The AMODEUS Project
ESPRIT Basic Research Action 7040

Structuring Displays:
exercise companion

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UM/WP32

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Exercise Set 1

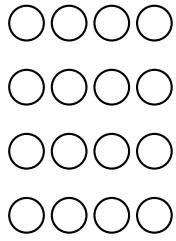
1 Draw structure diagrams for these sets of objects – start each with a group called ‘set’ at the top level of the structure and use up to four levels.

2 Describe the visual attribute that ‘causes’ each group.

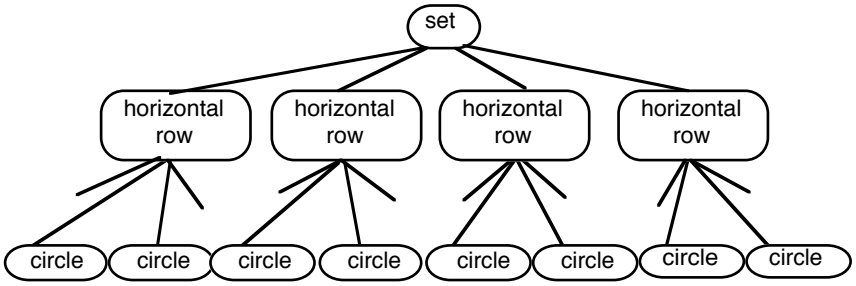
These figures are intended to show that although there may be several possible ways of structuring the groups, there is usually one 'perceptually obvious' way. Here we only include the structure of this obvious grouping. The less obvious structures are not 'wrong', but they require effort to impose upon the groups.

Note also that we have not always included every single circle and square in the figures - just enough to make it clear what ought to be represented.

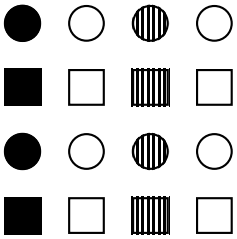
The precise terms that are shown in the diagrams are not important - we have shown each as starting with 'set', but the words themselves are not crucial. Group, Array, or Pattern would all serve just as well, and there are undoubtedly many other synonyms. These are just 'labels': what is being described is more important. In some cases we have drawn the objects themselves rather than use words.



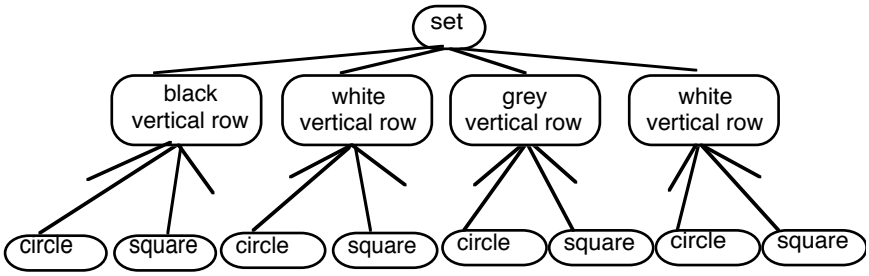
(1)



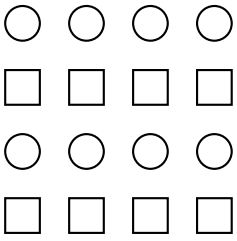
Here the attribute that is 'causing' the circles to be grouped into rows is **proximity.**



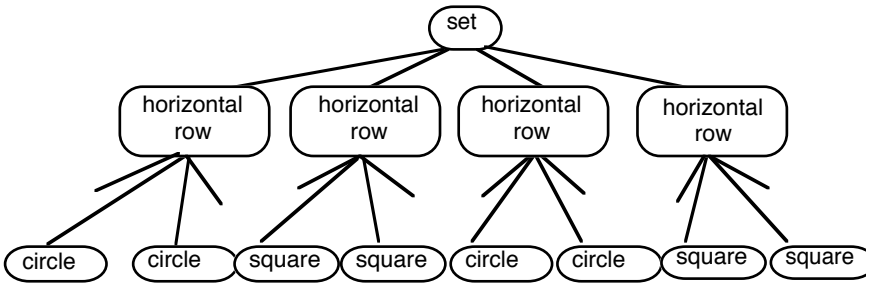
(2)



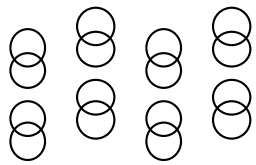
In this and the next figure, the similarity of the shapes in each row suggests that the second level of the structure could be rows – but in this figure the **colour** of the columns predominates.



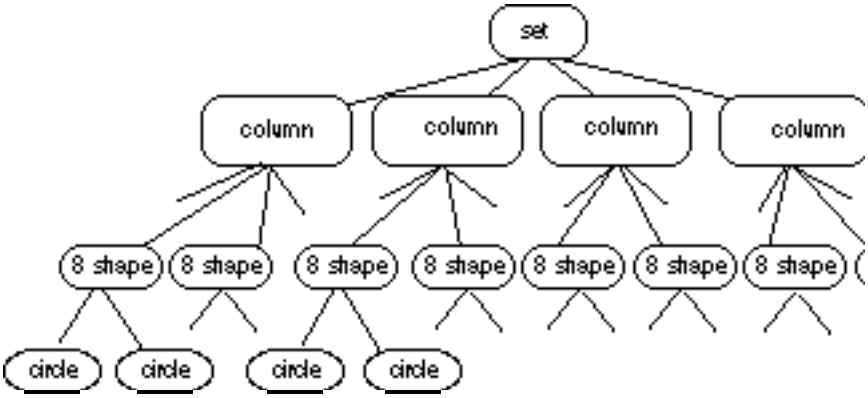
(3)



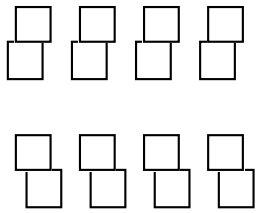
When the colour is removed from (2), the similarity of **shape** dominates the structure, and the rows become the second level of structure.



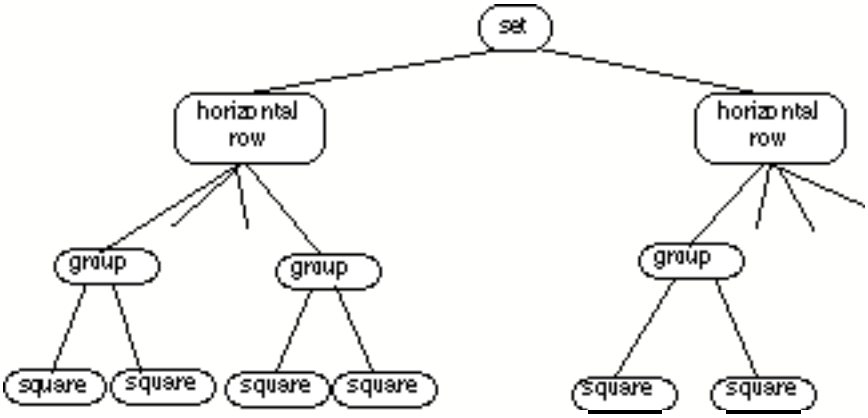
(4)



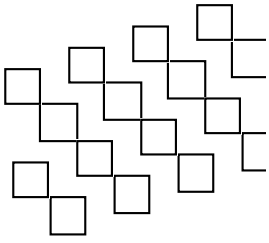
This figure has circles grouped by **collocation** into 'figures of eight' or '8 shapes', but the grouping of these shapes is ambiguous. You might represent them as columns, wavy horizontal rows, or even groups of four (in a rhombus). There is some structure there though, so the diagram should have four levels.



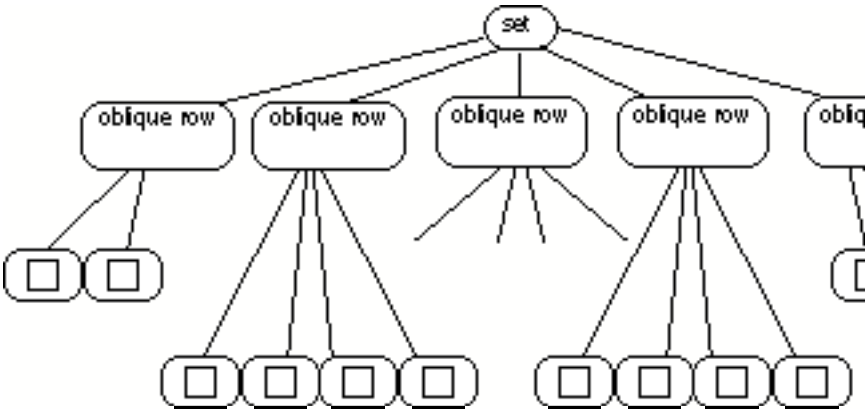
(5)



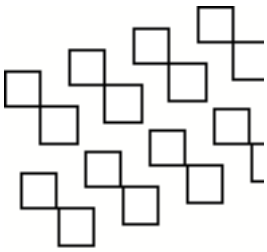
Here the squares are joined at their **boundary** into groups, and these groups then form rows due to their **proximity** to each other. Note that if the slight horizontal offset of each square were not present, the eight groups would look like rectangles with a line across the middle, not two squares.



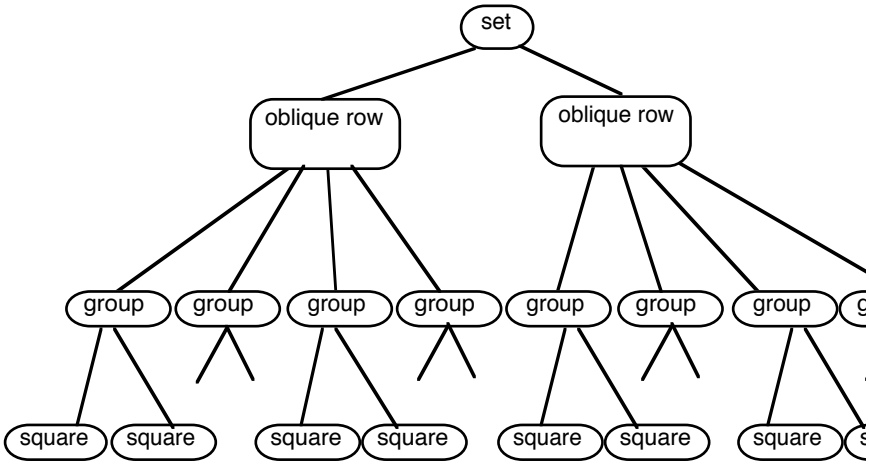
(6)



Now the **junction** of the squares links them into five oblique or diagonal rows, although some rows have two and some four elements. The presence of the 'pairs' at each end might lead you to see the centre three rows as also being composed of two pairs, adding another level of structure to the diagram.



