When Visual Programs are Harder to Read than Textual Programs

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Spring 2017

Introduction

Previous study: Visual language study(LabView) which express conditionals as ‘forward’ structures or ‘backward’ structures

Use previous study for visual and textual programming

Claim: the structure of the graphics in the visual programs is harder to scan than in the text version.

(a) Reports results from a further sample of electronics designers, thoroughly familiar with the underlying metaphor of LabView

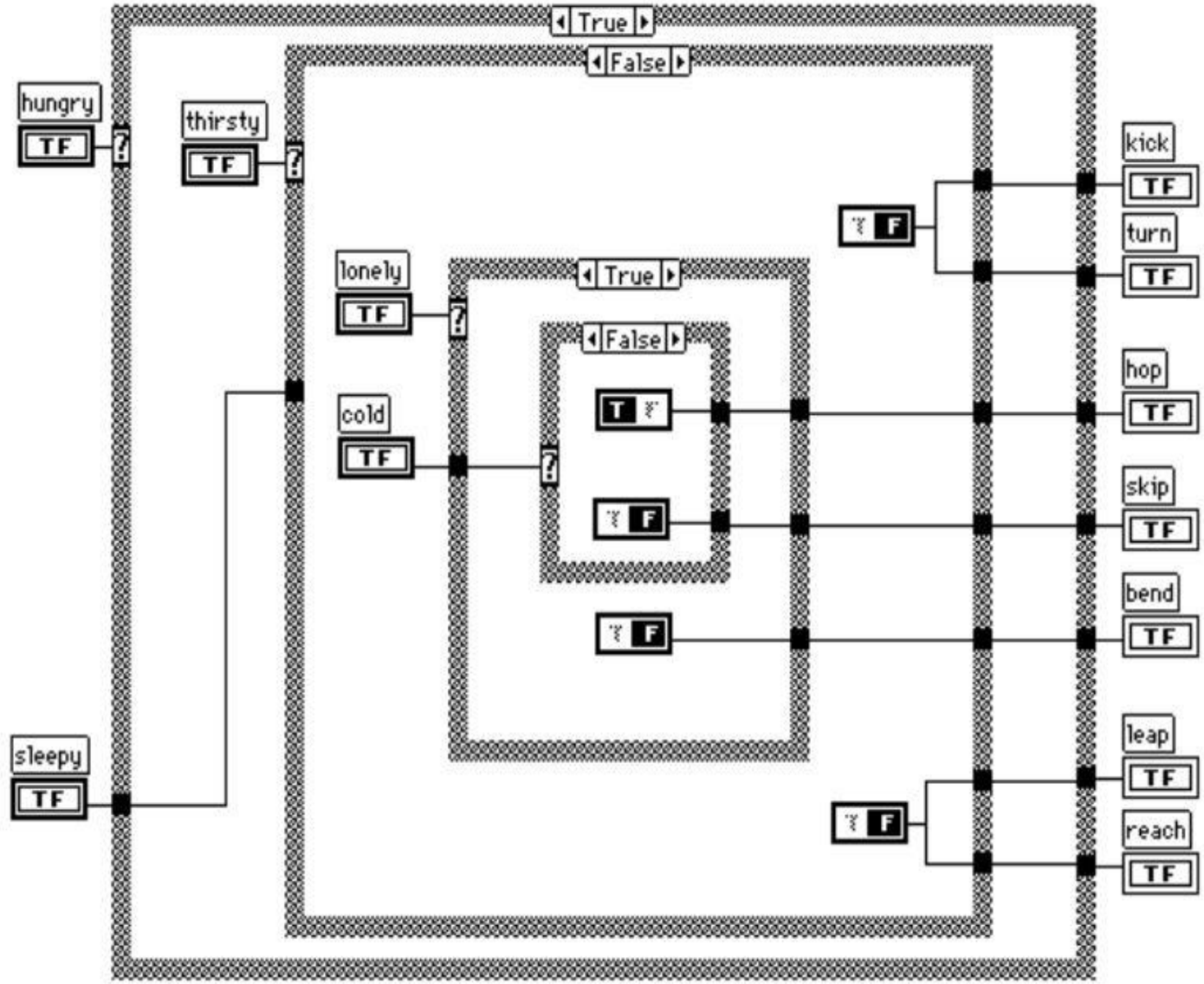
(b) Presents full analyses

(c) Relates the findings to the ‘match-mismatch’ hypothesis and the ‘cognitive fit’ hypothesis

