

# Undermining Cognitive Constraints:

## Revealing Threats Buried Beneath Mounds of Data

Trevor Cohen MBChB, PhD



PMA-3 landmine (image courtesy wikipedia)



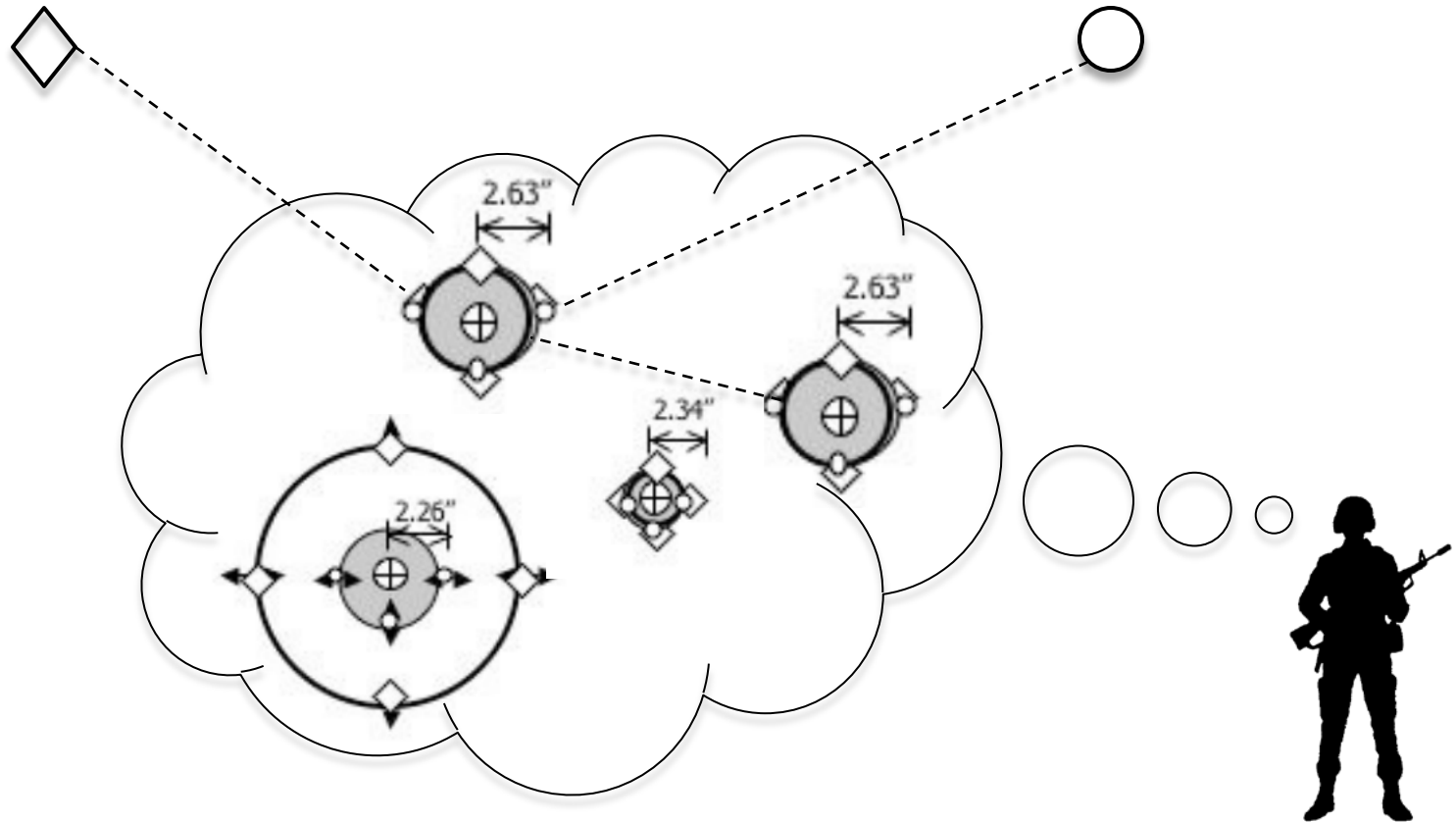


JAMES STASZEWSKI  
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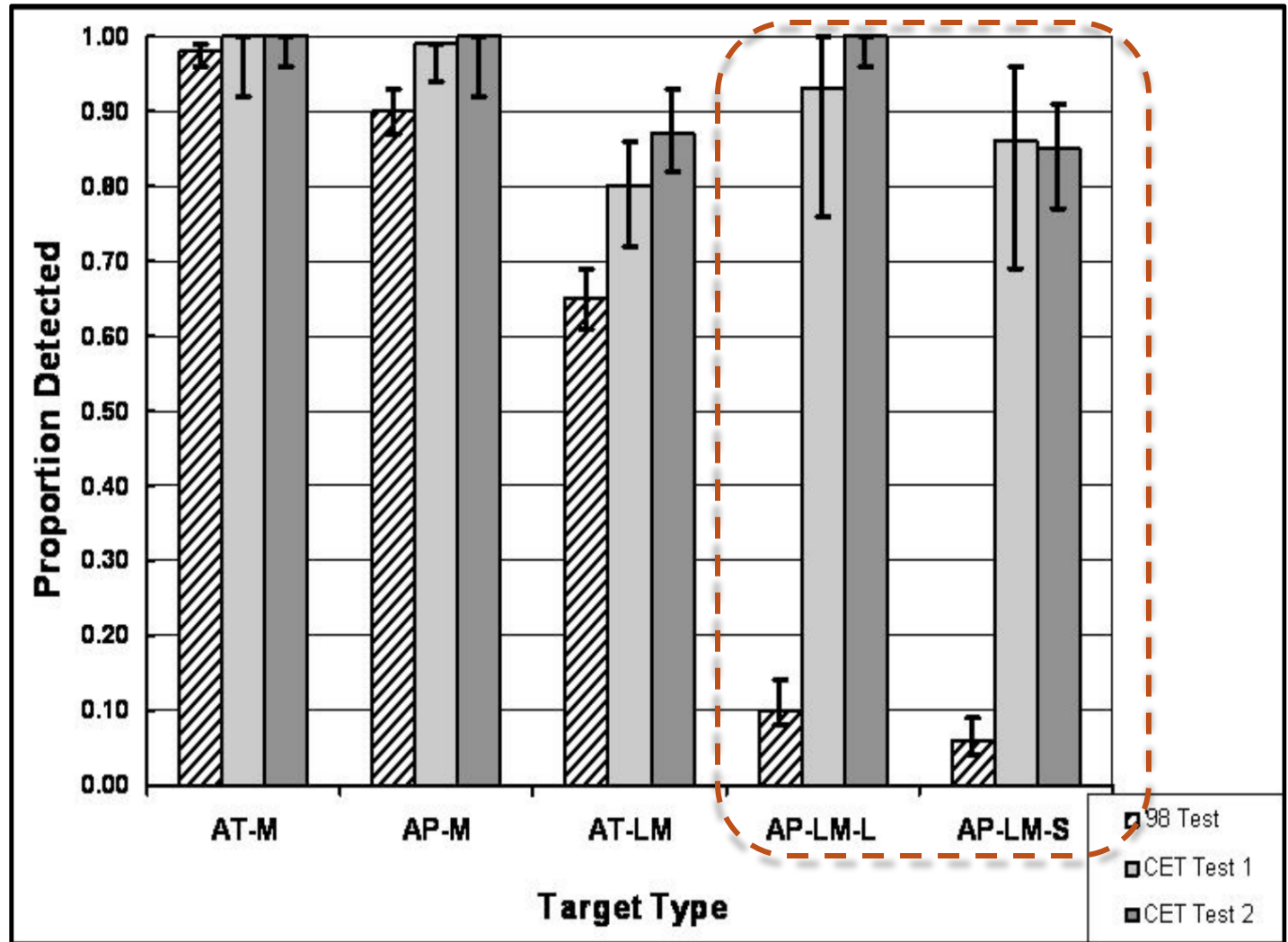
PSS 14 mine detector      Image: [www.cytterra.com](http://www.cytterra.com)