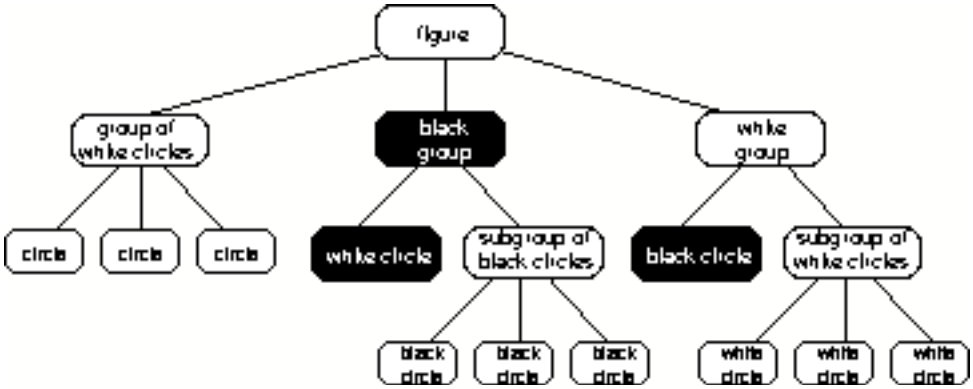
(7)



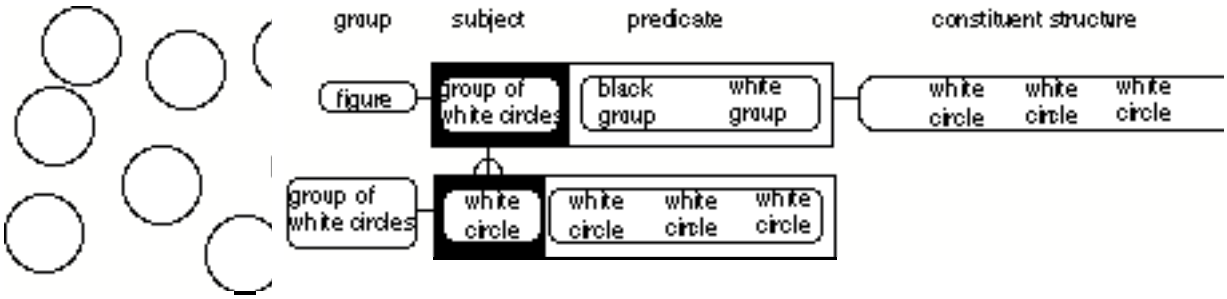
This figure is exactly the same as (6), except that a slight gap has been introduced into the middle of the three central rows. Instead of just breaking the structure up into eight pairs, two new diagonal rows emerge (**proximity).** This figure shows that there are often several different grouping principles competing to provide organisation, and that when one is weakened, another may take over.

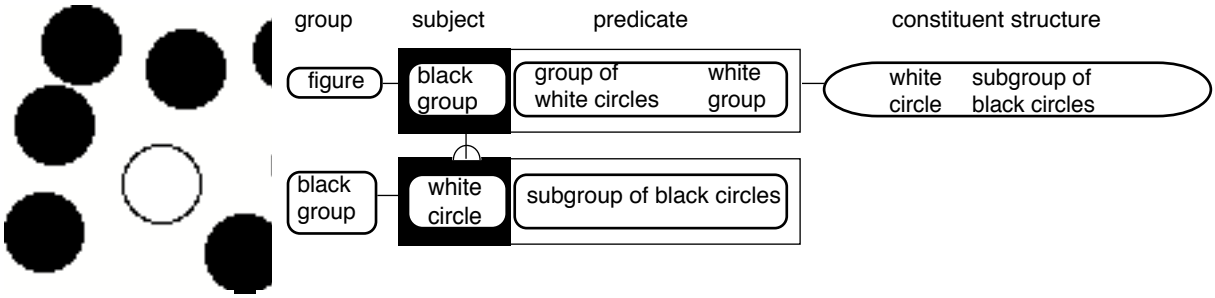
Exercise Set 2

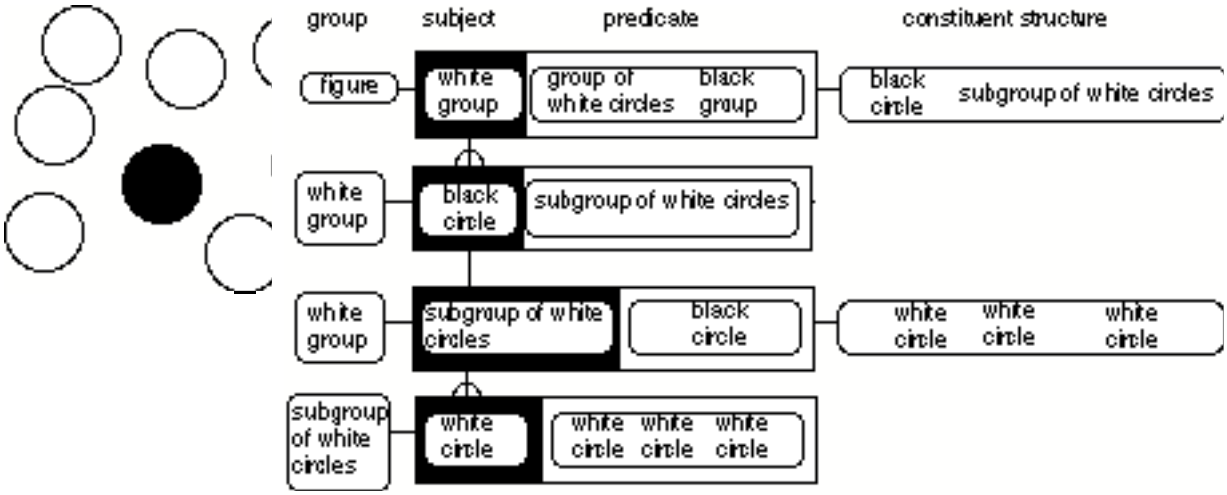
1. Draw transition path diagrams for Figure 14, showing the transitions that are needed to look at a white circle in each subgroup (you can base them on the structure diagrams from Figure 15).



This exercise shows how the transition path diagrams represent the more complex search in the right hand group. The presence of the black circle makes it harder to 'zoom-in' to the substructure of the white group distractor.

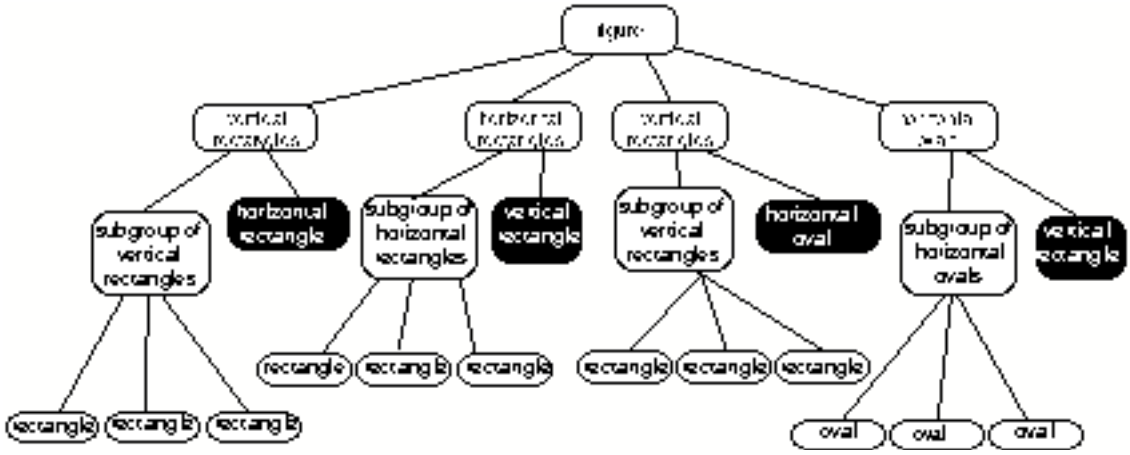

group
subject
predicate
constituent structure
figure
group of white circles
black group
white group
white circle
white circle
white circle
white circle
group of white circles
white circle
white circle
white circle
white circle


group
subject
predicate
constituent structure
figure
black group
group of white circles
white group
white circle
subgroup of black circles
black group
white circle
subgroup of black circles


group
subject
predicate
constituent structure
figure
white group
group of white circles
black group
black circle
subgroup of white circles
white group
black circle
subgroup of white circles
white group
subgroup of white circles
black circle
white circle
white circle
white circle
subgroup of white circles
white circle
white circle
white circle
white circle

