cases

Three clusters a), b) and c) among the 88 cases were identified by analysis of the 120 questions. Various numbers of clusters were tried but three clusters gave the most meaningful results. Figure

Table 1 Distribution of Rating Scores for DSM-III-R Axis II Personality Disorders for 88 Patients

<table>
<thead>
<tr>
<th>Personality Disorders</th>
<th>None or very few traits</th>
<th>Almost Meets DSM-III-R</th>
<th>Meets DSM-III-R</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>N</td>
<td>%</td>
<td>N</td>
</tr>
<tr>
<td>Paranoid</td>
<td>59</td>
<td>67</td>
<td>21</td>
</tr>
<tr>
<td>Schizoid</td>
<td>68</td>
<td>77</td>
<td>17</td>
</tr>
<tr>
<td>Schizotypal</td>
<td>75</td>
<td>85</td>
<td>10</td>
</tr>
<tr>
<td>Histrionic</td>
<td>58</td>
<td>66</td>
<td>24</td>
</tr>
<tr>
<td>Narcissistic</td>
<td>59</td>
<td>67</td>
<td>22</td>
</tr>
<tr>
<td>Antisocial</td>
<td>75</td>
<td>85</td>
<td>7</td>
</tr>
<tr>
<td>Borderline</td>
<td>54</td>
<td>62</td>
<td>24</td>
</tr>
<tr>
<td>Avoidant</td>
<td>71</td>
<td>81</td>
<td>16</td>
</tr>
<tr>
<td>Dependent</td>
<td>79</td>
<td>90</td>
<td>7</td>
</tr>
<tr>
<td>Compulsive</td>
<td>82</td>
<td>93</td>
<td>6</td>
</tr>
<tr>
<td>Passive-Aggressive</td>
<td>64</td>
<td>73</td>
<td>17</td>
</tr>
</tbody>
</table>

Table 2 Correlation Matrix of Rating Scores for DSM-III-R Personality Disorders

<table>
<thead>
<tr>
<th>Schizoid</th>
<th>Schizotypal</th>
<th>Antisocial</th>
<th>Borderline</th>
<th>Histrionic</th>
<th>Narcissistic</th>
<th>Avoidant</th>
<th>Dependent</th>
<th>Compulsive</th>
<th>Passive-Aggressive</th>
</tr>
</thead>
<tbody>
<tr>
<td>Paranoid</td>
<td>0.49**</td>
<td>0.40**</td>
<td>0.25**</td>
<td>0.25**</td>
<td>0.30**</td>
<td>0.35**</td>
<td>-0.05</td>
<td>-0.14</td>
<td>0.10</td>
</tr>
<tr>
<td>Schizoid</td>
<td>0.26**</td>
<td>0.16</td>
<td>0.06</td>
<td>0.10</td>
<td>0.23**</td>
<td>-0.14</td>
<td>-0.08</td>
<td>-0.10</td>
<td>-0.01</td>
</tr>
<tr>
<td>Schizotypal</td>
<td>0.01</td>
<td>-0.17</td>
<td>-0.10</td>
<td>-0.11</td>
<td>-0.01</td>
<td>-0.07</td>
<td>0.13</td>
<td>0.02</td>
<td></td>
</tr>
<tr>
<td>Antisocial</td>
<td>0.17</td>
<td>0.30*</td>
<td>0.20**</td>
<td>-0.11</td>
<td>-0.02</td>
<td>0.22</td>
<td>0.22</td>
<td>0.02</td>
<td></td>
</tr>
<tr>
<td>Borderline</td>
<td>0.38**</td>
<td>0.16</td>
<td>-0.01</td>
<td>0.37**</td>
<td>0.18</td>
<td>0.06</td>
<td>0.46**</td>
<td>0.06</td>
<td></td>
</tr>
<tr>
<td>Histrionic</td>
<td>0.58**</td>
<td>-0.03</td>
<td>0.16*</td>
<td>0.06</td>
<td>0.46**</td>
<td>0.56**</td>
<td>0.22</td>
<td>0.02</td>
<td></td>
</tr>
<tr>
<td>Narcissistic</td>
<td>0.11</td>
<td>-0.02</td>
<td>-0.03</td>
<td>0.29*</td>
<td>-0.03</td>
<td>0.22</td>
<td>0.01</td>
<td>-0.01</td>
<td></td>
</tr>
<tr>
<td>Avoidant</td>
<td>0.01</td>
<td>-0.01</td>
<td>-0.01</td>
<td>0.01</td>
<td>-0.01</td>
<td>-0.01</td>
<td>0.01</td>
<td>-0.01</td>
<td></td>
</tr>
<tr>
<td>Dependent</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Compulsive</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Passive-Aggressive</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* : p < 0.05
** : p < 0.01
1 shows the dendrogram of clusters closely corresponding to the A, B, and C clusters of the DSM-III-R, except for borderline and antisocial personality disorders. This means that cases of borderline personality disorder were scattered into three clusters of a) (3 cases, 17%), b) (9, 50%) and c) (6, 33%); while those of antisocial personality disorder fell into cluster a) in 12 cases (92%), whereas the DSM-III-R included both personality disorders in cluster B. Other personality disorders categories, however, belonged to the same clusters as the DSM-III-R.