Ground Penetrating Radar

Metal Detector

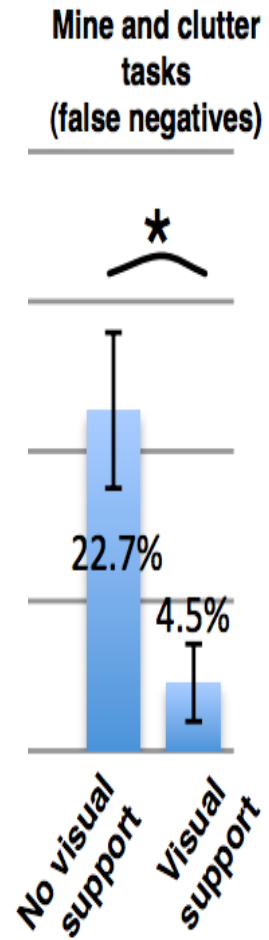
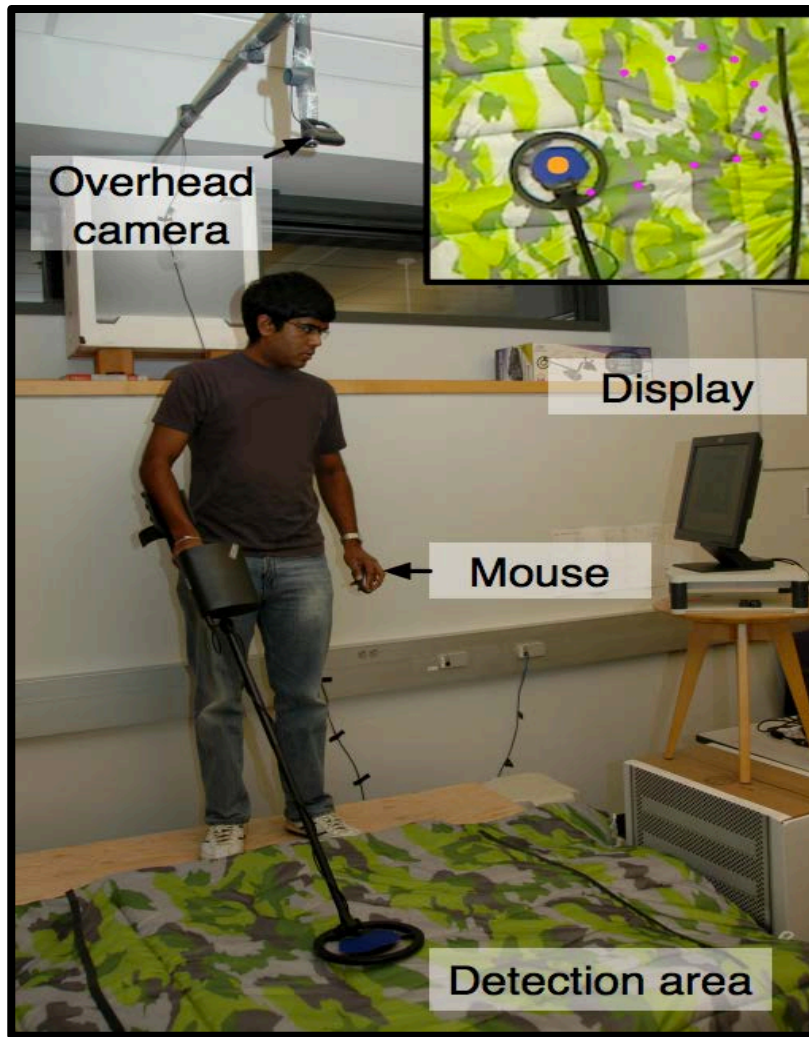


Staszewski, J. (2006). Spatial thinking and the design of landmine detection training. In G. A. Allen, (Ed.), Applied spatial cognition: From research to cognitive technology. (pp. 231–265). Mahwah, NJ: Erlbaum Associates



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Lahiru G. Jayatilaka, Luca F. Bertuccelli, James Staszewski, and Krzysztof Z. Gajos. PETALS: Understanding the Implications of Visual Decision Support in Humanitarian Landmine Clearance. In CHI 2011: Proceeding of the annual SIGCHI conference on Human factors in computing systems , New York, NY, USA, 2011. ACM

DECISION



2.63"



