

“Does Emergence Matter?”

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"I think the study of 'emergence' can be seen as a luxury topic. People may see it as non-critical, and do not see it as a field of inquiry that will immediately solve real problems. (I beg to differ). I suspect that the few women and other underrepresented groups are attracted, first, to the major topics, and slowly diffuse into 'fringe' areas."

----DougBlank, Emergence Blog

"This sentiment rang all too true to me. Emergence may attempt to explain and describe the physical world, but constructing computer models does not feel like solving everyday problems. It feels like playing games.

I didn't begin seriously studying science until college. And, four years later, I still find myself fighting my distaste for disciplines that feel so distanced from the rest of the world. It is sometimes hard to justify studying an obscure discipline. What is the value in studying emergence?

I found a great deal of solace in a blog post by a great blogger, Young Female Scientist. She writes

"One of the only things that keeps me in science is knowing- not wondering in the slightest, actually- that my project is something that I can do now, and that science will be better off than if I left. "

As the class winds down, I find that this is an extremely comforting thought. Our thoughts and contributions do matter. And even if we do not have the answers to emergence now, we have come closer. She adds

"There are plenty of examples of stories in science that got dropped for say, 30 years, and then picked back up again. Or 100 years."

“Does Emergence Matter?”

We probably will drop the blog, more or less, but who knows if someone will stumble upon our musings, extrapolate a new conclusion and sketch out a discovery that turns into a breakthrough? Even tiny steps can further scientific knowledge.

--- FloraShepard, Emergence Blog 4/16/06

“Does Emergence Matter?”

- “What is the value in studying emergence?”
- Where do you find emergence in the world, in your life, in science?
- Does it help to recognize emergence?
- How can you, as a simple part, affect the whole?
- What can computer models tell us about anything?

Artificial Intelligence

- The science of reducing complex, rational problems into simpler, rational problems
- Driven by a “database of facts”

Artificial Intelligence

- The science of reducing complex, rational problems into simpler, rational problems
- Driven by a “database of facts”
- How do you get these facts?
- How do you keep the facts in sync with reality?
- Why is it that the more facts the system has the slower it goes, but people are the opposite?

How would you do this?

Who is the first lady of Great Britain?

How would you do this?

Who was the first lady of Great Britain when Margaret Thatcher was prime minister?

How would you do this?

Is Iraq another Vietnam?

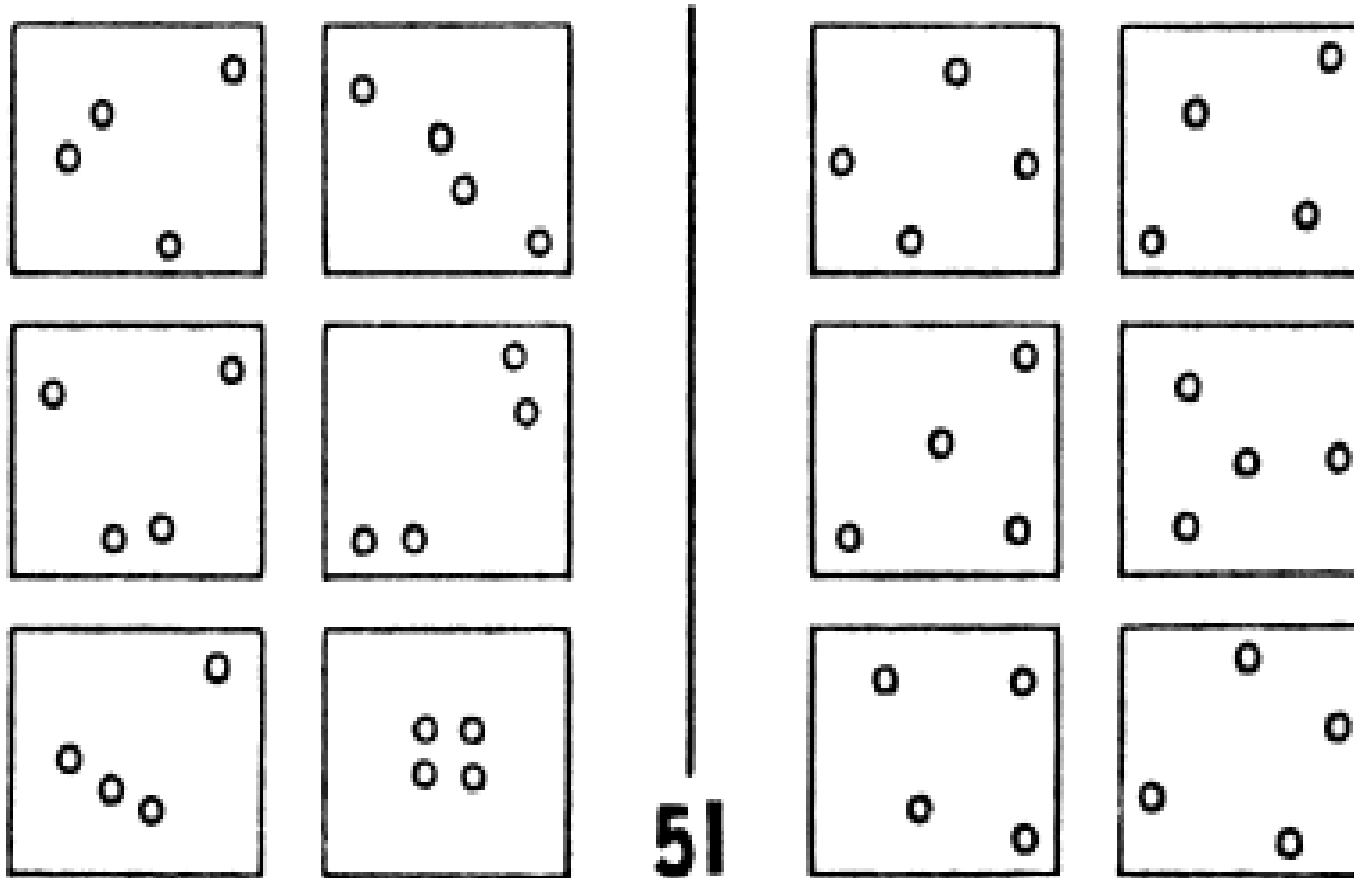
How would you do this?

