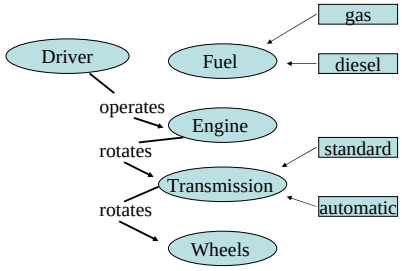
General Problems with Unstructured Feature Lists

- Do not specify relations btw. features
  - Spatial, temporal, causal, intentional relations between features
  - Car, gas, engine, pollution
  - *Frames represent the relationship between attributes*
- Don't capture difference between attributes and values
  - Standard transmission, Automatic transmission
  - Feature lists treat attributes and values as same kind of representational entity
  - *Frames distinguish between attributes and values*

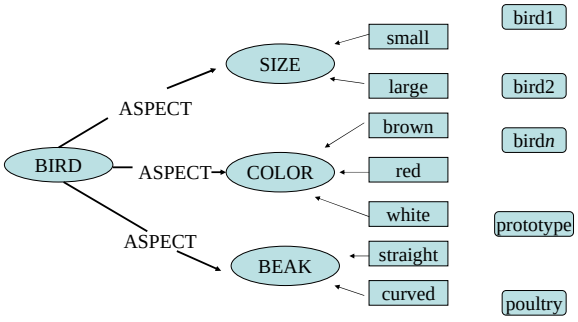
Explanation-Based/Theory-Based Approaches

- Concepts can have attributes
- Relations between attributes
  - Explanatory connections btw. Attributes
    - Wings, feathers, light bones help birds fly
- Concepts can be dynamically constructed in working memory (not static)
  - Ad hoc categories
- Conceptual coherence emerges from underlying theoretical knowledge of concepts, not similarity alone

Frames



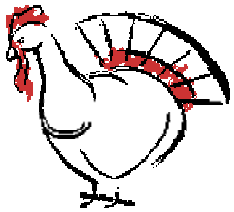
Frames: Exemplars & Prototypes



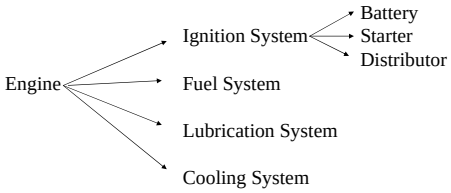
Virtues of Frames

- Specify relations between features
- Capture difference between attributes and values
- Also capture assumed info w/default values
  - Table
    - Made-of(wood)
    - Surface(flat)
    - Legs(4)
    - Supports(Legs, Surface)

When I came home a bird was sitting on the porch



Recursive Embedding



- Frames capture structured information in human concepts

Things Frames Can Do For You

- Represent both prototypes and exemplars
- Represent multiple prototypes
  - When I came home, a white bird was sitting on the porch
- Frames embed recursively in one another

History of Schema Theory

- Kant
  - Triangle schema allows us to understand triangles
- Bartlett
  - Understanding memory for events is shaped by expectations based on similar events

General Characteristics of Schemas (schemata)

- Consist of relations w/attribute/value structure
- Simple relations like HIT
- Complex relations like ENABLE, CAUSE, PREVENT, DESIRE
- Attributes (slots, variables) contain values (fillers) or other frames
- Encode generic knowledge applicable to many specific situations
  - Can leave attributes open (unfilled) or employ default values

Evidence for Schemas

- Different Expectations → Different Interpretation → Different Recall
  - War of the Ghosts

Script Theory (Schank & Abelson)

- Scripts are frames/schemas for temporally extended events
- Scripts allow you to fill in 'missing' information
- Scripts represent scenes that determine what an actor does in a given situation
  - Sequence of events
  - Causal & Temporal Information
  - Roles for Actors

Restaurant Script: Coffee Shop Track

- Props: tables, menus, food, check, money
- Roles: customer, cook, owner, waiter, cashier
- Entry Conditions:
  - Customer is hungry
  - Customer has money
- Results:
  - Customer has less money
  - Customer is full
  - Owner has more money

Scenes in Restaurant Script

1. Entering
   1. Customer goes into restaurant
   2. Customer looks around
   3. Customer decides where to sit
   4. Customer goes to table and sits down
2. Ordering
   1. Customer picks up menu
   2. Customer decides on food
   3. Customer orders food from waiter
   4. Waiter tells order to cook
   5. Cook prepares food
3. Eating
   1. Cook gives food to waiter
   2. Waiter gives food to customer
   3. Customer eats food
4. Exiting
   1. Waiter writes out check
   2. Waiter brings check to customer
   3. Customer gives tip to waiter
   4. Customer goes to cash register
   5. Customer gives money to cashier
   6. Customer leaves restaurant

Evidence for Script Theory (Bower & colleagues)

- 73% mentioned
  - Sitting down
  - Looking at menu
  - Ordering
  - Eating
  - Paying the bill
  - Leaving
- 48% mentioned
  - Entering
  - Giving reservation name
  - Ordering drinks
  - Discussing menu
  - Talking
  - Eating soup or salad
  - Ordering dessert
  - Eating dessert
  - Leaving tip

Evidence for Script Theory

- Galambos & Rips (1982)
  - Explicit script events verified faster than non-scripted events as being involved in (say) eating dinner in a restaurant

Scripts & Goals

- Scripts are related to actor's GOALS
  - Causal info refers to goals
- Scripts are useful for planning
- Causal info helps to understand violations of script

Scripts Reprise

- Scripts: Sequence of actions w/info about ACTORS, ACTIONS, and GOALS
- Fill in missing info by assuming events occurred as they typically do
- Explain unanticipated events
- Used for planning
  - Gives list of actions
  - Causal info helps us to adapt