MENTAL  
REPRESENTATION



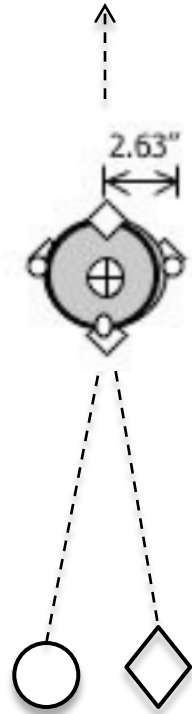
PERCEIVED  
DATA



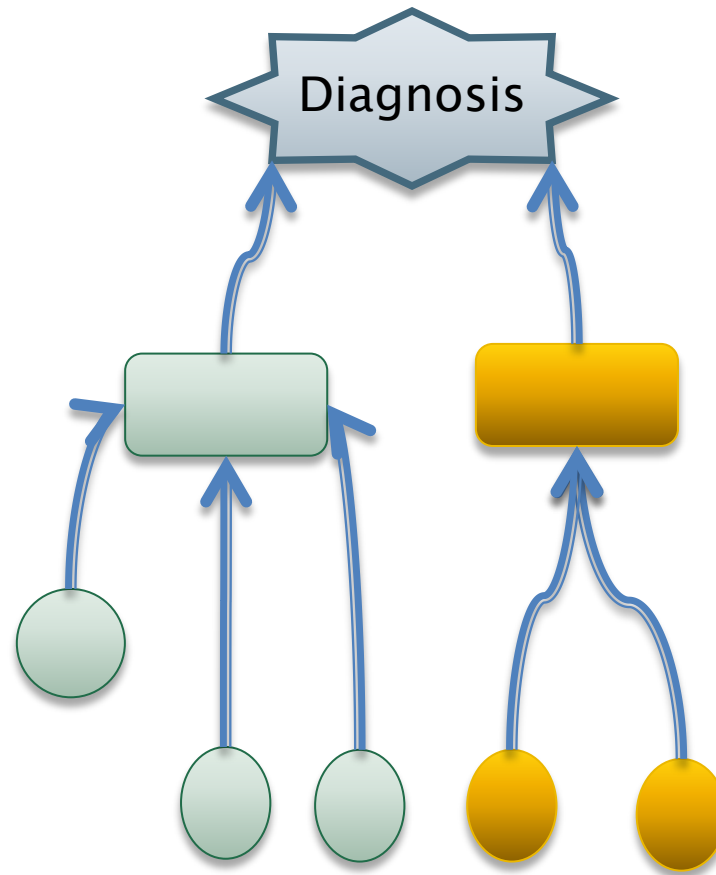
DECISION



MENTAL REPRESENTATION



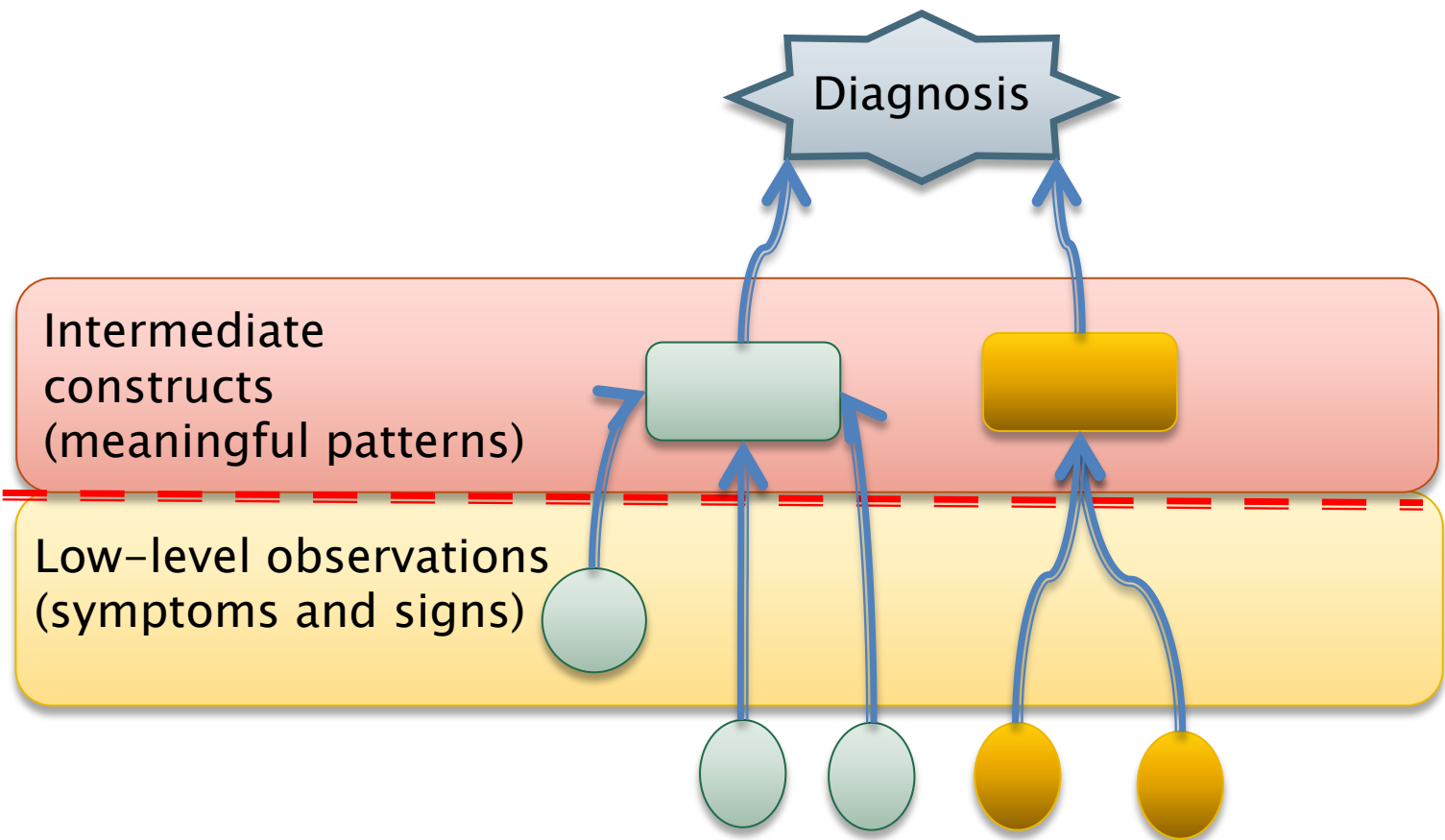
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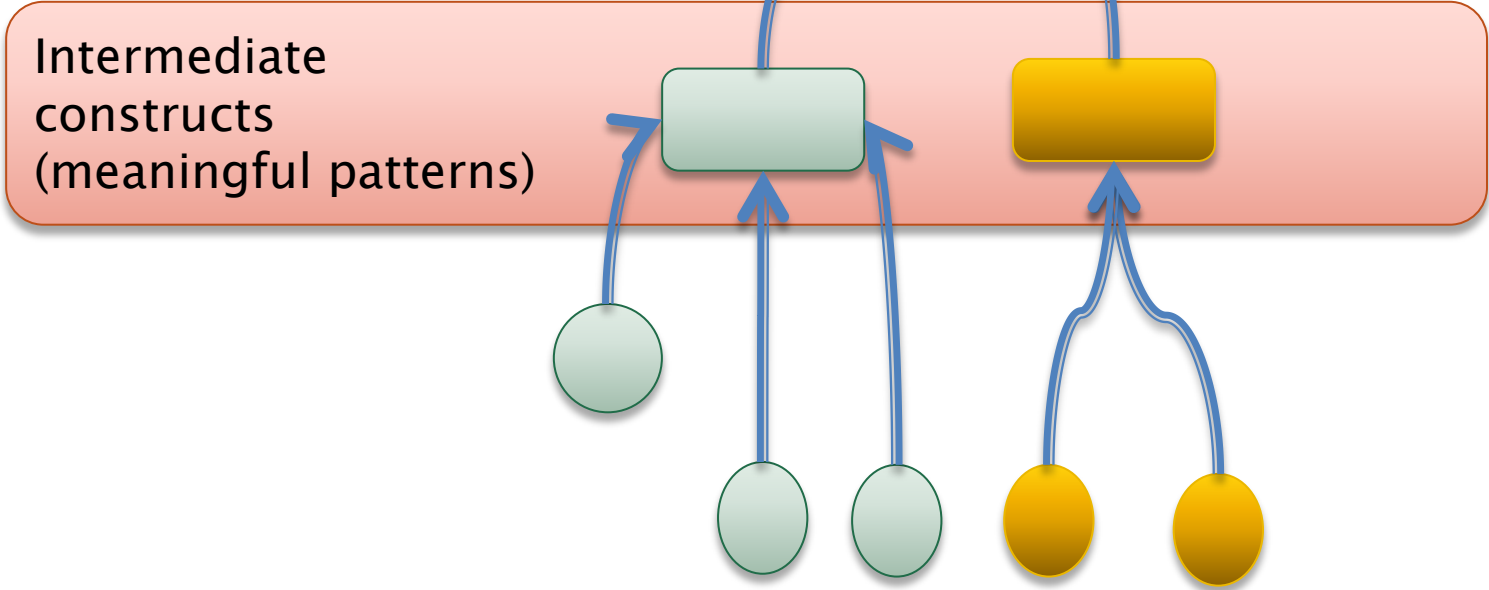


