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Adjudicative Competence: Evidence That Impairment in “Rational Understanding” Is Taxonic

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In *Dusky v. United States* (1960), the U.S. Supreme Court articulated 3 abilities that determine a criminal defendant’s competence to stand trial: He or she must be able to consult with counsel, have a factual understanding of the proceedings, and have a rational understanding of the proceedings. Although the legal determination of a defendant’s competence involves a dichotomous judgment, the latent structures of the constructs that underlie the abilities articulated in *Dusky* are unknown. The current study focused on the *rational understanding* prong of the *Dusky* standard. We hypothesized that, whereas factual knowledge of the legal system and ability to assist counsel may fall on a continuum, plausible (i.e., rational) beliefs about legal proceedings may be dichotomous in nature. Taxometric analyses of the Appreciation scale of the MacArthur Competence Assessment Tool—Criminal Adjudication, with a sample of 721 defendants, provided support for a taxonic structure.

Keywords: competency to stand trial, latent structure, MacArthur Competence Assessment Tool—Criminal Adjudication, taxometrics

Ultimate legal decisions are dichotomous. One is judged guilty or not guilty, liable or not liable, competent or not competent. However, multiple constructs may underlie a legal decision, and these constructs may vary in terms of having either categorical or dimensional latent structures. This state of affairs is analogous to many medical diagnoses, such as diabetes. A patient is either diagnosed with diabetes or not, but whereas the latent structure of Type I diabetes is itself taxonic (a person cannot be borderline Type I diabetic), Type II diabetes is diagnostically categorical but has a dimensional latent structure (the line between diabetes and prediabetes is drawn on the basis of pragmatic but scientifically arbitrary criteria). The latent structure of most psycholegal constructs has received limited attention; however, insight into latent structure could assist legal theorizing about these constructs and with the development of instruments to assess these constructs.

As articulated in *Dusky v. United States* (1960), determinations of defendants’ competency to stand trial depend on their being able to consult with counsel, having a factual understanding of the proceedings, and having a rational understanding of the proceedings. Although such determinations ultimately yield a dichotomous decision, the structures of the psycholegal abilities of the defendant that underlie that decision are unknown.

The current study focuses on the *rational understanding* prong of the competency standard because it is the element most likely to have a categorical latent structure. Whereas knowledge of the legal system (factual understanding) and ability to assist counsel may exist on a continuum, we hypothesized that one either has or does not have plausible beliefs about the legal process. This hypothesis is based on part on research suggesting that psychotic spectrum disorders (e.g., schizotypy) may be taxonic (e.g., Lenzenweger, McLachlan, & Rubin, 2007; see also Meyer & Keller, 2001).¹ Although adjudicative competence is certainly not legally or statistically isomorphic with psychotic spectrum symptomatology, a psychotic spectrum diagnosis is strongly related to being found incompetent to proceed (Nicholson & Kugler, 1991; Warren et al., 2006). Moreover, prominent delusional belief systems in particular pose potentially significant barriers to rational decision making concerning legal proceedings—as opposed to impairing one’s factual understanding of a legal case. For example, a defendant who shot a police officer believing him to be the devil could well understand that he is being tried for murder. If, however, he also suffers from companion delusions that as a special agent of God he

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¹ The taxonicity of schizotypy has recently come into question, however (see Rawlings, Williams, Haslam, & Claridge, 2008).

will receive special consideration by the judge or jury, such delusions would indicate an irrational appraisal of the adjudicative process and of his actual legal jeopardy. Such implausible beliefs are more often found in psychotic spectrum disorders.

To evaluate the latent structure of rational understanding, we conducted taxometric analyses of scores on the Appreciation scale of the MacArthur Competence Assessment Tool—Criminal Adjudication (MacCAT-CA; Poythress et al., 1999), an interview-based measure designed to facilitate clinicians' ratings of the plausibility of defendants' beliefs about the adjudicatory process.

Method

Participants

Data from the normative sample for the MacCAT-CA (Poythress et al., 1999) were used in the taxometric analyses. This sample consisted of 721 felony defendants, drawn from eight states. The sample included defendants who were hospitalized because they were adjudicated incompetent to proceed (HI; $n = 278$), jail inmates who were receiving mental health services but whose competence had not been called into question (JT; $n = 246$), and unscreened jail inmates who were presumptively competent to proceed (JU; $n = 197$). Additionally, clinical staff at each facility where HI participants were recruited provided independent ratings of each defendant's competence status. These ratings were used to further parse the HI sample into a subgroup whose (in)competent status was considered to be clinically confirmed ($n = 170$) or not ($n = 90$). These staff ratings were missing for 18 of the HI participants.