(d) presents a simple model of information-gathering from VPLs and TLs which is sufficient to account for the results

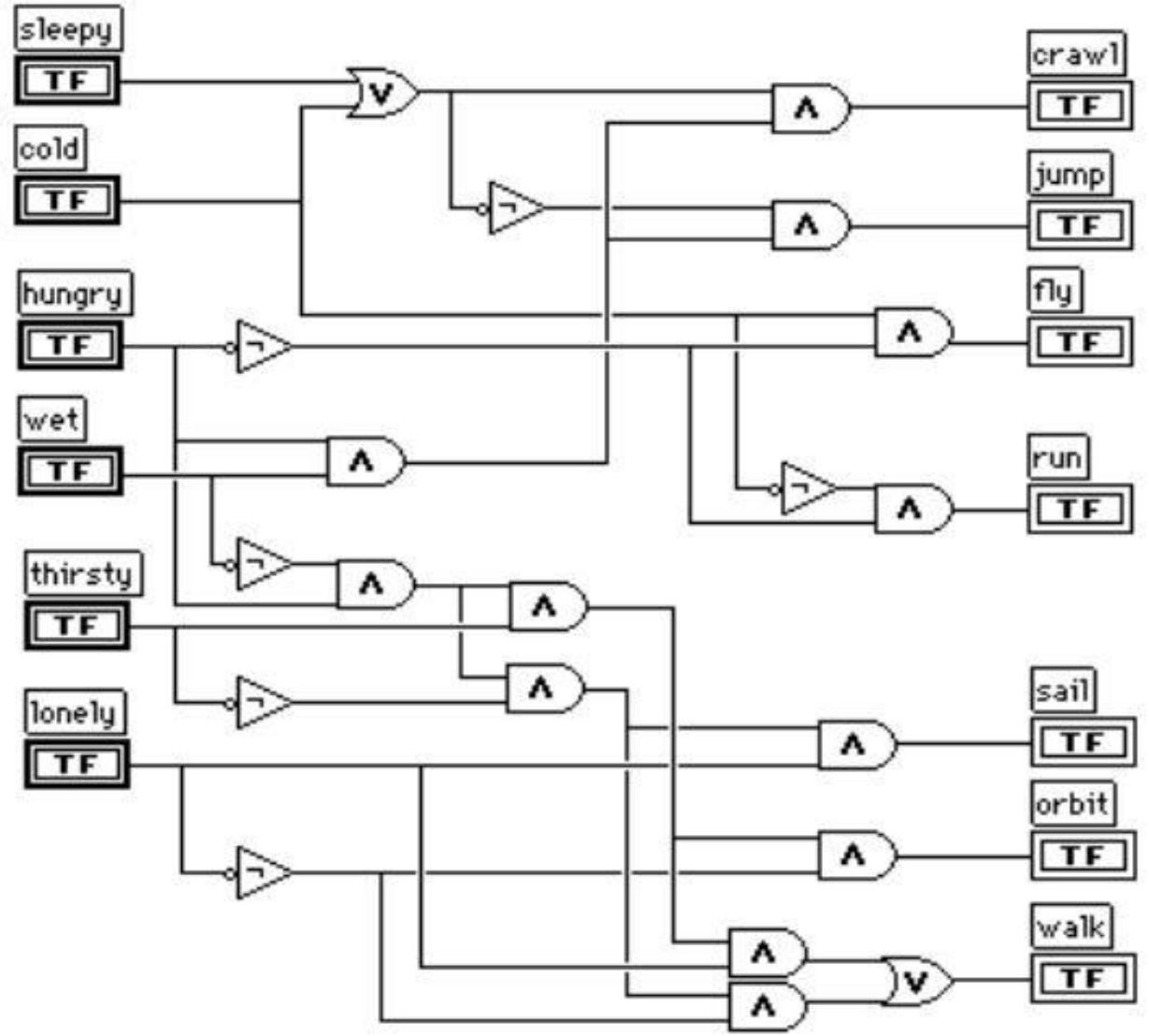
Sequential Structure - Nest-INE (Working forwards)

```
if high :
   if wide :
      if deep : weep
      not deep :
         if tall : weep
         not tall : cluck
         end tall
      end deep
   not wide :
      if long :
         if thick : gasp
         not thick : roar
         end thick
      not long :
         if thick : sigh
         not thick : gasp
         end thick
      end long
   end wide
not high :
   if tall : burp
   not tall : hiccup
   end tall
end high
```



