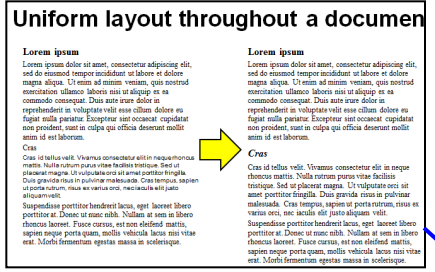
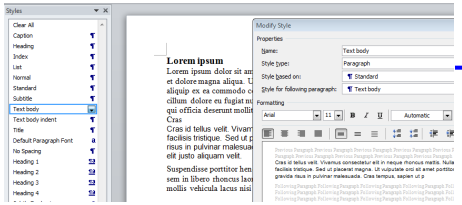
Understanding functionality and structure

- Aim
  - Design scaffolds for understanding IT use
  - Complete Assignment 2
- Core literature:
  - Chapter 4. Understanding IT
- Additional literature
  - Aharoni, D. (2000) Cogito, ergo sum! Cognitive processes of students dealing with data structures
  - Furuta, T. (2000) The Impact of Generating Spontaneous Descriptions on Mental Model Development
  - Vessey & Conger (1994) Requirement Specification: Learning Object, Process, and Data Methodologies

Module for Understanding

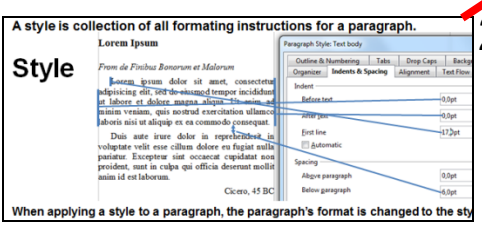


1. Introduction



   a. Usefulness of the learning objectives. Slide + demo

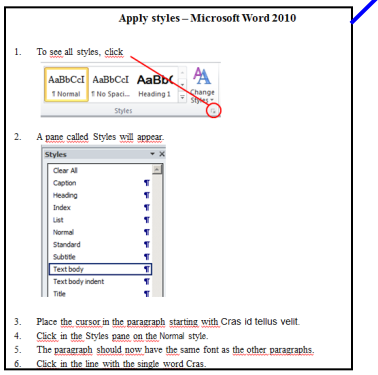
   b. Explanation of new functionality/structure



2. Practical hands-on exercises

   a. Exercise 1: follow instructions

   b. Exercises 2 and 3: somewhat different from the instructions



3. Summary

   a. Multiple choice question on new functionality/structure

   b. Discuss functionality/structure and confront misconceptions

   c. Discuss usefulness

Quiz

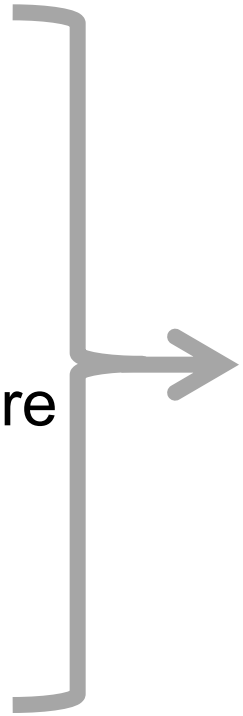
A style is a …

a. document which looks good.
b. collection of formating for a document.
c. common set of formating for all paragraphs.
d. collection of formating for a paragraph.
e. sequence of characters of the same shape.
f. uniformly looking document.

Understanding in addition to skills

Learning IT never ends

- New functionality
- New installations of software
- New versions of software
- New vendors
- New software types
- New hardware



Understanding ease learning compared to skills only

Understanding functionality and structure of IT neccessary for IT competence

Type the Column letter.
Type the Row number.

Skill

Carry out an action and say each step.

In order to have one cell refer to another, one has to get the coordinates of the other cell into the formula

Functional understanding

Talk about the input and output of the action without actually doing it.

Cell-referencing is an ingredient in formulas

Structural understanding

Refer to the action like an object of its own which can be part of other actions

Exercise

- When requested to explain graphs in spreadsheets, we get the following responses:

  Gloria:

  – Graphs are drawings of numbers. They show us the numbers so that they are easier to compare.

  Jussi:

  – The graphs are linked to the numbers, so when I change a number, the graph will also change.