The eligibility requirements were that the participants had to speak English, have a full-scale IQ greater than 60, not have a diagnosis that would suggest an organic condition, and be between the ages of 18 and 65. All three subsamples were 90% male. Eight participants from the normative sample were excluded from the current analyses because of missing items on the Appreciation scale. See Poythress et al. (1999) or Otto et al. (1998) for additional demographic and methodological information.

MacCAT-CA

The MacCAT-CA is a 22-item clinical instrument that includes three scales, Understanding, Reasoning, and Appreciation. The primary scale of interest in this study was the Appreciation scale, which comprises six items designed to assess a defendant's rational understanding of the proceedings. Each item solicits the defendant's beliefs about key issues related to the adjudication process, for example, how likely he or she is to be treated fairly, the extent to which his or her lawyer will be helpful, and how likely he or she is to be found guilty. For each item, after the defendant states his or her beliefs, the clinician then asks the defendant to explain the reasons or justifications for those beliefs. Using a 0–2 scale, the clinician rates the plausibility of the reasons stated for the belief held. A score of 2 is assigned when the defendant's reasoning is judged to be clearly plausible—that is, not tainted by disordered thinking. A score of 0 reflects the determination that the defendant's reasons are clearly implausible and probably tainted by impaired thinking indicative of a mental disorder.² A score of 1 is assigned when, after a defendant has been probed for further

clarification, the plausibility of his or her reasons remains questionable.

In the initial validation study of the MacCAT-CA (the source of the current data set), the Appreciation scale demonstrated strong psychometric properties. Test scores for the Appreciation scale were internally consistent ($\alpha = .88$) and had acceptable interrater reliability (intraclass correlation = .75). As expected, the HI group scored significantly lower on this scale than did the JU and JT groups. The Appreciation scale was also significantly positively correlated with independent clinical ratings of competence in the HI sample ($r = .49$) and negatively correlated with the Brief Psychiatric Rating Scale—Anchored (Overall & Gorham, 1962; Woerner, Mannuzza, & Kane, 1988) Psychoticism subscale ($r = -.52$) and the Minnesota Multiphasic Personality Inventory—2 (MMPI-2) Psychoticism (Harkness, McNulty, & Ben-Porath, 1995) scale ($r = -.21$) in the total sample (both p values < .001). Unlike the Understanding and Reasoning scales,³ the Appreciation scale was only modestly associated with intellectual functioning (using a short form of the Wechsler Adult Intelligence Scale—Revised (WAIS-R; Kaufman, Ishikuma, & Kaufman-Packer, 1991) in this sample ($r = .14$, $p < .001$), rendering it unlikely that our findings for the lattermost scale are attributable to low levels of general intelligence.

Taxometrics

We used two nonredundant taxometric procedures: mean above minus below a cut (MAMBAC; Meehl & Yonce, 1994) and maximum covariance (MAXCOV; Meehl & Yonce, 1996) for the analyses.⁴ MAMBAC requires a minimum of two indicators, the input indicator x and the output indicator y . Cuts are made at regular intervals along the input indicator (50 in the present study). At each cut the difference between the mean score on the output indicator for those cases above the cut and the mean scores for those cases below the cut is graphed on the y -axis. The prototypic graph for a taxonic construct is convex. In contrast, dimensional constructs typically yield a concave graph.

MAXCOV requires at least three indicators. The input indicator is placed along the x -axis, and the other two indicators are used to generate the output. The sample is divided into a series of overlapping windows along the x -axis. We grouped the data into 25 subsamples using windows with .90 overlap.⁵ The covariance between the two output indicators is plotted as the y value for that

² A score of zero is also assigned when the defendant is unable to articulate any reasons for the belief stated.

³ Pearson correlations were .41 and .34, respectively ($p < .001$).

⁴ L-mode, a third nonredundant taxometric procedure, was not used in the present studies because L-mode appears to be most accurate when there are a large number of indicators (Waller & Meehl, 1998), and the current studies each used only three indicators.

