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Decision Making in a Schizophrenic Population*

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Over the past decade, competence to make decisions has become a prominent topic in forensic psychology. We employed a gambling paradigm to measure ability to weigh risks, benefits, and probabilities in an internally consistent manner. Decision-making behavior of chronic, involuntarily committed schizophrenic inpatients was compared to outpatient schizophrenics and first-degree relatives of the patients. We found significant differences between inpatients and non-mentally-ill relatives, and between inpatient and outpatient schizophrenics. When WAIS-R Vocabulary subtest score was statistically controlled, no significant differences between any of the groups remained. Vocabulary × group interactions revealed that Vocabulary subtest predicted decision-making behavior for outpatients and controls, but not inpatients. Severity of psychiatric symptoms and number of prior hospitalizations predicted decision-making behavior for inpatient schizophrenics. Results suggest that competence assessments that rely primarily on verbal abilities may be inadequate to assess competence in acutely ill psychiatric patients.

The ability of chronic psychiatric patients to make rational decisions has been the subject of considerable controversy. Legal doctrines such as informed consent

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rely on the construct of decision-making competence (Appelbaum & Grisso, 1988; Appelbaum & Roth, 1982; Grisso, 1986; Meisel, Roth, & Lidz, 1977; Tepper & Elwork, 1984). Despite the clinical and theoretical importance of assessing decision-making competence, little empirical research has focused on the specific cognitive abilities considered relevant by clinicians.

Many theoretical descriptions of competence have been attempted (Grisso, 1986). These definitions often include several levels of competence, with increasingly stringent requirements at each successive level (Appelbaum & Grisso, 1988; Appelbaum & Roth, 1982; Drane, 1985; Roth, Meisel, & Lidz, 1977). One of the most widely accepted standards was proposed by Appelbaum and Roth (1982): (a) evidence of a choice, (b) factual understanding of the issues, (c) appreciation of the nature of the situation, and (d) rational manipulation of information.

Rational manipulation of information has been suggested as a minimum standard of decision-making competence for any important decision (Appelbaum, Mirkin, & Bateman, 1981; Drane, 1985; President's Commission, 1982). Rational manipulation of information involves a cost–benefit analysis of the decision unimpaired by delusional beliefs (Appelbaum & Grisso, 1988; Appelbaum & Roth, 1982). In medication decisions, for example, rational manipulation of information involves evaluating potential risks and benefits of the medication, weighted by the subjective values and objective probabilities associated with each positive and negative outcome, such as symptom reduction or uncomfortable side-effects. Courts and clinicians have acknowledged that patients have the right to make decisions that may appear nonoptimal, provided that the decision-making process is internally consistent (Appelbaum & Grisso, 1988).

Although rationality is crucial to many definitions of competence, decision-making rationality has rarely been the focus of clinical or empirical investigation, and assessment of rationality is often not included in clinical evaluations of competence (Appelbaum & Roth, 1982). Instead, most empirical research has focused on the ability to recall or paraphrase information (Appelbaum et al., 1981; Grisso, 1981; Grossman & Summers, 1972; Olin & Olin, 1975; Palmer & Wohl, 1972).

Only two studies have evaluated psychiatric patients' ability in the rational manipulation of information, and both relied on self-reported decision-making behavior in hypothetical situations. Costello (1983) asked currently depressed, formerly depressed, and normal women to estimate the probability of success or subjective value that would be required before they would elect one alternative over another. No significant differences in decision-making processes were found, although depressed women were slightly more risk-aversive than nondepressed and formerly depressed women. Radford, Mann, and Kalucy (1986) utilized hypothetical decision scenarios as a basis for eliciting self-report of decision strategies and confidence levels in psychiatric inpatients. Severity of psychiatric disturbance was associated with less adequate decision making.

In contrast to the small number of studies of decision-making behavior in clinical populations, normal decision-making behavior has been the focus of extensive empirical research for several decades (Payne, 1982). A common research methodology, referred to as the paired-comparison paradigm, requires participants to express preferences between two possible gambles (Louviere, 1988;

Payne, 1982). This method avoids introspective verbal reports of decision strategy, which are of questionable validity (Abelson & Levi, 1985; Nisbett & Wilson, 1977), and instead attempts to infer decision-making processes from the pattern of preferences among the paired alternatives.