Circumstantial Structure - And / Or (Working backward)

howl : if honest & tidy & (lazy | sluggish)
laugh : if honest & tidy & ¬ lazy & ¬ sluggish
whisper : if honest & ¬ tidy & (nasty & greedy | ¬ nasty & ¬ greedy)
bellow : if honest & ¬ tidy & nasty & ¬ greedy
groan : if honest & ¬ tidy & ¬ nasty & greedy
mutter : if ¬ honest & sluggish
shout : if ¬ honest & ¬ sluggish



Study

Part1 - Forward & Backward Questions

OUTCOME:

gasp

	TRUE	FALSE	IRREL	TRUE	FALSE	IRREL
high	◉	○	○	◉	○	○
wide	○	◉	○	○	◉	○
deep	○	○	◉	○	○	◉
tall	○	○	◉	○	○	◉
long	○	◉	○	◉	○	○
thick	○	◉	○	◉	○	○

IS:
- high
- tall
- thick

IS NOT:
- wide
- deep
- long

- ○ weep
- ○ cluck
- ○ gasp
- ○ roar
- ○ sigh
- ○ gasp
- ○ burp
- ○ hiccup

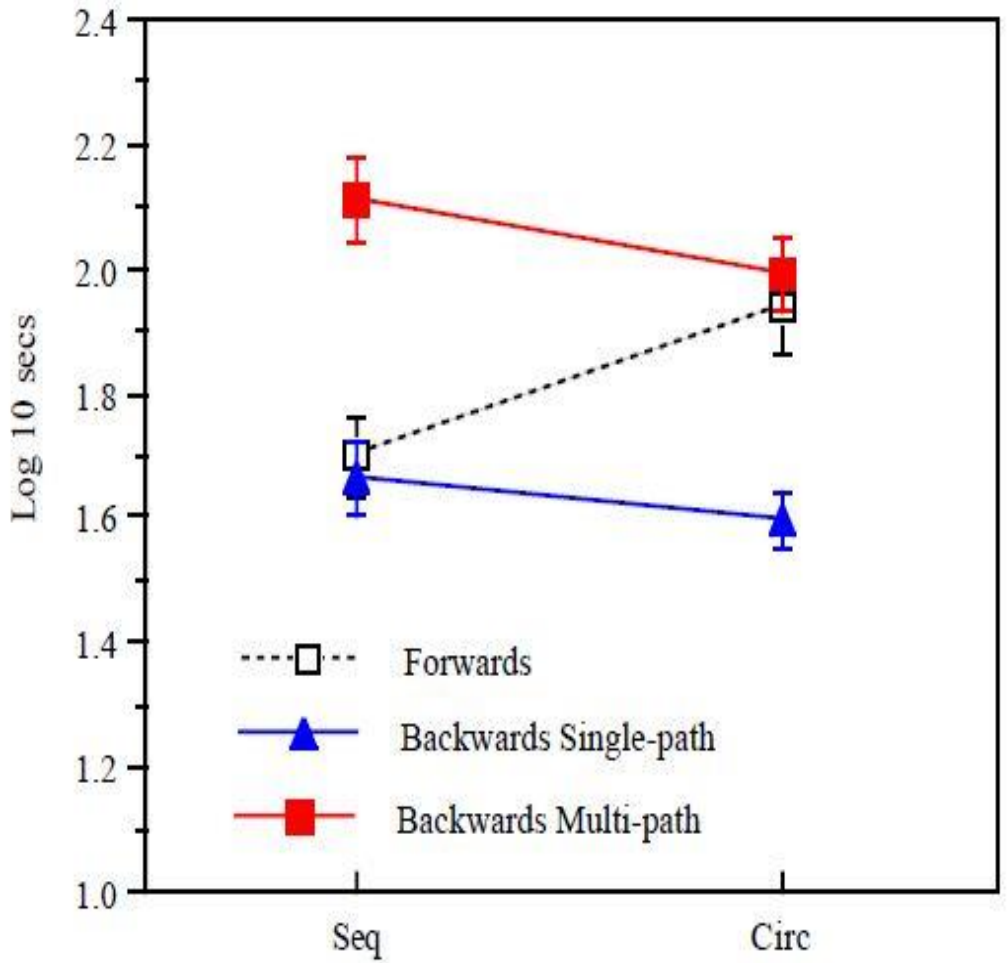
Part2 - same-different judgements

- In Part 2 of the study two programs were presented side by side, and the subject responded either Same or Different
- By mousing a button.

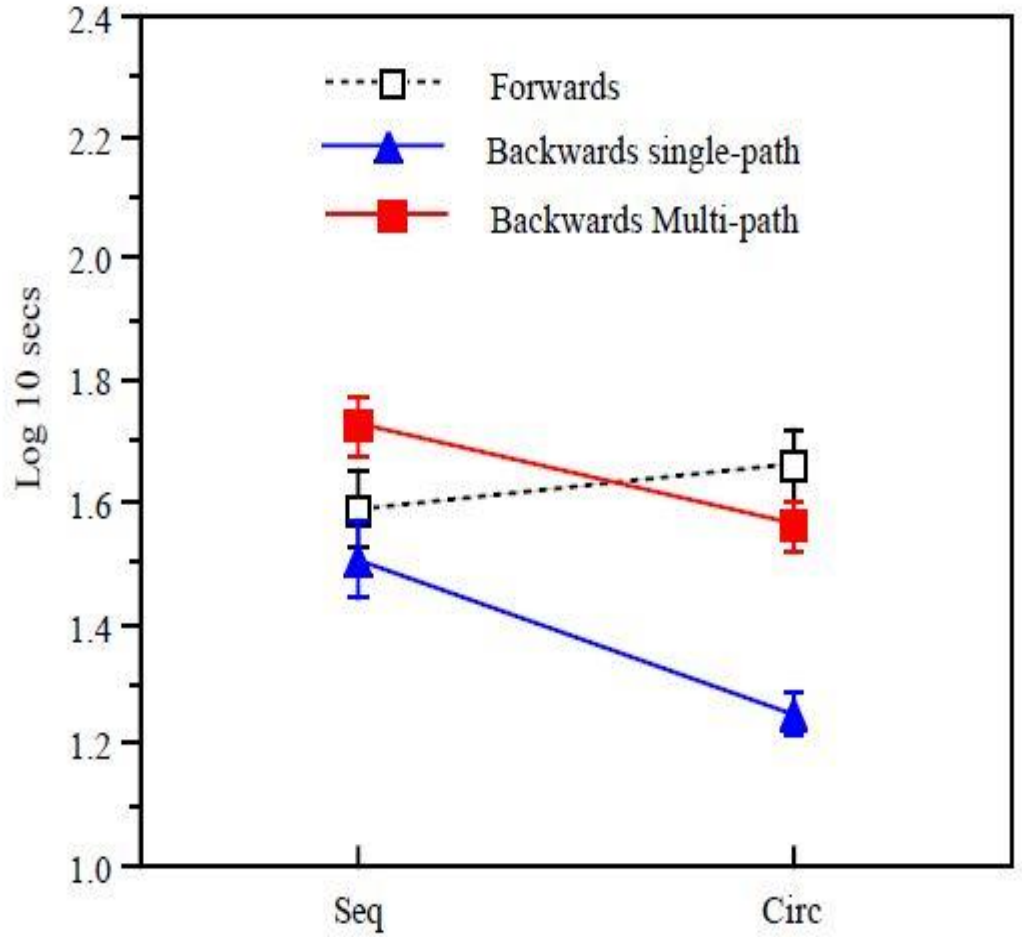
Results

Part1-Forward & Backward Questions

(a) The two Graphics notations (Boxes and Gates):