⁵ Traditionally, maximum covariance (MAXCOV) has typically been conducted with discrete intervals instead of overlapping windows, and researchers have usually used more than 25 windows. However, a recent Monte Carlo study (Walters & Ruscio, in press) found that MAXCOV analyses that used windows were significantly more accurate than MAXCOV analyses that used intervals. Also, using fewer windows, which results in a larger number of cases in each subsample, yields more accurate results than does using many windows.

window. When there is a taxon, there should be weak associations between the output indicators when the window either includes mostly taxon members or mostly complement members. In contrast, there should be much larger associations when a subsample contains an even mixture of taxon and complement members. Therefore, taxonic data should yield curves that peak near the window containing a roughly equal mixture of taxon and complement members. Dimensional data tend to yield curves with no clear peak.

Although prototypically shaped taxometric curves can be easily interpreted, these curves may be influenced by a variety of factors, such as the skew of the indicators and the base rate of the putative taxon. Thus, taxometric graphs generated by real-world data are often more difficult to interpret because they do not always yield such prototypical shapes. Simulated comparison data sets that reproduce many of the features of the actual data, while varying the latent structure (taxonic or dimensional), can assist with the interpretation of taxometric graphs. For the present study, each analysis included 100 samples apiece of taxonic and dimensional comparison data (Ruscio, Ruscio, & Meron, 2007). For descriptions of the generation and use of comparison data in taxometric research, see Ruscio, Haslam, and Ruscio (2006), Ruscio and Kaczetow (2008), and Ruscio et al. (2007).

The graphs of the actual data can be compared with the graphs of the simulated taxonic and dimensional data using an objective index. This Comparison Curve Fit Index (CCFI) ranges from 0 (*strong support for dimensional structure*) to 1 (*strong support for taxonic structure*), with 0.5 indicating equivalent support for either structure. Several large Monte Carlo studies have demonstrated that across a range of data conditions, the CCFI accurately distinguishes taxonic from dimensional data (e.g., Ruscio & Marcus, 2007; Ruscio et al., 2007). For example, Ruscio, Walters, Marcus, and Kaczetow (2010) generated 50,000 categorical and 50,000 dimensional data sets varying across a wide range of data conditions (e.g., sample size, skew, number of indicators, indicator validity). They found that when MAMBAC and MAXCOV both yielded CCFIs less than 0.45 or greater than 0.55, the latent structure was correctly identified 99.7% of the time.

Results

Indicators

Taxometric analyses require valid indicators that can be used for discriminating between the presumptive taxon and complement groups. Because each item on the MacCAT-CA is scored on a three-point scale and taxometric analyses with fewer than four ordered categories increase the risk of yielding inaccurate results (Walters & Ruscio, 2009), we created three indicators by combining highly correlated pairs of items from the Appreciation scale. Thus, each indicator had a range of five ordered categories.⁶ On the basis of subsequent taxometric analyses, these indicators had excellent validity, with average degrees of separation ranging from 3.29 to 3.74 standard deviation units, far exceeding Meehl's (1995) recommended minimum (1.25).

Full Sample

MAMBAC yielded six curves,⁷ five of which appeared to have a clear right-side cusp indicative of a low base rate taxon. (Because

higher scores on the MacCAT-CA indicate greater competency, the scales were reverse scored so that the taxon group would comprise those who lack a rational understanding of the legal proceedings, and the complement would comprise those who possess a rational understanding.) The actual data were more similar to the taxonic simulation than to the dimensional simulation, with a CCFI of 0.742 (see Figure 1). The estimated base rate of defendants lacking a rational understanding of the proceedings was 15%, and there was little variability across these base rate estimates ($SD = 0.05$).

MAXCOV yielded three curves. All three curves peaked on the right side of the graph, which could be indicative of a low base rate taxon or of a dimensional construct measured with negatively skewed indicators. The actual data were, however, much more similar to the taxonic simulation than to the dimensional simulation, with a CCFI of 0.712 (see Figure 2). The base rate estimated by MAXCOV (8%) was slightly lower than the MAMBAC estimate, but again there was considerable consistency across the estimates yielded by the three MAXCOV curves ($SD = 0.01$). Finally, because the MAXCOV curves with just 25 windows did not produce a clear cusp (although their CCFI was strongly indicative of a taxon) consistent with the inchworm consistency test (Waller & Meehl, 1998), we reran the MAXCOV analysis with 100 windows. These curves had clear cusps that strongly indicated a taxonic structure and yielded a CCFI (0.587) that supported a taxonic structure. They also yielded a higher taxon base rate (13%) that was very close to the base rate indicated by the MAMBAC analyses.