Spygate

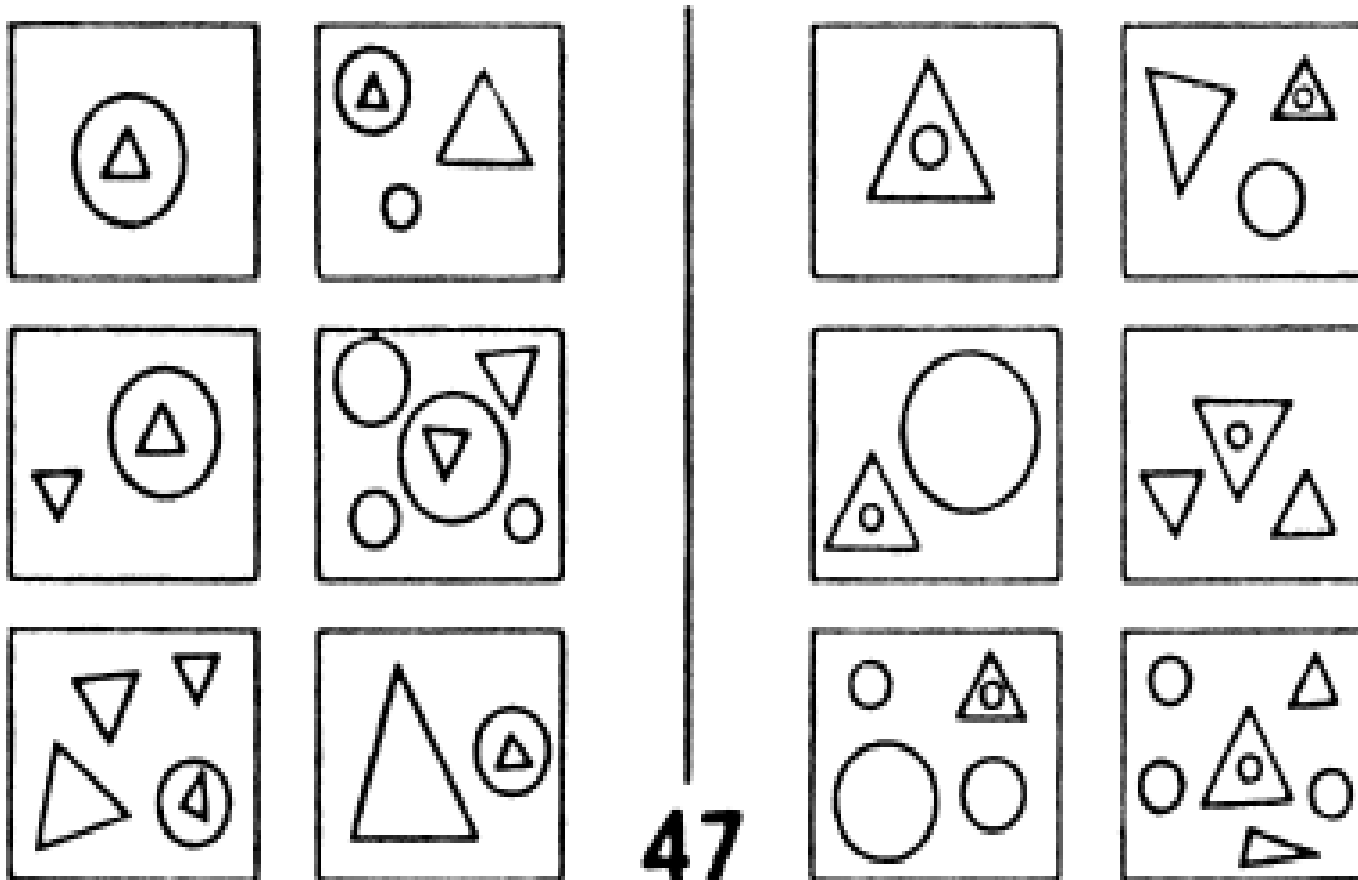
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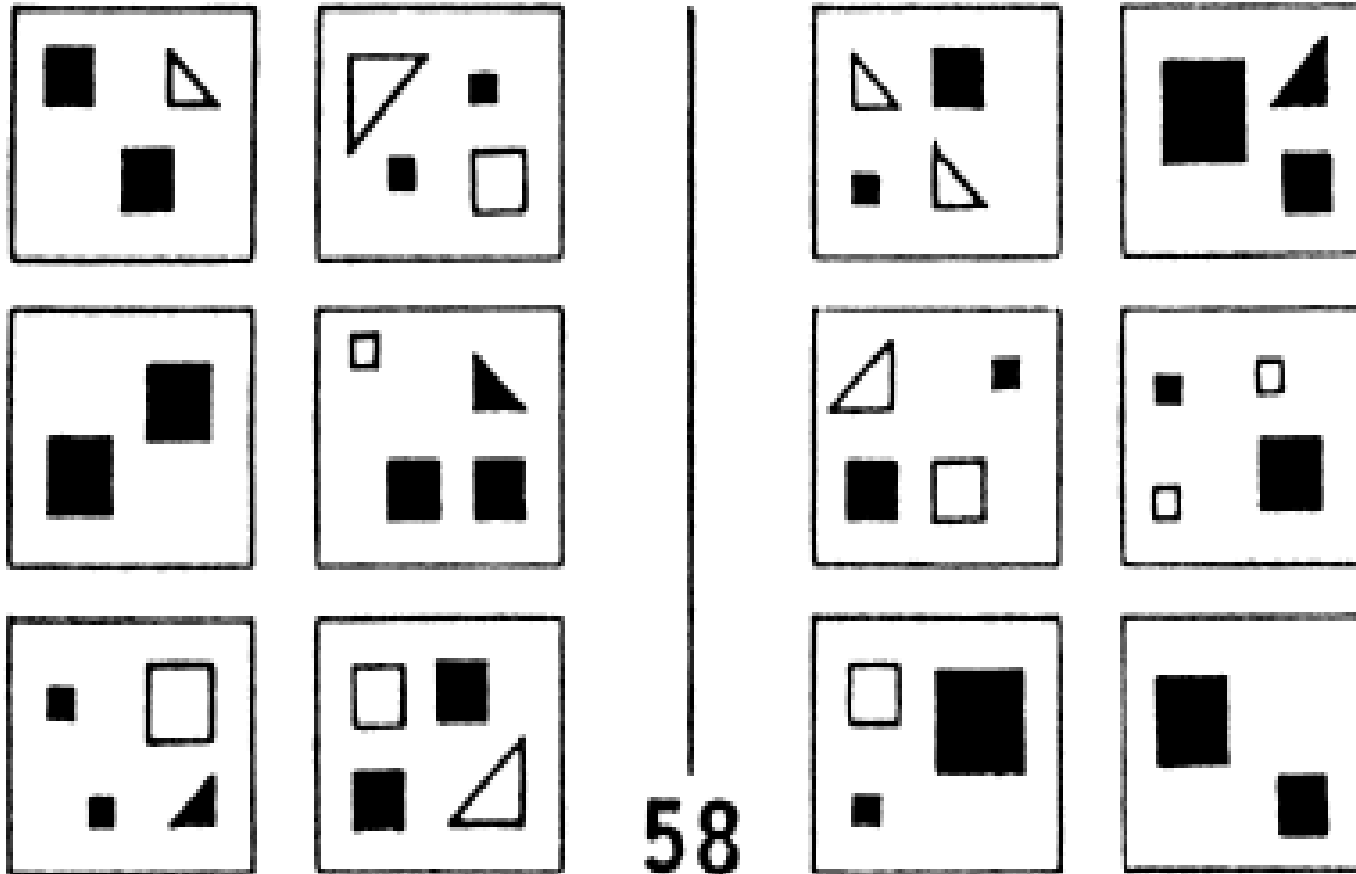
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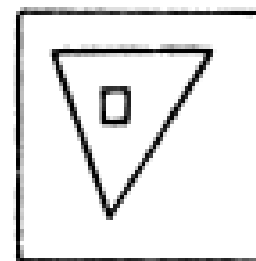
