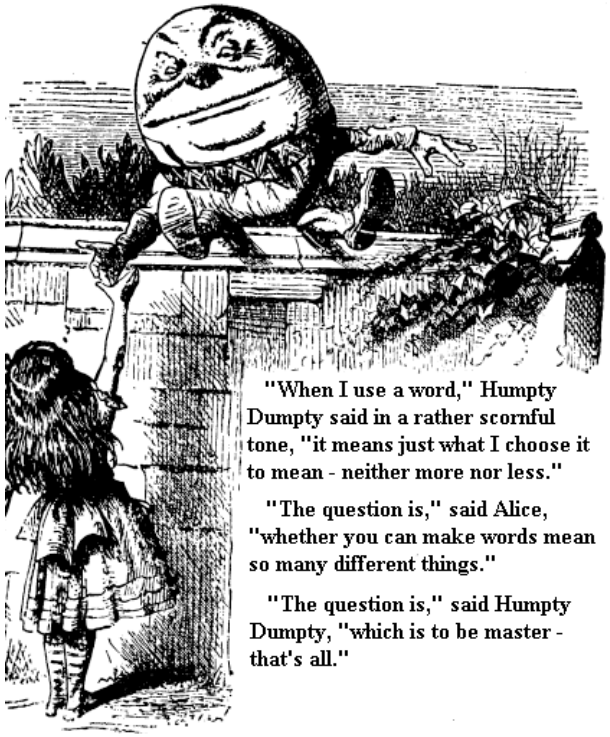
wot I done in AI

Alan Dix

note ...

- using ‘intelligent’ to include
  - traditional artificial intelligence
  - statistical methods
  - information retrieval techniques
  - neural nets
  - genetic algorithms
  - simple heuristics

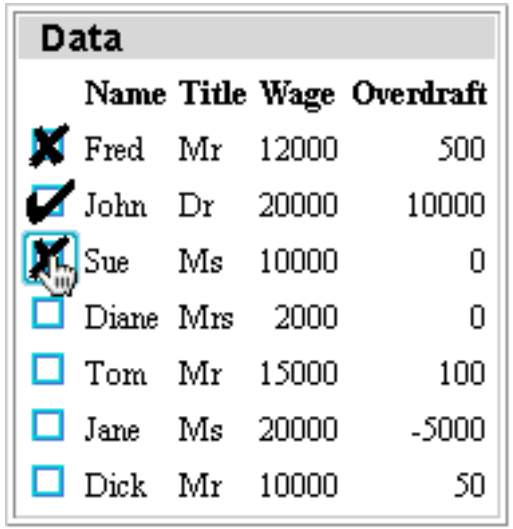


'intelligent' things …

- submarine design
  - use genetic algorithms to solve constraints
- database interface: Query-by-Browsing
  - use decision trees to infer queries
- intelligent web interfaces
  - simple pattern matching + blackboard + appropriate interaction
- typing error analysis (for dyslexia)
  - iterative deepening search (variant of depth first) to find most likely errors

Query by Browsing

- user chooses records of interest
  - ✓ tick for those wanted
  - ✗ cross for those not wanted
- system infers query
  - web version uses rule induction
  - variant of Quinlan's ID3



