* Operators are information processing systems that have to solve a finite set of problems using system information and application programs. The keys elements are:-

a. The rules that the operator uses to control the system.

b. The strategies that determine how the rules are used.

c. The type of system feedback employed.

Some models of the operator and their uses:-

* Prediction of operator behaviour
* Facilitation of task load evaluation
* Direction of equipment design evaluation
* Evaluation of equipment design procedures
* Evaluation of training programs.
* Implementation of model in a digital setup for behaviour simulation.

2. PROBLEM SOLVING:

* Problem solving involves the interaction between the operation of programs and movement of data between

different memory stores.

* Memory limitations can affect problem solving by causing the problem solver to return to previous knowledge states. This is backtracking.

PROBLEM REPRESENTATION AND INFORMATION DESIGN:

* The representation of problem influences how it is represented at a cognitive level.

* Appropriate representation of problems can make its structure explicit and facilitate problem solving procedures

* Wason and Shapiro investigated subjects' problem solving ability in a falsification task. The subjects were presented with the following rule :-

"Every card that has a E on one side has a 4 on the other"

* Four cards were placed in front of the subjects and they were asked which cards they had to turn over to find out definitely if the rule was true or false.

* The cards showing E and 7 are turned over. If E does not have 4, rule is false. If 7 has E on the

other side, rule is false.

* '4' card is irrelevant to the problem:- just because cards with 'E' have a '4' on the other side, the vice versa need not be true.

* Wason represented the problem in a more familiar form and the subjects' had lesser difficulty in selecting the card.

* Thus, the way in which a problem is presented to people has an influence on the ease with which they solve it.

* Less abstract the representation → Easier to solve.

* Thus, abstract terminology is avoided on products and machines.

PROBLEM SOLVING AND COGNITIVE STYLE:

* Individuals have preferred cognitive style for

conceptualising problems. These depend on prior associations and occupational experiences.

Eg. Two Liquids Problems:-

Two jars A and B contain exactly same amounts of different liquids. Suppose a teaspoonful of A is taken and mixed thoroughly with contents of B.

When contents of B is mixed, the liquid is mixed with A. Which is more contaminated?

* Intuition leads many to conclude that jar B is the one that is more contaminated, but it does not account for reduction in volume in jar A.

* Engineers and scientists approach this problem in a straightforward, stereotyped method using volumes of liquids. They construct arithmetic solutions.

* Mathematicians and statisticians construct a universal proof using formal notation.

* An alternative method is based on visual imagery.

* It is also possible to solve the problem using verbal approaches.

* The Two Liquids Problem thus shows that the way a problem is represented determines the type of cognitive operations to reach the solution.

3. PSYCHOLOGICAL ASPECTS OF HUMAN ERRORS:

Human machine interaction can be conceived as a behaviour stream governed by user intentions, expressed as goals and subgoals via plans.

* Norman calls these action schemas and they are well learnt and carried out in full consciousness. Error occurs due to disassociation between behaviour and intention.

* Error can occur when the intention is correct but the devised action scheme is faulty.