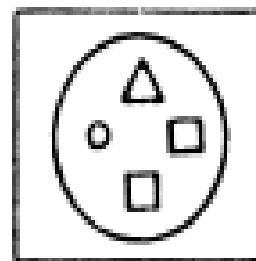
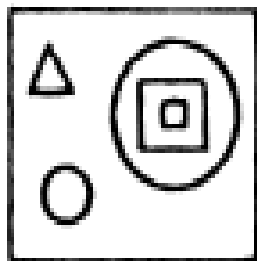
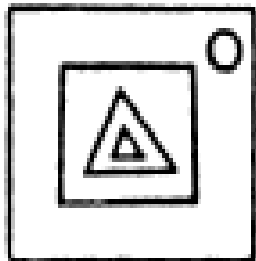
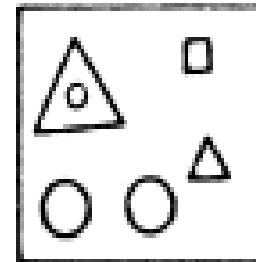
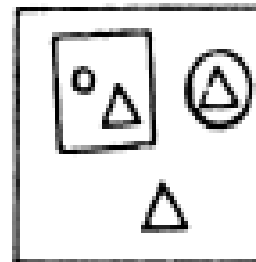
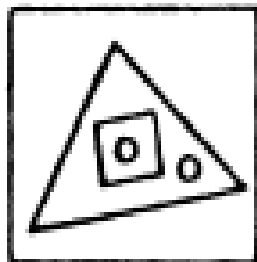
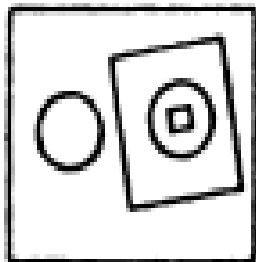
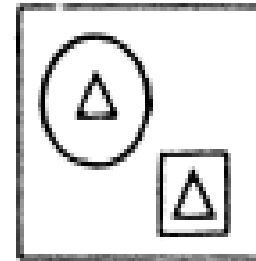
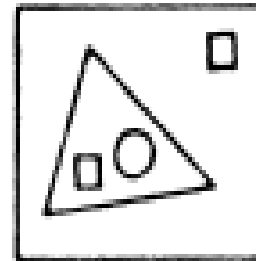
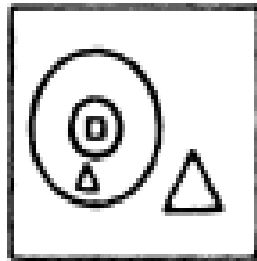
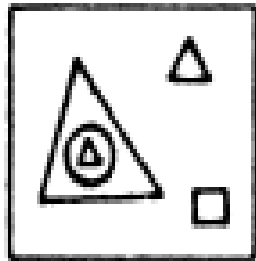
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How would you do this?

