

# 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].

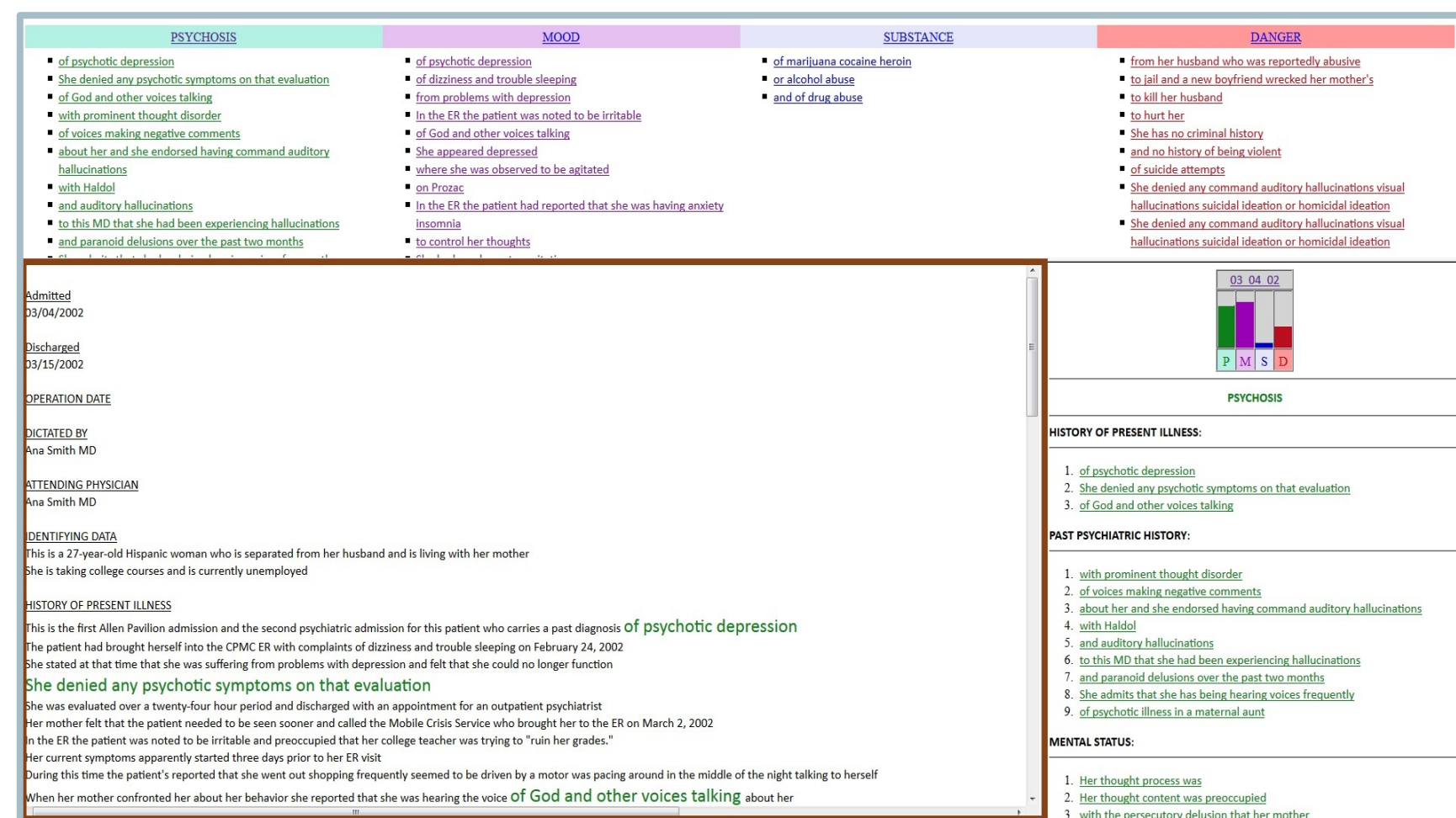
## Methodology

### 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.



The screenshot shows a clinical case with text segments highlighted under four categories: **PSYCHOSIS**, **MOOD**, **SUBSTANCE**, and **DANGER**. The interface also includes a patient history section and a summary of the present illness.