b. Cluster analysis of 120 symptom items

Table 3 shows cluster analysis of 120 symptoms items. Ten clusters from (a) to (j) gave the most meaningful results: (a) inadequate emotional expression and egocentricity, (b) impairment in social activity, (c) instability in interpersonal relations, (d) irresponsibility, (e) unstable self-image, (f) self-destructive behavior, (g) withdrawal from interpersonal relations and odd behavior, (h) idea of reference, (i) conduct disorder with onset before age 15, (j) adult antisocial behavior. The results of this cluster analysis showed that the items of schizoid, schizotypal, narcissistic, dependent, compulsive, passive-aggressive, and antisocial personality disorder, included 1–2 relatively narrow clusters, but those of paranoid, borderline, histrionic, and avoidant personality disorder were scattered over wider-ranging clusters. A summary of the DSM-III-R criteria for the 11 person-

![Dendrogram 1](image-url)

**Figure 1**

Dendrogram 1

Table 3  Cluster Analysis of 120 Symptom Items

<table>
<thead>
<tr>
<th>Cluster</th>
<th>Member criterion features</th>
</tr>
</thead>
<tbody>
<tr>
<td>(a)-cluster</td>
<td></td>
</tr>
<tr>
<td>(a)-1-cluster</td>
<td>NS1, PN4, NG8, BP4, PN6, PA2</td>
</tr>
<tr>
<td>(a)-2-cluster</td>
<td>HS4, HS6, HS7, BP3</td>
</tr>
<tr>
<td>(a)-3-cluster</td>
<td>NS3, HS5, PA6, NS2, NS6, NS5, NS7</td>
</tr>
<tr>
<td>(b)-cluster</td>
<td></td>
</tr>
<tr>
<td>(b)-1-cluster</td>
<td>PA3, PA5, PA1, CP5, AV7, AV4, PA7</td>
</tr>
<tr>
<td>(b)-2-cluster</td>
<td>NS8, PA4, PA8, PA9, CP8, BP7, HS8</td>
</tr>
<tr>
<td>(c)-cluster</td>
<td></td>
</tr>
<tr>
<td>(c)-1-cluster</td>
<td>DP6, DP8, DP7, DP9, HS1, AV3</td>
</tr>
<tr>
<td>(c)-2-cluster</td>
<td>CP1, CP2, CP6, CP4, CP9</td>
</tr>
<tr>
<td>(c)-3-cluster</td>
<td>DP1, DP2, DP3, DP4, AV6</td>
</tr>
<tr>
<td>(d)-cluster</td>
<td>AS.C(8), PN7, HS2, HS3</td>
</tr>
<tr>
<td>(e)-cluster</td>
<td>BP8, BP6, BP1, BP5</td>
</tr>
<tr>
<td>(f)-cluster</td>
<td>BP2, DP5</td>
</tr>
<tr>
<td>(g)-cluster:</td>
<td></td>
</tr>
<tr>
<td>(g)-1-cluster</td>
<td>SD7, ST8, CP7, ST5, ST7, SZ5</td>
</tr>
<tr>
<td>(g)-2-cluster</td>
<td>ST2, AV5, SZ3, SZ4, ST6, SZ2, SZ1</td>
</tr>
<tr>
<td>(h)-cluster</td>
<td>ST1, ST9, PN3, PN2, PN1, ST3, ST4</td>
</tr>
<tr>
<td>(i)-cluster</td>
<td>AS.B</td>
</tr>
<tr>
<td>(j)-cluster</td>
<td>AS.C(1) ~ (7), (9), (10)</td>
</tr>
</tbody>
</table>