Effective  
problem  
solvers

Less  
effective  
problem  
solvers



Cognitive Support System



SIRS

WBC

Infect

9.5

K/uL

2012-02-03 10:14:00 +0000

Sho

Orga

Respiratory Rate

0

BPM

2012-02-04 21:50:00 +0000

Heart Rate

35

BPM

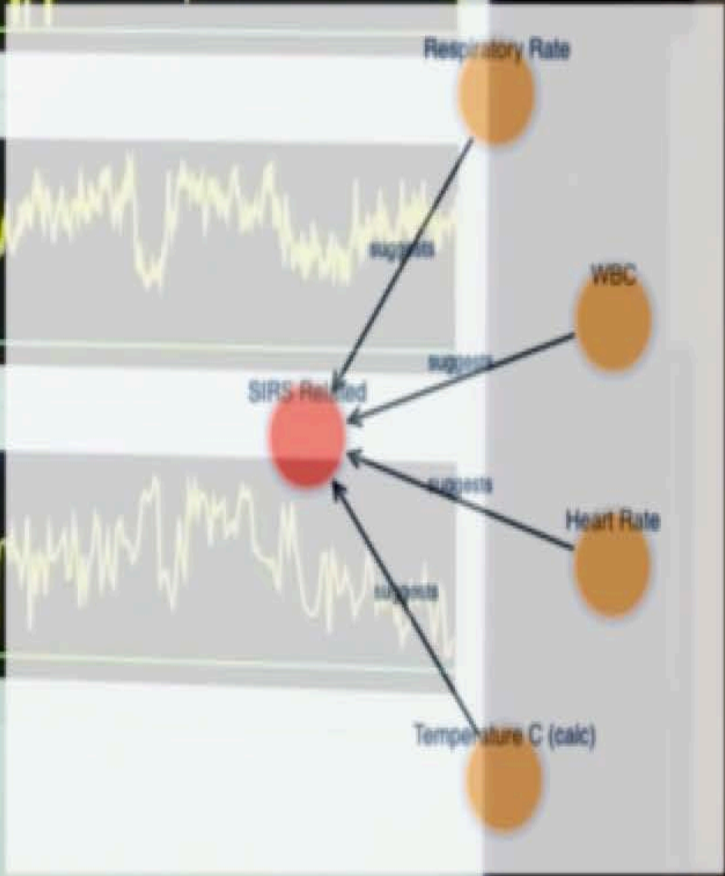
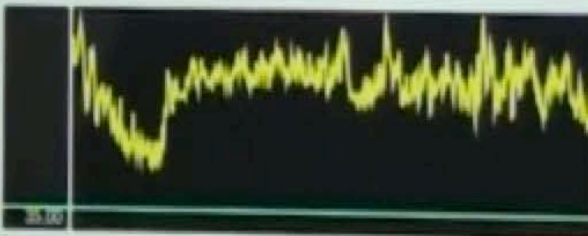
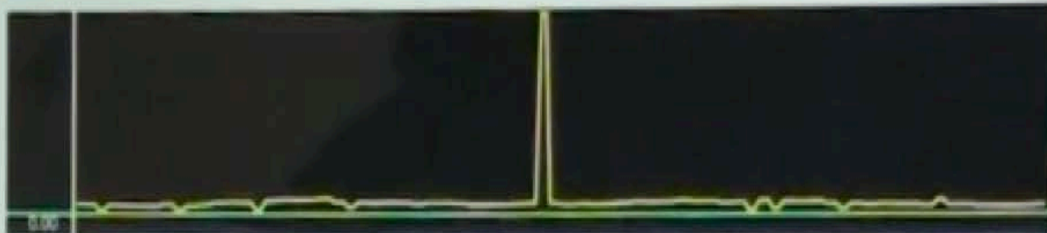
2012-02-04 22:00:00 +0000

Temperature C (calc)

35.556

Deg. C

2012-02-04 22:00:00 +0000



**PSYCHOSIS**

- of the delusional idea that he was transparent ("
- during episodes when his delusion was most manifest he drank heavily
- and were sometimes associated with generalised convulsions that were considered to be alcohol withdrawal fits
- with a diagnosis of schizophrenia
- Antipsychotic agents
- and there were no delusional ideas expressed at that time
- on treatment the delusion had completely gone

**MOOD**

- and one anti-epileptic agent (carbamazepine ) had been ineffective in moderating his feelings
- with increasing social isolation and

**SUBSTANCE**

- with alcohol abuse
- He discovered that alcohol suppressed these symptoms
- during episodes when his delusion was most manifest he drank heavily
- The drinking spells were often followed
- and were sometimes associated with generalised convulsions that were considered to be alcohol withdrawal fits
- The episodic alcoholic binges continued
- by the end of 1993 he was drinking
- because of intoxication
- from alcohol according to British National Formulary guidelines over a seven day period
- into drinking again
- after drinking several pints the night
- to use more alcohol to suppress the feeling

**DANGER**

- by numerous "drunken and disorderly" problems

## [A] Summary of Case Categories

**PSYCHOSIS**

- of the delusional idea that he was transparent ("
- during episodes when his delusion was most manifest he drank heavily
- and were sometimes associated with generalised convulsions that were considered to be alcohol withdrawal fits
- with a diagnosis of schizophrenia
- Antipsychotic agents
- and there were no delusional ideas expressed at that time
- on treatment the delusion had completely gone

## [C] Details related to Categories Selected in [A]

We report the case of a 31 year old man who had an 11 year history of the delusional idea that he was transparent ("

The intense fear he experienced when people seemed able to look right through him caused him to hurry along the streets seeking shadows or darkness in order to hide his face as far as possible

He discovered that alcohol suppressed these symptoms and therefore during episodes when his delusion was most manifest he drank heavily

The drinking spells were often followed by numerous "drunken and disorderly" problems and were sometimes associated with generalised convulsions that were

After having a fit he often felt much less fearful and was able to work hard in his family's

He was never financially embarrassed took pride in his independence and had built his own house

Taken together with the fact that he was warm and pleasant in conversation these seemed unusual features in one labelled with a diagnosis of schizophrenia

He had been referred to neurologists on previous occasions for their opinion especially because there was a history of head injury at the age of 17

The full case-notes have not been available to us but no abnormal findings resulted

Antipsychotic agents and one anti-epileptic agent (carbamazepine ) had been ineffective in moderating his feelings of transparency

These various medications had been prescribed at another hospital over the course of the previous 10 years and we have been unable to discover the dosages used although compliance was poor

The episodic alcoholic binges continued and were associated with increasing social isolation and by the end of 1993 he was drinking to a consistently heavy degree

He was referred to a Community Mental Health Team and was admitted to an inpatient unit for assessment

At this point his mental state was difficult to assess because of intoxication

However the following day he was relaxed and well-spoken and apologetic for his previous state

He had good cognitive function and there were no delusional ideas expressed at that time

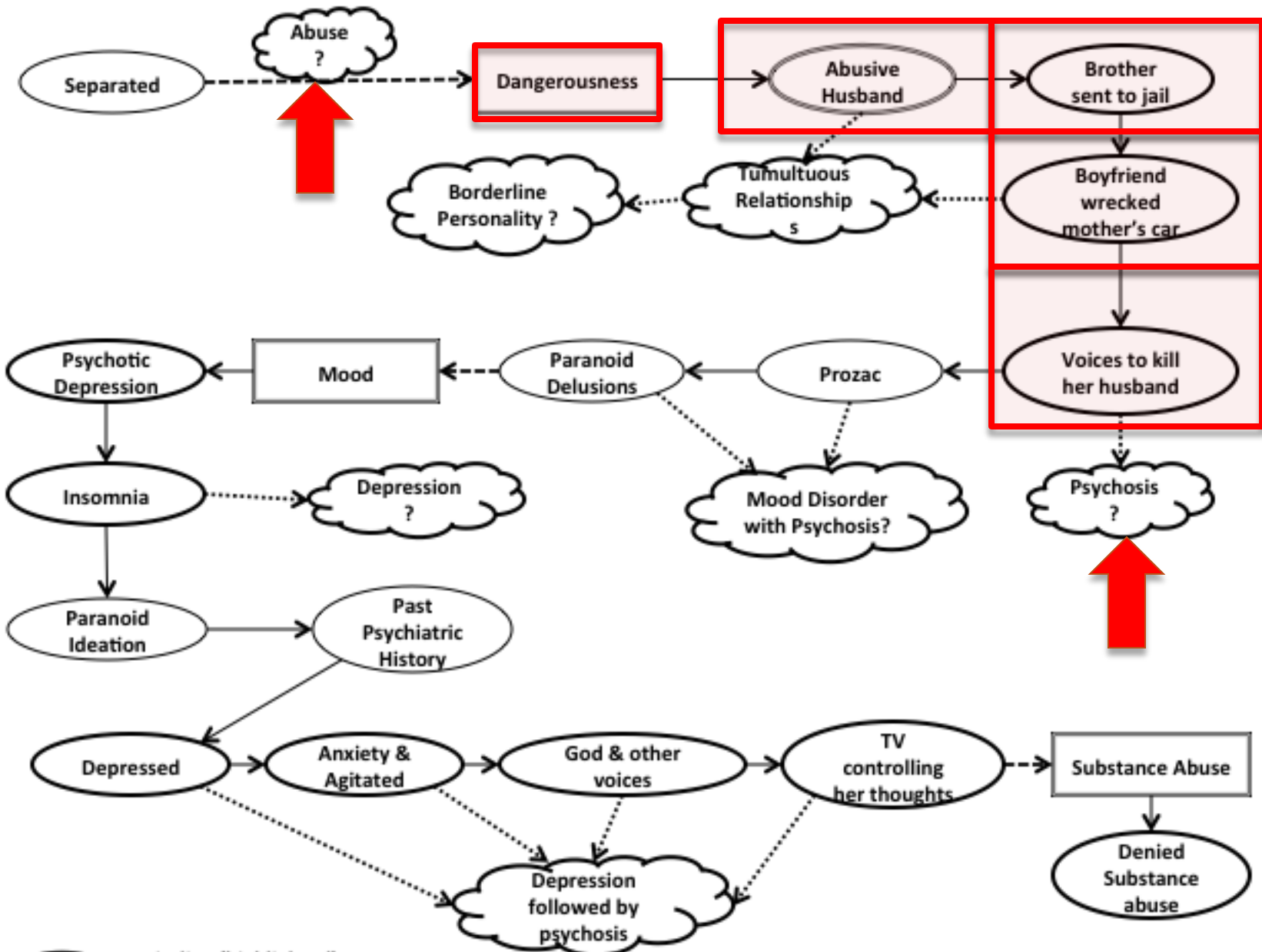
He was de-toxified from alcohol according to British National Formulary guidelines over a seven day period