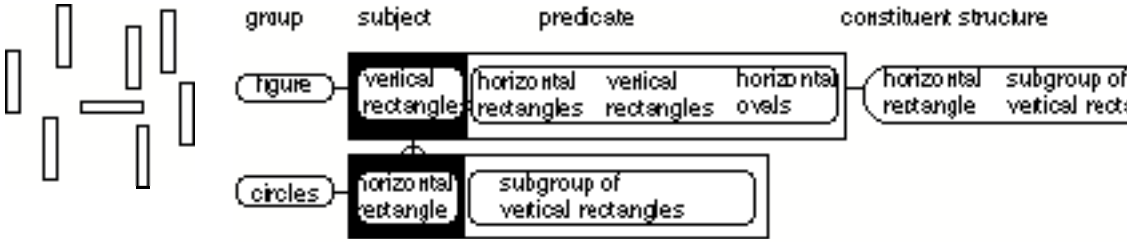
Exercise Set 2

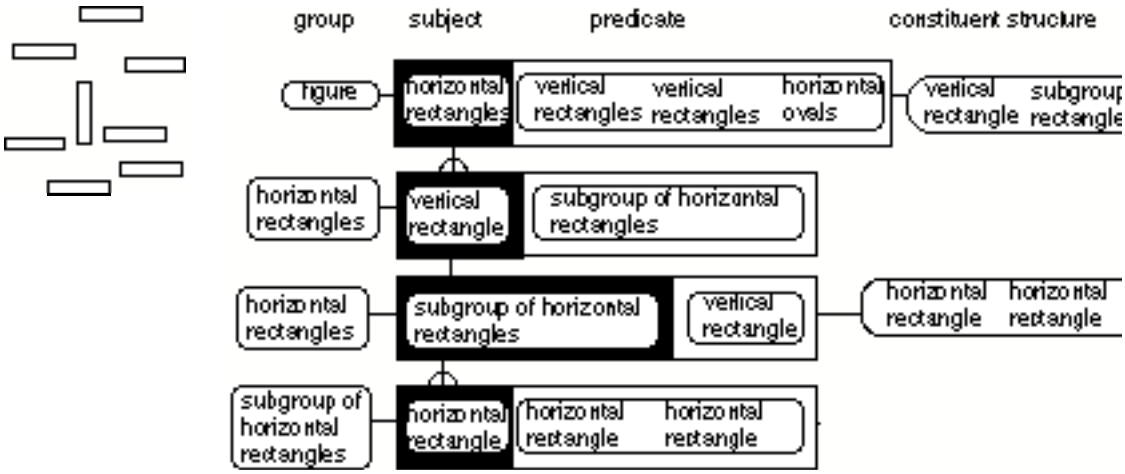
2. Draw a structure diagram for Figure 16, indicating which object forms the pragmatic subject of each group.

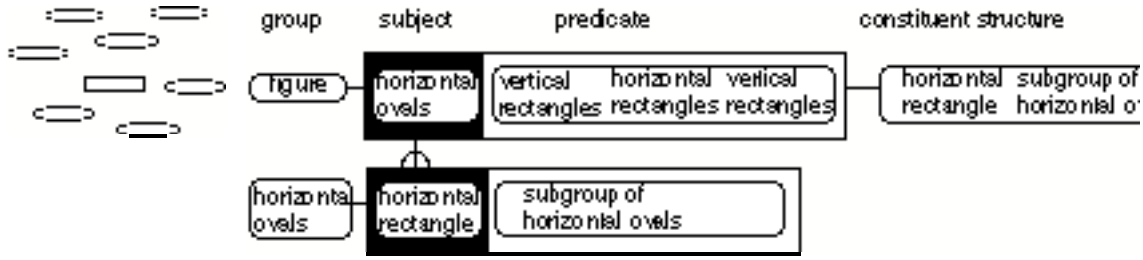


Exercise Set 2

3. Using this structure diagram, make transition path diagrams to show how a 'horizontal oblong' would be located in the first, second and fourth group (there isn't a horizontal oblong in the third group!)

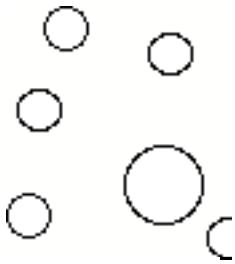


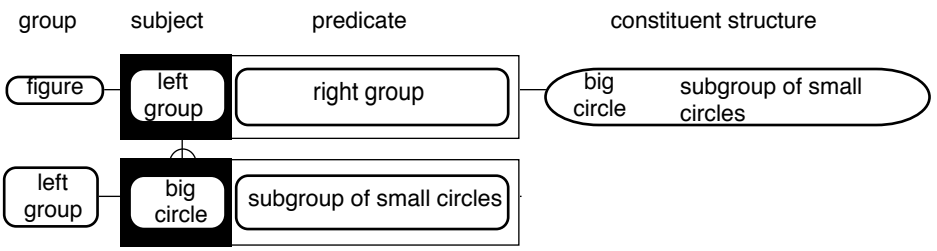


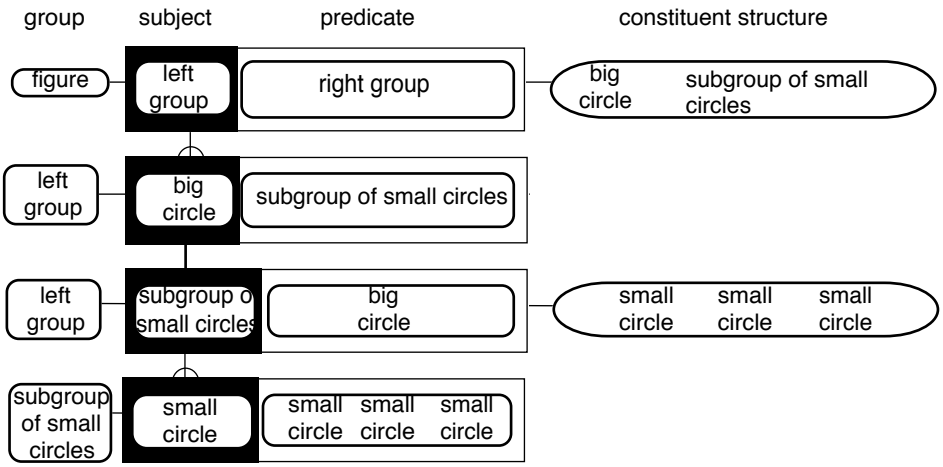


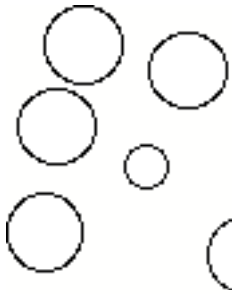
Exercise Set 3

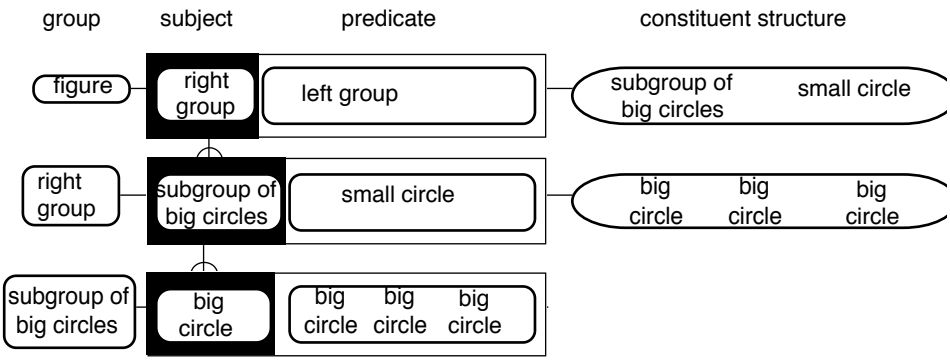
1. Draw transition path diagrams for the location of a big circle and a small circle in each part of Figure 17.