Note. All personality disorder features are coded according to the criteria number assigned in DSM-III-R. PN = paranoid; SD = schizoid; ST = schizotypal; AS = antisocial; BP = borderline; HS = histrionic; NS = narcissistic; DP = dependent; AV = avoidant; CP = compulsive; PA = passive-aggressive.

...ality disorders is shown in Appendix 2.

c. Relations between cluster analyses of 88 cases and symptom items

Table 4 shows the calculated mean and SD of each cluster obtained by adding and averaging the scores for each symptom item. Uncontrolled emotion [(a)-1], exaggeration and shallow expression [(a)-2], negative attitudes towards others [(b)-2], irresponsibility [(d)], unstable self-image [(e)] and self-destructive behavior [(f)] correlated significantly with both cluster a) and b). These characteristics, however, failed to correlate significantly with cluster c), which had a significant positive correlation only with compulsive traits. Between cluster a) and b), withdrawal from interpersonal relations and odd behavior [(g)], idea of reference [(h)], conduct disorder with onset before age 15 [(i)] and adult antisocial behavior [(j)] correlated significantly with cluster a). Conversely, egocentricity [(a)-3], procrastination [(b)-1] and unstable relationships [(c)-1] correlated significantly with cluster b).

d. Validity of first cluster analysis

Several investigators have suggested that the results of cluster analysis may be unstable. For this reason, 88 cases were reanalyzed by cluster analysis using 16 variables identified by the second cluster analysis, including the subclusters of (a)-1 to (j), to investigate the validity of clusters a), b) and c) in the first cluster analysis. The result showed that the result of the third cluster analysis was practically identical with those of the first cluster analysis, although cluster b) was scattered to two clusters, thus this cluster was not a tight cluster. The results of these two cluster analyses indicated that the results of the first cluster analysis were valid.

e. Comorbidity of borderline and antisocial personality disorders

The number of overlapping comorbid conditions of 88 patients was 2.40 ± 1.93 at over the level of "some traits" and 2.83 in cluster a), 3.12 in cluster b) and 0.92 in cluster c) respectively. There was no statistically significant difference
### Table 4  Relationship between Cluster Analyses of 88 Cases and Symptom Items