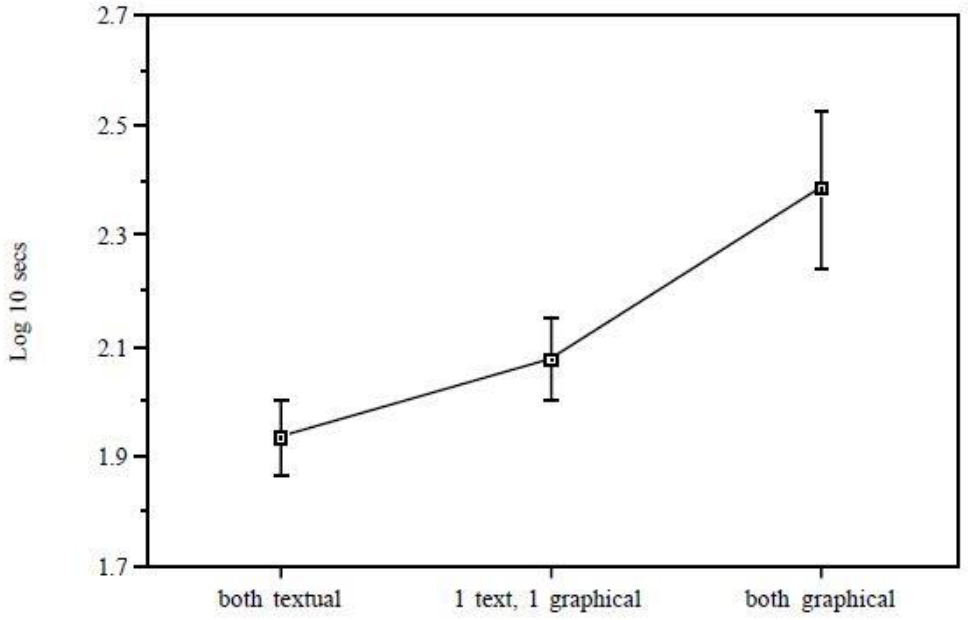


(b) The two Text notations (Nest-INE and And/Or):