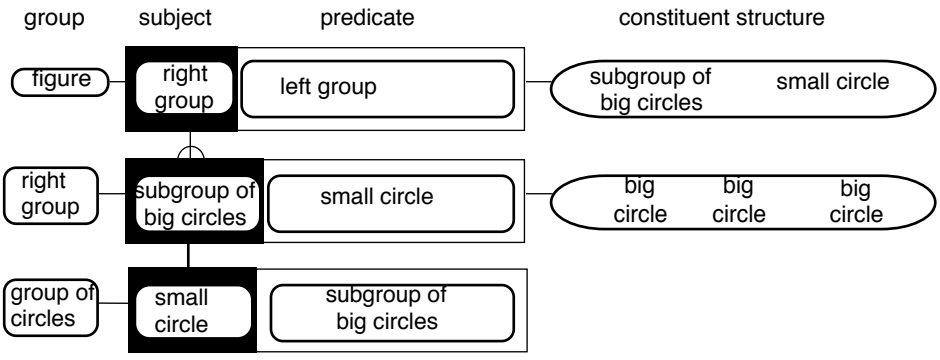






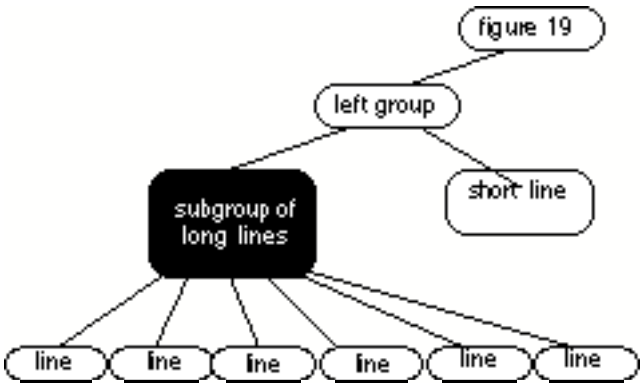


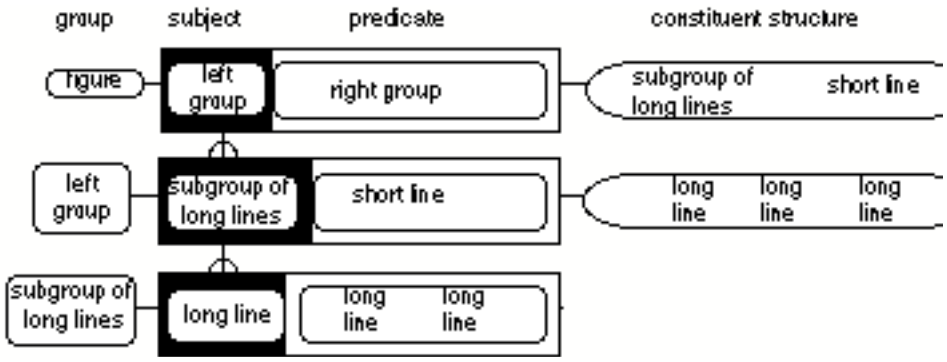


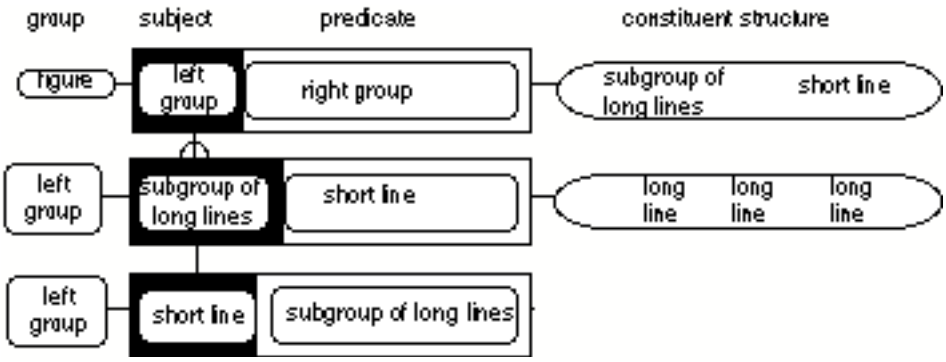


Exercise Set 3

2. Draw structure diagrams for both parts of Figure 19, and transition path diagrams for the location of a small and a large line in each part.







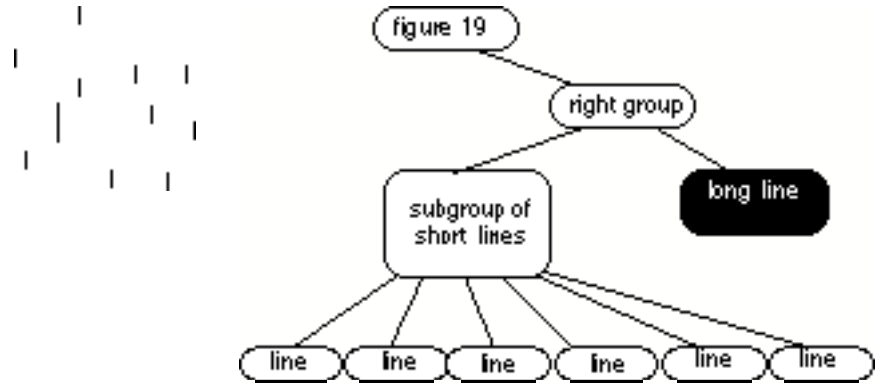
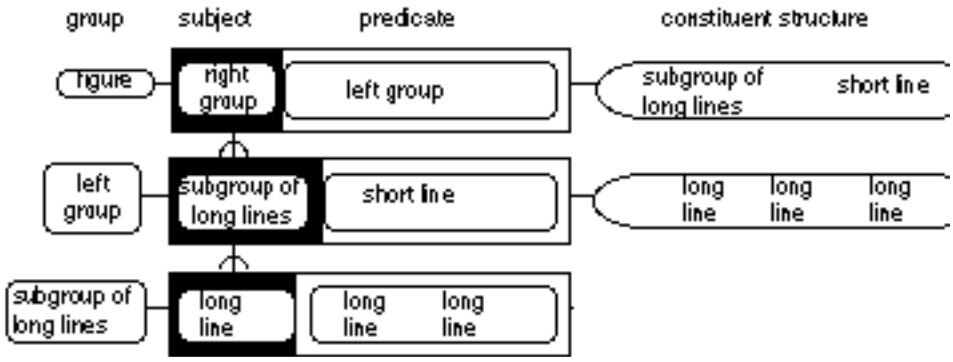
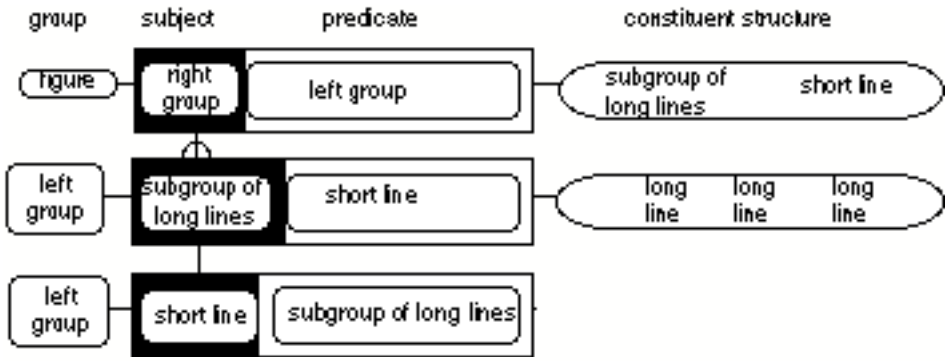


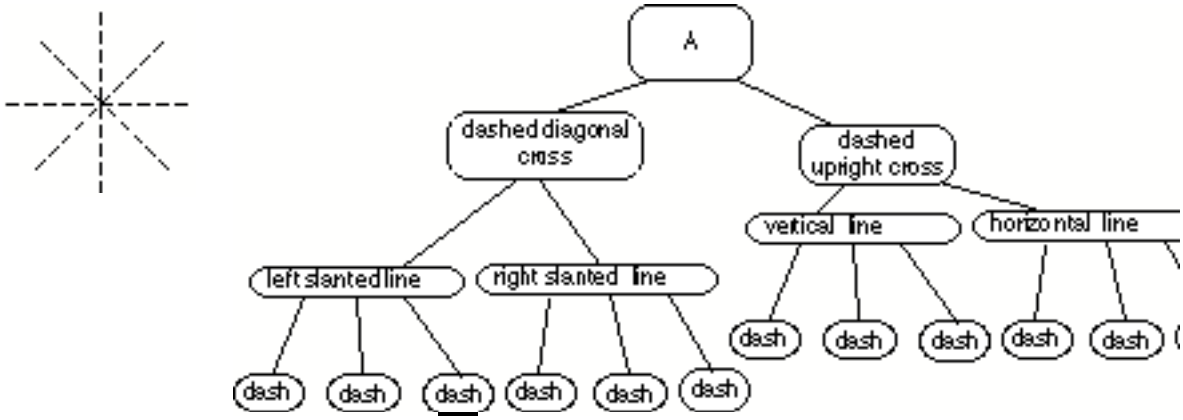
figure 19
right group
subgroup of short lines
long line
line
line
line
line
line
line

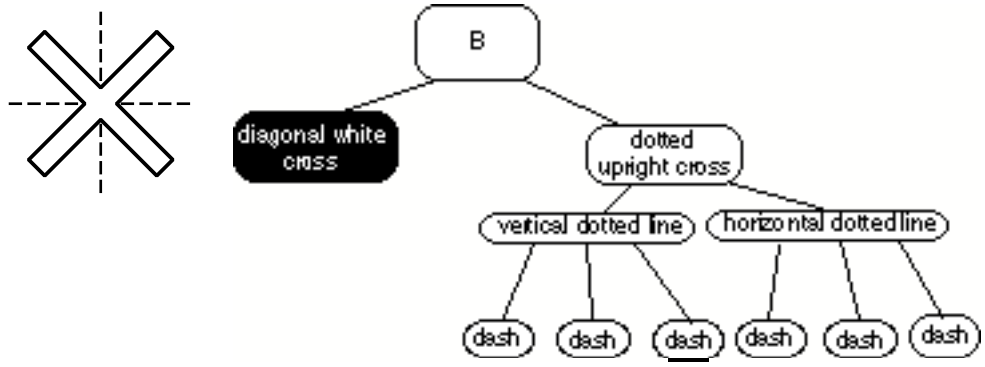

group
subject
predicate
constituent structure
figure
right group
left group
subgroup of long lines
short line
left group
subgroup of long lines
short line
long line
long line
long line
subgroup of long lines
long line
long line
long line

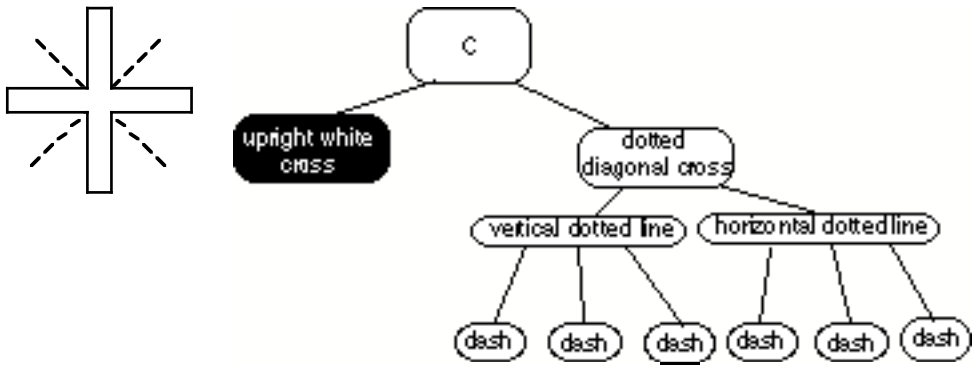

group
subject
predicate
constituent structure
figure
right group
left group
subgroup of long lines
short line
left group
subgroup of long lines
short line
long line
long line
long line
left group
short line
subgroup of long lines