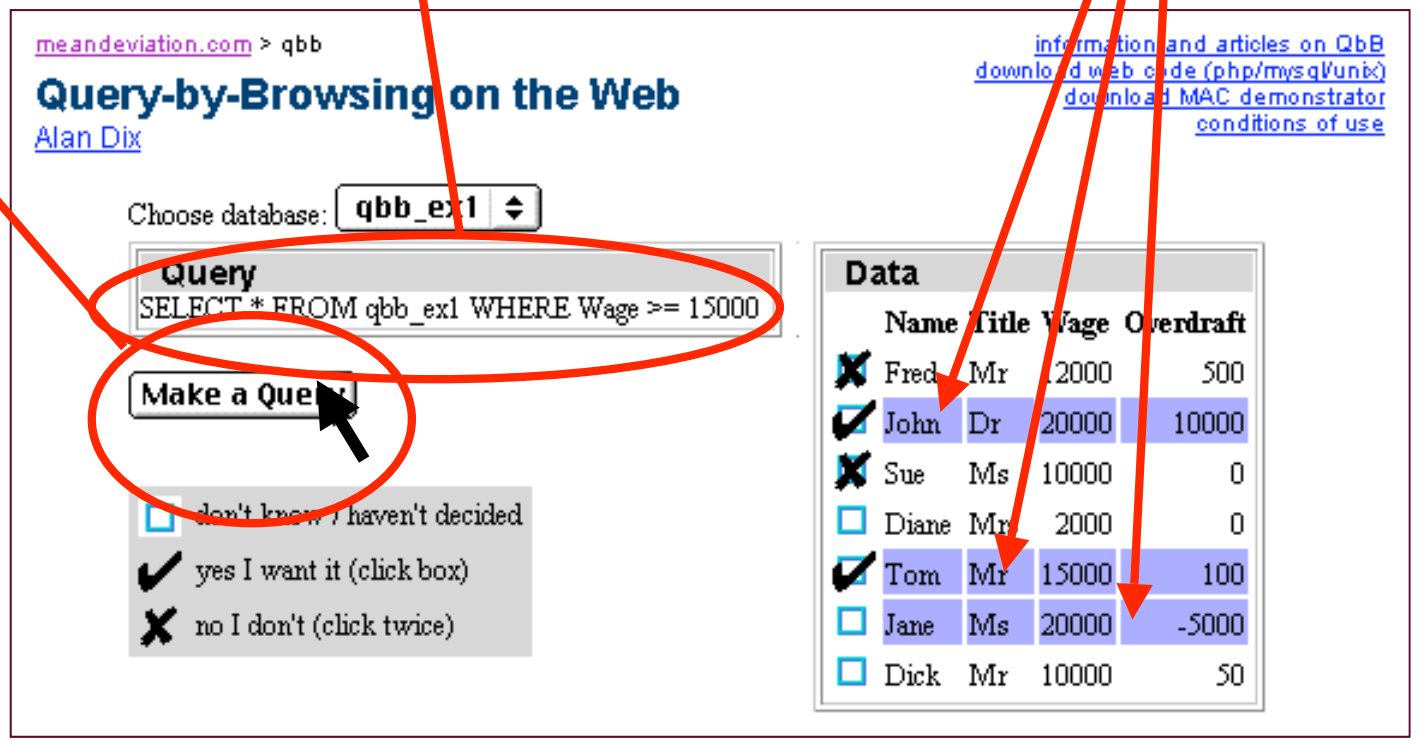
www.meandeviation.com/qbb

Query by Browsing
what it looks like

user asks system to make a query

system infers SQL query

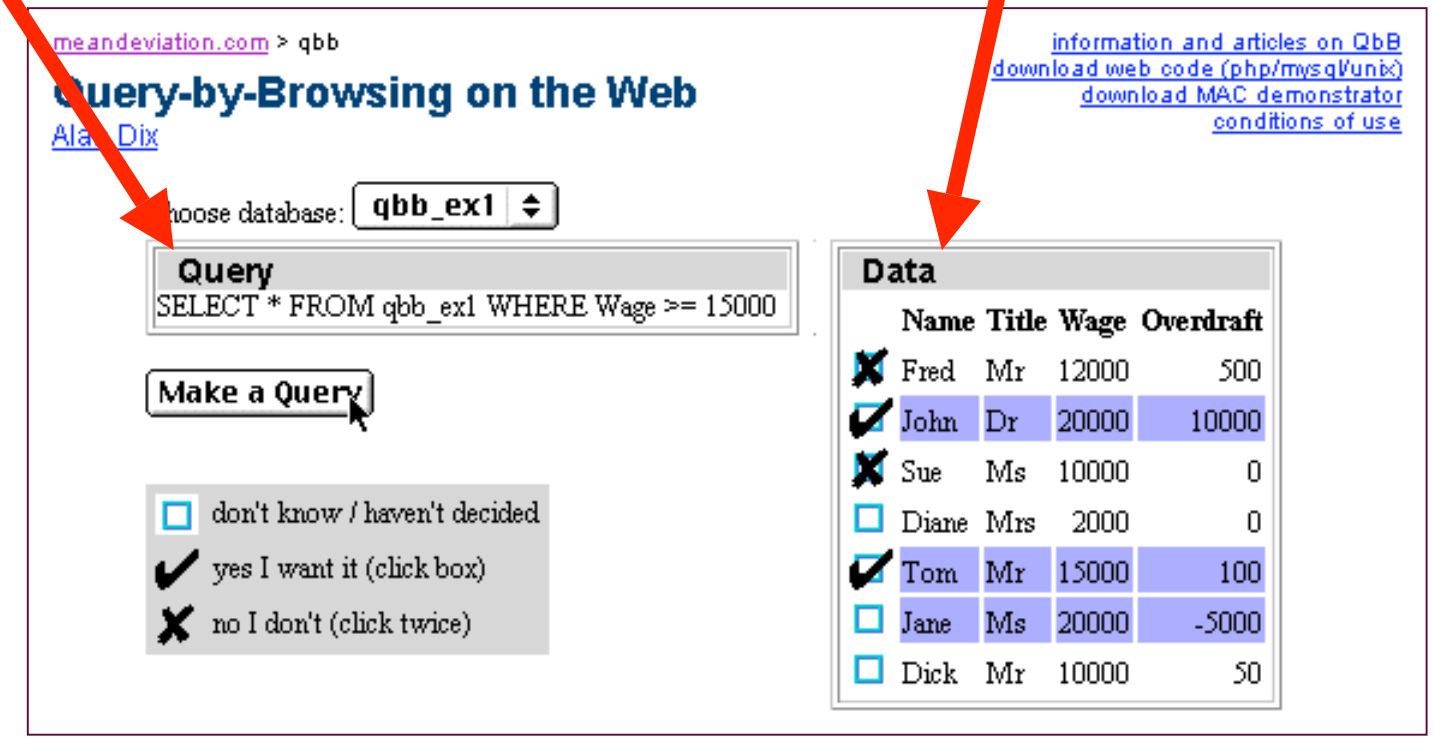
query results highlighted



Query by Browsing
dual representation

query (intensional)
for precision

listing (extensional)
for understanding



Query by Browsing
how it works

examples

Data

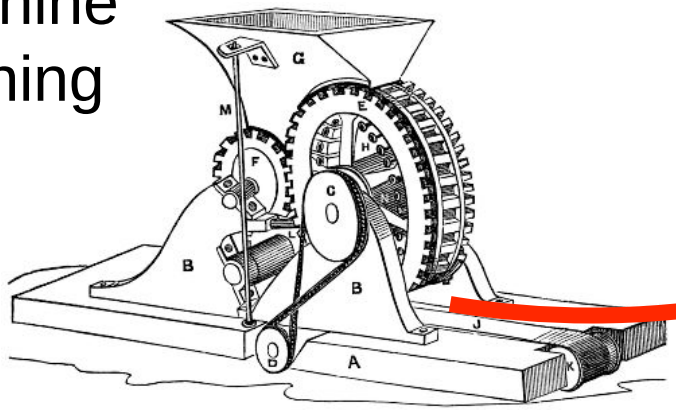
	Name	Title	Wage	Overdraft
✗	Fred	Mr	12000	500
✓	John	Dr	20000	10000
✗	Sue	Ms	10000	0
☐	Diane	Mrs	2000	0
✓	Tom	Mr	15000	100
☐	Jane	Ms	20000	-5000
☐	Dick	Mr	10000	50

SQL query

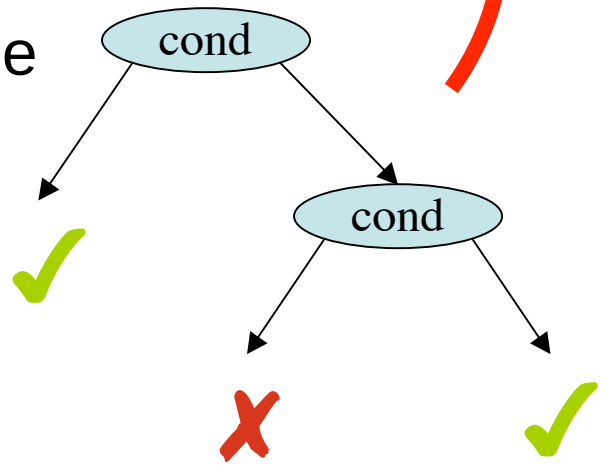
Query

```
SELECT * FROM qbb_ex1 WHERE Wage >= 15000
```

machine learning

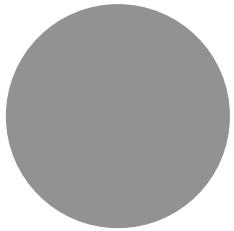


decision tree



Query by Browsing keywords

- knowledge representation
  - uniform attribute–value data