<table>
<thead>
<tr>
<th>cluster of variables</th>
<th>a (N = 30)</th>
<th>b (N = 33)</th>
<th>c (N = 25)</th>
<th>total (N = 88)</th>
<th>p &lt; 0.01 (t-test)</th>
</tr>
</thead>
<tbody>
<tr>
<td>(a)-1 6 items</td>
<td>12.36</td>
<td>12.91</td>
<td>4.00</td>
<td>10.19</td>
<td>a &gt; c, b &gt; c</td>
</tr>
<tr>
<td>(a)-2 5 items</td>
<td>13.13</td>
<td>12.97</td>
<td>3.60</td>
<td>10.36</td>
<td>a &gt; c, b &gt; c</td>
</tr>
<tr>
<td>(a)-3 7 items</td>
<td>6.97</td>
<td>11.64</td>
<td>2.76</td>
<td>7.52</td>
<td>b &gt; a &gt; c</td>
</tr>
<tr>
<td>(a)-total 21 items</td>
<td>33.77</td>
<td>39.15</td>
<td>11.08</td>
<td>29.34</td>
<td>b &gt; a &gt; c</td>
</tr>
<tr>
<td>(b)-1 7 items</td>
<td>5.13</td>
<td>9.37</td>
<td>4.32</td>
<td>6.49</td>
<td>b &gt; a, b &gt; c</td>
</tr>
<tr>
<td>(b)-2 6 items</td>
<td>7.70</td>
<td>8.67</td>
<td>1.80</td>
<td>6.39</td>
<td>a &gt; c, b &gt; c</td>
</tr>
<tr>
<td>(b)-total 15 items</td>
<td>15.36</td>
<td>20.81</td>
<td>7.28</td>
<td>15.11</td>
<td>b &gt; a &gt; c</td>
</tr>
<tr>
<td>(c)-1 7 items</td>
<td>7.13</td>
<td>10.39</td>
<td>7.12</td>
<td>8.35</td>
<td>b &gt; a, b &gt; c</td>
</tr>
<tr>
<td>(c)-2 6 items</td>
<td>2.97</td>
<td>1.58</td>
<td>5.28</td>
<td>3.10</td>
<td>c &gt; a, c &gt; b</td>
</tr>
<tr>
<td>(c)-3 6 items</td>
<td>4.13</td>
<td>5.21</td>
<td>4.52</td>
<td>4.64</td>
<td>ns</td>
</tr>
<tr>
<td>(c)-total 20 items</td>
<td>15.33</td>
<td>18.51</td>
<td>17.88</td>
<td>17.25</td>
<td>ns</td>
</tr>
<tr>
<td>(d)-total 9 items</td>
<td>3.37</td>
<td>3.12</td>
<td>0.52</td>
<td>2.46</td>
<td>a &gt; c, b &gt; c</td>
</tr>
<tr>
<td>(c)-total 4 items</td>
<td>5.47</td>
<td>5.12</td>
<td>2.36</td>
<td>4.45</td>
<td>a &gt; c, b &gt; c</td>
</tr>
<tr>
<td>(f)-total 2 items</td>
<td>2.80</td>
<td>2.91</td>
<td>0.64</td>
<td>2.23</td>
<td>a &gt; c, b &gt; c</td>
</tr>
<tr>
<td>(g)-1 8 items</td>
<td>10.93</td>
<td>2.78</td>
<td>3.52</td>
<td>5.77</td>
<td>a &gt; b, a &gt; c</td>
</tr>
<tr>
<td>(g)-2 7 items</td>
<td>8.90</td>
<td>6.18</td>
<td>6.60</td>
<td>7.23</td>
<td>a &gt; b, a &gt; c</td>
</tr>
<tr>
<td>(g)-total 17 items</td>
<td>23.16</td>
<td>11.84</td>
<td>12.24</td>
<td>15.82</td>
<td>a &gt; b, a &gt; c</td>
</tr>
<tr>
<td>(h)-total 8 items</td>
<td>11.3</td>
<td>6.15</td>
<td>3.72</td>
<td>7.21</td>
<td>a &gt; b &gt; c</td>
</tr>
<tr>
<td>(i)-total 12 items</td>
<td>8.93</td>
<td>1.03</td>
<td>0.04</td>
<td>3.44</td>
<td>a &gt; b, a &gt; c</td>
</tr>
<tr>
<td>(j)-total 12 items</td>
<td>20.13</td>
<td>10.00</td>
<td>1.52</td>
<td>11.05</td>
<td>a &gt; b &gt; c</td>
</tr>
</tbody>
</table>

The upper figures in each log is the average total score for each symptom item. The low figure is the SD.
between a) and b) clusters, however the number of overlapping comorbid conditions was statistically significant higher in clusters a) and b) than cluster c) (t-test: $t = 4.53$, df = 47.20, $p < 0.05$, $t = 5.59$, df = 53.44, $p < 0.01$). The number of overlapping comorbid conditions of borderline and antisocial personality disorder were examined in each cluster according to the results of the DSM-III-R (Table 5).