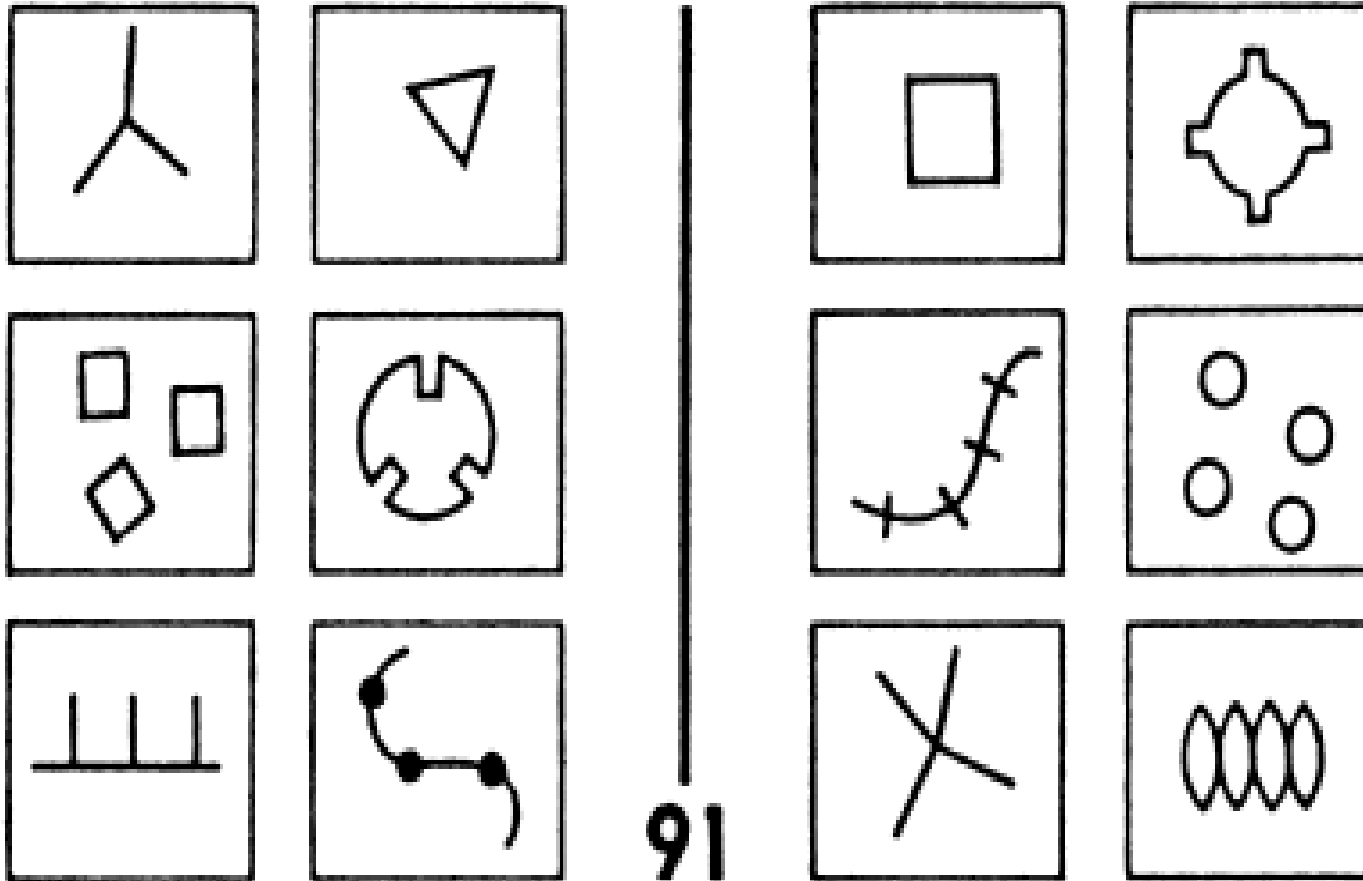


How would you do this?




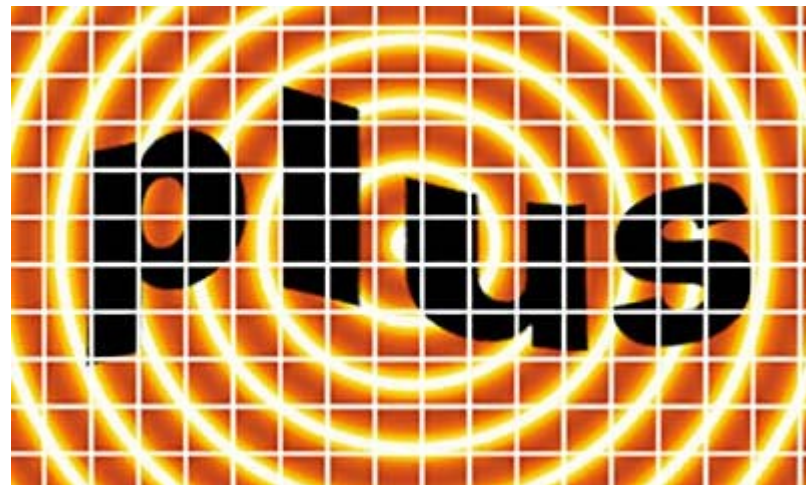
71

How would you do this?



