



# Intelligent Information Systems

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Lecture Notes: Module 8



**HUMAN CAPITAL**  
HUMAN – BEST INVESTMENT!

EUROPEAN UNION  
EUROPEAN  
SOCIAL FUND



# Frames

## Module 8

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# Background

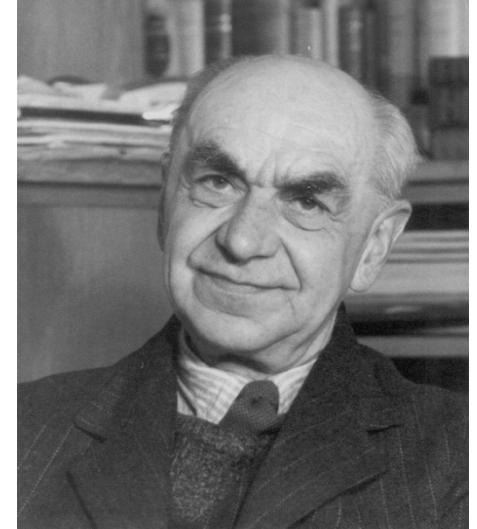
# Constructivism

## Sir Frederic Bartlett

**Constructivist school of research on formation of human's memory.**

**He discovered that most people found it extremely difficult to recall the story exactly, even after repeated readings, and hypothesized that, where the elements of the story failed to fit into the **schemata** of the listener, these elements were omitted from the recollection, or transformed into more familiar forms.**

**The man in a new situation tries to make use of the knowledge and experience acquired from previous similar situations.**



**1886 - 1969**

# Example of Behavior

While entering a theater in which we have never been, we have a set of **expectations** regarding the objects that we'll find in the room and a **sequence of events** that will have occurred – all these on the basis of our previous visits in other theaters.



# Frames

# Marvin Minsky



**Frames**, proposed by M. Minsky (1975), [web.media.mit.edu/~minsky/](http://web.media.mit.edu/~minsky/), are a method of knowledge representation that has been applied among others to the interpretation and understanding of visual perception and understanding and carrying out dialogs in natural languages.



# Frame's Definition

“When one encounters a new situation (or makes a substantial change in one's view of the present problem) one selects from memory a structure called a *Frame*.

This is a remembered framework to be adapted to fit reality by changing details as necessary.

A *frame* is a data-structure for representing a **stereotyped situation**, like being in a certain kind of living room, or going to a child's birthday party. Attached to each frame are several kinds of information. Some of this information is about how to use the frame. Some is about what one can expect to happen next. Some is about what to do if these expectations are not confirmed.”

*„A Framework for Representing Knowledge”, 1974*  
*M. Minsky, [web.media.mit.edu/~minsky/papers/Frames/frames.html](http://web.media.mit.edu/~minsky/papers/Frames/frames.html)*

# Scripts

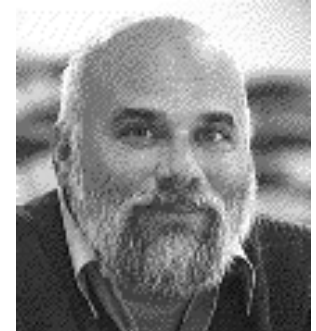
## R. Schank, Abelson

**Scripts, proposed by Schank and Abelson (1977), are the method to describe sequences of events.**

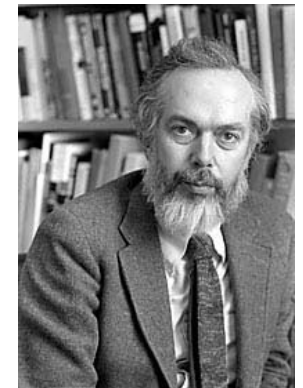
**“Scripts are groups of causal chains that represent knowledge about frequently experienced events (e.g. going to a restaurant). In other words, a script is a stereotyped sequence of actions that defines a well-known situation and has associated with it:**