  Yma:

  – First we select the numbers to be charted, and then choose the graph type. We can change the format of the graph afterwards.

- At which levels of skills or understanding of IT are Gloria, Jussi and Yma?

Functional model
– scaffold for achieving functional understanding

Input: Database + more records in another file

1. Backup the database.
2. Locate file with records to be imported.
3. Specify column containing record identification.
4. Import.
5. Repeat
    1. Check records with similar but not identical identification.
    2. Judge whether the records concern the same object.
    3. Merge if they do

Output: Database with records from other file, duplications removed

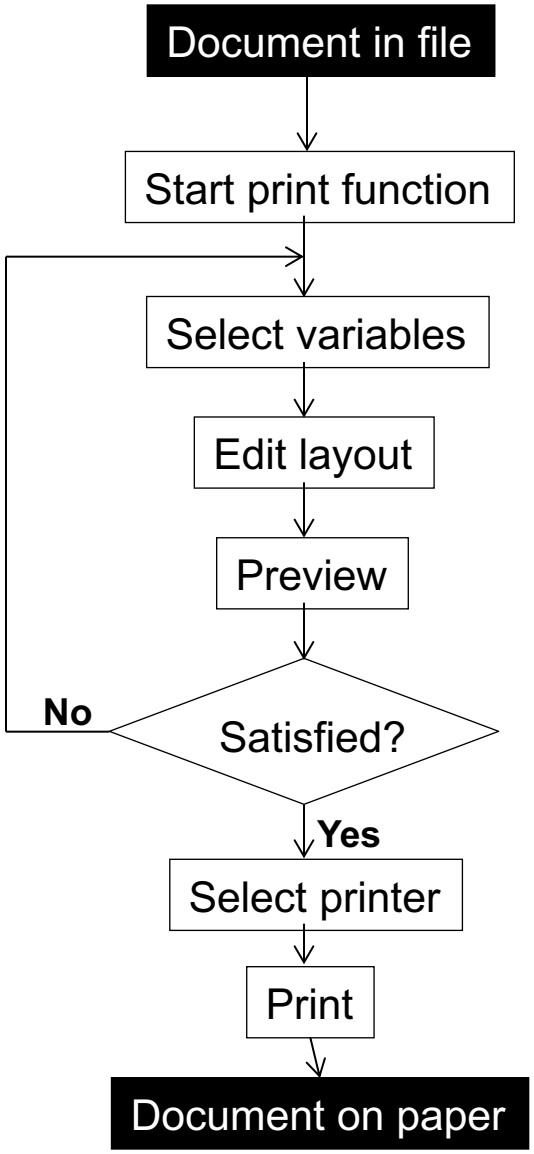
No user interface details

Functional model