How would you do this?

Blog address (URL)	<input type="text" value="http://"/>
Word Verification	 <input type="text"/>



How would you do this?

Molly Brown : sink :: Bill Clinton : ?

inhale
elected
campaign
sing

What do all of these have in
common?

What do all of these have in common?

- Pattern recognition
- Perceiving categories
- Seeing abstractions
- Making analogies
- Context matters
- Requires some creativity, intelligence, exploration, perception, adaptability, flexibility

How could you model this?

Traditional AI with its facts, databases, and rationality didn't seem to fit the problem.

Hofstadter's Copycat

a -> b; c -> ?

*If "a" changes into "b",
what does "c" change into?*

Copycat “Toy World” Domain

- 26 letters
- Every letter has a predecessor, except A
- Every letter has a successor, except A
- Questions can only involve one changed item
- You can use number concepts, up to 5
- Answers are stated as rules, either concrete or abstract
- No knowledge of phonemes, shapes, etc.

Copycat

abc -> abd; pqr -> ?

Copycat

abc -> abd; xyz -> ?

Copycat

abbccc -> abbccccc; pqqrrr -> ?

Copycat

abbccc -> abbccccc; pqr -> ?

Copycat

abc -> abcc; pqr -> ?

Copycat

abc -> abcc; xyz -> ?

Copycat

abc -> cba; pqrs -> ?

Copycat

aaaaaa -> aaaaaaa; pqr -> ?

Copycat Domain

- No correct answer
- Many possible answers
- Some answers are better than others; why?

Copycat Domain

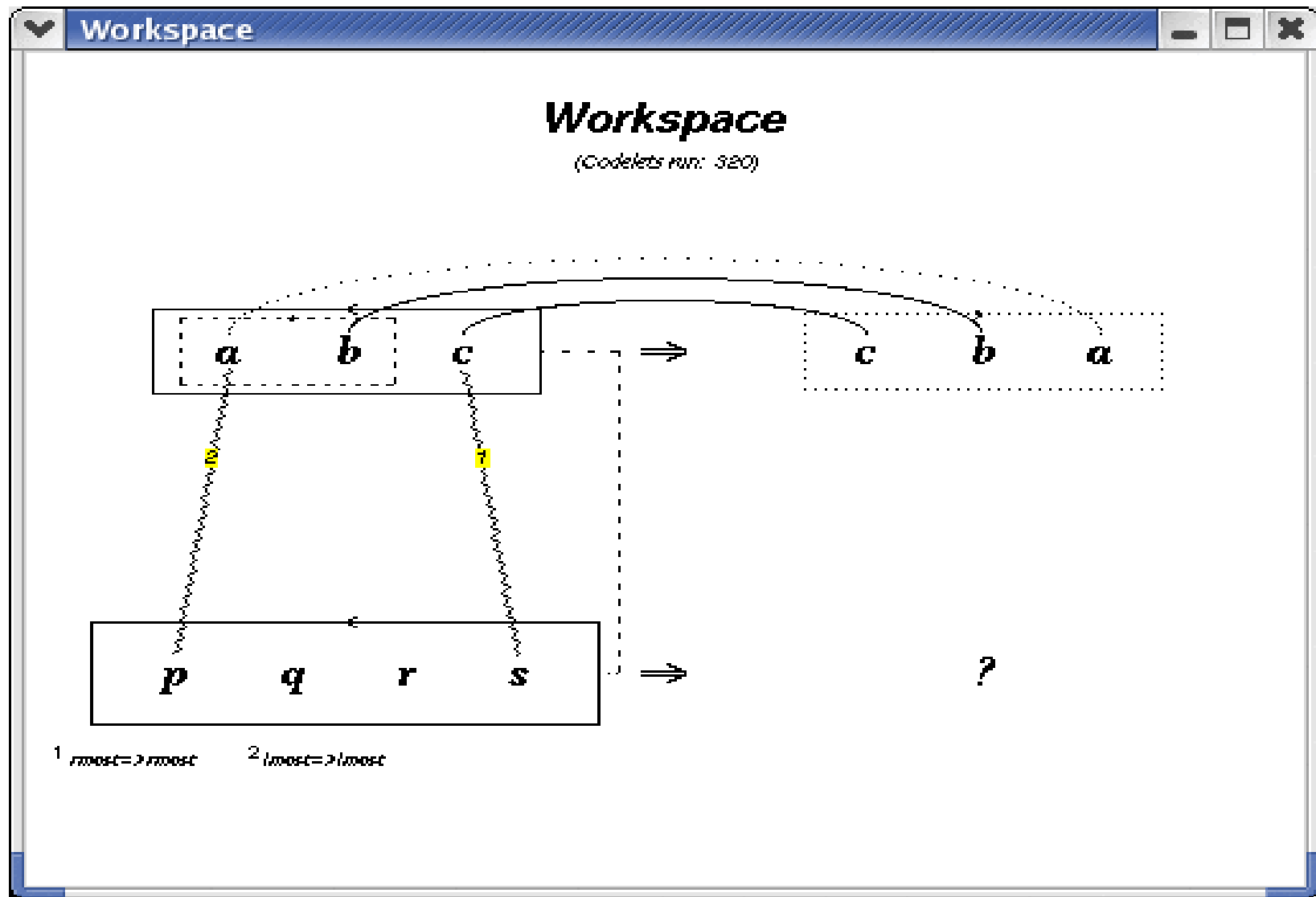
- No correct answer
- Many possible answers
- Some answers are better than others; why?
 - Structure
 - Interestingness
- How often would you want these to be produced?