    simple values (numbers, strings)
- rule representation
  - decision tree
- algorithm
  - variant of ID3 - inductive learning



intelligent user interfaces

- have had a bad history!
- why?
  - often focused on clever techniques
  - forget wider interaction

e.g. intelligent menus:

- monitor command use
- reorder so most frequent on top ☺
- but order keeps changing ☹

appropriate intelligence

- often simple heuristics
- combined with the right interaction

rules of standard AI interfaces

1. it should be right as often as possible

2. when it is right it should be good

good for demos
look how clever it is!

rules of appropriate intelligence

1. it should be right as often as possible

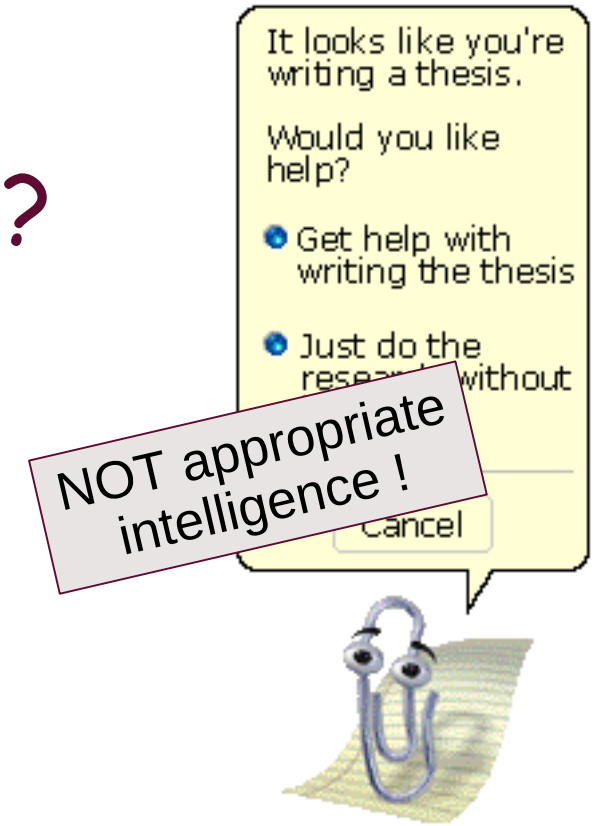
2. when it is right it should be good

3. when it isn't right …
   it shouldn't mess you up

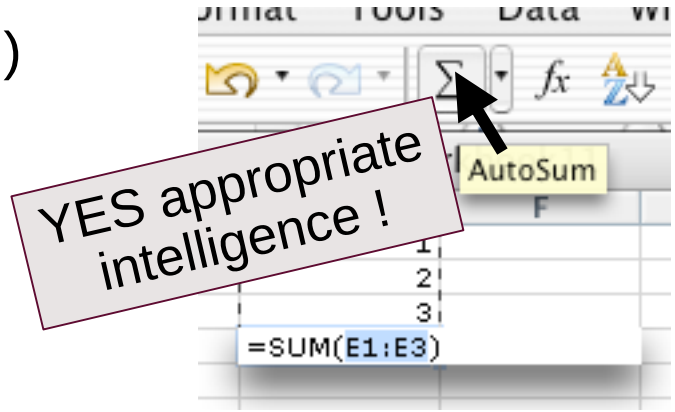
} what makes a system really work!

