

The University of Texas Health Science Center at Houston

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Evaluating A Cognitive Support System For Psychiatric Clinical Comprehension

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Introduction

- Clinical comprehension differs between experts and novice clinicians with respect to selective filtering, pattern recognition and accuracy of inference generation [1].
- The ability to generate "intermediate constructs" (meaningful clusters of observations that point toward specific diagnoses) is a distinguishing characteristic of expert clinical comprehension [2].
- So a cognitive support system that organizes the information in a manner that mediates efficient problem solving may improve clinical comprehension, and hence the quality and efficiency of patient care.
- This poster documents the evaluation of a cognitive support system that organizes psychiatric narrative in accordance with key intermediate constructs [3].

Methodology

Participants and Study Design

- Sixteen (n=16) PGY3 psychiatry residents.
- Within-subjects, repeated measures 2x2 experiment with Case Complexity and Interface Type (IC, No-IC) {**Figure 1**} as factors.
- Order of cases counterbalanced to avoid learning effects.

Procedure

- Participants instructed to read case while thinking aloud, and then summarize key features.
- Verbal protocols audio-recorded and transcribed for text analysis.
- The interaction with the system was captured using Techsmith Morae.
- Text analysis of case summaries are used in this research report.

PSYCHOSIS	MOOD	SUBSTANCE	DANGER
 of psychotic depression 	 of psychotic depression 	 of marijuana cocaine heroin 	from her husband who was reportedly abusive
She denied any psychotic symptoms on that evaluation	 of dizziness and trouble sleeping 	 or alcohol abuse 	to jail and a new boyfriend wrecked her mother's
 of God and other voices talking 	from problems with depression	and of drug abuse	to kill her husband
 with prominent thought disorder 	In the ER the patient was noted to be irritable		to hurt her
of voices making negative comments	 of God and other voices talking 		She has no criminal history
 about her and she endorsed having command auditory 	She appeared depressed		and no history of being violent
hallucinations	 where she was observed to be agitated 		 of suicide attempts
with Haldol	on Prozac		She denied any command auditory hallucinations visual
 and auditory hallucinations 	 In the ER the patient had reported that she was having anxiet 	V.	hallucinations suicidal ideation or homicidal ideation
 to this MD that she had been experiencing hallucinations 	insomnia	1	She denied any command auditory hallucinations visual
 and paranoid delusions over the past two months 	 to control her thoughts 		hallucinations suicidal ideation or homicidal ideation
			nandemations succear relation of nomicidal relation
			03 04 02
dmitted			
3/04/2002			
, - ,			
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3/15/2002			P M S D
,,			
PERATION DATE			PSYCHOSIS
CTATED BY			HISTORY OF PRESENT ILLNESS:
na Smith MD			
			1. of psychotic depression
TENDING PHYSICIAN			 She denied any psychotic symptoms on that evaluation
na Smith MD			 <u>she defied any psycholic symptoms on that evaluation</u> of God and other voices talking
			5. of God and other voices taiking
ENTIFYING DATA			PAST PSYCHIATRIC HISTORY:
his is a 27-year-old Hispanic woman who is separated from her husba	and and is living with her mother		
e is taking college courses and is currently unemployed			1. with prominent thought disorder
			2. of voices making negative comments
STORY OF PRESENT ILLNESS			 about her and she endorsed having command auditory hallucination
	vision (athies that the series and discussion of psychotic	depression	4. with Haldol
	mission for this patient who carries a past diagnosis Of psychotic	depression	5. and auditory hallucinations
e patient had brought herself into the CPMC ER with complaints of			 6. to this MD that she had been experiencing hallucinations
e stated at that time that she was suffering from problems with dep	<u> </u>		 and paranoid delusions over the past two months
She denied any psychotic symptoms on that evaluation			 and paranoid deusions over the past two months She admits that she has being hearing voices frequently
she was evaluated over a twenty-four hour period and discharged with an appointment for an outpatient psychiatrist			 of psychotic illness in a maternal aunt
er mother felt that the patient needed to be seen sooner and called	the Mobile Crisis Service who brought her to the ER on March 2, 2002		2. Or psycholic niness in a maternal aunit
the ER the patient was noted to be irritable and preoccupied that h			MENTAL STATUS:
er current symptoms apparently started three days prior to her ER vi			
	and the second sector of the second sector of the second sector sec	dle of the night telling to herself	
uring this time the patient's reported that she went out shopping fre	equently seemed to be driven by a motor was pacing around in the mid	ale of the hight talking to herself	1 Hor thought process was
	at she was hearing the voice of God and other voices talk		Her thought process was 2. Her thought content was preoccupied

Figure 1: IC interface assigns relevant text segments to one of four intermediate constructs ("psychosis", "mood", "substance" and "danger") automatically. NO-IC interface contains the case narrative as in the highlighted box, but without highlighting.

Qualitative Analysis:

compared to No-IC group. Identification of Facets:

Category **Observations** Findings Facets Diagnosis

Quantitative Analysis:



Figure 2: Relatedness to aspects of text considered relevant by experts. Mean values by category (error bars denote standard errors)

Quantitative Analysis:

- (Pearson's *r*=0.8884).
- Statistically significant difference is between CASE1_NOIC and CASE2_NOIC (t(7)= 3.1108, p= 0.0171)
- Significant drop in the similarity between participants and the reference standard in the No-IC group when moving from the simple case to the complex case.

Data Analysis

 Descriptive analysis of the usage of the interface by the IC group participants, used to determine if there was any correlation with the expert's approach and betterment in clinical comprehension, when

Definition	Example
Units of clinically relevant Information	"voices of god telling her to kill her husband"
Subset that is relevant to patient care	"Command auditory hallucinations"
Clusters of findings related by pathophysiology	"Psychosis"
Subsumes all previous levels	"Schizophrenia"

Latent Semantic Analysis(LSA) [4] was used as a means to measure representation of aspects of case deemed relevant by experts.

Results and Discussion

Individual performances were strongly correlated across cases

This effect was far more prominent in the IC group (Pearson's r=0.9479) than the No-IC group (Pearson's r=0.8810).



Summary of Conclusions

- Quantitative results suggest supportive effects in complex case.
- organization by the system and diagnostic reasoning.
- Limitation: variable system use by IC participants
- A follow up study is currently underway with altered experimental design to further encourage system use in IC case.

References

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concluded with a proper diagnosis.

Descriptive findings demonstrate the interplay between information