On high doses of chlormethiazole he had been able to speak normally but as the dose was reduced he began to stammer and develop a tic on the right side of his mouth

This tic was noted to be much worse when he was in stressful situations and the patient reported that he had had it before

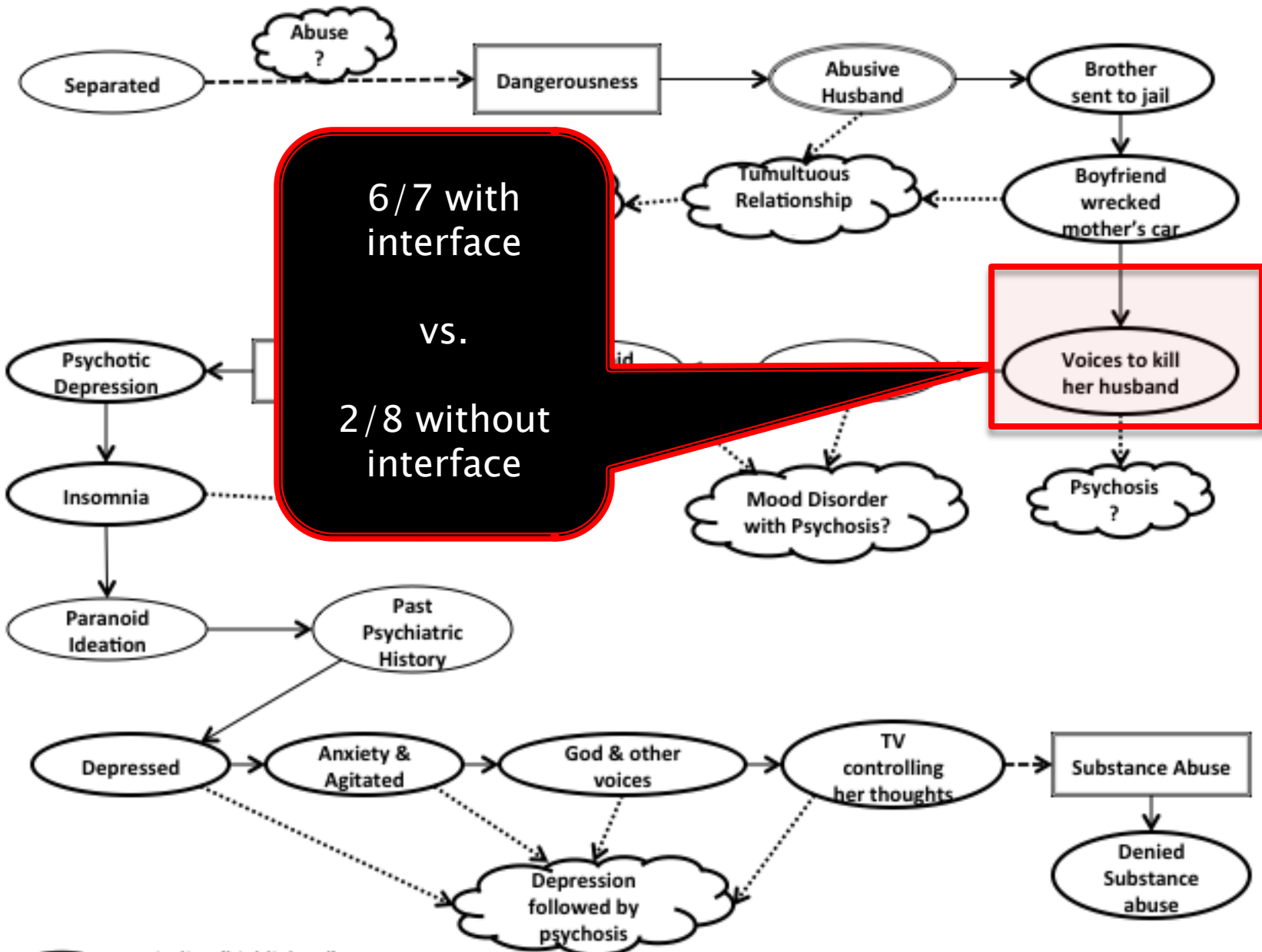
## [B] Detailed Patient Note





- Finding (highlighted)
- Finding (text)
- Think Aloud
- Facet