Mental Health Sample

Because it is possible that the full sample analyses may have yielded an institutional pseudotaxon by generating a taxon group consisting simply of individuals with mental health problems, we reran the analyses excluding the JU group. When the analyses were limited to the data from the 524 defendants from the mental health sample (JT and HI combined), the results remained clearly taxonic. Once again, five of the six MAMBAC curves displayed a clear right-side cusp, and the average curve was more similar to the taxonic simulation than to the dimensional simulation, with a CCFI of 0.724. As in the full sample, the three MAXCOV curves had a right-side peak, and the average MAXCOV curve was more similar to the taxonic simulation than to the dimensional simulation (CCFI = 0.646). As would be expected, the taxon base rate of competent defendants increased because the (presumably competent) jail inmates without mental health issues were excluded from the analyses (MAMBAC = 21%, $SD = 0.02$; MAXCOV 12%, $SD = 0.01$). As indicated by the small standard deviations, there was, once again, considerable base rate consistency within each procedure.

⁶ Alternatively, we could have used all six items as indicators and summed them to create the input, but Walters and Ruscio's (2009) Monte Carlo study also demonstrated that the summed-input method yields less accurate results than does not summing.

⁷ Copies of these and all subsequent graphs not presented in this article are available from the first author.

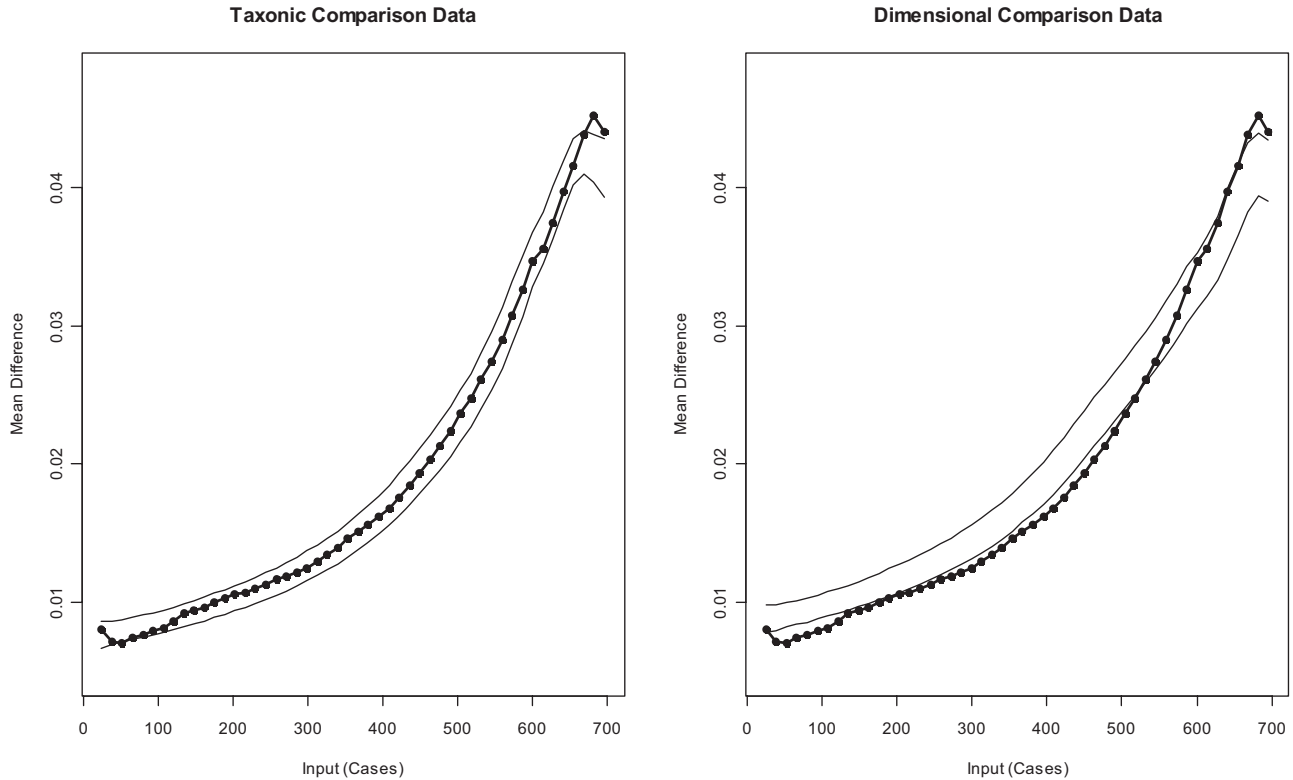


Figure 1. MacCat-CA full sample MAMBAC: CCFI = .742. The average mean above minus below a cut (MAMBAC) curves (comparison curve fit index = .742) for the three MacArthur Competence Assessment Tool—Criminal Adjudication Appreciation scale indicators. Dark lines on the curves represent the actual data, and the lighter lines represent one standard deviation above and below the average for the taxonic and dimensional comparison data. We stabilized the shape of the curves by replicating the analyses 10 times, randomly shuffling the cases with equal scores on the input indicator and recalculating the output indicator, with the average values across the 10 replications serving as the final results (Ruscio et al., 2006).

Factual Understanding as Point of Comparison

