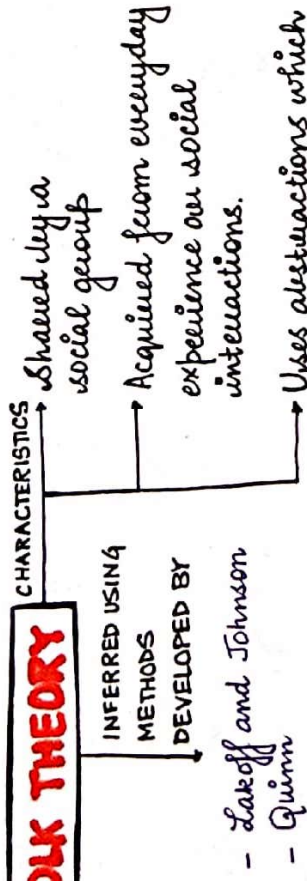


# TWO THEORIES OF HOME HEAT CONTROL

WILLETT KEMPTON

"Human beings strive to connect unrelated phenomena and make sense of the world."

## FOLK THEORY



**EXPANSION OF COGNITIVE ANTHROPOLOGY FROM FOLK CATEGORIES TO MORE COMPLEX STRUCTURES**

- Sets of propositions - (D'Andrade + Kay)
- Inference rules - (Cole & Scribner + D'Andrade + Hutchins)
- Cognition in everyday activities - (Holland + Lawe & Rogoff + Muntanga & Faust & De la Rocha)
- Connections in discourse - (Agar + Rice)

## RELATED COGNITIVE STRUCTURES

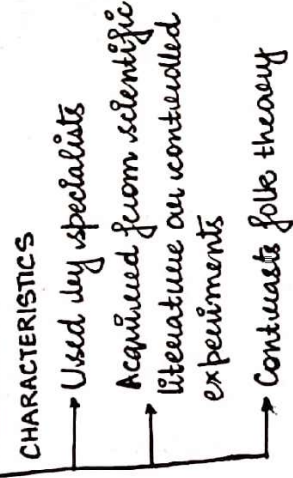
- **NAIVE THEORY** (diSessa + McKloskey + Caromazza & Lucan)
- **MENTAL MODELS** (deKleer & Burrows + Gentner & Stevens + Johnson Laird)
- **NAIVE PROBLEM REPRESENTATION** (Laird)
- **INTUITIVE THEORY** (McKloskey)

"The non-recognition of conflicting systems and the persistence of the folk system do not assemble phenomena at a cultural boundary."

## THE EXPERTS PERSPECTIVE

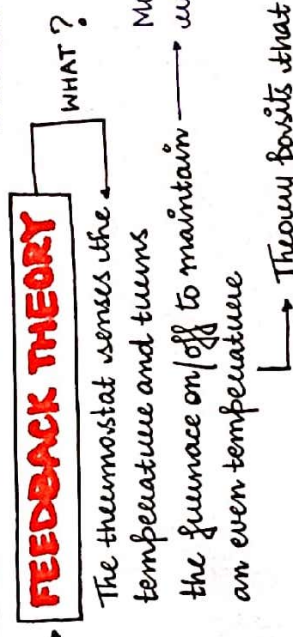
Heating experts consider the value theory incorrect even when it provides its users with about the same number of useful predictions as the feedback theory.

## INSTITUTIONALIZED THEORY

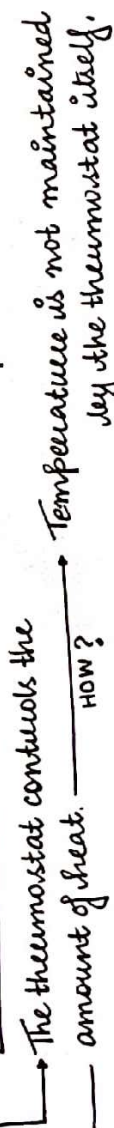


"Folk theory is resistant to change."

## TWO THEORIES OF THERMOSTATS



## VALVE THEORY



**THERMOSTAT SETTING IS CHANGED WHEN THE DESIRED TEMPERATURE CHANGES.**

- When waking/going to sleep
- When entering/exiting the house
- Around mealtime.

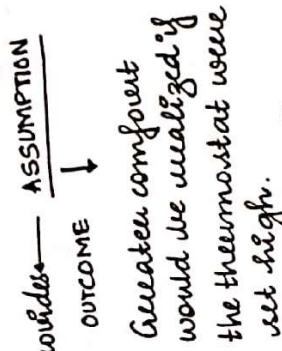
**DRAWBACK** → Does not correspond to the mechanism inside the device.

**WHY?**

After training, experts possess a full, institutionally sanctioned theory, which can be acquired from the feedback theory by simply adding details and adjacent systems.

**FUNCTIONALITY OF THE TWO THEORIES**

**HOW WELL DOES EACH FOLK THEORY MEET THE GOALS OF ITS USERS?**



**WHY?**

- A person entering a cold house from outside will not feel warm when the air first reaches the correct temperature.

"The folk theory that is endorsed by the experts may not work as well in practical day-to-day application."

**INDICATES**

A theory that is useful for designing thermostats is not guaranteed to be a good theory for using them.

## PROS OF CONVERTING FROM VALVE TO FEEDBACK MODEL

- (1) Save management effort (not adjusting often)
- (2) Occasionally save energy (not leaving it set high)

## CONS OF CONVERTING TO FEEDBACK MODEL

- Eliminates the theoretical rationale for night setback.
- Settings predict that savings from setback would be cancelled by later setup.

"When the operation of the system is made visible, the folk, on their own, choose feedback theory."

**IN CONTRAST** → Acquiring from the value theory requires a conversion.

→ Experts evaluate folk theories from this perspective.

**ASSUMPTION** → **VALVE THEORY** | **APPROACH**

Thermostats do not have feedback mechanisms

When it is cold outside, you must turn the heat up.

→ **LEADS TO**

Correct management

→ **WHY?**

Infiltration and distribution asymmetries

**PREDICTION**

**ENERGY USE**

More energy/fuel is consumed at higher settings than at lower ones.

→ **WHY?**

Higher inside temps cause more heat loss through the shell of the house.