**DISCUSSION**

1) **Comorbidity**

In this examination, the DSM-III-R conceptual
organization of 11 personality disorders into three superordinate clusters was supported by the cluster analysis, although borderline and antisocial personality disorder diagnoses were included in other clusters in the DSM-III-R. The comorbidity issue has been among the more controversial topics in the diagnostic criteria of personality disorders. In particular, borderline personality disorder had the most numerous overlaps with other personality disorder, and several authors pointed out that borderline personality disorder usually met the criteria for at least one other personality disorder\textsuperscript{19, 20, 21}. Practicing clinicians rarely give more than two, and usually just one, personality disorder diagnosis. However, semistructured interviews have obtained an average of 3.75 (Widiger et al., 1986)\textsuperscript{22} and 4.6 (Skodol et al. 1988)\textsuperscript{16} personality disorder diagnoses per patient. Although the DSM-III-R attempts to decrease the overlap by deleting some of the overlapping items, it resulted in substantial shifts in prevalence rates and co-occurrence rates of personality disorder diagnoses. Morey\textsuperscript{22} has demonstrated that with the DSM-III-R there was an 800\% increase in the rate of schizoid personality disorder and a 350\% increase in narcissistic personality disorder, and with the DSM-III-R, 51.9\% met the criteria for two or more diagnoses, in comparison with the DSM-III, according to which 36.4\% of his 291 subjects met the criteria for two or more personality disorder diagnoses. Little research has focused on comorbid conditions concerning the diagnostic criteria of the DSM-IV personality disorders. However, it is presumed that similar comorbid conditions still continue because changes in diagnostic criteria of personality disorders from the DSM-III-R to the DSM-IV was very small.

In the present study, the average number of overlapping comorbid personality disorders diagnoses was $2.40 \pm 1.93$. There were 55 cases (62.5\%) given more than two diagnoses. Although it is not possible to exclude the effect of Axis I disorder, it is presumed that either the 23 cases diagnosed as “personality disorder not otherwise specified” did not fit any other DSM-III-R specific diagnostic items, or that many patients who might have been stable at the time of evaluation required subsequent treatment.

2) Problems on diagnostic criteria of borderline and antisocial personality disorder

Results of cluster analyses of 88 cases and symptom items showed that a) and b) clusters were almost concordant with superordinate DSM-III-R clusters A and B, respectively, but the compulsive tendency in cluster c) was stronger than that of the superordinate cluster C of the DSM-III-R. In cluster c), 6 out of 25 cases were diagnosed as compulsive personality disorder and the average number of overlapping comorbid conditions of these 25 cases was the lowest among the three clusters. It was presumed that patients belonging to cluster c) did not have more severe personality disturbance than those in cluster a) and b), so that cluster c) only had significant correlation with compulsive traits. One reason for this is that cluster c) had a lower number of comorbidities and consisted of personality traits such as perfectionism and excessive devotion to work, which were not recognized in other personality disorders, or fewer personality traits of behavioral failure were contained in cluster a) and b). In the Japanese clinical setting, other personality disorders in the C cluster, except for compulsive personality disorder, might be subclinical cases who not diagnosed as personality disorder requiring treatment, or given another Japanese-specific nomenclature such as “taijin kyofusho”. The cluster analysis of 120 symptom items failed to confirm each category as homogeneous with the DSM-III-R criteria. This result suggests that each personality feature may be problematic, relocated and reconceptualized, and be insufficient taxonomically.