To rule out the possibility that our taxonic findings were an artifact of the psychometric or scoring properties of the MacCAT-CA, we ran a series of parallel taxometric analyses using the items from the Understanding scale of the MacCAT-CA, which assesses a defendant’s factual understanding of the legal process and the roles of the various participants. The Understanding scale is composed of eight items, and we again created four indicators by combining highly correlated pairs of items from this scale. Based on the subsequent taxometric analyses, these indicators had excellent validity, with average degrees of separation ranging from 2.18 to 2.38 standard deviation units. The MAMBAC analyses yielded ambiguous results, with a CCFI of 0.488 for the full sample and a CCFI of 0.522 when the analyses were limited to the mental health sample. MAXCOV yielded dimensional results with CCFIs of 0.336 and 0.283 for the full sample and the mental health sample, respectively. Thus it appears that having a factual understanding of the legal process most likely has a dimensional structure (or the structure is indeterminate). Therefore, there appears to be nothing inherent to the MacCAT-CA or our analytic strategy that would yield a rational understanding pseudotaxon.

Taxon Membership by Legal Status

We next examined the distribution of scores on the Appreciation scale across the three groups (JU, JT, HI), using a cut score (>5) that most closely corresponded to the base rate of the taxon in the full sample (12.5%). All of the participants in the JU sample scored >5, indicating membership in the rational understanding complement, as did the vast majority of the JT sample (>98%). In contrast, 31% of the HI group scored below the cut score, $\chi^2(2) = 141.43, p < .001$. Mean (SD) Appreciation scores for the JU, JT, and HI samples were 11.44 (1.01), 11.02 (1.63), and 7.89 (4.01), respectively.

Finally, we also examined Appreciation score distributions within the clinically confirmed subgroup of the HI sample, given that one would predict even greater representation of the taxon members (i.e., those demonstrating qualitatively impaired performance) among those judged by staff members to be incompetent to proceed. Among those 170 confirmed incompetent patients, 43% scored <5, whereas among the 90 cases not confirmed by staff to be incompetent, only 12% scored in the range indicating taxon membership, $\chi^2(1) = 26.21, p < .001$. Mean (SD) Appreciation scores for these two subgroups were 6.58 (4.08) and 9.87 (3.00), respectively.