Copycat/Metacat

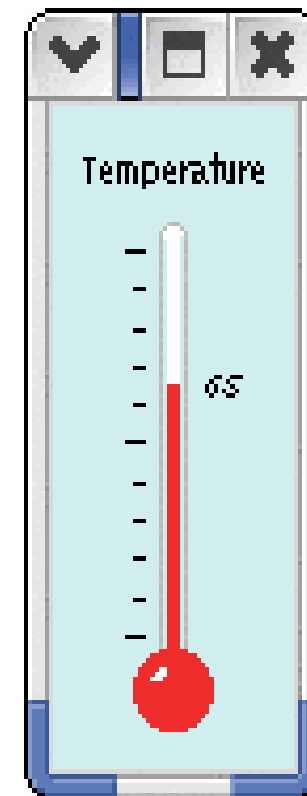
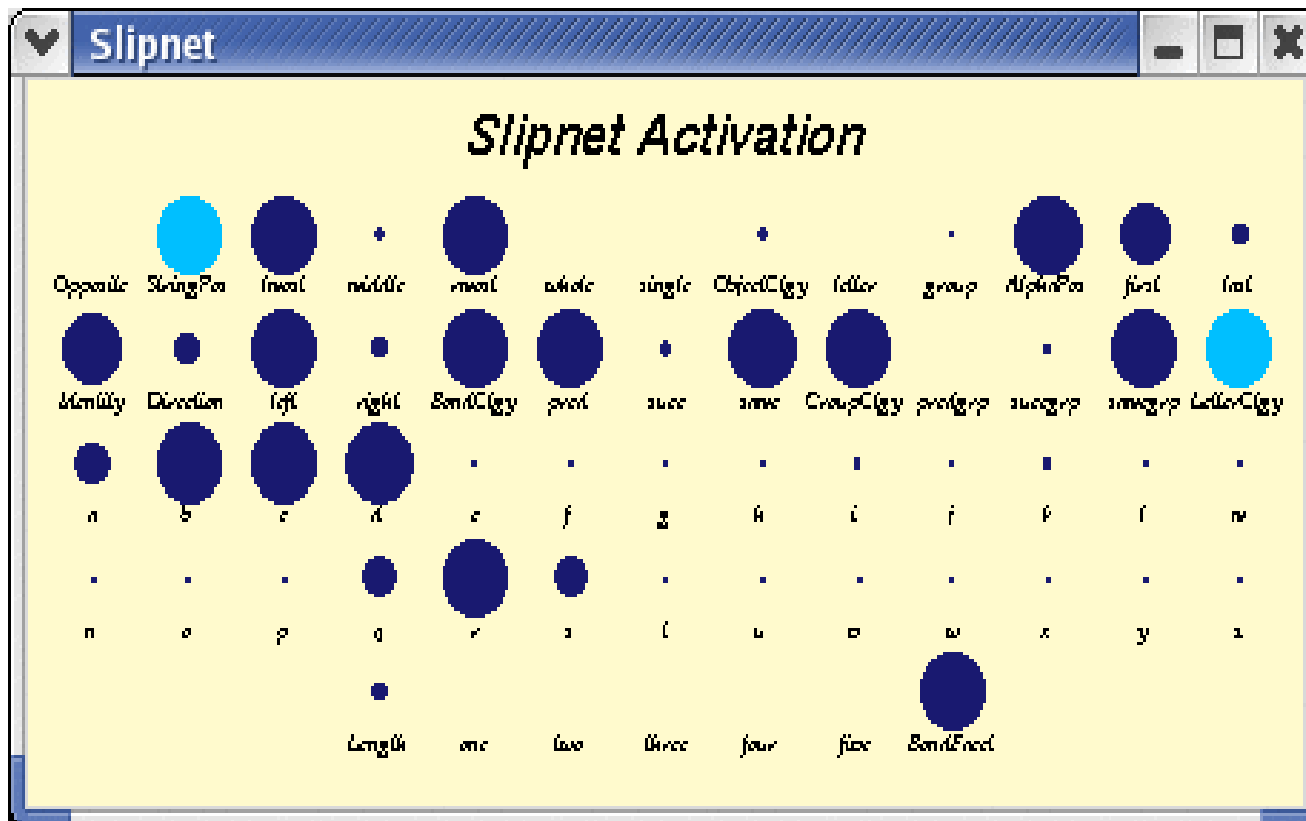