Concerning scattering of borderline and antisocial personality disorders belonging to different clusters in the DSM-III-R, some reasons might be considered the result of scattering in borderline personality disorder. The author pointed out earlier that borderline personality disorder had a higher number of overlapping comorbid conditions than other personality disorders, and that borderline personality disorder overlapped in particular with not only near neighbor categories such as antisocial, histrionic and narcissistic personality disorder, but also schizotypal and dependent personality disorders\textsuperscript{16, 19–20}. On the other hand, there is little research on compulsive per-
sonality disorder, and it seems to be theoretically at the opposite end of spectrum. However, borderline personality disorder cases in this study strongly correlated with cluster c) cases in which the only characteristic was compulsive tendency. Three possibilities were considered. First, criteria such as controlling, indecisiveness and lack of generosity in compulsive personality disorder may all exist in varying degrees in all individuals with personality disorder, including borderline personality disorder, although the motivation for these behaviors may differ in ways not easily clarified by the criteria\(^{27}\). Secondly, borderline personality disorder is regarded as an obsessive-compulsive spectrum disorder\(^{28}\). In Hollander’s hypothesis, it is located at the end-point of risk seeking (impulsivity), compared with compulsive disorders, which are located opposite end point of risk aversive. Thirdly, scattering to three clusters of borderline personality disorder could not be discussed from the point of view of comorbidity, however, it is safe to say that the cases diagnosed as having had borderline personality disorders in this study had severe forms of disorder or belonged to a very heterogeneous group with extensive overlap with other categories. This might have been because clinicians weighted borderline personality disorder diagnosis in their personality diagnosis assessment, and once a borderline diagnosis had been made, other personality diagnoses were not important clinically. Another reason might be that among the diagnoses of borderline personality disorder, not only borderline personality disorder in a narrow sense but some others were included in the so-called “borderline state”, mainly pseudoneurotic schizophrenia, borderline personality organization (BPO)\(^{29}\) etc. As was pointed out by Livesley\(^{30}\), there are two potential threats to content validity when defining and compiling, diagnostic under-representation and diagnostic irrelevancy, and the latter was a major problem with DSM borderline personality disorder diagnosis.

Furthermore, the author would like to consider the core of antisocial personality disorders which were mostly included within cluster a). The number of overlapping comorbid conditions in antisocial personality was the highest in cluster a). It is unlikely that overlapping comorbid conditions affecting scattering in both those of cluster a) and b) of antisocial personality disorder were the same as borderline personality disorder, because the criteria of antisocial personality disorder was strongly related to behavior criteria with lack of personality characteristics. Cluster analysis of symptom items fell into two clusters of “conduct disorder onset before age 15” and “adult antisocial behavior” which were behavior criteria but not personality characteristics. Frances\(^{9}\) pointed out in his earliest review of the DSM-III that antisocial personality disorder was the most controversial topic among the personality disorders. Since publication of the DSM-III, many researchers have criticized the diagnostic criteria of antisocial personality disorder. Our studies suggest that patients diagnosed as antisocial personality disorder in a criminal setting are very heterogeneous with very extensive overlap with other categories (data not shown).

Instead of Pritchard’s\(^{31}\) old term of “moral insanity”, Schneider\(^{32}\) used the term of “affectionless personality (Gemütlose Psychopathische Persönlichkeit)” which was used as one of his ten types of psychopathic personality. He defined affectionless personality as “pitiless and lack of capacity for shame,”, “ungracious, cold, surly, and brutal in crime.” Yet he also pointed out that “many affectionless personalities remain non-delinquent, especially in the higher social strata”, “the non-delinquent affectionless character will often do astonishingly well in responsible positions”, “naturally they are hard as iron and utterly fearless and ruthless. Their aims are not always egotistic and they can pursue ideals”. In addition, Schneider himself mentioned in his description on the characteristics of affectionless that “I avoid using the term antisocial because the term is defined by sociological but not character-based evaluation”\(^{33}\).