Hit or a Miss?

✘ paper clip
- can be good when it works
- but interrupts you if it is wrong



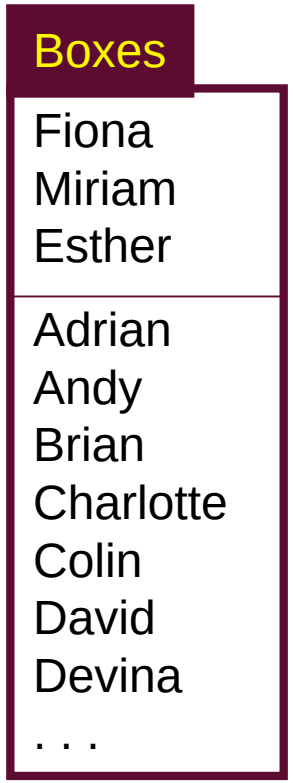
✓ Excel '∑' button
- guesses range to add up
- very simple rules (contiguous numbers above/to left)
- if it is wrong … simply select what you would have anyway



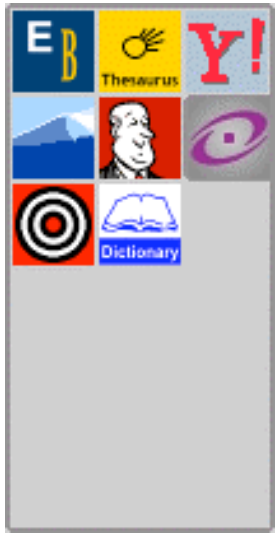
… for menus

- small number of most popular at top
  quick when it gets it right

- alphabetic below
  still easy to scan when it isn't



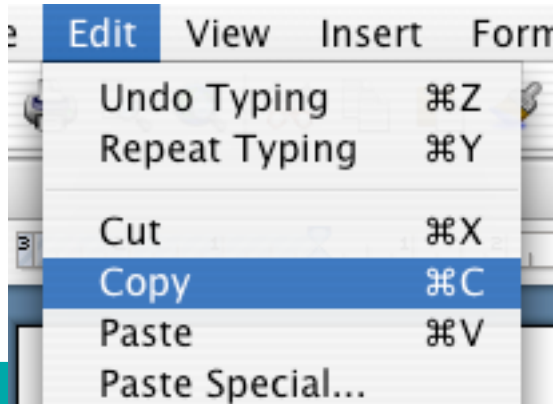
designing appropriate intelligence
onCue



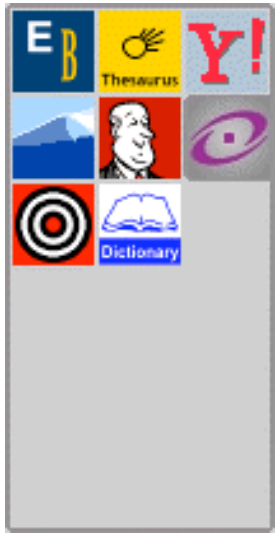
- intelligent toolbar
- sits at side of the screen
- watches clipboard for cut/copy
- suggests useful things to do with copied date

onCue in action

user selects text



and copies it to clipboard



slowly icons fade in

```
      20        21
      25        24
       7         7          3         7

the dancing histograms very useful a
ing out some of the textile sites yo
x's page at http://www.hiraeth.com/
```

onCue appropriate?