Although gambling paradigms may be somewhat less realistic than hypothetical scenarios or real-world decisions, they offer several methodological advantages. The parameters of the gambles can be manipulated by the experimenter to allow for analysis of how aspects of the decision (e.g., risk, benefit, probability of winning) affect observed patterns of choice behavior. In addition, participants can be rewarded for success on the gambling task, so they are motivated to perform well.

The current study attempts to evaluate the decision-making capacities of involuntarily committed inpatient chronic schizophrenic participants, outpatient schizophrenic participants, and a comparison group of first-degree relatives of these participants. A paired-comparison task is used to assess the rational manipulation standard of decision-making competence in terms of ability to weigh risks, benefits, and probabilities in an internally consistent manner.

Schizophrenic patients are of particular interest because their decision-making competence is frequently at issue. Although cognitive deficits associated with schizophrenia have been well established, the possible relationship between cognitive deficits and decision-making behavior has not been systematically addressed. Similarly, possible relations between psychiatric symptoms and decision-making behavior have received little empirical attention. Involuntarily committed patients are of particular interest, because they have traditionally been presumed incompetent to make decisions for themselves (Melton, Petrilla, Poythress, & Slobogin, 1987). Differences between inpatient and outpatient schizophrenic participants and between schizophrenic and non-mentally-ill participants will be analyzed while controlling statistically for differences in vocabulary subtest score, as a means of clarifying the relationship between verbal ability and decision-making abilities.

METHOD

Participants

Participants included 47 involuntarily committed chronic schizophrenic inpatients, 32 chronic schizophrenic outpatients, and 35 siblings or parents of these participants. The inpatient sample was drawn from 11 units at Western State Hospital in Virginia. All patients who met the following inclusion criteria were offered participation in the study: hospitalization for a minimum of 6 months, current diagnosis of schizophrenia or schizoaffective disorder (with no concomitant diagnosis of an organic brain disorder or mental retardation), legal status of involuntary civil commitment, and no medication or privilege status changes in the preceding 72 hours.

The outpatient sample was recruited from four sites: two clubhouse programs

operated through a regional mental health center in central Virginia and two regional mental health centers in central Virginia. Participants were either approached by members of the research team with an offer to participate in the study or were referred by their case manager. Participants in this group were required to have been discharged from the hospital no less than 6 months previously, to carry a current diagnosis of schizophrenia (with no concomitant diagnosis of an organic brain disorder or mental retardation), and to have had no medication changes in the preceding 72 hours.

Family members of these two groups of schizophrenic participants who were currently living in Virginia and the metropolitan Washington, DC area were contacted (with the permission of the participant) and offered participation in the study. This comparison group was chosen in an effort to generate a group similar to the schizophrenic participants with regard to possible confounding variables such as socioeconomic status, premorbid intellectual functioning, and environmental and genetic factors (Chapman & Chapman, 1973). Family members were included in the study if they consented to participate and had no previous history of psychiatric treatment for a psychotic illness.

After a description of the study procedures, participants were provided a consent form explaining all relevant risks and benefits. Approximately one half of all patients who met inclusion criteria agreed to participate in the study. No participants were excluded from the study on the basis of their level of functioning, but four inpatient participants were unable to complete the experimental procedure and were therefore not included. Three additional inpatients were dropped after completion of the study, including one who obtained a subsequent diagnosis of affective disorder, and two who were diagnosed with organic brain disorder. The final inpatient sample included the remaining 40 participants.

Clinical and Diagnostic Instruments

Schizophrenic participants were administered several subsections of the Diagnostic Interview Schedule Version III-A (Robins j Helzer, 1985) to establish a diagnosis of schizophrenia independent of the hospital diagnosis, in accordance with DSM-III criteria (American Psychiatric Association, 1980). Two participants were excluded because of failure to meet the diagnostic criteria for schizophrenia using this measure.

In addition, a series of tests and interview schedules was administered following the decision-making task, including the vocabulary subtest of the Wechsler Adult Intelligence Scale—Revised (WAIS-R, Wechsler, 1981), and a revised version of the Brief Psychiatric Rating Scale (BPRS, Overall & Goreham, 1962). The average rating for the 18 standard BPRS items was used as an index of overall pathology.