In spite of Schneider’s excellent nomenclature and definition, the ICD and DSM have used the term of antisocial (dissocial) personality disorder, except that the ICD-9 defined it as “with predominantly sociopathic or asocial manifestation”. This nomenclature was decided on after heated discussion on the appropriateness of the term as
Appendix 1 Kato’s Model of Diagnosis and Classification in Personality Disorder

A psychopathological characteristics, independent from legal and ethical evaluations, at the 1971 WHO Tokyo Meeting. Although the DSM-III-R and also the DSM-IV are heavily weighted with criteria of social deviance (antisocial behavior), a substantial proportion of people in socially deviant populations, such as incarcerated criminals, delinquents, or drug addicts meet the criteria of antisocial personality disorder.

From the above results, it was presumed that the range of antisocial personality disorder was extensive. Moreover, when a person committed a crime, or experienced a conduct disorder with onset before age 15, and showed any kind of personality disorder which belonged mainly to A or B superordinate clusters, the patient may be diagnosed as having an antisocial personality disorder. Thus it is possible to advocate changing sociological terms such as antisocial personality to character-based and psychological term, for example the “affectionless personality disorder” of Schneider or the “loveless and guiltless” by McCord and McCord. Besides, it might be much better to use V or Z codes as used in the DSM or the ICD classifications for adult antisocial behavior, e.g., callous or affectionless personality disorder, with or without V71.01 or Z65.x (Adult antisocial behavior).

3) Proposal of classification of features

Finally, it is meaningful to create a more appropriate classification of personality disorders, taking into consideration the results of this research. The question of whether mental disorders are optimally classified categorically or dimensionally is a long standing issue. The DSM-III conceptual organization of 11 personality disorders into three superordinate clusters was supported by cluster analysis, although borderline and antisocial personality disorder were not included in the original superordinate clusters in the DSM-III-R.

On the other hand, there are several dimensional models based on particular personality theory. However, their value in the clinical
Appendix 2

Paranoid personality disorder
1 Suspiciousness
2 Questions
3 Hidden demening
4 Grudge
5 Secretiveness
6 Easily slighted
7 Jealousy

Schizoid personality disorder
1 No close friend
2 Solitary
3 No strong emotion
4 Little desire to sexual experience
5 Indifference
6 Few friend
7 Lacks feeling

Schizotypal personality disorder
1 Idea of reference
2 Social anxiety
3 Magical thinking
4 Unusual perceptual experience
5 Odd behavior
6 Few friends
7 Odd speech
8 Cold/aloof
9 Suspiciousness

Antisocial personality disorder
B. Conduct disorder in childhood
: delinquency, fight, etc.
C(1) Poor employment
C(2) Criminal behavior
C(3) Aggressiveness
C(4) Fails financial obligations
C(5) Fails plan ahead
C(6) Lying/coning
C(7) Recklessness
C(8) Neglects children
C(9) Promiscuity
C(10) Lacks remorse

Borderline personality disorder
1 Unstable relationship
2 Impulsivity
3 Affect instability
4 Intense anger
5 Self-destructive acts
6 Identity disturbance
7 Emptiness/boredom
8 Avoids abandonment

Histrionic personality disorder
1 Seeks praise
2 Sexual seductiveness
3 Physical attractiveness
4 Exaggeration

Narcissistic personality disorder
1 Reacts criticism
2 Exploitation
3 Grandiosity
4 Believes uniqueness
5 Fantasies
6 Sense of entitlement
7 Self-centered
8 Lacks empathy
9 Feeling of envy

Avoidant personality disorder
1 Easily hurt
2 Few friends
3 Needs acceptance
4 Avoids social activities
5 Reticent
6 Fears being embarrassed
7 Exaggerates potential difficulties

Dependent personality disorder
1 Unstable to decide without reassurance
2 Allows others to make decisions
3 Fear of being rejected
4 Difficulty initiating projects
5 Volunteerism
6 Feels devastated
7 Fear of being abandonment
8 Easily hurt

Obsessive-compulsive personality disorder
1 Perfectionism
2 Preoccupation with details
3 Controlling
4 Excessive devotion to work
5 Indecisiveness
6 Overconsciousness
7 Restricted expression
8 Lacks of generosity
9 Inability to discard