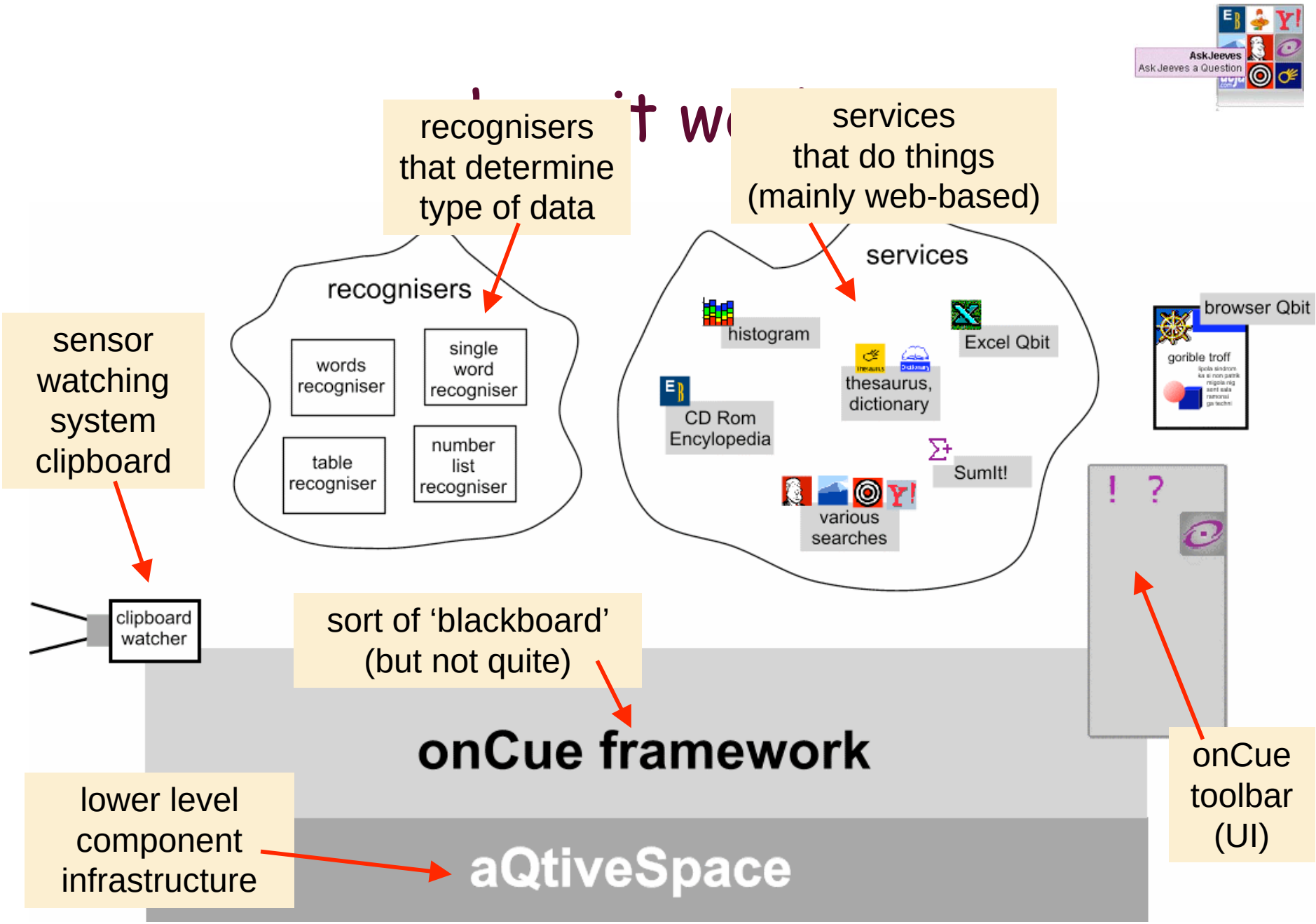
1. it should be right as often as possible
   - uses simple heuristics:
     e.g. words with capitals = name/title

2. when it is right it should be good
   - suggests useful web/desktop resources

3. when it isn't right it shouldn't mess you up
   - slow fade-in means doesn't interrupt

kinds of data

short text	–	search engines
single word	–	thesaurus, spell check
names	–	directory services
post codes	–	maps, local info
numbers	–	SumIt! (add them up)
custom	–	order #, cust ref …
tables	–	…

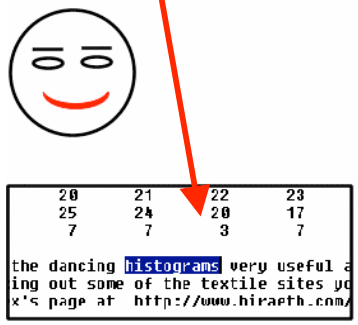

recognisers
that determine
type of data
services
that do things
(mainly web-based)
sensor
watching
system
clipboard
recognisers
words
recogniser
single
word
recogniser
table
recogniser
number
list
recogniser
services
histogram
Excel Qbit
thesaurus,
dictionary
CD Rom
Encyclopedia
SumIt!
various
searches
browser Qbit
gorible troff
clipboard
watcher
sort of ‘blackboard’
(but not quite)
onCue framework
lower level
component
infrastructure
aQtiveSpace
onCue
toolbar
(UI)

how it works

1. user copies text

2. clipboard watcher puts text on ‘blackboard’

3. recognisers that deal with raw text fire



clipboard watcher

text: "histograms"

recognisers

words recogniser

single word recogniser

table recogniser

number list recogniser

services

histogram

Excel Qbit

thesaurus, dictionary

CD Rom Encylopedia

SumIt!