Family members were administered a schizophrenia screening version of the DIS (Marcus, Robins, Bucholz, & Przybeck, 1989) to ensure that they had not experienced symptoms of schizophrenia. Two family members were excluded after acknowledging a history of psychotic symptoms. Family members were also administered the WAIS-R Vocabulary subtest.

Following completion of the study, all participants were paid for their participation (proportional to the number of points they won in the experimental procedure). Demographic information for the schizophrenic participants was obtained from the participant's hospital or mental health center record following the conclusion of the study and from family members either before or after testing.

Stimuli

The experimental stimuli comprised all 28 possible pairs of eight two-outcome gambles (hereafter referred to as *spinners*), presented using a procedure developed by Tester, Gardner, and Wilfong (1987) and analogous to those described by past researchers (e.g., Payne, 1975; Slovic & Lichtenstein, 1968). Pairs of spinners were represented by two pie diagrams displayed on a computer monitor (Figure 1).

Each spinner was divided into two parts, with the upper portion of the pie colored green and labeled *win* and the lower portion colored red and labeled *lose*. Above and below the spinners were boxes containing red and green balls, which indicated the number of points to be won or lost on that spinner. At the bottom of the screen a large two-headed arrow was divided into two equal parts and was labeled *strongly prefer* at each end and *somewhat prefer* across the middle. A mouse-controlled cursor enabled participants to indicate the spinner they preferred and the strength of their preference.

Two levels of probability of winning and losing (0.6/0.4 and 0.4/0.6), two amounts to be won (5 and 3), and two amounts to be lost (5 and 3) were combined to form eight spinners. Each possible combination of these spinners was presented, resulting in 28 paired comparisons.

Procedure

Participants were introduced to the gambling procedure with a prepared script and five practice trials. During the practice trials participants were ques-

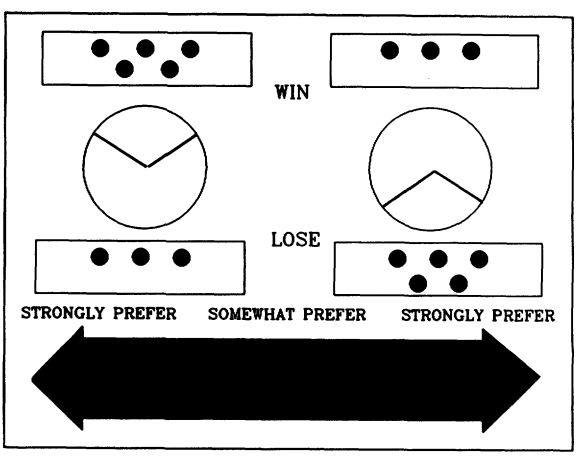

Fig. 1. Example of "spinner" task displayed on computer screen. Actual display in color.

tioned to establish whether they understood the task and were capable of performing the necessary manipulations. Only one inpatient participant was excluded on this basis. Participants were informed that they would receive payment commensurate with the number of points won in the procedure and then presented with the 28 pairs of the eight spinners, randomized as to order of presentation and position on the screen. Following each choice, the computer randomly "played" the spinner chosen by the participant, providing immediate feedback as to the result of that decision.

Statistical Analyses

Performance on the decision-making task was analyzed by fitting a linear model to each participant's preferences on the 28 paired alternatives. Each preference for each participant was expressed as the difference between the unknown subjective values of the two stimuli presented. This resulted in 28 equations (one for each preference for each participant), and eight unknowns (the subjective values of the eight stimuli). A 29th equation required that the eight subjective values have a sum of zero. The fit of this model to a participant's preferences (R^2) quantifies the internal consistency of the estimation of spinner values by the participant (i.e., if spinner 1 has a greater subjective value than spinner 2, and spinner 2 has a greater subjective value than spinner 3, then spinner 1 should also have a greater subjective value than spinner 3). An advantage of this model for the assessment of competence is that participant's actual preferences were irrelevant, as long as they formed an internally consistent set.

The R^2 score for each participant was transformed using a Fisher-Z transformation of its square root, owing to the skewed distribution of R^2. Statistical analyses were performed on the transformed scores.

