Reasoning Machine - To memorize the reasoning rules and the control strategies applied.

Interpreter - Through UI ; interpreter explains user's questions or commands & other info. generated by expert system.

Steps:

1) Design of initial know. base
   - Problem identification
   - Know. conceptualization
   - Rule formulation
   - Rule validation

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Conceptual Dependency

3) - Knowledge representation method
   - A single sentence in natural lang. may have many inferences.

→ CD helps in drawing inferences and it is independent of the lang. (capture the concept). It provides structures and specific set of primitives from which representation can be built.

Primitives of CD theory

i) ATRANS - Transfer of abstract relationship (give, take, buy)

i) PTRANS - Phy. transfer (go, put)

1) PROPEL - Appl^n of physical force (push, pull) throughout

iv) MOVE - Movement of body part (kick)
v) GRASP - Grasping an obj. by an action (throw, pick, grab, let go)
vi) INGEST - Ingesting obj. by animal (eat, drink, smoke, breath)
vii) EXPEL - Expulsion of something from body (sweat, cry, spit, excrete)
viii) MTRANS - Trans. of mental info. (tell, see, remember)
ix) MBUILD - Building new info. from old (decide, conclude, imagine, consider)
x) SPEAK - Producing sounds (say, play, music, scream)
xi) ATTEND - Fowling of a sense organ toward a stimulus (listen)

Conceptual categories:
- ACT : Actions
- PP : Objects (Picture producers)
- AA : Modifiers of action (Action aiders)
- PA : Modifiers of picture producers (picture aider)

Ex: I gave a book to the man.
(O) (R) D (Destination)
P (Past tense) Obj Recipient → man (to)
I ⟷ ATRANS ← book ←
← I (from)

Inference : i) I gave the man a book.
ii) The man was given a book by me.
iii) The man got book from me

Dependency structures are themselves conceptualization and can serve as higher conceptual dependency to other structures.

Rule 1 : PP ⟺ ACT

Ex : John ran

P

John ⟺ PTRANS

Rule 2 : ACT ⟵ PP

Ex: John pushed the bike

O

John ⟺ PROPEL ⟵ bike

Rule 3 : PP ⟷ PP

Ex: John is doctor

John ⟷ doctor

Rule 4 : PP ⟵ PP

Ex : John's dog

poss-by

dog ⟵ John

// poss-by : possessed by.

↑ towards concept being described

Rule 5 : PP ⟺ PA

Ex : John is fat

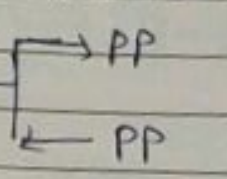
John ⟺ weight (>80)

Rule 6: PP ← PA

Ex: Smart John

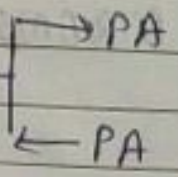
John ← Smart.

Rule 7:

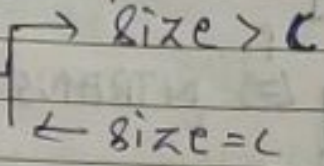


Ex: John took the book from Mary.

Rule 8:



Ex - Tree grows



Rule 9: {x} (Cause-effect relationship)

↑

{y}

Ex: Bill shot Bob

{x}: Bill shot Bob

⇑

{y}: Bill's health is poor.

Rule 10: {x} (Both events occured simultaneously)