various searches

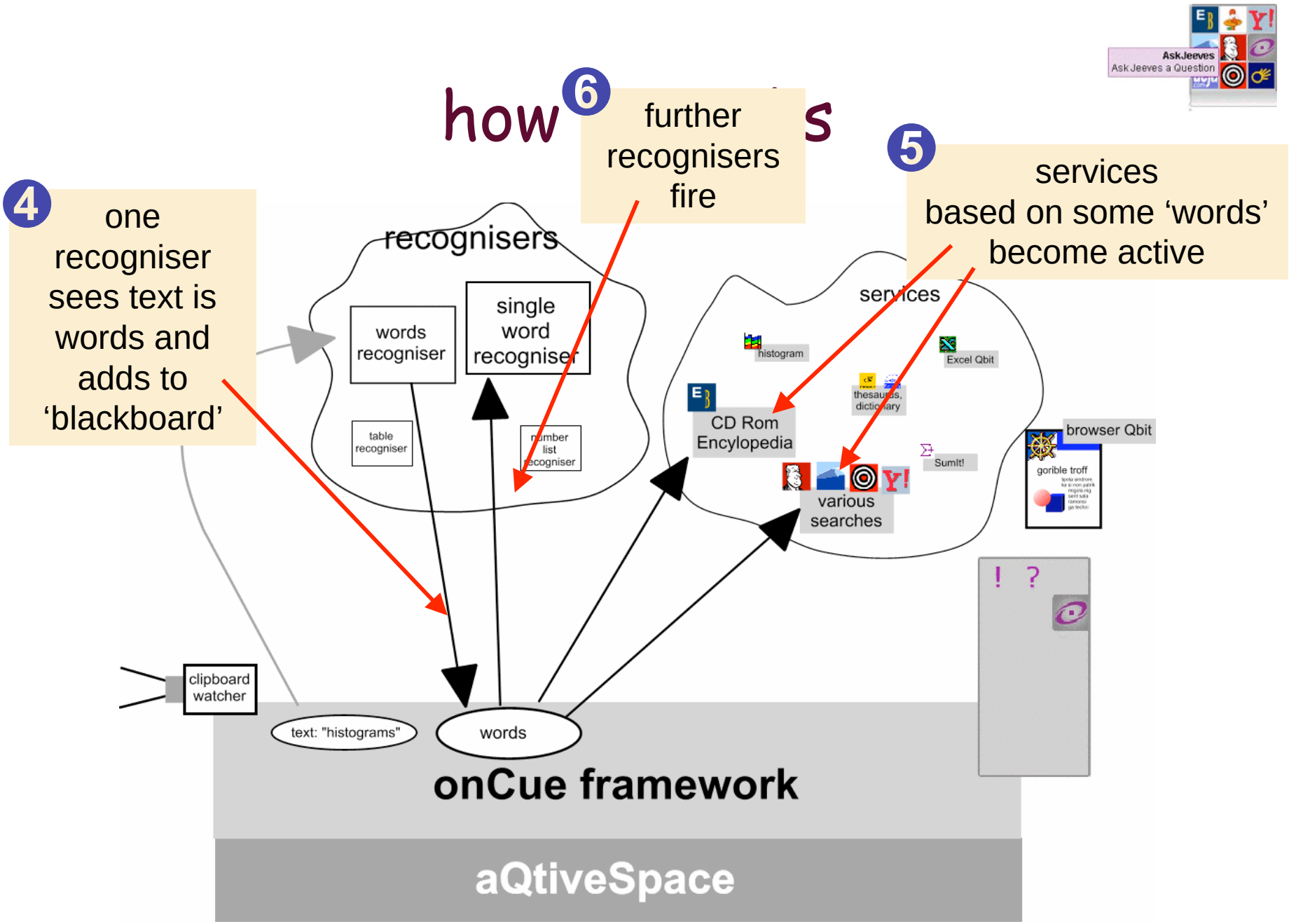
browser Qbit

gorible troff

! ?

