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Frames

Using Frames to solve RPM problems

Frames provide a mechanism for capturing stereotypical representations of concepts that can be verbs or nouns. The concepts are described as a collection of slots and fillers where slots are typical characteristics of the concept and fillers are either default values or specific values of an instance of the concept.

Frames are very similar to Classes in object-orientated programming as they can exhibit inheritance by identifying a frame as a generalization of another frame. Fillers can also refer to frames as well as static values.

The concepts identified by frames can be verbs or nouns. If Frames were used to solve Ravens Progressive Matrices they could capture information about each object in a figure. A representative stereotype of an object in a figure would look something like this:

Object	
	name : X
	shape : circle
	size : large
	fill : false
	angle :
	above:
	inside:
	left-of:
	right-of:

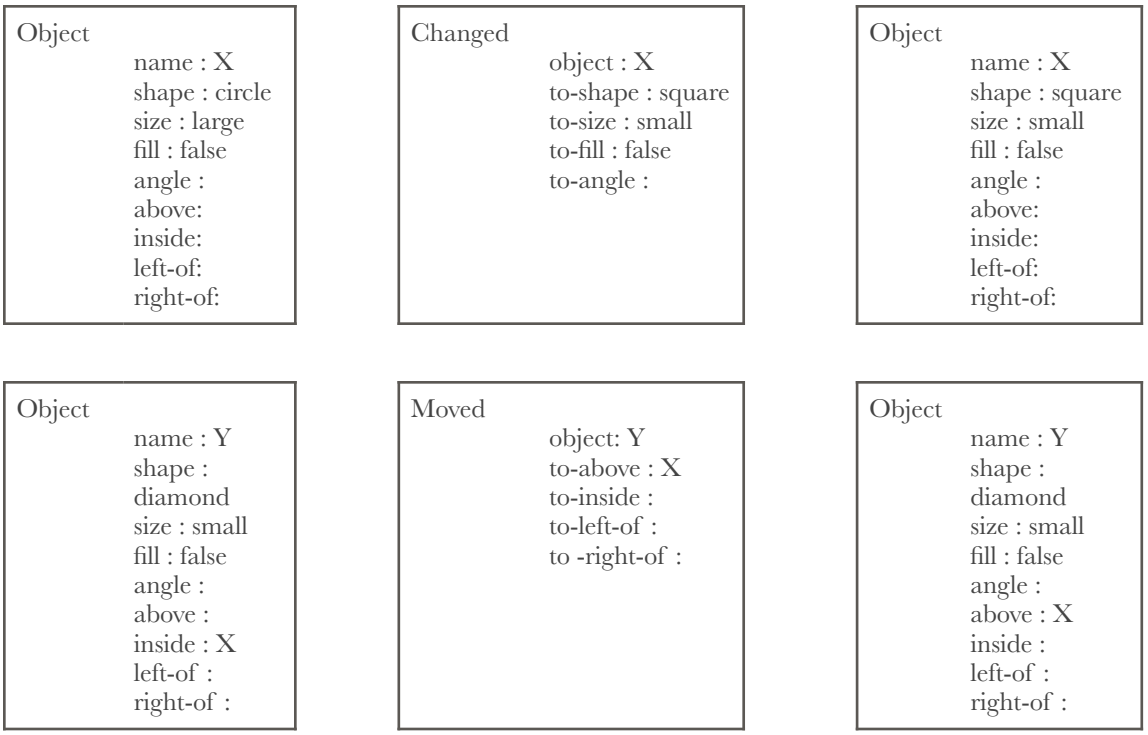
Object	
	name : Y
	shape : diamond
	size : small
	fill : false
	angle :
	above :
	inside : X
	left-of :
	right-of :

The frame will have slots for all possible attributes of the concept even if a particular instance does not have fillers for all slots. Also, some fillers could be default values or be overridden by instance values. A filler value can be a reference to a frame, too, as with object Y in the example above.

Frames could also be used to describe the transformation from one figure to another. In this case the concepts would be verbs such as Changed, Deleted, Added and Moved. Each of these type frames would contain an object slot that would refer to an object frame. The additional slots defined in these frames would be dependent on the type of transformation that occurred.

Changed	object, to-shape, to-size, to-fill and to-angle
Deleted	object
Added	object
Moved	object, to-above, to-inside, to-left-of and to-right-of

The following example demonstrates how a figure to figure transformation could be represented.



In applying the use of Frames to solving Ravens Progressive Matrices problems a semantic network could be created for the figures in a problem where each figure node "contains" object

nodes which are defined by a frame. The transformation from one figure to another would be a transformation node which "contains" object transformation nodes which are defined by a frame. These transformation frames contain the instructions necessary to generate potential problem solutions that can compared to the set of solutions provided to determine the correct answer to the problem.