Transformed R^2 values were entered into an analysis of variance with participant group as the independent variable. Because several clinical variables applied only to the schizophrenic participants, independent comparisons were planned between the inpatient and outpatient schizophrenic samples and between the combined schizophrenic sample and comparison participants.[1]

RESULTS

Table 1 presents the means and standard deviations for the three groups on the demographic and clinical variables. WAIS-R Vocabulary subtest score (using age-standardized scaled scores) was significantly correlated with years of education for all three groups ($r = .36$, $p < .01$ for inpatients, $r = .66$, $p < .01$ for outpatients, and $r = .58$, $p < .01$ for comparison participants). T tests revealed

[1] Because of the different covariance structures of inpatient and outpatient subjects, combining the inpatient and outpatient sample into a single group was deemed inappropriate; therefore results are reported contrasting the inpatient and outpatient schizophrenic subjects, as well as the inpatient and non-mentally-ill comparison sample.

Table 1. Means and Standard Deviations on the Independent Variables

Variable	Inpatients (n = 40)		Outpatients (n = 32)		Controls (n = 33)	
	M	*SD*	*M*	*SD*	*M*	*SD*
Sex (male/female)**	25/15		21/11		10/23	
Marital status (single/other)***	34/6		23/9		6/27	
Age*	34.4	7.7	45.2	11.7	47.5	14.3
Years of education***	11.2	2.8	10.2	2.9	14.2	2.9
WAIS-R vocabulary***	7.9	3.0	6.7	2.3	10.2	2.8
Mean BPRS†	1.8	0.6	1.5	0.6	N.A.	
Previous hospitalizations	3.9	3.2	4.4	2.8	N.A.	

† $p < 0.05$ between inpatient and outpatient samples.
* $p < 0.01$ between inpatient and outpatient samples.
** $p < 0.01$ between schizophrenic and comparison samples.
*** $p < 0.0001$ between schizophrenic and comparison samples.

only one significant difference between the two schizophrenic groups on the clinical variables: inpatient participants were significantly higher than outpatient participants in average BPRS ratings, $t(70) = 2.37$, $p < 0.05$. Inpatient participants were also significantly younger than outpatients, $t(70) = -4.74$, $p < .01$, and schizophrenic participants on the whole were less likely to have been married than their relatives, $t(102) = -5.58$, $p < .0001$, and contained a greater proportion of males than did control participants, $t(103) = -3.38$, $p < .01$; neither age, sex, nor marital status, however, was correlated with the dependent measure.

Of the 40 inpatient schizophrenic participants, 30 (75%) gave the name of a family member (either a sibling or parent). Of these, 27 (90%) were contacted, and 24 (80%) were willing to participate in the study. Of the 33 outpatient participants, 22 (66.7%) provided a family member (the total number of relatives was 21, because two of the outpatient participants were twins who provided the same family member). Of these, 17 (81%) were contacted, and 11 (53%) agreed to participate. *T* tests between the family members of inpatient and outpatient participants yielded no significant differences ($p < .05$) between the groups. These two groups were combined into one comparison group for the remaining analyses.

T tests between inpatient participants for whom family members were willing to serve as comparisons and those without family members participating revealed two significant differences. The inpatients with family members participating were significantly younger than those without, $t(38) = 2.29$, $p < .05$, and scored significantly higher on the WAIS-R Vocabulary subscale, $t(38) = 2.07$, $p < .05$. There were no significant differences between the outpatients with and without a participating family member on any of the variables collected.

Overall Group Differences

The measure of internal consistency of participant's responses was found to differ significantly among the three groups, $F(2,102) = 9.62$, $p < .001$. The average Fisher-Z transformed R^2 for the inpatient participants was 1.02 ($SD = 0.27$)

with outpatient participants averaging 1.20 (SD = 0.25) and comparison participants averaging 1.28 (SD = 0.26). Independent contrasts revealed significant differences between the inpatient and outpatient participants' $F(1,102) = 8.39$, $p < .005$, and between inpatient and non-mentally-ill comparison participants, $F(1,102) = 18.0$, $p < .001$.

Examination of Figure 2 suggested that the presence of several very low consistency scores in the inpatient group may have contributed to the significantly lower group mean. Therefore, we conducted a Kruskal–Wallis analysis of ranks on the consistency scores in the three groups. Results were very similar to the analysis of variance, $\chi^2(2,N = 105) = 16.28$, $p < .001$, indicating that the significant group difference was not unduly influenced by a few inpatients with very low consistency scores.