onCue framework

aQtiveSpace

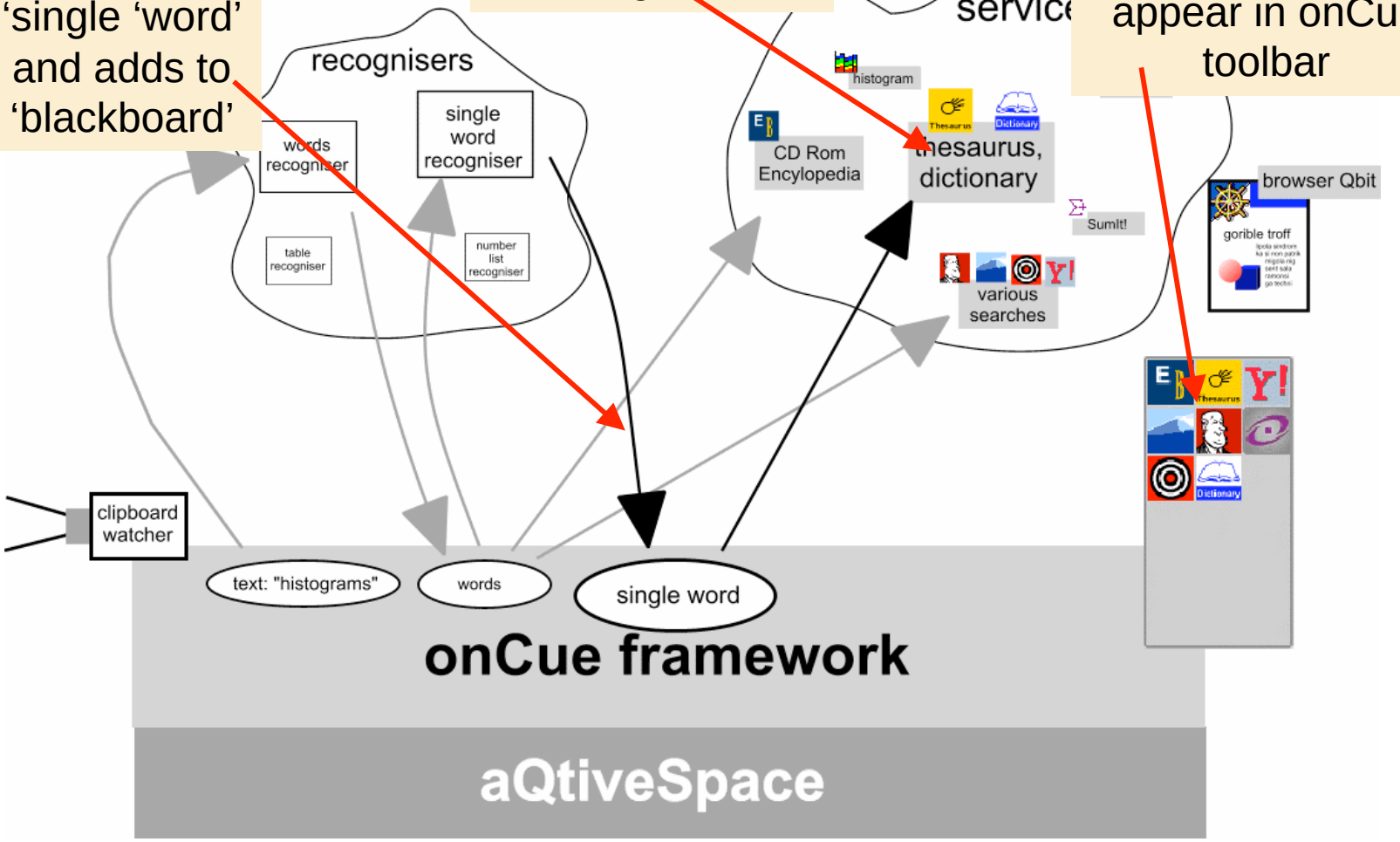

how
6
further recognisers fire
5
services based on some ‘words’ become active
4
one recogniser sees text is words and adds to ‘blackboard’
recognisers
words recogniser
single word recogniser
table recogniser
number list recogniser
services
histogram
Excel Qbit
thesaurus, dictionary
CD Rom Encylopedia
SumIt!
browser Qbit
gorible troff
various searches
AskJeeves
Ask Jeeves a Question
clipboard watcher
text: "histograms"
words
onCue framework
aQtiveSpace

how it works

7 recogniser sees it is ‘single ‘word’ and adds to ‘blackboard’

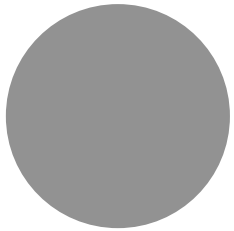
8 more services activate for ‘single word’

9 active services appear in onCue toolbar



onCue
keywords

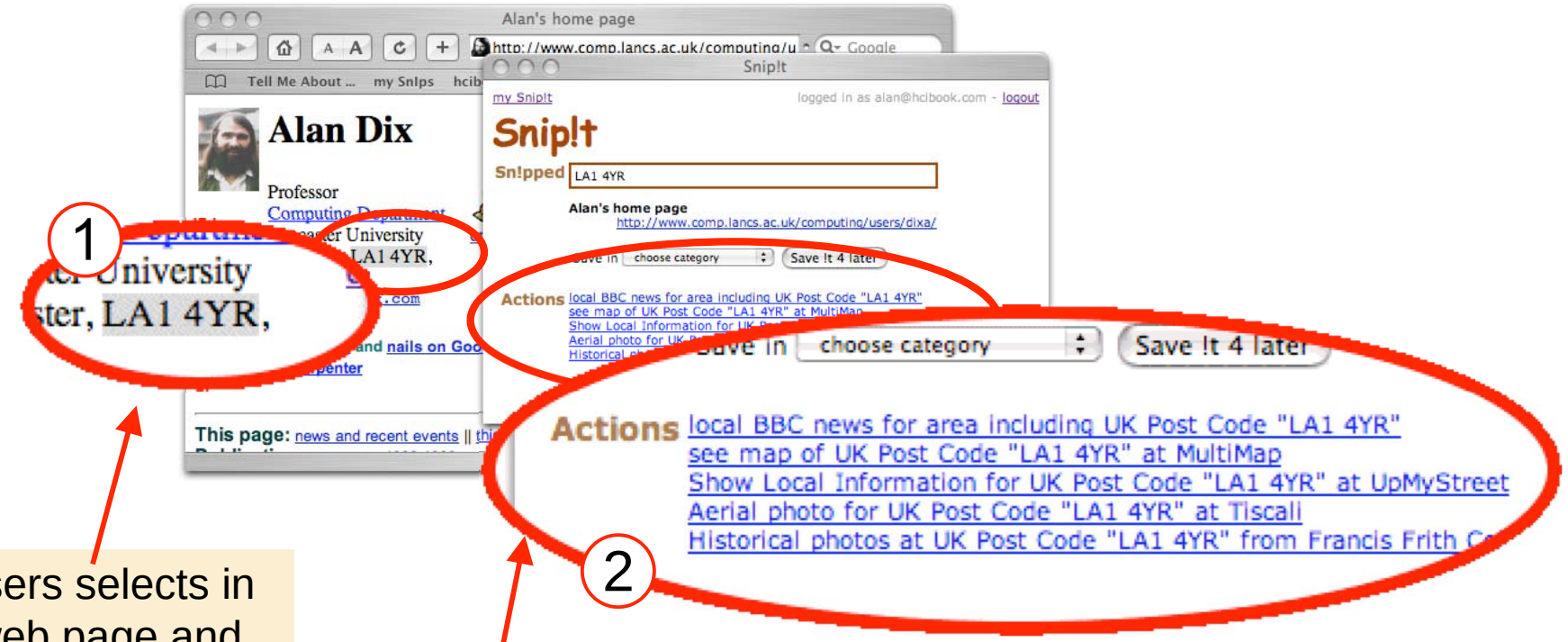
- knowledge representation
  - hetrogeneous attribute-value / frame
- rule representation
  - regular expressions
    sort of production rule
    hand-crafted heuristics
- algorithm
  - multi-agent blackboard, emergent behaviour
    pattern matching – text mining