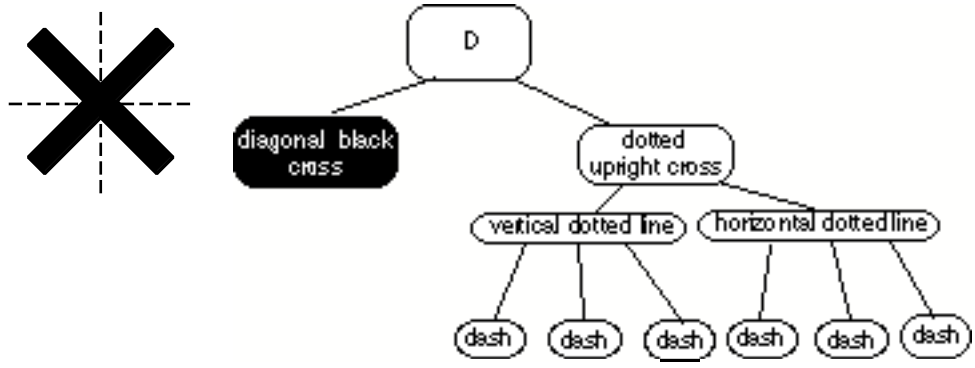
Exercise Set 3

3. Draw structure diagrams for each of the icons in Figure 21.


A
dashed diagonal cross
dashed upright cross
vertical line
horizontal line
left slanted line
right slanted line
dash
dash
dash
dash
dash
dash
dash
dash
dash
dash
dash


B
diagonal white cross
dotted upright cross
vertical dotted line
horizontal dotted line
dash
dash
dash
dash
dash
dash

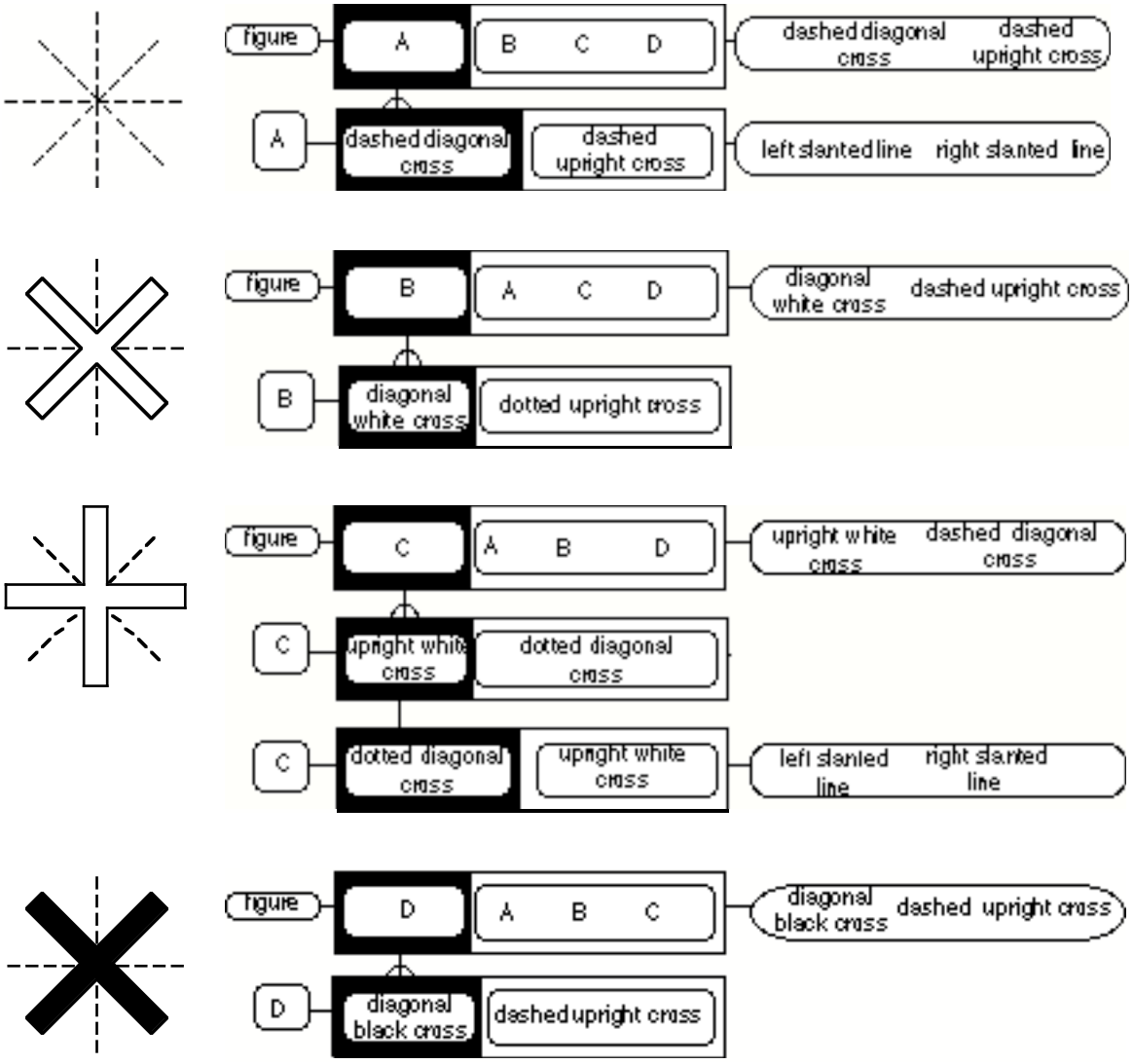

C
upright white cross
dotted diagonal cross
vertical dotted line
horizontal dotted line
dash
dash
dash
dash
dash
dash


D
diagonal black cross
dotted upright cross
vertical dotted line
horizontal dotted line
dash
dash
dash
dash
dash
dash

Exercise Set 3

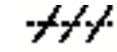
4. Draw transition path diagrams for Figure 21, showing the transitions necessary to attend to the diagonal crosses of each icon. Which cross is hardest to attend to?

Of these icons, A, B and D all have only one transition represented to make the diagonal cross the subject, while in C the upright cross is the pragmatic subject, and so an additional transition is required. This means that the diagonal cross in C is the hardest to attend to.



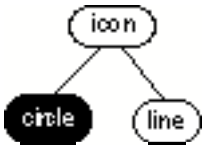
Exercise Set 4

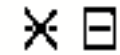
1. Draw structure diagrams for each of these abstract icons (ignore the words):



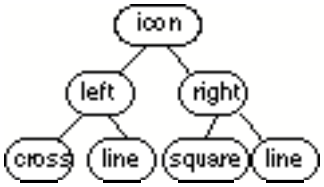
delete line

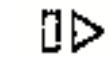
word search



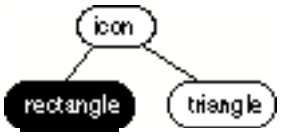


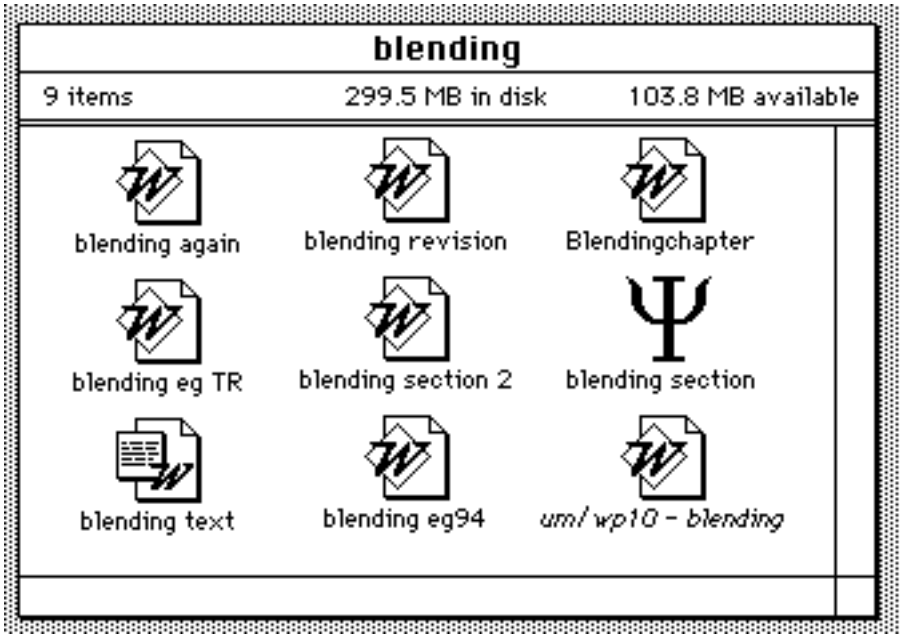
replace word





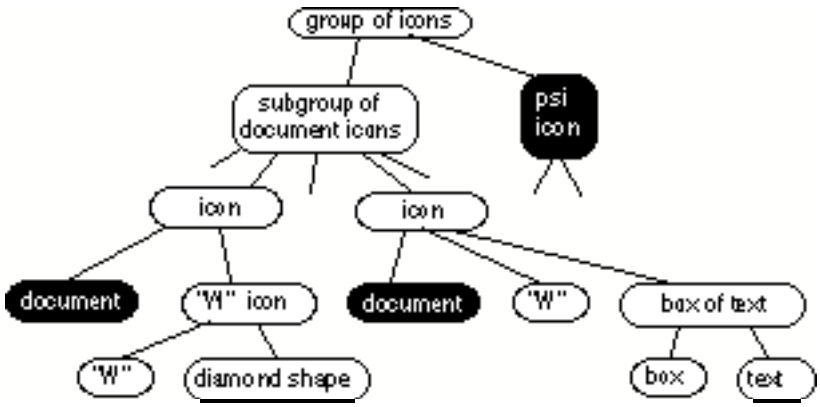
scroll right





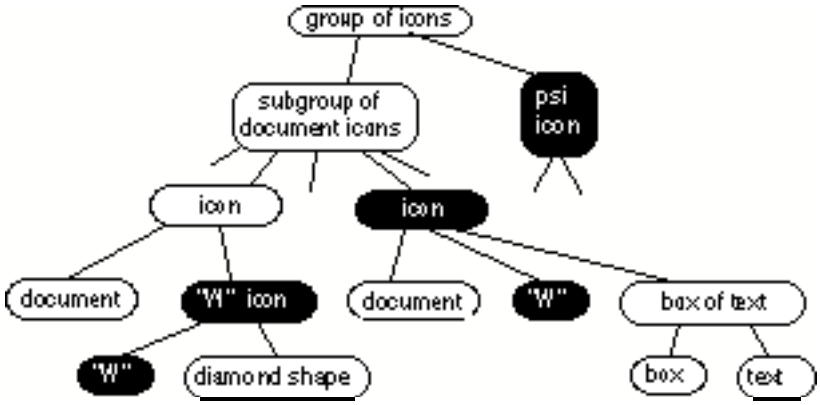
Exercise Set 4

2. Draw a structure diagram for the array of icons in Figure 29 (ignore the text labels and the ‘frame’ of the window), with the ‘document shape’ as the pragmatic subject of the icons that have one.