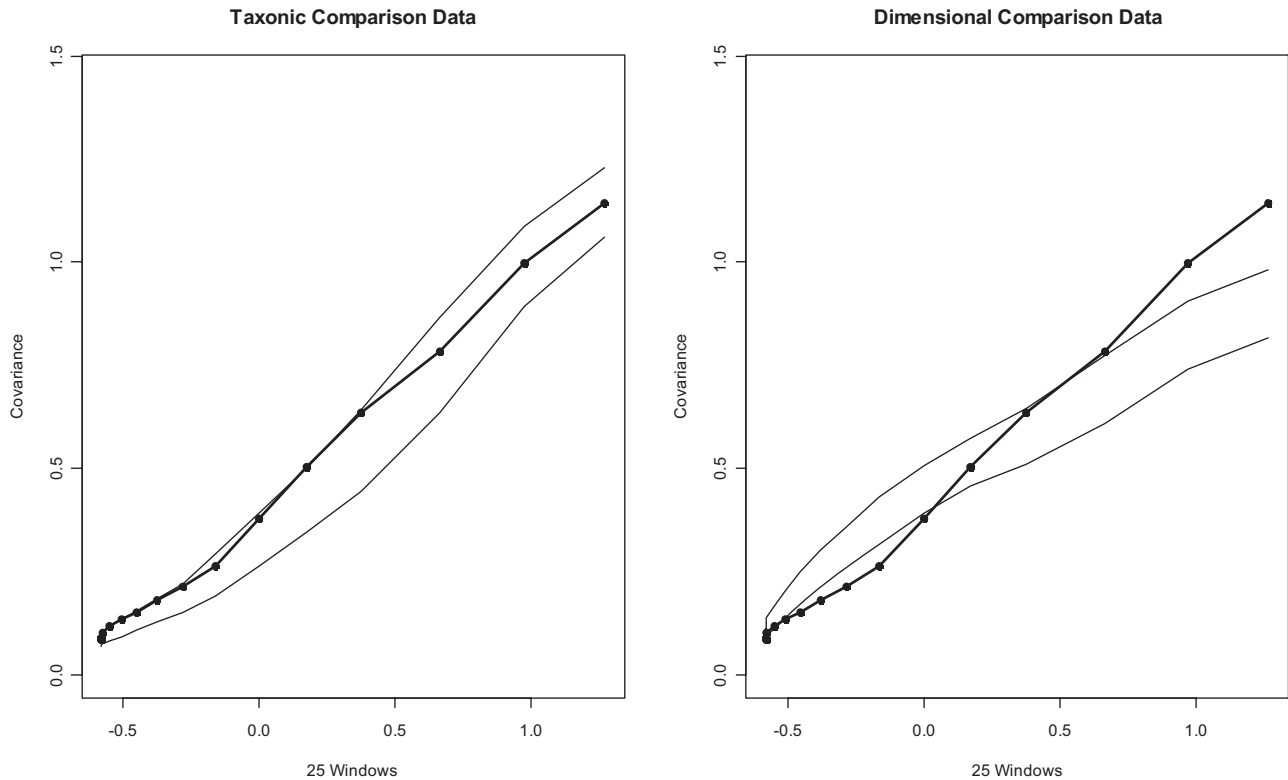


Figure 2. MacCAT-CA full sample MAXCOV: CCFI = .712. The average maximum covariance (MAXCOV) curves (comparison curve fit index = .712) for the three MacArthur Competence Assessment Tool—Criminal Adjudication Appreciation scale indicators. Dark lines on the curves represent the actual data, and the lighter lines represent one standard deviation above and below the average for the taxonic and dimensional comparison data. We stabilized the shape of the curves by replicating the analyses 10 times, randomly shuffling the cases with equal scores on the input indicator and recalculating the output indicator, with the average values across the 10 replications serving as the final results (Ruscio et al., 2006).

Taxon Membership by Diagnosis

A question may be raised about whether the rational understanding taxon is simply a renamed psychosis or schizotypy taxon, with the Appreciation scale serving as a proxy for a measure of schizotypy. Based on chart reviews, diagnoses per the *Diagnostic and Statistical Manual of Mental Disorders* (4th ed.; DSM-IV; American Psychiatric Association, 1994) were available for 82 of the 91 taxon members and 372 of the 638 complement members (psychiatric records were available for only 5 of the inmates in the JU group). As would be expected, a majority of taxon members ($n = 50$, 61% of those with available diagnoses) had schizophrenia spectrum diagnoses (e.g., schizophrenia, psychotic disorder not otherwise specified). However, a variety of other diagnoses were represented in the taxon group, including bipolar disorder ($n = 14$), various substance abuse and dependence disorders ($n = 6$), and numerous miscellaneous diagnoses. Furthermore, 128 members of the complement group (34% of those with available diagnoses) also had diagnoses of schizophrenia spectrum disorders. Although it is worth noting the important caveats that (a) these diagnoses were based on chart review and not research diagnoses, and (b) the schizotypy taxon includes a much wider range of individuals than those who are diagnosed with schizophrenia (e.g.,

Lenzenweger et al., 2007), these findings provide preliminary evidence that the Appreciation taxon overlaps with, but is not synonymous with, a schizotypy taxon.