Snip!t

web version of onCue

Snip!t

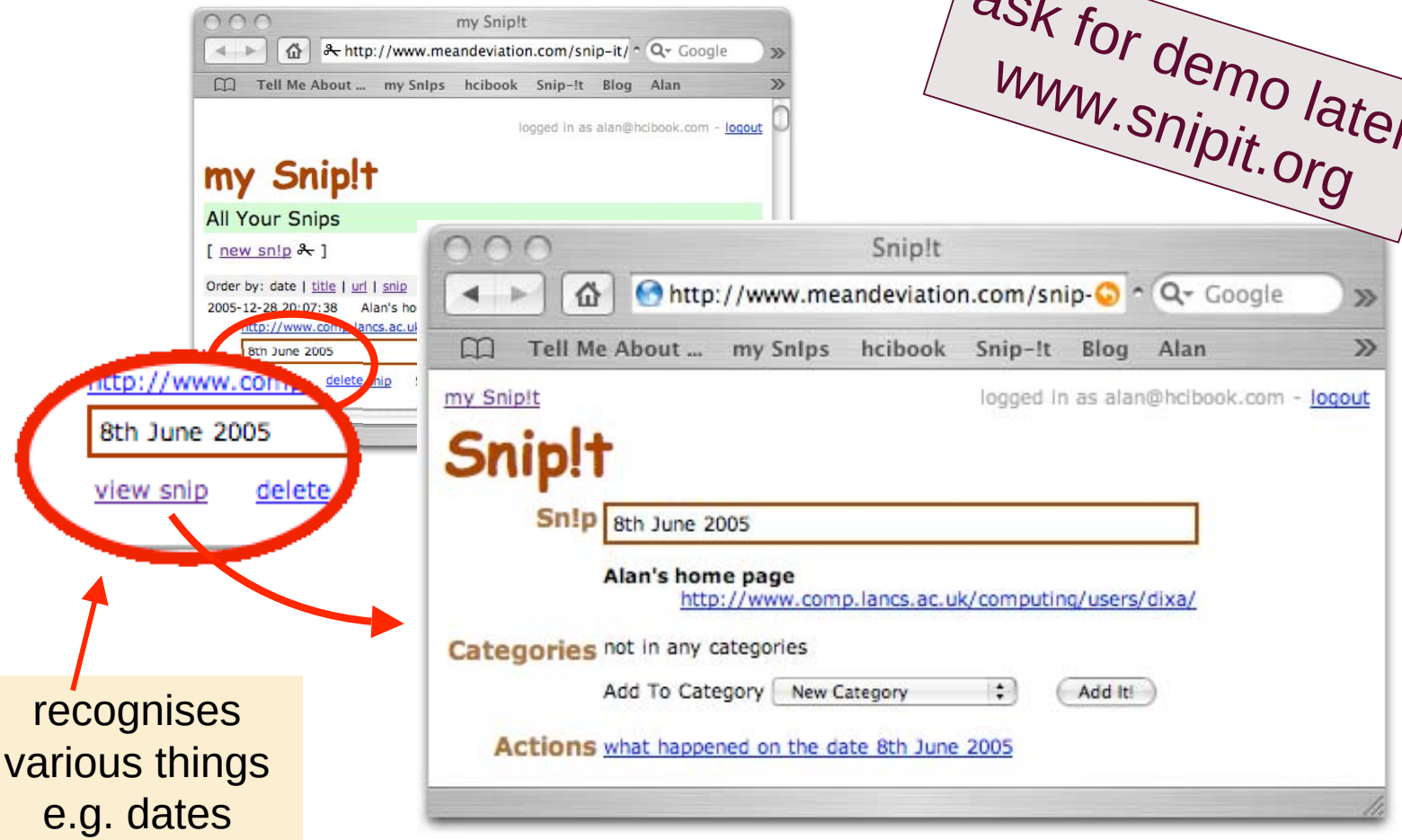


users selects in web page and presses “Snip!t” bookmarklet

Snip!t pops up page with suggested things to do with the snip (and saves it for later, like bookmark)

Snip!t

ask for demo later
www.snipit.org



recognises various things e.g. dates

bringing it together

Kinds of recogniser:

syntactic	–	regular expression / patterns / structure e.g. post code, email address
lexicon	–	large look up tables e.g. countries, internet TLD
hybrid	–	popular first names => full name
+context	–	telephone number … what country??

architecture

representation vs. semantics very important

- server-side ‘intelligence’
- recognisers + services again
- different kinds of recogniser chaining:
  - from semantics to wider representation
    e.g. postcode suggests look for address
  - from semantic to semantic
    e.g. domain name in URL
  - from semantic to inner representation
    e.g. from Amazon author URL to author name

provenance

when you have a recognised term:

- where did it come from
  - text char pos 53-67
  - transformed from Amazon book URL
- how confident are you
  - 99% certain Abraham Lincoln is a person
- how important
  - mother-in-law's birthday