Exercise Set 4

3. Draw another structure diagram for the icons in Figure 29, this time assuming that the ‘W” of each icon was its pragmatic subject.


group of icons
subgroup of document icons
psi icon
icon
icon
document
"W" icon
document
"W"
box of text
"W"
diamond shape
box
text

Exercise Set 4

4. On the basis of the two diagrams you have drawn for Figure 29, would it be easier to find the ‘blending text’ icon if it had the ‘document’ or the ‘W’ as its pragmatic subject?

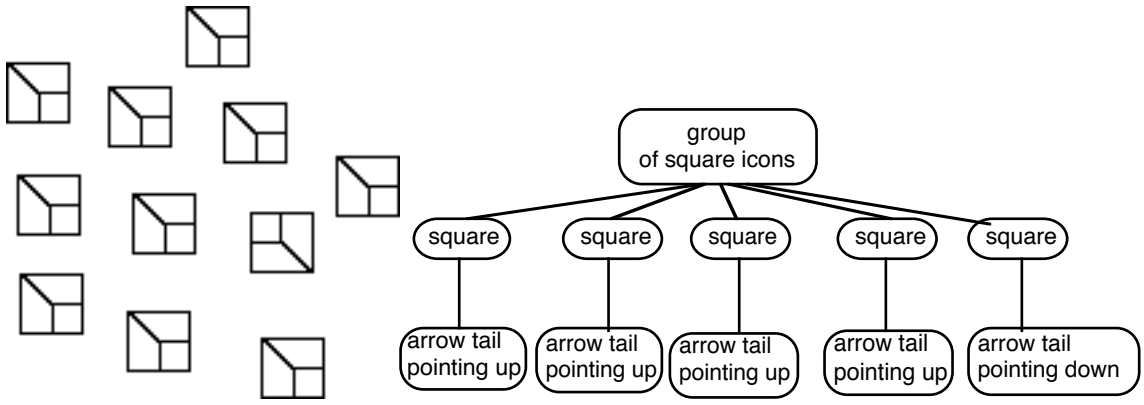
The document shape is common to all of the document icons, and so having it as the pragmatic subject does not help distinguish between them. Additional transitions are required to examine the distinguishing features of each icon (or the textual label, although we are not including these in the structure here).

The 'blending text' icon differs in the location of the W and the 'box of text', and so if either of these were the pragmatic subject then the icon could be found easily, since the discriminating feature could be found without a transition.

Since it has a different pragmatic subject to the rest of the subgroup, it may actually 'pop-out' from the others. We have shown this in the answer to 4.3 by highlighting the 'icon' that it belongs to – you could also add in another subgroup for all of the other document icons, to make this pop-out effect obvious.

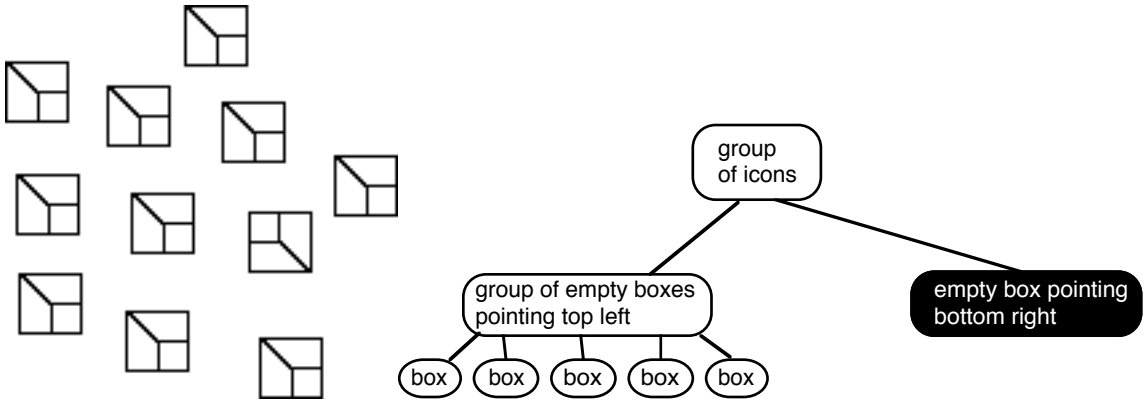
Exercise Set 5

1. Draw the structure diagram for the part b of Figure 32, showing the representations formed without any propositional knowledge, so that objects are perceived as two dimensional.



Exercise Set 5

2 Now draw the structures with propositional input, so that they are perceived as 'empty boxes'. Which object is the pragmatic subject?



Exercise Set 5

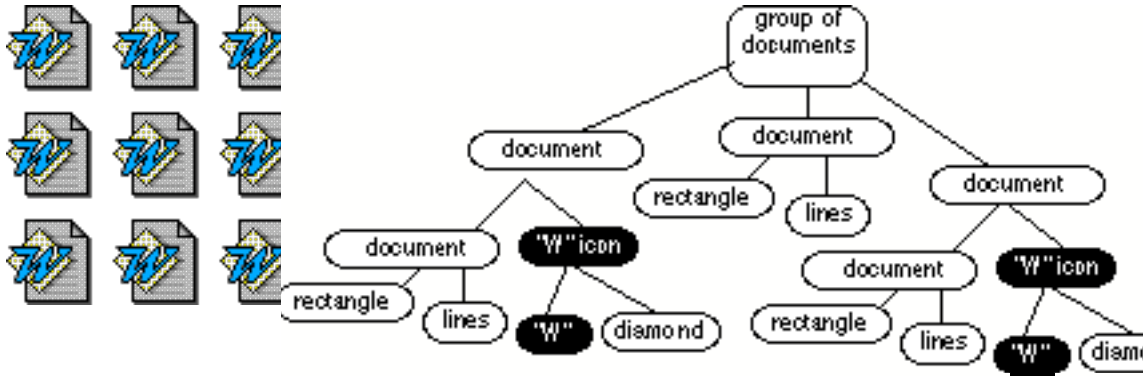
3. Look back to the structure diagrams that you drew for questions 2 and 3 in Exercise Set 4 (for the document icons). Which of the document icons is the most 'complex'?

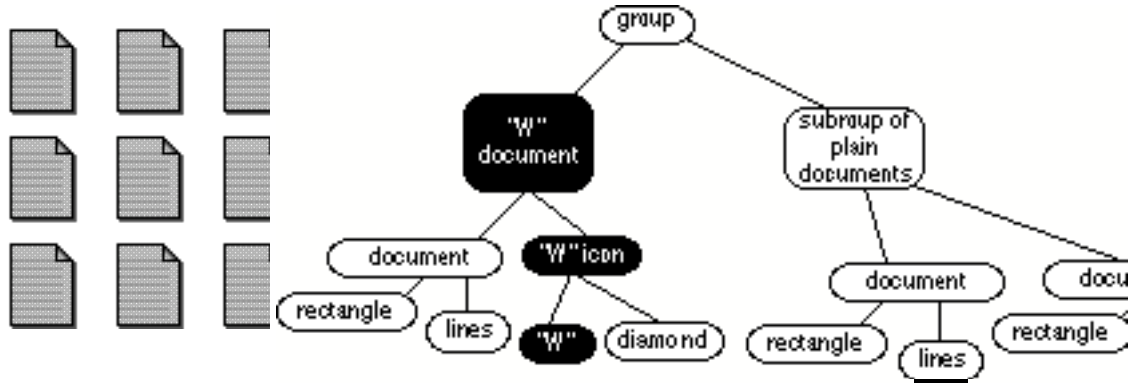
The 'blending text' icon is the most complex, and so even when the document shape is the pragmatic subject it still 'pops-out' to a certain extent, although we have not shown this happening in the answer for Exercise 4.

Exercise Set 5

4. Draw structure diagrams for these two arrays of icons, and identify which icon, if any, is the pragmatic subject:

There are no pragmatic subjects in the first array, since the simpler icon hides among the more complex

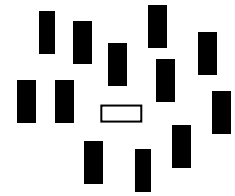


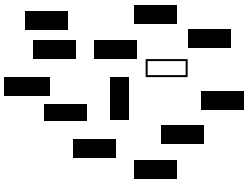


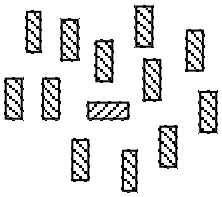
Exercise Set 6

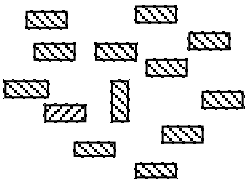
1. Draw a structure diagram for parts c, d, e and f of Figure 46.
2. Identify the pragmatic subject of the main group in each diagram.
3. Which of the subgroups also have pragmatic subjects?
4. According to the answers that you have given for question 3, is it easier to locate the differently shaped oblong in part d, or the differently textured icon in part f?