Upon finding significant group differences, a comparison of hierarchical analysis of covariance (ANCOVA) models was used to explore the group differences on the measure of internally consistent decision making. The variables collected (age, marital status, WAIS-R Vocabulary score, number of years of education, average BPRS rating, number of previous hospitalizations) and their interactions with participant group were added to the model. Next, all the nonsignificant interaction effects were removed from the model, and then the nonsignificant main effects were removed, unless the interaction with participant group was significant. This analysis was conducted twice, once for the comparison of inpatient and outpatient schizophrenics and once for the comparison of inpatient participants to the control group.

ANCOVA Between Inpatient and Outpatient Schizophrenics

The final model for the ANCOVA exploring differences in the measure of internal consistency between the two patient groups retained the main effects of

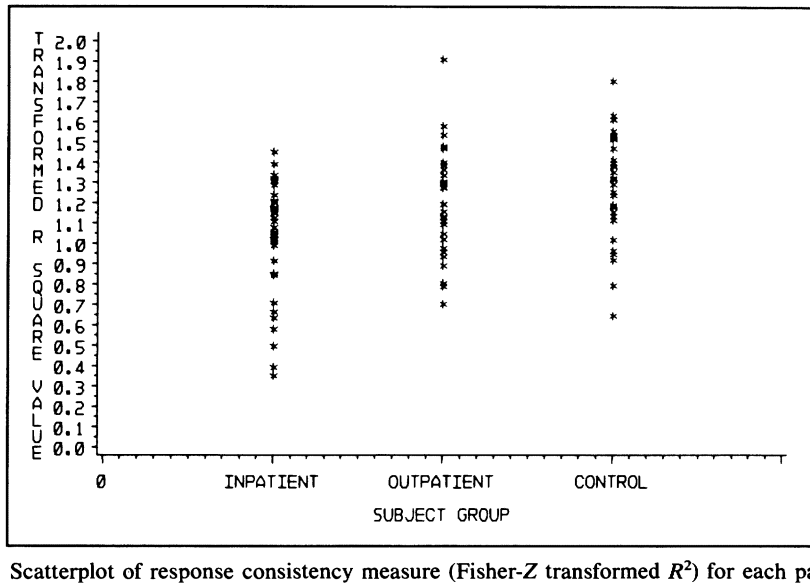

Fig. 2. Scatterplot of response consistency measure (Fisher-Z transformed R^2) for each participant group.

the severity of psychiatric symptoms (BPRS) and vocabulary score and the interaction between vocabulary and participant group. The model accounted for 27% of the variance of response consistency scores, $F(4,67) = 6.20$, $p < .001$. Higher vocabulary scores were associated with more consistent response patterns ($p < .05$), and higher symptom ratings were significantly associated with lower internal consistency of responses ($p < .05$). The interaction between group and WAIS vocabulary resulted because vocabulary scores were more highly associated with response consistency in the outpatient group, $r(32) = .54$, $p < .01$, than in the inpatient group, $r(40) = .09$, ns. When the effects of symptom level and intellectual ability were in the model, the main effect of group was no longer significant.

ANCOVA Between Inpatient Schizophrenic and Control Participants

The ANCOVA contrasting the inpatient schizophrenic sample with the comparison participants on the measure of response consistency yielded a final model that accounted for 28% of the variance, $F(3,69) = 8.96$, $p < .0001$. This analysis indicated that higher scores on the WAIS-R Vocabulary subtest were associated with greater consistency ($p < .05$), and with this effect in the model, the main effect of group was no longer significant. BPRS scores were not included in the analysis because they were not collected for the comparison participants. Similar to the ANCOVA model contrasting inpatients and outpatients, an almost significant interaction effect remained in the model ($p < .1$), indicating a stronger relationship between WAIS-R Vocabulary score and response consistency in the comparison group $r(33) = .49$, $p < .01$, than in the inpatient schizophrenic group $r(40) = .09$, ns.