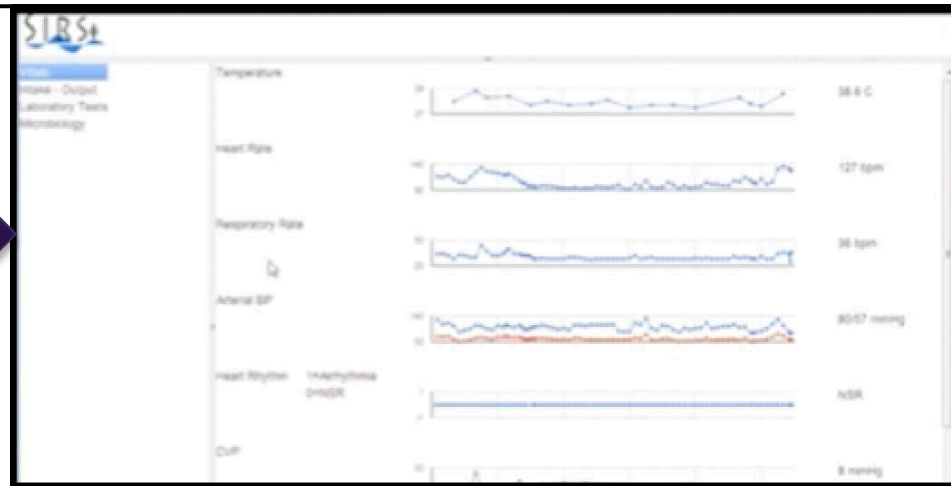
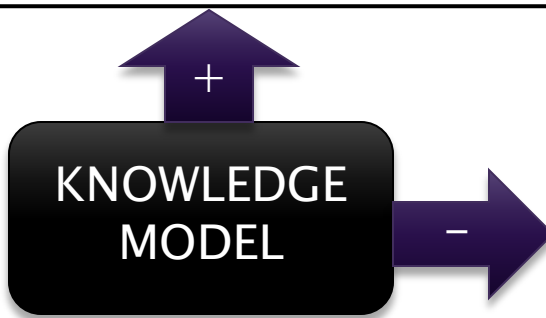
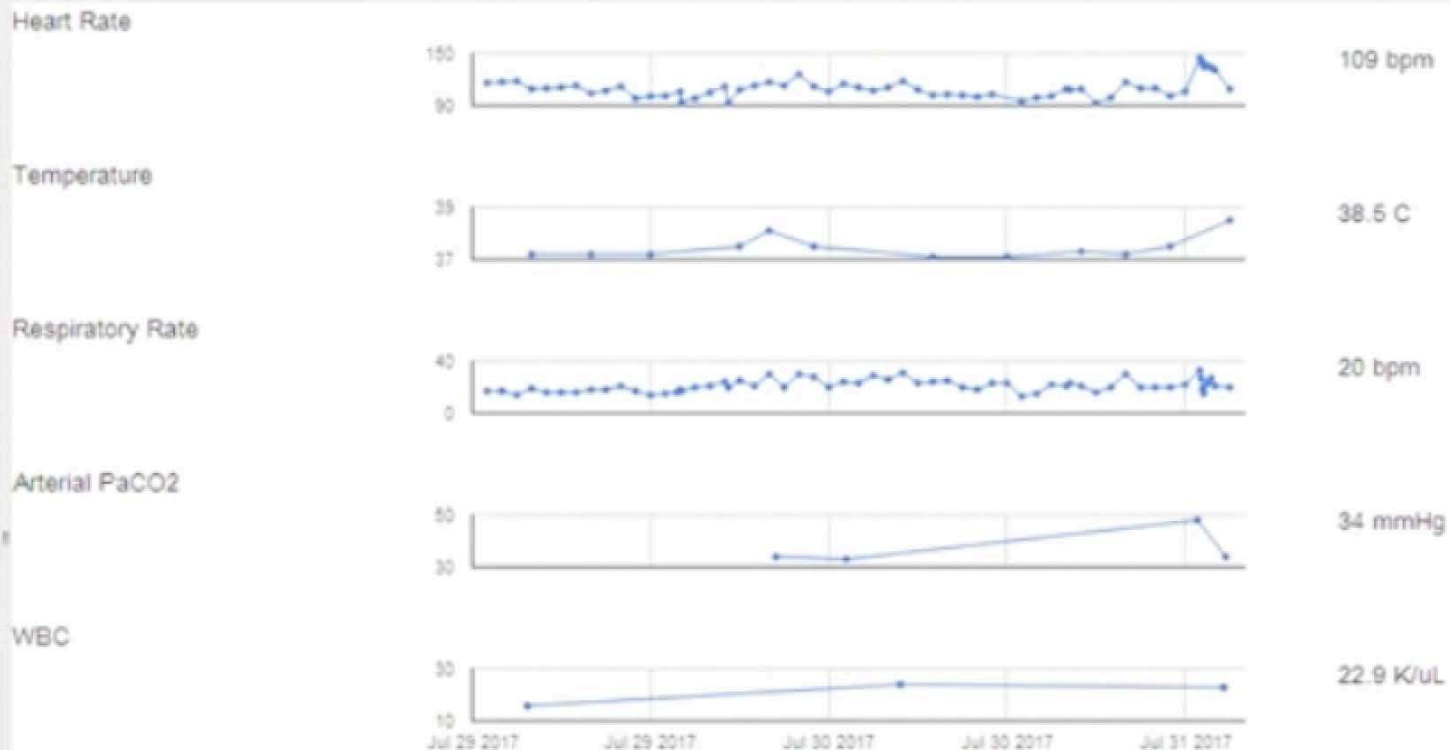
- Mouse Click
- Finding to Facet
- Finding to Think Aloud
- Regular flow



- Finding (highlighted)
- Finding (text)
- Think Aloud
- Facet

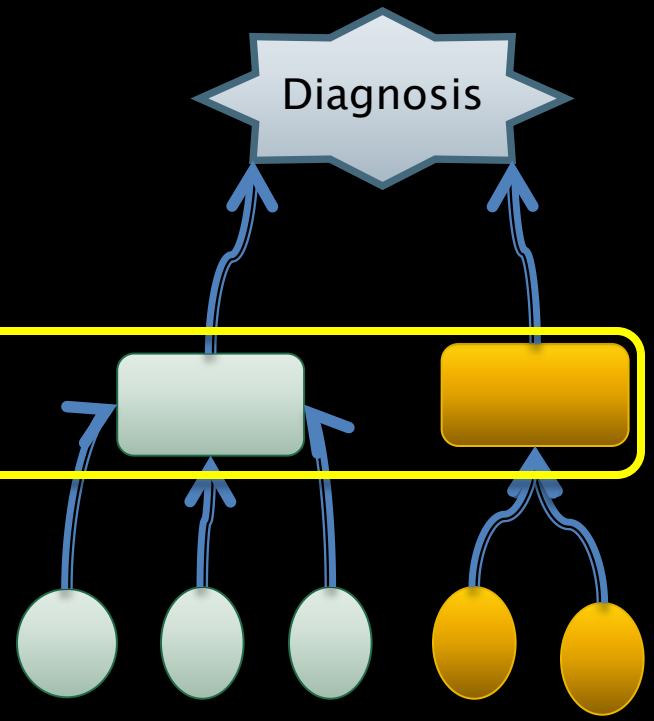
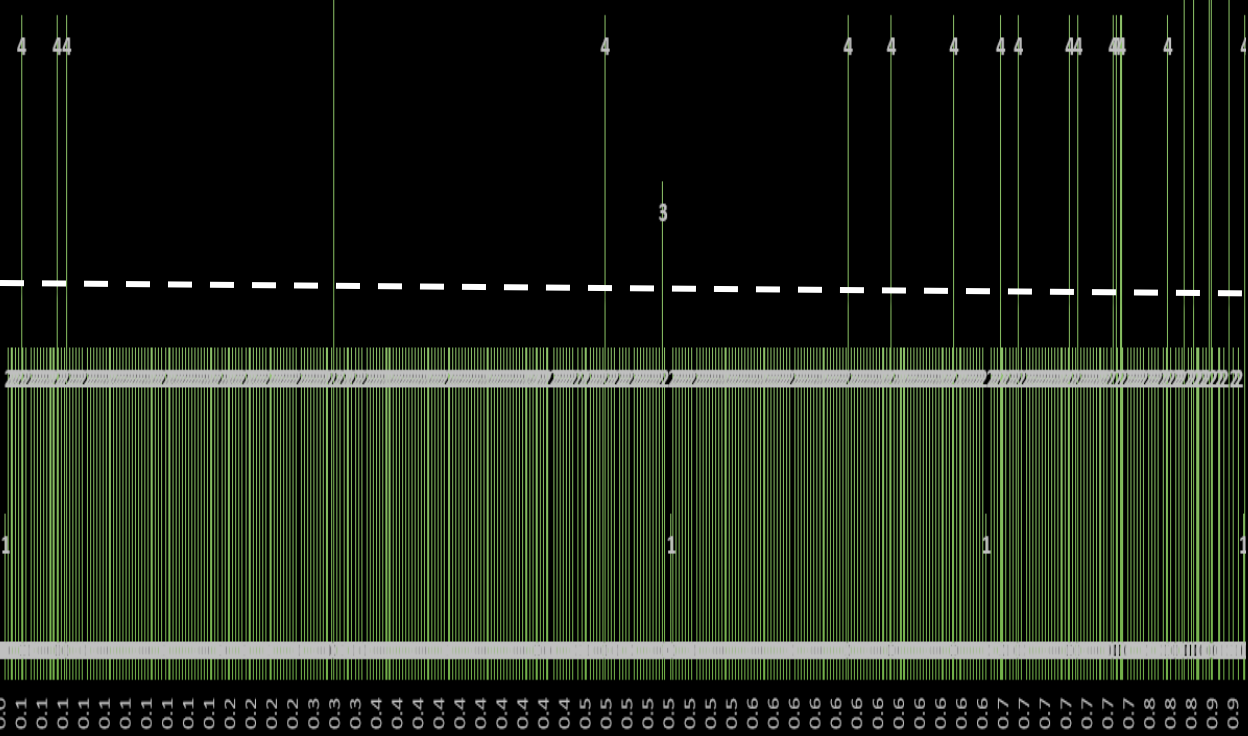
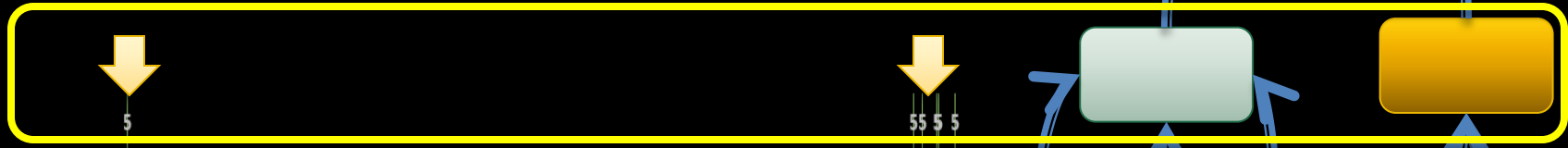
- Mouse Click
- Finding to Facet
- Finding to Think Aloud
- Regular flow