- Run "metacat"
- Enter the question
- You may leave out the -> and ;
- Click "go"

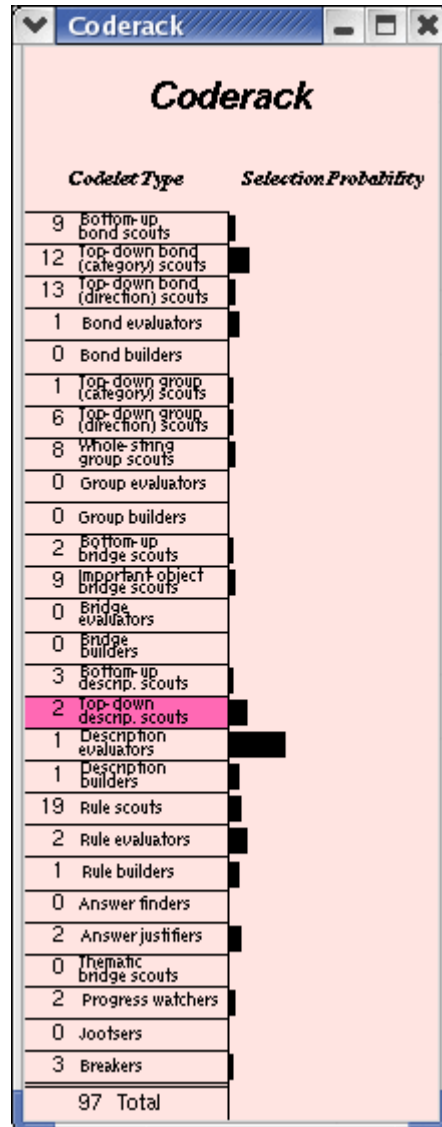
Workspace



Slipnet and Computational Temperature



Coderack



The screenshot shows a window titled "Coderack" containing a table of codelets. The table has two columns: "Codelet Type" and "Selection Probability". The codelets are listed with their counts and corresponding probability bars. The "Top-down descrip. scouts" codelet is highlighted in pink.

Codelet Type	Selection Probability
9 Bottom-up bond scouts	
12 Top-down bond (category) scouts	
13 Top-down bond (direction) scouts	
1 Bond evaluators	
0 Bond builders	
1 Top-down group (category) scouts	
6 Top-down group (direction) scouts	
8 Whole string group scouts	
0 Group evaluators	
0 Group builders	
2 Bottom-up bridge scouts	
9 Important object bridge scouts	
0 Bridge evaluators	
0 Bridge builders	
3 Bottom-up descrip. scouts	
2 Top-down descrip. scouts	
1 Description evaluators	
1 Description builders	
19 Rule scouts	
2 Rule evaluators	
1 Rule builders	
0 Answer finders	
2 Answer justifiers	
0 Thematic bridge scouts	
2 Progress watchers	
0 Jootsers	
3 Breakers	
97 Total	

- Holds the “codelets”
 - The ants
 - Small pieces of code that run on specific structures in the workspace