↓

{y}

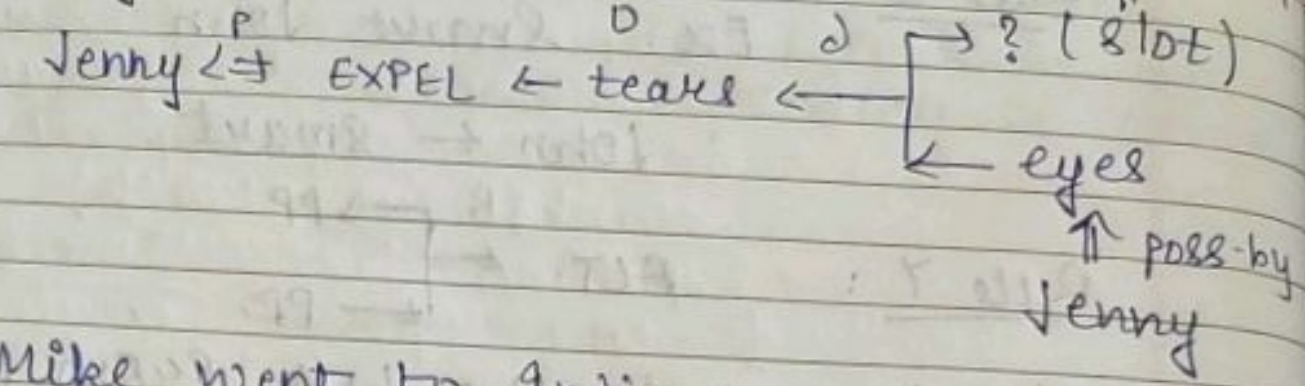
Ex - While going home I saw a snake.