Passive-aggressive personality disorder
1 Procrastination
2 Sulky
3 Intentional inefficiency
4 Protest
5 Avoids obligations
6 Overevaluation of self
7 Resent usual suggestions
8 Abstacts others
9 Unreasonable criticism
setting is unclear\textsuperscript{(2)}, and there has been no agreement regarding the relationships among these dimensions. It is difficult to develop a consensus with a dimensional model, because the DSM-III (R) and also the DSM-IV contained a mixture of several theoretical backgrounds from which each personality disorder emerged. For example, narcissistic and borderline personality disorder depend on psychoanalytic theory, avoidant personality disorder on social learning theory, and schizotypal personality disorder on hereditary theory. There is no shortage of theories.

All typological classifications require some degree of point of rarity distinguishing the condition to be classified\textsuperscript{(25)}. Zimmerman et al\textsuperscript{(14)} and Livesley et al\textsuperscript{(25)} investigated the bimodality of point of rarity, but both groups of researchers found no evidence of it. However, to that extent that items related to normal personality traits in normal personality theories are used, point of rarity would not be found, since personality traits in abnormal or personality disorders are contained within normal personalities. No empirical study has ever identified a clear qualitative distinction between the presence or absence of personality disorders. However, it is presumed that personality disorders appear to differ in quality rather than quantity, as Schneider\textsuperscript{(26)} pointed out. If a person is excessively disturbed in only one abnormal personality pathology, which has no continuity with normal personality, he or she would be given a diagnosis of personality disorder. Even though characteristics considered to be contained in normal personality context be developed extensively, this would still be considered within normal personality. It is difficult to determine in quality, but it is indispensable for future research on personality disorders. If not, the present confusion will continue.

The author would like to propose the following compromise. Factor and cluster analytical studies including the present research supported the notion of at least three, or four, main personality grouping. As was pointed out by Kato\textsuperscript{(7)}, those categories which have been left in the ICD-8, 9, 10 and DSM-III(-R) were paranoid, hysterical, and compulsive personality disorder. Paranoid personality disorder corresponds to A, hysterical to B, and compulsive to cluster C in the DSM-III (R) and IV. Rutter\textsuperscript{(41)} also suggested to group together those dramatic, emotional, erratic clusters, which agrees with Kato’s model. The historical fact that classification of personality disorders has emerged from abnormal personality but not normal personality schemes must be taken into consideration. As was pointed out by Livesley\textsuperscript{(45)}, it seems premature to reach a conclusion. The present study suggests that the dimensional model would work best as an adjunct to the three clusters in the DSM-III(-R) and IV, because the classification of personality disorders will probably shift to a dimensional model in the future.

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人格障害のクラスター分析

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本研究の目的は、DSM-III-Rの人格障害の診断分類と加藤による「国際比較のための理論的人格障害モデル」の妥当性を調査することである。88名の人格障害患者を対象とし、2種類のクラスター分析を施行したところ、3つの上位、及び10の症状項目のクラスターが抽出された。最初のクラスター分析の結果、DSM-III-R分類ではともにBクラスターに帰属している境界性人格障害、及び反社会性人格障害が、前者は3つのクラスターに分散し、後者はAクラスターに帰属する結果となった。次いで症状項目をクラスター分析したところ、不適切な行動発現と自己中心性、社会活動性の障害、対人関係の不安定さと強迫傾向、親としての無責任さ、自己像の不安定さ、自己破壊行動、対人関係における引きこもりと奇妙な行動、関係念慮、15歳未満に始まった行為障害、成人の反社会行動などの特徴を有する10のクラスターが抽出された。これらの結果から、DSM-III-Rで分類されている11の人格障害の相互独立性を支持する結果は得られなかったが、加藤のモデルの妥当性を支持する可能性が示唆された。

キーワード：人格障害、DSM-III-R、クラスター分析、境界性人格障害、反社会性人格障害