- Infection
- SIRS**
- Renal System
- Respiratory System
- Central Nervous System
- Hepatic System
- Cardiovascular System



- diagnosis
- facet
- finding
- observation
- view datapoint
- change category
- non-coded

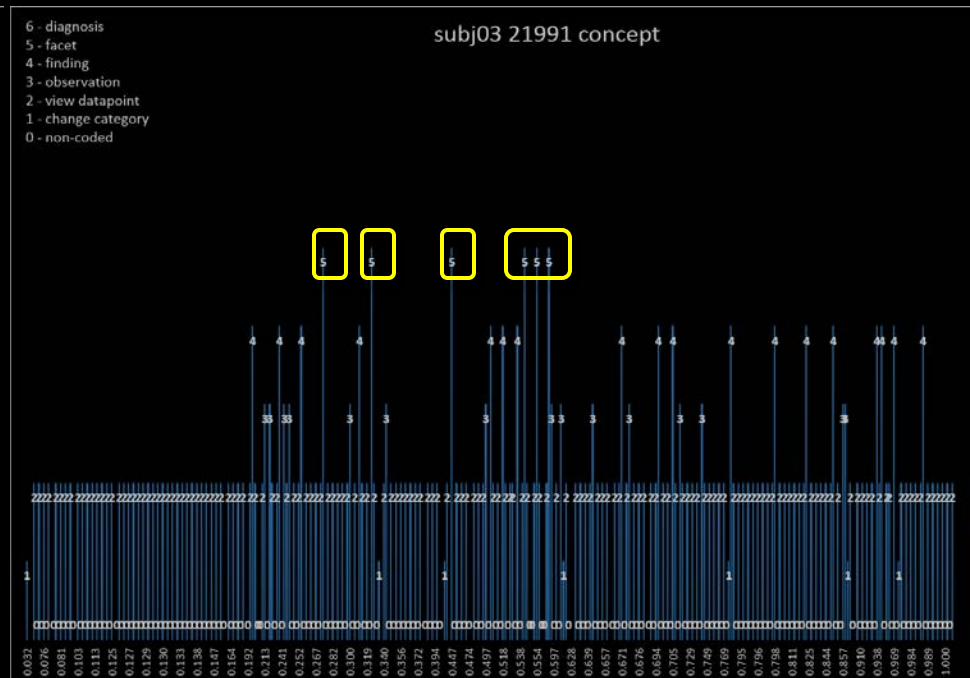
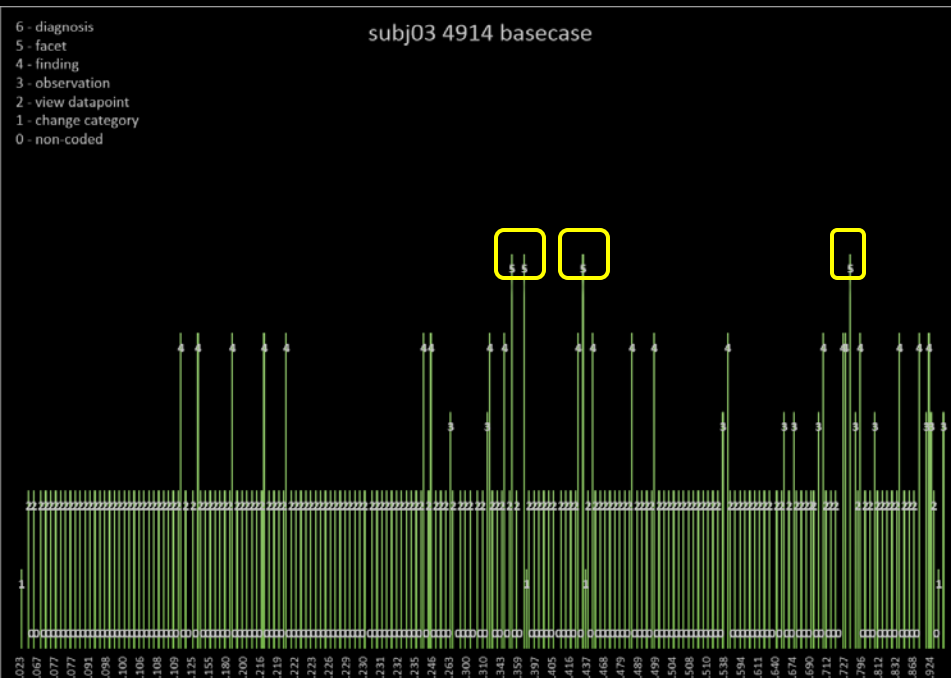
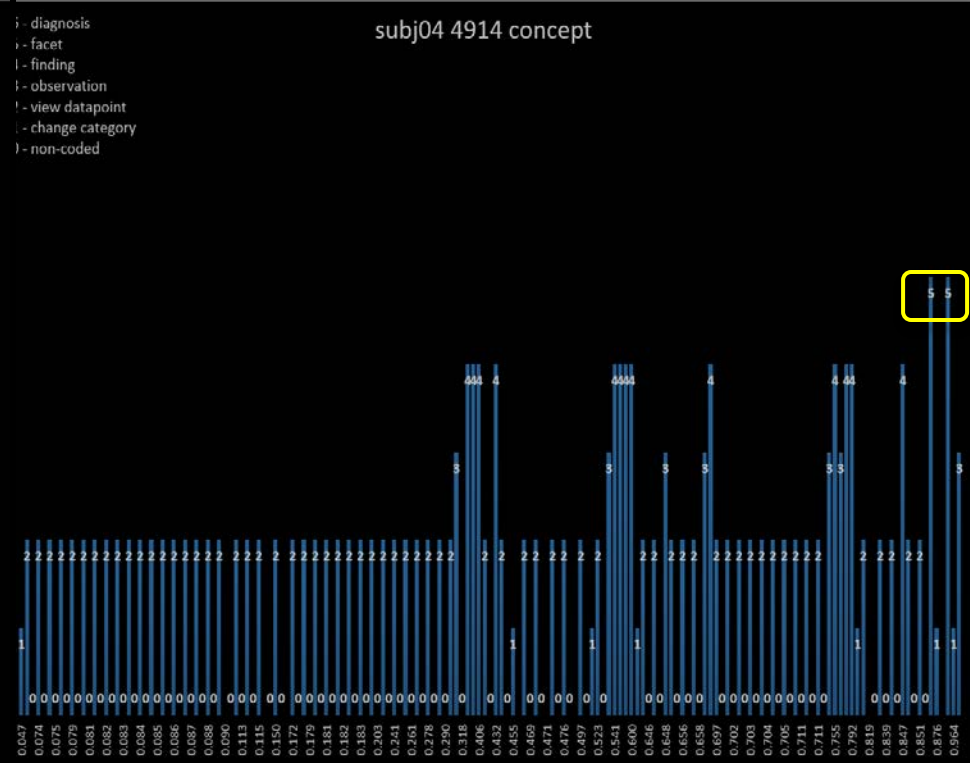
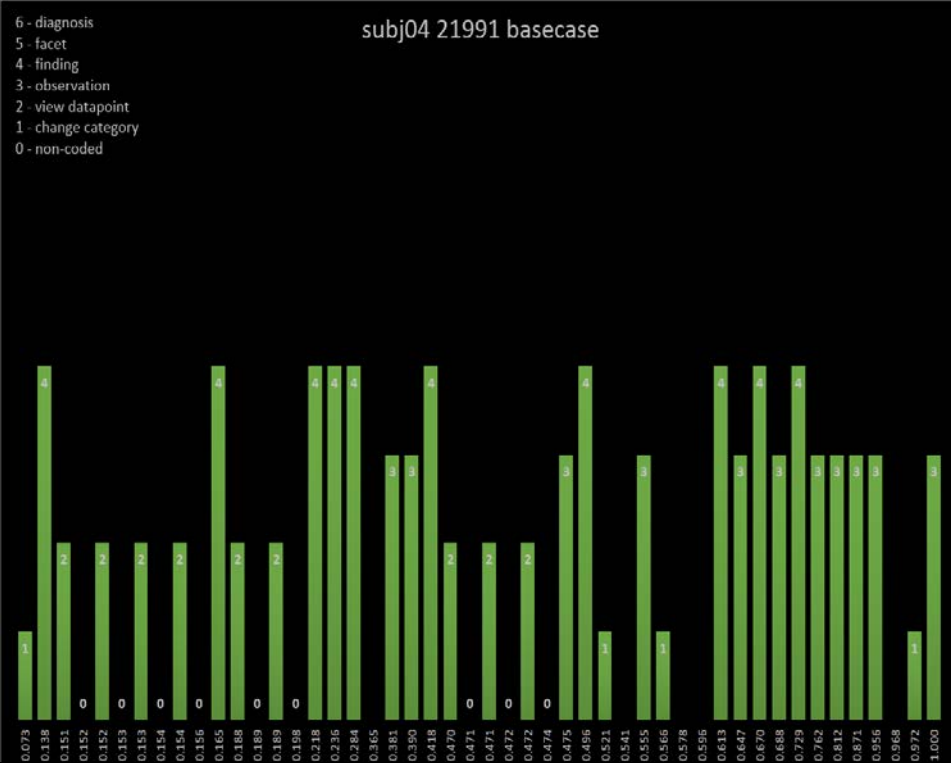
subj06 4914 base