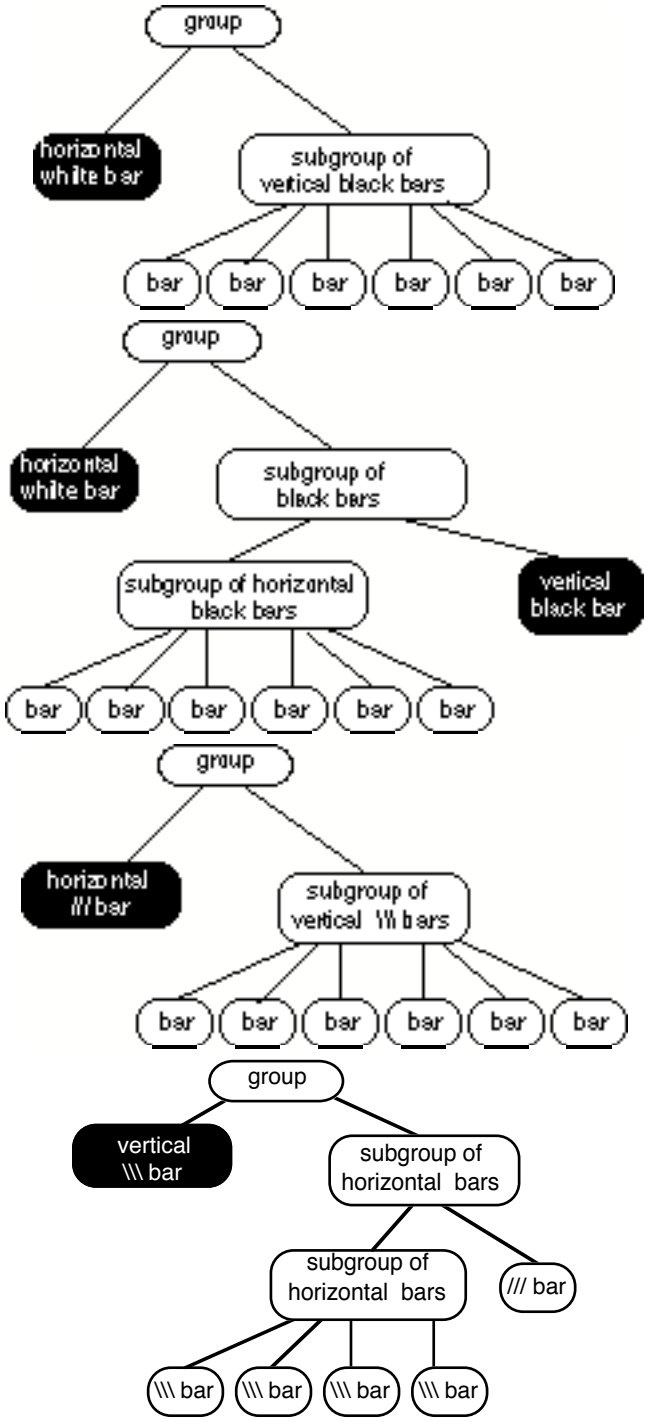
As the figures below show, only the subgroup in part d has a pragmatic subject, which stands out from the rest of the black group on account of its different shape. It is therefore easier to find this oblong than the differently textured oblong in part f, which does not form a pragmatic subject (texture here not being a grouping cue).



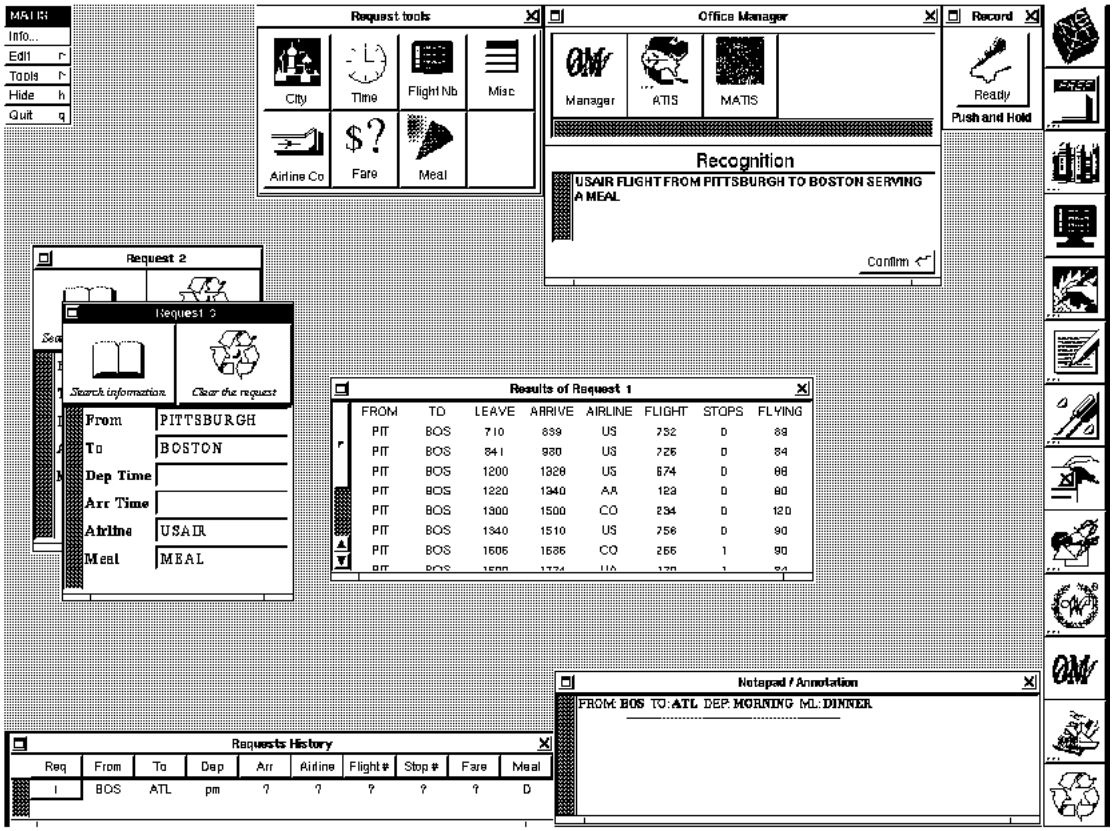






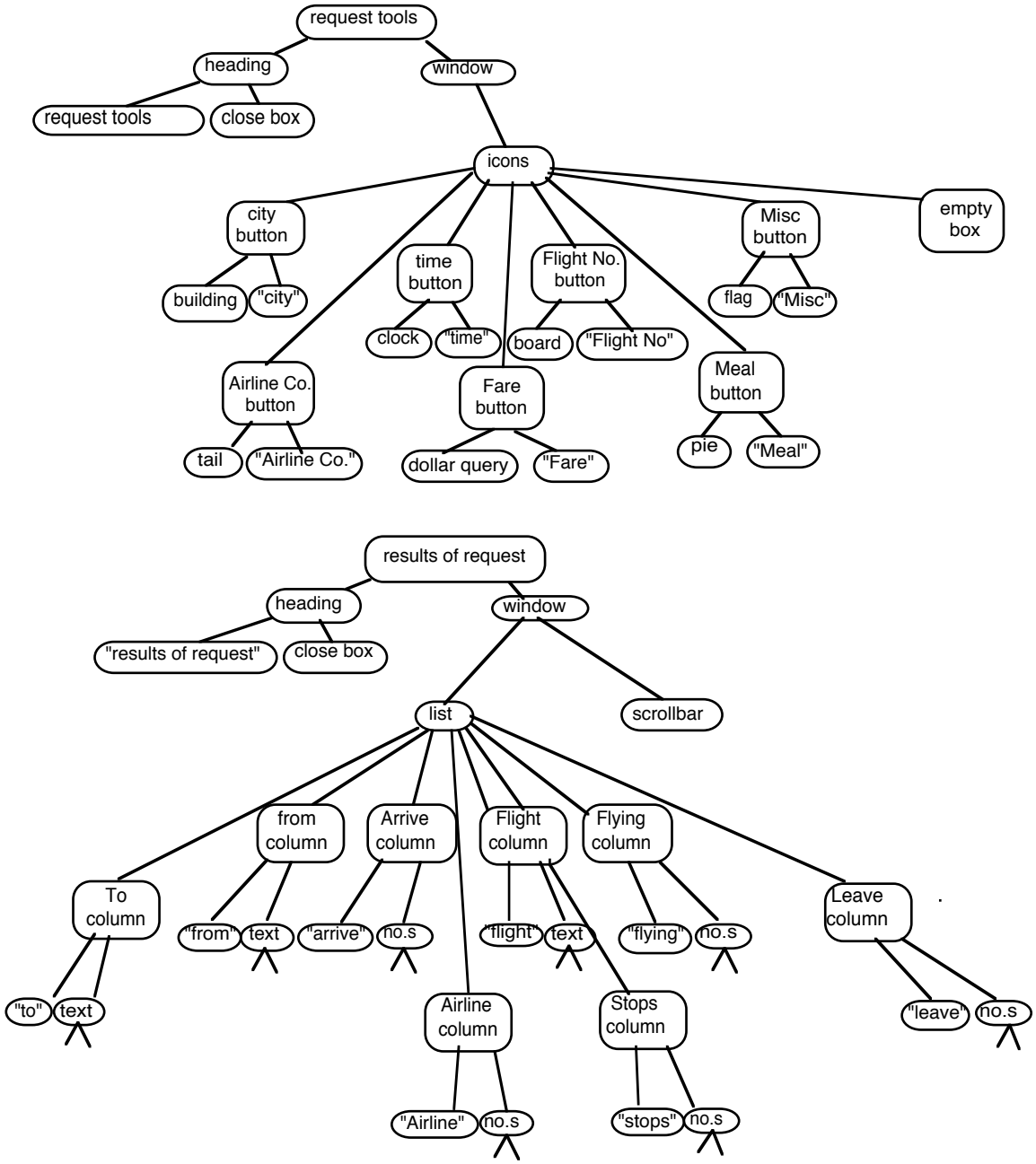

group
horizontal white bar
subgroup of vertical black bars
bar
bar
bar
bar
bar
bar
group
horizontal white bar
subgroup of black bars
subgroup of horizontal black bars
vertical black bar
bar
bar
bar
bar
bar
bar
group
horizontal /// bar
subgroup of vertical \\\ bars
bar
bar
bar
bar
bar
bar
group
vertical \\\ bar
subgroup of horizontal bars
subgroup of horizontal bars
/// bar
\\\ bar
\\\ bar
\\\ bar
\\\ bar