- **a number of roles for the actors (different points of view on the situation, e.g. customer vs waiter vs cook),**
- **different tracks (e.g. restaurant, fast-food),**
- **different scenes (e.g. enter, order, eat, pay); each scene has a MAINCON, i.e. a main conceptualization, which must have happened if the scene is instantiated,**
- **as well as props, entry conditions, results, branches and loops etc.”**

*Roger C. Schank and Robert P. Abelson (1977). Scripts, Plans, Goals and Understanding: an Inquiry into Human Knowledge Structures*



R. Schank



R. P. Abelson  
1928-2005

# Frames + Scripts

**A frame is composed of slots that include declarative or procedural information.**

**Frames are usually organized as hierarchical structures that heritage properties.**

**Both frames and scripts can include inference mechanisms.**

# Examples

# Generic RESTAURANT Frame

**Specialization-of: BUSINESS-ESTABLISHMENT**

**Types:**

**range:** (Cafeteria, Seat-Yourself, Wait-to-be-Seated)

**default:** Wait-to-be-Seated

**if-needed:** IF plastic-orange-counter THEN Fast-Food,  
IF stack-of-trays THEN Cafeteria,  
IF wait-for-waitress-sign or reservation-made THEN Wait-to-be-Seated,  
OTHERWISE Seat-Yourself

**Location:**

**range:** an address

**if-needed:** (Look at the Menu)

**Name:**

**if-needed:** (Look at the Menu)

**Food-Style:**

**range:** (Burgers, Chinese, American, Seafood, French)

**default:** American

**if-needed:** (Update Alternatives of Restaurants)

**Times-of-Operation:**

**range:** a Tome-of-Day

**default:** open evenings except Mondays

**Payment-Form:**

**range:** (Cash, Credit-card, Check, Washing-Dishes-Script)

**Event-Sequence:**

**default:** Eat-at-Restaurant-Script

**Alternatives:**

**range:** all restaurants with same food style

**if-needed:** (Find all Restaurants with the same Food-Style)

*Source: E.A. Feigenbaum*

# Generic RESTAURANT Script

## EAT-AT-RESTAURANT Script

**Props:** (Restaurant, Money, Food, Menu, Tables, Chairs, ...)

**Roles:** (Hungry-Persons, Wait-Persons, Chef-Persons, ...)

**Point-of-View:** Hungry-Persons

**Time-of-Occurrence:** (Times-of-Operation of Restaurant)

**Place-of-Occurrence:** (Location of Restaurant)

**Event-Sequence:**

**first:** Enter-Restaurant Script

**then:** if (Wait-to-be seated-sign or Reservations)

**then** Get-Maitre-de'salle Script)

**then:** Please-Be-Seated Script

**then:** Order-Food Script

**then:** Fast-Food Script unless

(Long-Wait) Exit-Restaurant-Angry Script

**then:** if (Food-Quality was good) then

Compliments-To-Chef Script

**then:** Pay-for-it Script

**finally:** Leave-Restaurant Script

*Source: E.A. Feigenbaum*

# Heritage

## CHAIR Frame

**Specialization-of: FURNITURE**

**Number-of-legs: an integer**  
**(DEFAULT=4)**

**Style-of-back: straight,**  
**cushioned, ...**

**Number-of-arms: 0, 1, or 2**

...

## JOHN'S-CHAIR Frame

**Specialization-of: CHAIR**

**Number-of-legs: 4**

**Style-of-back: straight**

**Number-of-arms: 0**

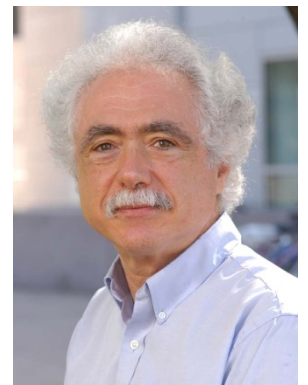
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# Important Note

**Contemporary object-oriented  
description and programming  
languages have adopted many ideas  
developed for frames and scripts.**



**Interesting frame-based systems:  
KRL (Bobrow & Winograd'77),  
PARMENIDES (Shell & Carbonell'91).**



**T. Winograd**





WARSAW UNIVERSITY OF TECHNOLOGY  
DEVELOPMENT PROGRAMME



# Thank you!



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