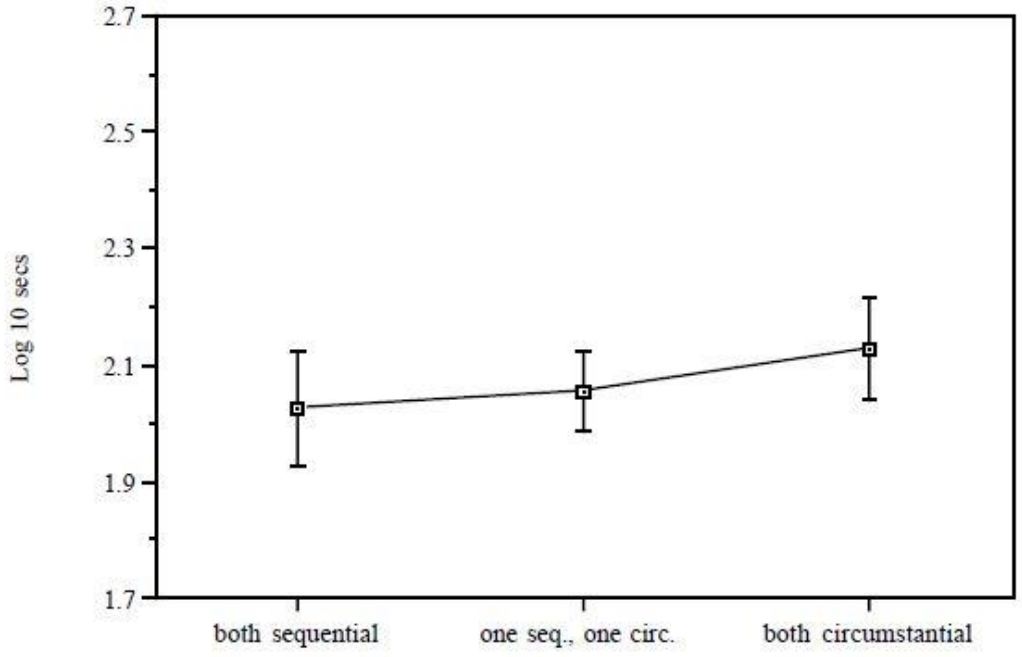


Part2-same-different judgements

effect of Mode:
Comparing two textual notations was fastest; comparing two graphical notations was slowest. The difference is surprisingly great.

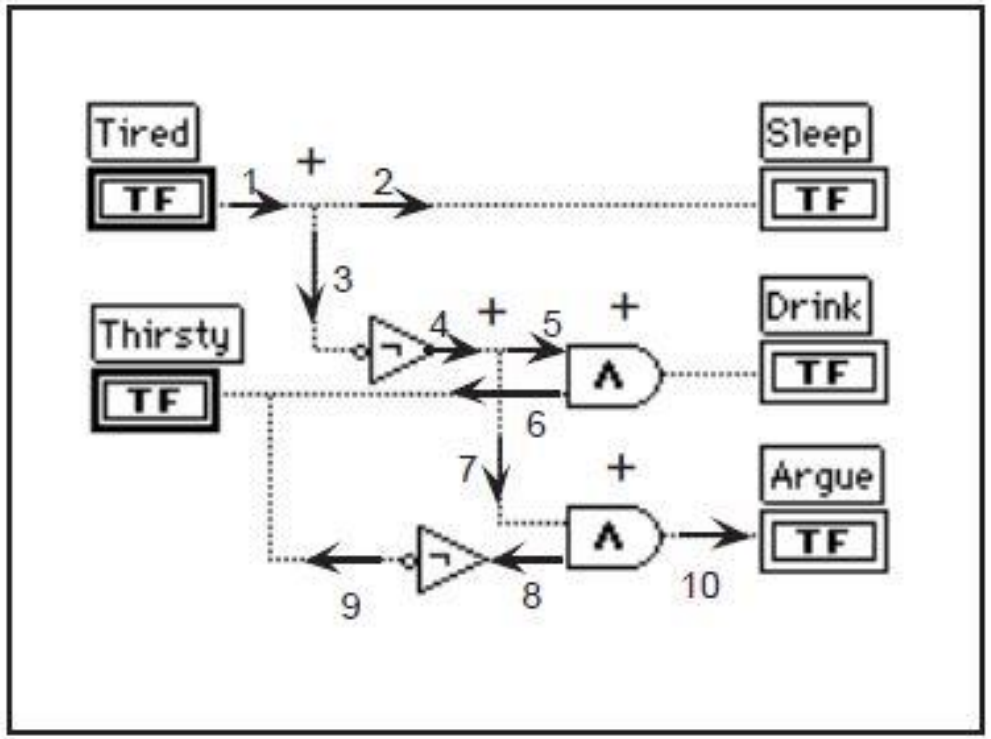


effect of Structure :
The comparisons in which both notations were Sequential were slightly faster than those in which one or both were Circumstantial.



Conclusion

- The study of cognitive processes involved in understanding graphs and tables
- The information structure of the graph must also be considered.
- In cases like these where the graphical structure contains ‘knots’ but the textual version does not, the supposed advantages of graphics over text will prove illusory



Sleep: if Tired
Drink: if ¬ Tired & Thirsty
Argue: if ¬ Tired & ¬ Thirsty

Open Questions

- Overall reaction to the paper
- Are the claim convincing?
- How Visual programming affects your performance in terms of time? Is it faster?