Exercise Set 7



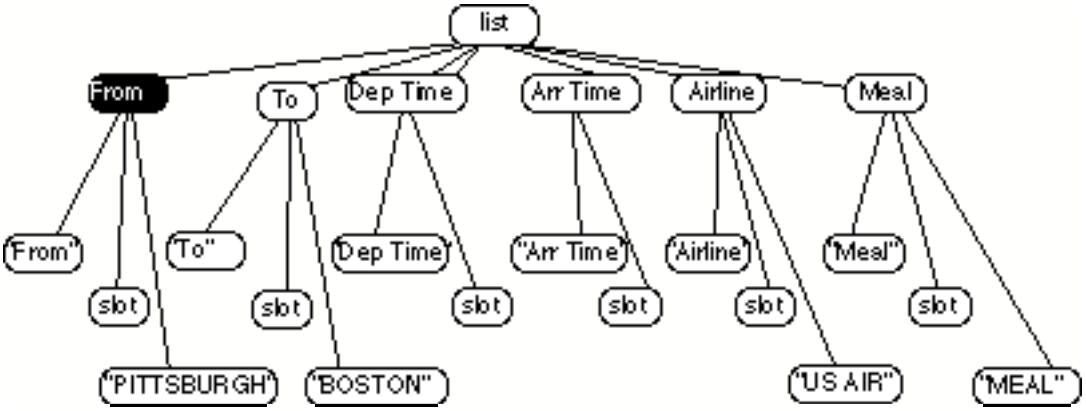
Exercise Set 7

1 Draw structure diagrams for the ‘Request Tools’ and ‘Results of request’ windows shown in Figure 56 – but don’t go into too much detail.



Exercise Set 7

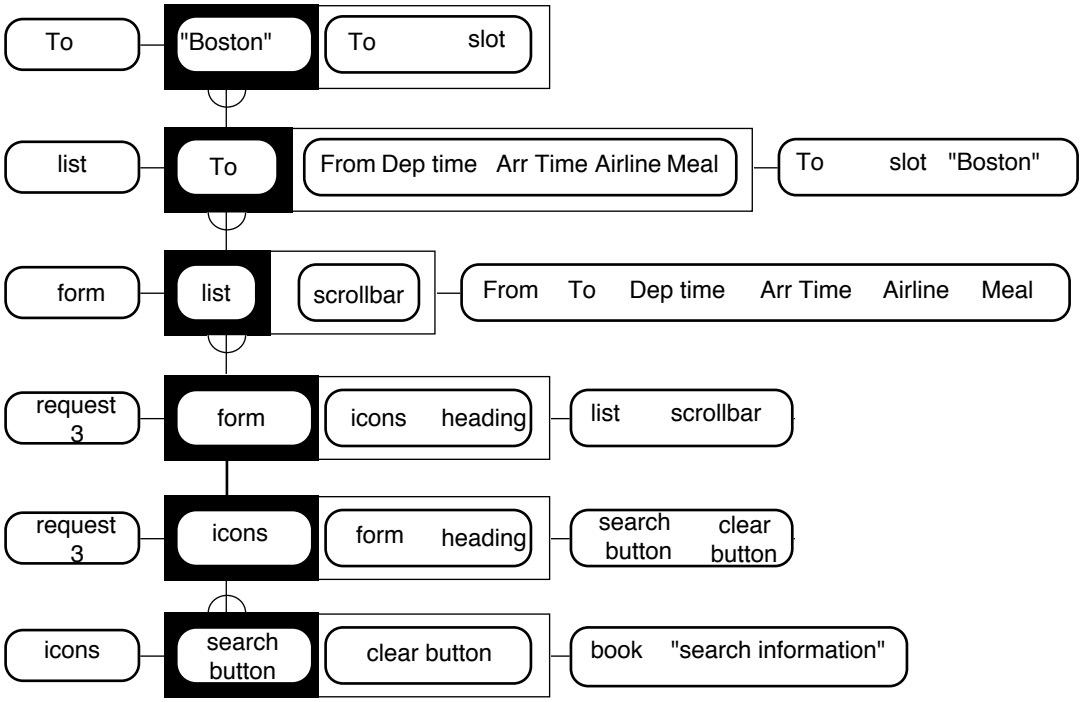
2. Complete the structure diagram of the Requests window by adding the contents of each filled and empty slot.



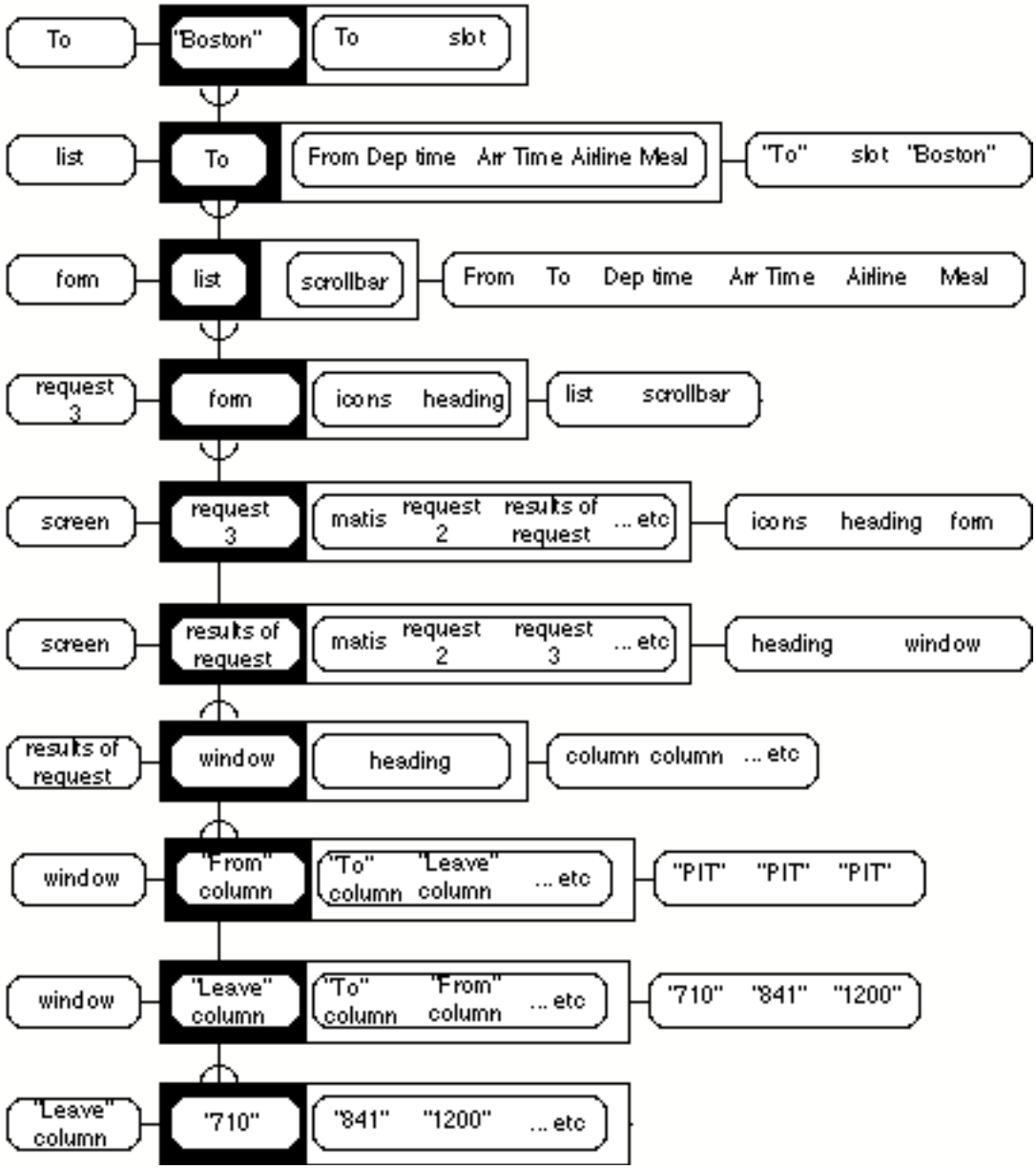
Exercise Set 7

3 Suppose the user had just entered ‘Pittsburgh’ into the ‘from’ slot of the Request form, and ‘Boston’ into the ‘to’ slot, so that they are now looking at the word ‘Boston’ (and the rest of the slots are empty). Draw a transition path diagram to show how they would:
a) locate the search button to carry out the request
b) find a flight that departs before midday from the ‘results of request’ window (which will be the one shown in Figure 56).

a)



b)


To
"Boston"
To slot
list
To
From Dep time Arr Time Airline Meal
"To" slot "Boston"
form
list
scrollbar
From To Dep time Arr Time Airline Meal
request 3
form
icons heading
list scrollbar
screen
request 3
matis request 2 results of request ... etc
icons heading form
screen
results of request
matis request 2 request 3 ... etc
heading window
results of request
window
heading
column column ... etc
window
"From" column
"To" column "Leave" column ... etc
"PIT" "PIT" "PIT"
window
"Leave" column
"To" column "From" column ... etc
"710" "841" "1200"
"Leave" column
"710"
"841" "1200" ... etc

Exercise Set 7

4 Consider the goals the user will have at each moment in this transition path diagram(that is, before making each transition), and so what mental images will be guiding their search. Can you spot a simple change that you would recommend to improve this display?

Having just filled in the 'Dep Time' slot, the user will still have a mental image of this phrase. The corresponding column in the results window is headed 'Leave', and so they may not realise that it is the one they want. Making the label for the slot in the Request and Results column correspond to each other would be best, whether they both say 'Dep Time' or 'Leave'.

Exercise Set 7

5. Suppose all of the slots had been filled in – does this change the way the 'list' object is structured? Draw a new structure diagram for the 'list' object