ANCOVA Models for Individual Participant Groups

In predicting performance on the measure of decision making for the individual participant groups, separate ANCOVA models were generated to predict consistency of decision making for each group. An ANCOVA of inpatient participants' performance on the measure of decision making yielded a significant model which accounted for 24% of the variance on this measure, $F(3,36) = 6.62$, $p < .01$. Higher average symptom ratings on the BPRS significantly predicted less consistent response patterns ($p < .01$), while greater numbers of hospitalizations significantly predicted greater consistency ($p < .05$, as the relationship between previous hospitalizations and the measure of decision making was curvilinear the square root of this variable was used in the ANCOVA), and with fewer previous hospitalizations, the effect of BPRS in predicting response consistency was even more pronounced ($p < .05$). Although a subgroup of inpatient participants demonstrated response consistency considerably below the range of consistency scores of outpatients or family members, no variables significantly differentiated the poorer decision makers from other inpatient participants.

Among both the outpatient schizophrenic participants and family member comparison participants, performance on the WAIS-R Vocabulary subtest was found to be the only significant predictor of response consistency. Higher scores on the WAIS-R Vocabulary subtest were significantly associated with greater

internal consistency of decision making and accounted for 29% of the variance of outpatient consistency scores $F(1,31) = 12.40$, $p < .01$, and 24% of the variance among family members, $F(1,32) = 8.87$, $p < .01$.

DISCUSSION

In an experimental gambling situation with monetary rewards based on performance, involuntarily committed chronic schizophrenic inpatients were significantly less able to weigh risks, benefits, and probabilities in a consistent manner than chronic schizophrenic outpatients. Similarly, inpatient schizophrenic participants also performed significantly worse on this measure of decision making than their nonpatient family members.

The differences among the groups appear to be explained by differences in current verbal intellectual functioning (as measured by the WAIS-R Vocabulary subtest). With performance on the WAIS-R Vocabulary subtest statistically controlled, no differences remained between inpatient and outpatient chronic schizophrenics or between schizophrenics and nonpatients in their ability to weigh risks, benefits, and probabilities in a consistent fashion.

Interactions between participant group and vocabulary subtest score, however, complicate interpretations of group differences. Performance on the vocabulary subtest was significantly correlated with decision-making behavior in the outpatient and control groups, but was not in the inpatient group, in which level of symptomatology was the best predictor.

One possible explanation of this finding is that the WAIS-R Vocabulary subtest is not an accurate measure of *current* intellectual functioning for inpatient chronic schizophrenics. Chapman and Chapman (1975) have reported that vocabulary is the WAIS-R subscale least impaired by the onset of schizophrenia. They have suggested that vocabulary performance may be a better measure of premorbid intelligence. Such an explanation is consistent with the significant correlation between the vocabulary subscale and years of education for the inpatient participants.

Another possible explanation for the lack of a significant relationship between vocabulary subtest score and decision-making behavior for inpatient participants is that other factors influence the ability of chronic inpatient schizophrenics to fully engage their intelligence in rational decision making. These factors may include attention deficits, the effects of antipsychotic medication, psychiatric symptoms, or the detrimental impact of long-term hospitalization on decision-making abilities. Our results suggest that these factors may be related to current levels of symptomatology as measured by the BPRS.

Whatever the explanation, the interaction suggests that the vocabulary subtest is not a sufficient measure of decision-making ability among inpatient schizophrenics. Similarly, in the assessment of decision-making competence, participants who appear competent based on verbal ability may in fact not be competent, as their decision-making processes may be more impaired than their verbal

abilities. Conversely, those who appear incompetent based on their verbal skills may in fact be more capable of making decisions in accordance with normal decision-making patterns than they appear. The patterns of decision making uncovered in this gambling paradigm, however, may differ considerably from those observed with regard to issues of greater legal relevance, such as decisions regarding medical treatment or legal proceedings, where decision makers typically have prior experience making similar decisions.

Additional research using more complete measures of verbal ability, general intelligence, and psychiatric symptomatology may help to clarify which aspects of intellectual functioning are necessary for competent decision making and which specific symptoms or syndromes impair these abilities. In addition, study of a wider range of decision tasks in a variety of settings is necessary to determine whether greater group differences emerge in some decision contexts than others. The incorporation of more complex and more emotionally salient decision-making tasks may help elucidate the effect of intelligence and psychiatric symptoms on the decision-making behavior of the mentally ill.

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