Discussion

Overall, these findings provide the first clear evidence that a rational understanding of the legal proceedings, as assessed by the Appreciation scale of the MacCAT-CA, has a taxonic latent structure. There appears to be a qualitative as opposed to a quantitative difference in participants' performance on this scale. Thus, this is one psycholegal construct in which the dichotomous legal decision is paralleled by the structure of at least one of the underlying functional abilities. The finding that taxonicity remained even after unscreened jail inmates were excluded suggests that a failure of rational understanding is not due simply to generalized psychological maladjustment.

Nevertheless, our descriptive findings should not be misinterpreted prescriptively. The legal dichotomy of competence status and the dichotomous underlying structure of performance on the Appreciation scale do not necessarily reflect the same underlying "line in the sand" in terms of functional impairment. That is, the underlying taxon evident in our data should not be misconstrued as

indicating where the legal bar for incompetence is, or should be, set in terms of level of impairment. Our analyses suggest that a significant percentage of adjudicated incompetent defendants do not demonstrate a level of impairment on Appreciation that is qualitatively distinct from those of individuals in the JT and JU groups. Although it is certainly plausible that some of these individuals might be “false positives” in the sense of having been misidentified by the legal decision maker as incompetent when they are not impaired in regard to the Dusky criteria,⁸ it is equally plausible that there may often be a genuine discrepancy between a statistical category and a legal determination. The former reflects a latent liability that gives rise to a phenotypic distribution, in this case a lack of rational understanding of the proceedings, and should not be conflated with it.

This distinction between psychometric properties and legal status is reflected in how the MacCAT-CA is conceptualized in the instrument’s professional manual (Poythress et al., 1999), in that it represents a *tool* rather than a *test* of a legal status (i.e., competence). Although there should certainly be a general level of correspondence between the functional abilities assessed by the MacCAT-CA and one’s competence status, the link between measure and construct is by no means isomorphic. Whether one is legally competent to proceed to adjudication is informed by the general functional abilities delineated in the Dusky standard, but their application is case specific and cannot be fully operationalized or quantified in reference to normative data concerning functional abilities. For example, a defendant might be involved in an exceedingly complex legal case that requires a relatively higher level of functioning to meaningfully participate in his or her defense. As such, relatively modest deficits in relation to a rational understanding of the proceedings might be considered sufficient to warrant a legal finding of incompetence in that case.

One would not expect to see perfect correspondence between the “irrationality” taxon group and the legal status of incompetence for several other reasons. Rational understanding is only one of the prongs of competence identified in the Dusky standard, and impairments in other areas can lead to one being found incompetent. For example, one might be quite rational about the legal system in general and yet be unable to work effectively with one’s attorney for a variety of reasons. It is worth highlighting that participants in our HI sample who were in the rationality complement—despite being legally incompetent—demonstrated significantly greater impairment on the Understanding and Reasoning scales of the MacCAT-CA than did members of the JU and JT groups.⁹ As such, these individuals may have been adjudicated incompetent due to significant impairments in other functional abilities rather than impaired rationality.

Conversely, significant irrationality concerning the legal process might not, in and of itself, result in a judge (or jury) finding a defendant incompetent in any given case, even though classification in the “impaired rationality” taxon group on the basis of Appreciation performance certainly should raise serious concerns that a defendant is demonstrating qualitatively distinct impairment in this psycholegal ability. The fact that almost none of the JU and JT participants demonstrated such impairment on the Appreciation scale is encouraging because it suggests that such discrepancies may be relatively rare.

In summary, our results suggest that a rational understanding of legal proceedings, as operationalized by performance on the Ap-

preciation scale of the MacCAT-CA, represents a discrete functional ability rather than a continuously distributed construct. To our knowledge, this is the first study to use taxometric analyses to examine the latent structure of a legal construct (as opposed to the study of psychopathology, in which taxometrics are widely used). Given that many legal issues imply the existence of discrete categories of people (e.g., one is or is not a sexually violent predator; not criminally responsible for one’s actions; mentally retarded and therefore not subject to capital punishment), taxometric examinations of these constructs might provide insight into how we construe important constructs in the law. We hope that the present study is an initial promising step in this direction.

⁸ The fact that our clinically confirmed incompetent subgroup was more likely to consist of members of the impairment taxon group at least indirectly supports this argument.

⁹ A more detailed summary of these findings is available from the third author.

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