I am going home

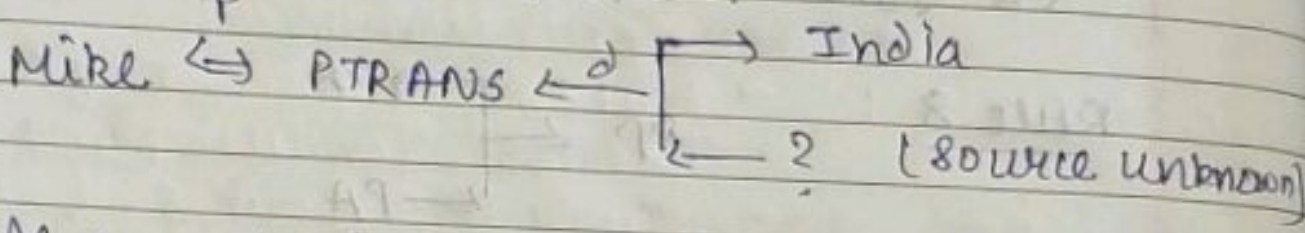
↓

I saw snake

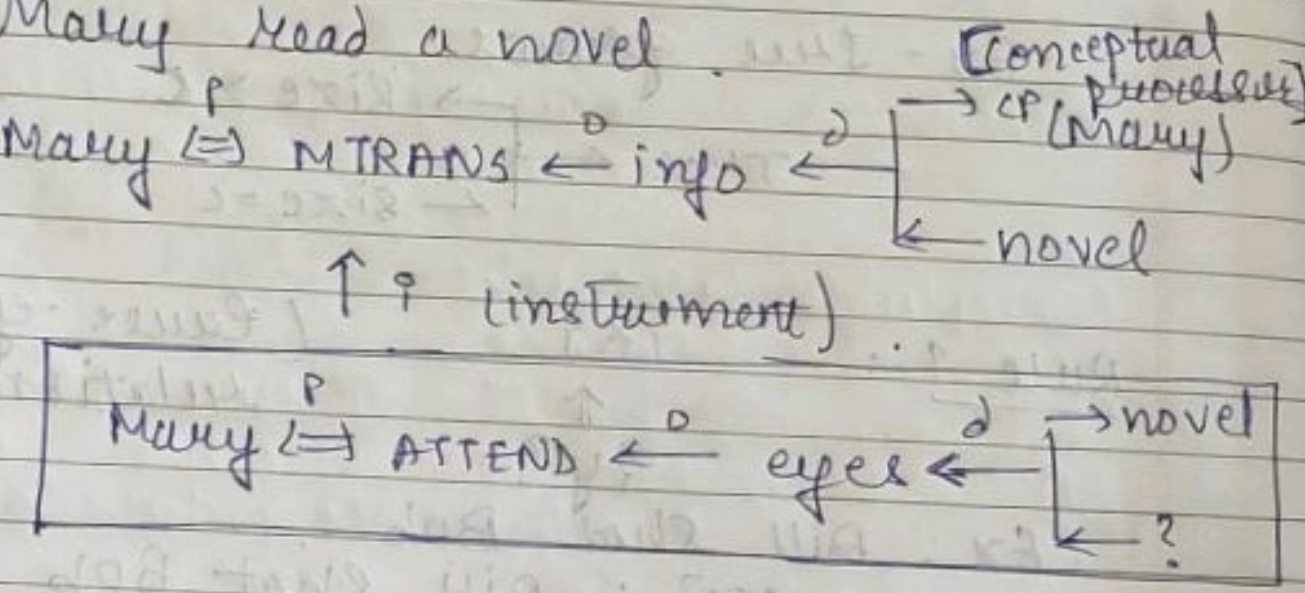
i) Jenny cried



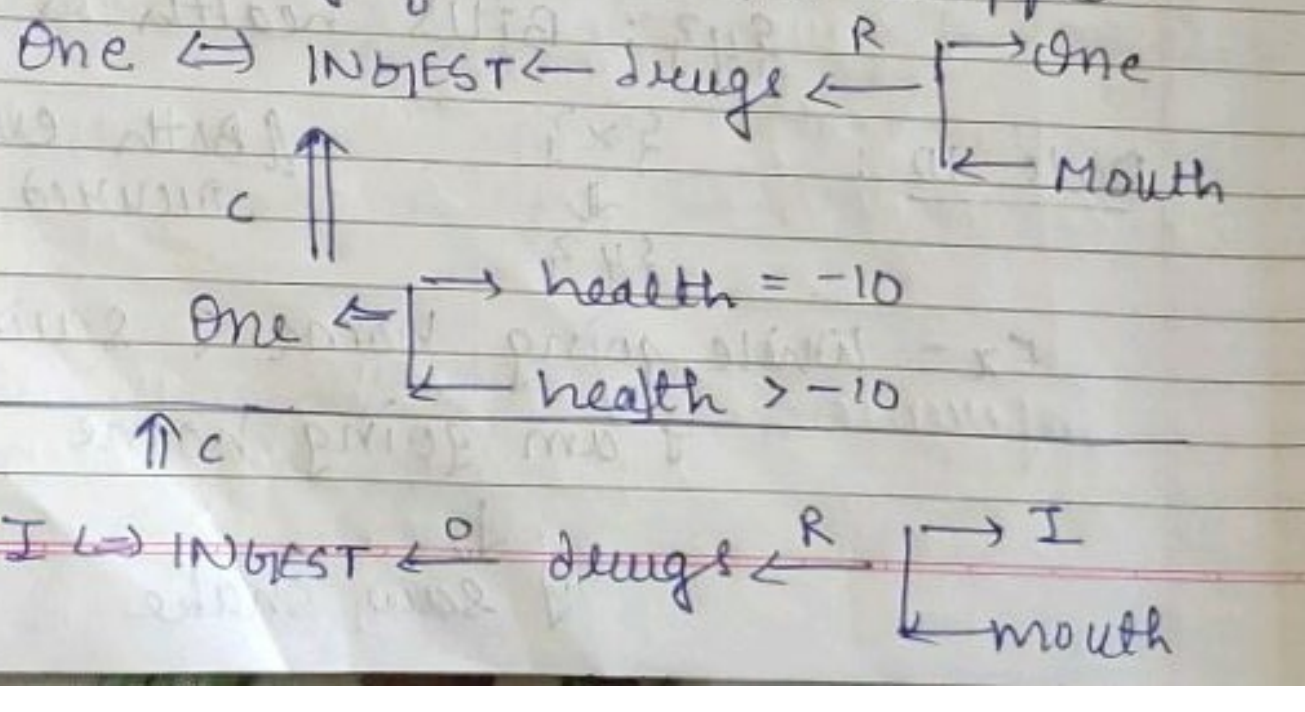
ii) Mike went to India.



iii) Mary read a novel.



iv) Since drugs can kill, I stopped.



v) John warned Mike with dire consequence.