THINK-ALoud DATA

LOG DATA





# Decompensating patient

Has myocardial infarction shortly after period displayed to participants

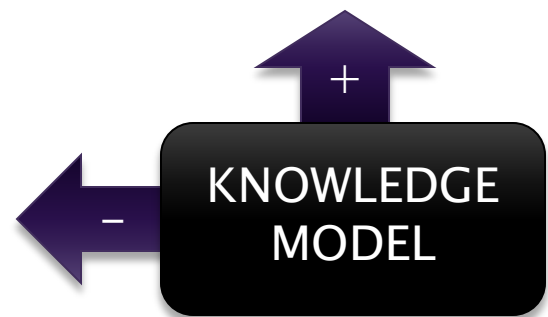
“she seems OK... I would be concerned”

“I don't think I would do anything“

“I won't do any intervention just wait and watch”

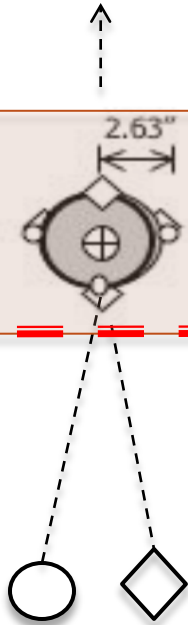
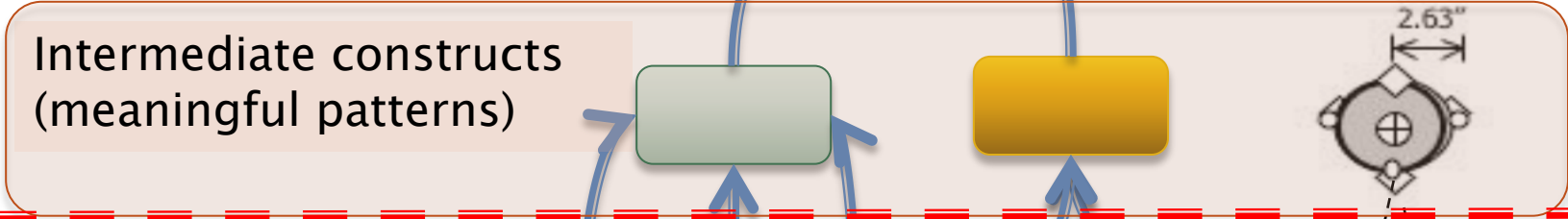
“I would be very concerned that this patient is acutely decompensating ”

“I am concerned” “This is something I would need to investigate and intervene on”



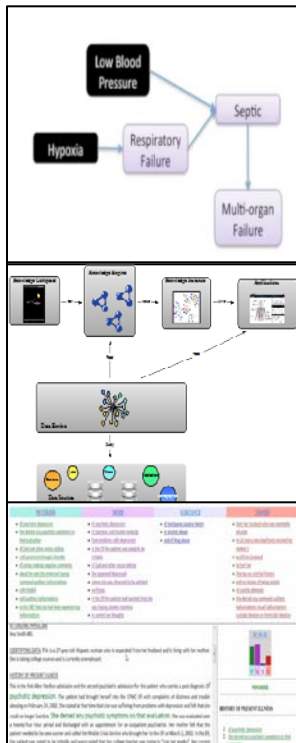
Cognitive support

Less effective problem solvers



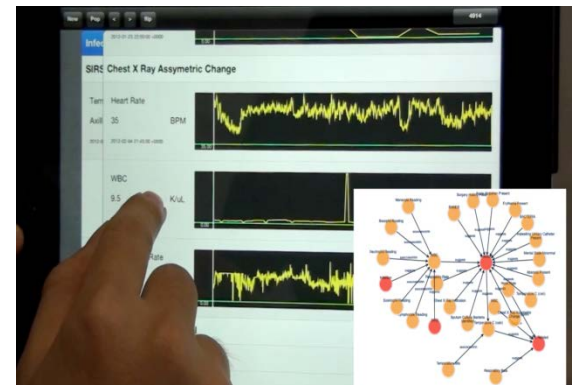
# Acknowledgments

- ONC
- Collaborators and contributors



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