**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.

## Data Analysis

### Qualitative 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 compared to No-IC group.

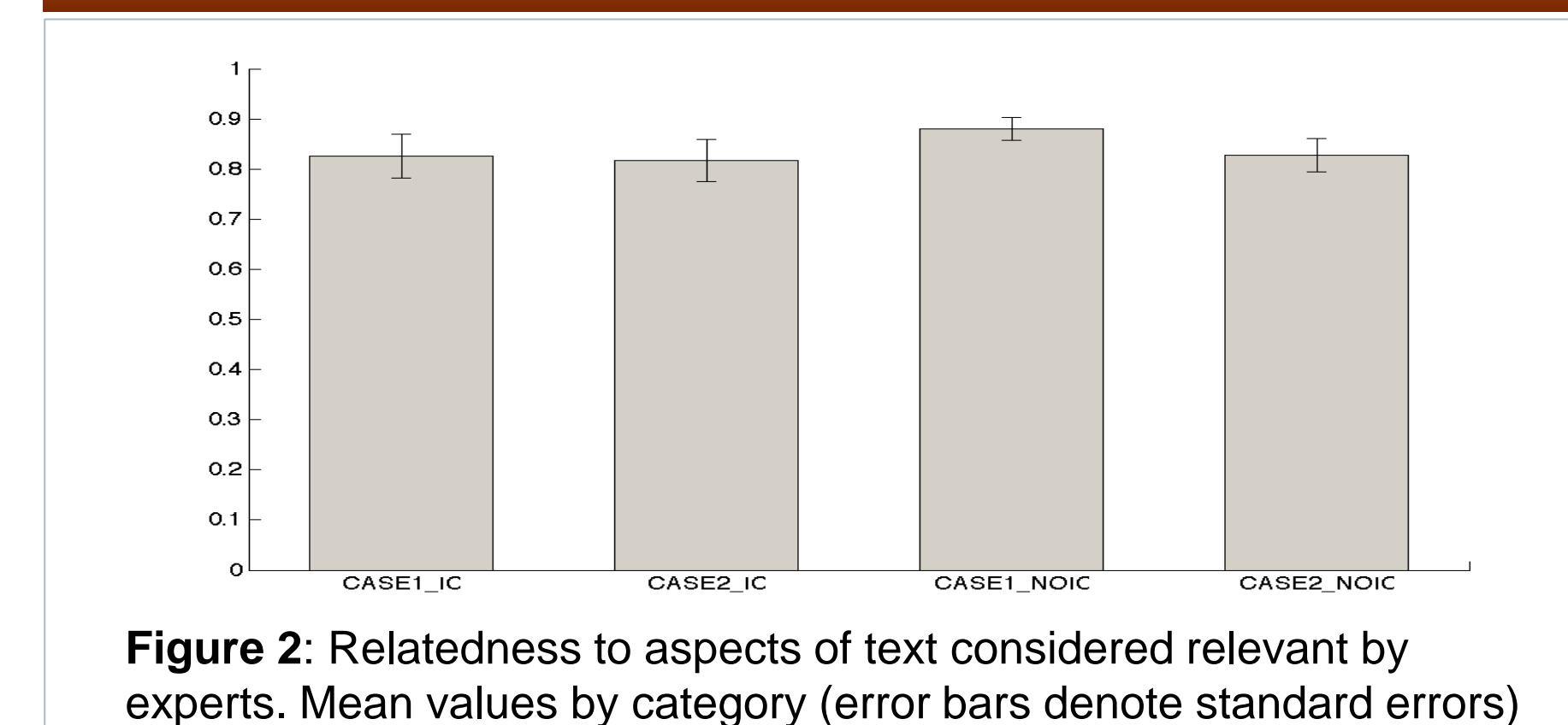
### Identification of Facets:

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

### Quantitative Analysis:

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

## Results and Discussion

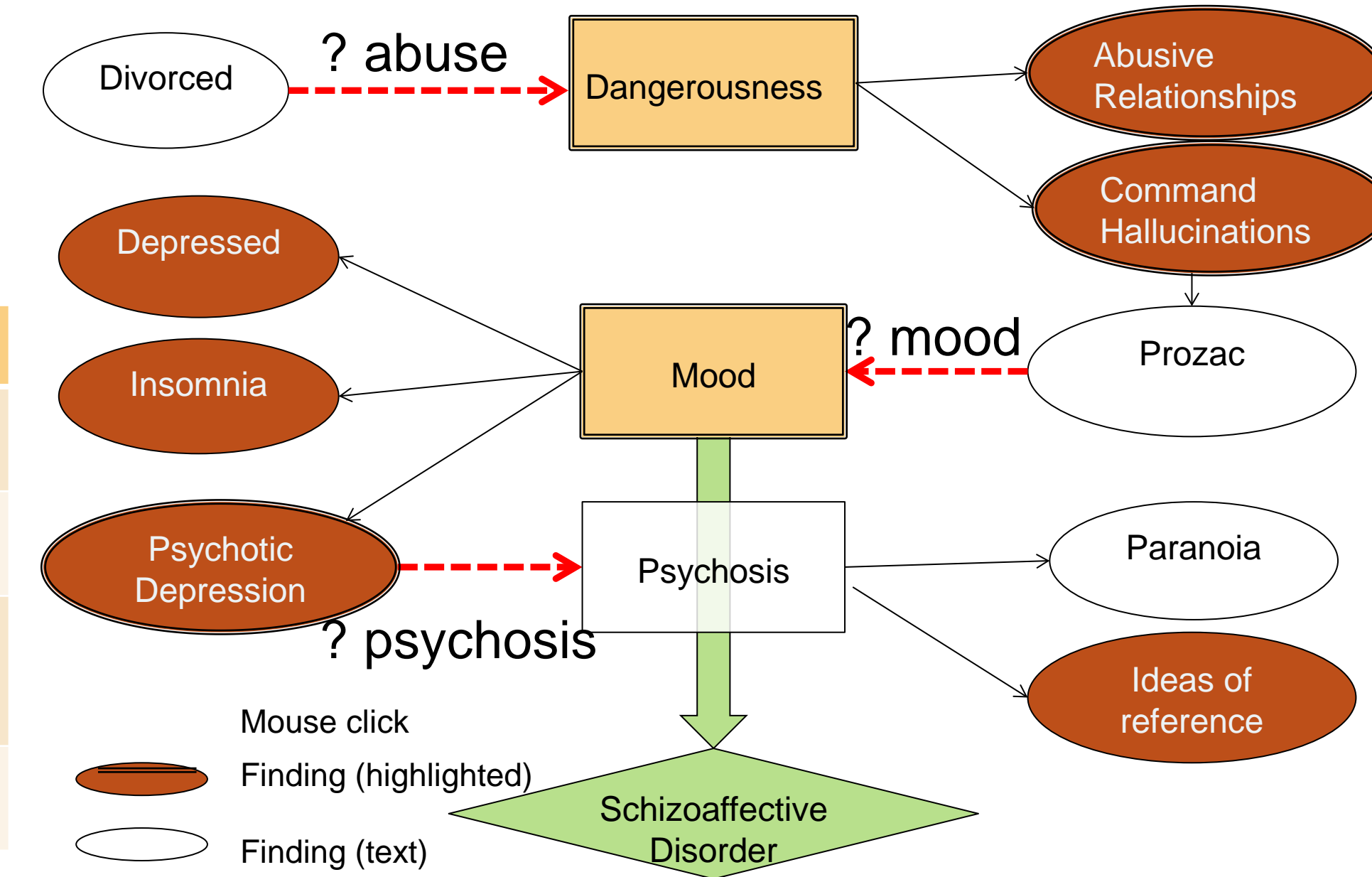


**Figure 2:** Relatedness to aspects of text considered relevant by experts. Mean values by category (error bars denote standard errors)

### Quantitative Analysis:

- Individual performances were strongly correlated across cases (Pearson’s  $r=0.8884$ ).
- This effect was far more prominent in the IC group (Pearson’s  $r=0.9479$ ) than the No-IC group (Pearson’s  $r=0.8810$ ).
- 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.

## Results and Discussion (Continued)



- Mouse click
- Finding (highlighted)
- Finding (text)
- Facet
- Diagnosis
- Finding to Facet
- Facet to Finding

**Figure 3:** Approach to the simple case by an IC group participant using the interface. The participant started reading the text, using the facets in the system during clinical comprehension and finally concluded with a proper diagnosis.

## Summary of Conclusions

- Quantitative results suggest supportive effects in complex case.
- Descriptive findings demonstrate the interplay between information 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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