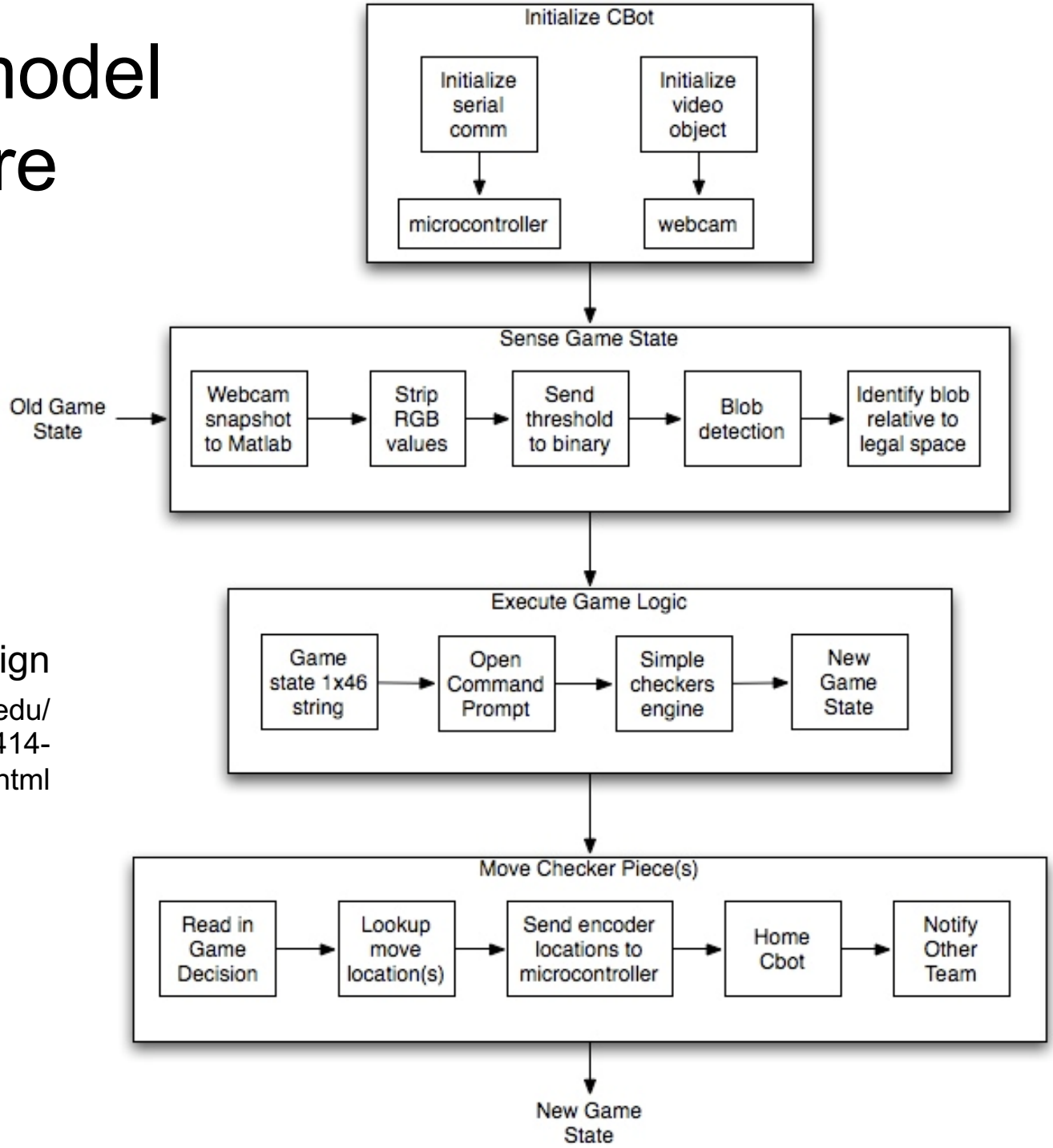
in general

Input → Process → Output

for printing



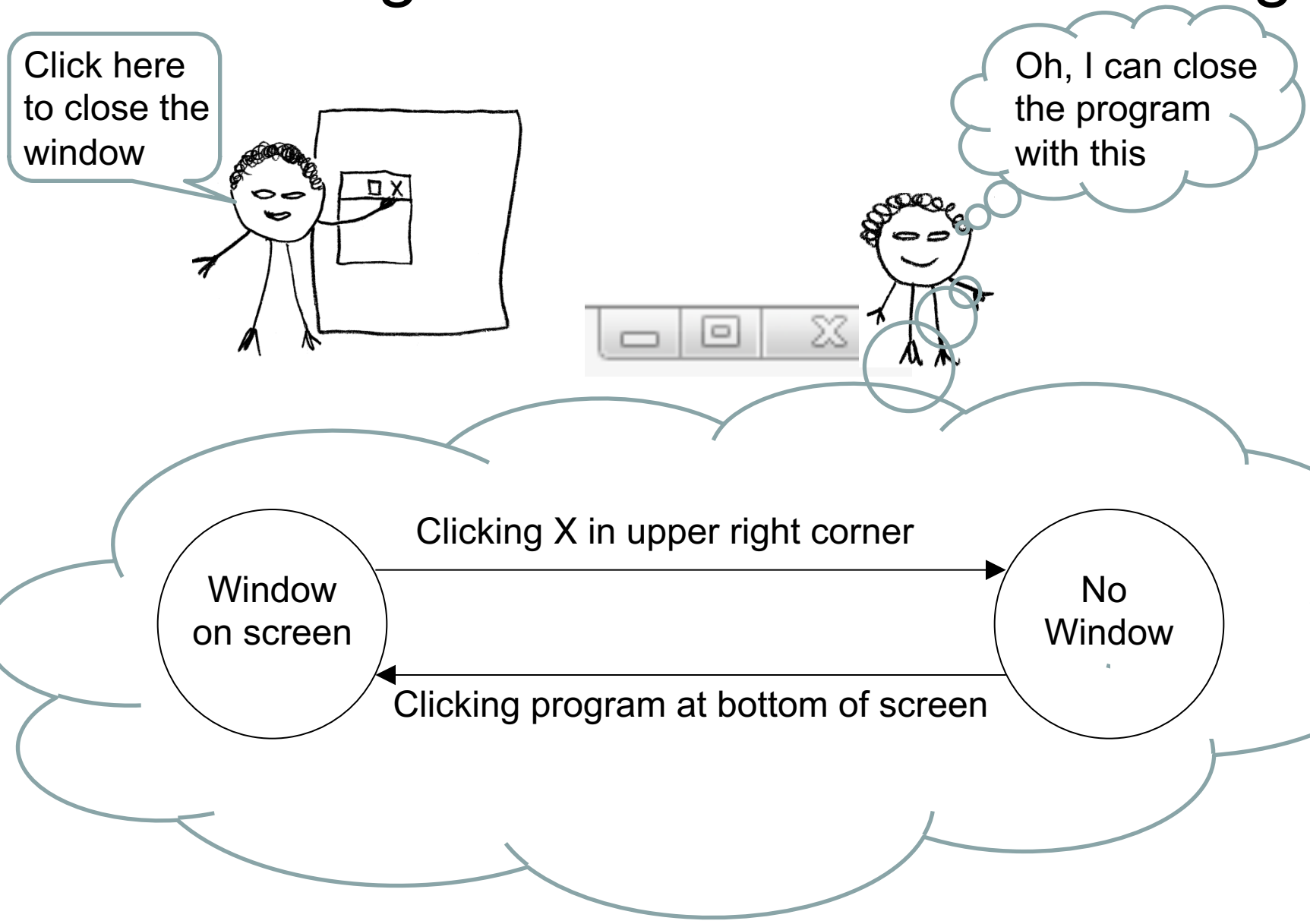
Functional model of software



CBot Design

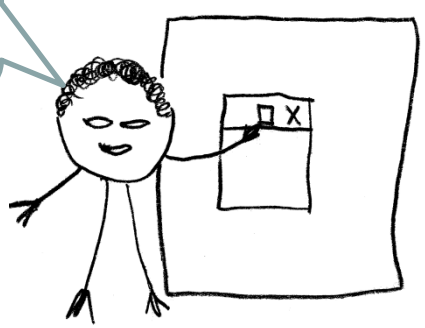
http://classes.engr.oregonstate.edu/mime/spring2010/me414-001/g2/pages/system.html

Obtaining a functional understanding

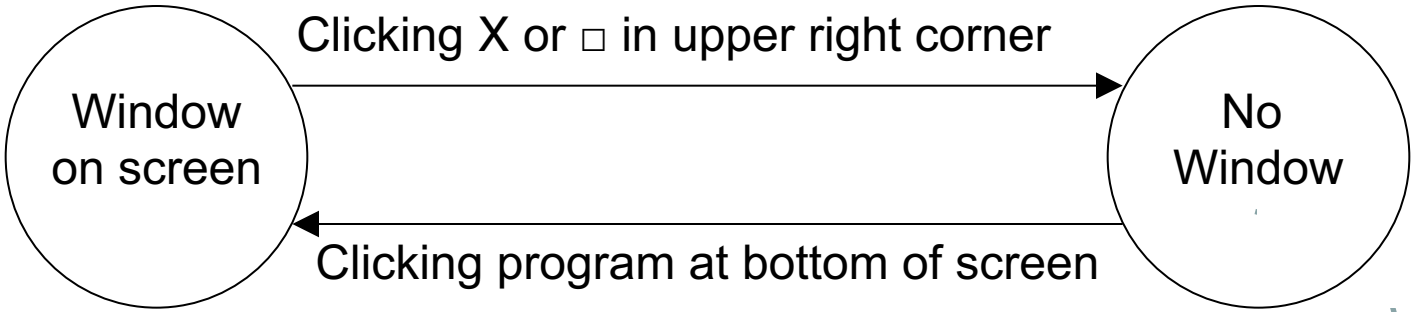


Discrimination error

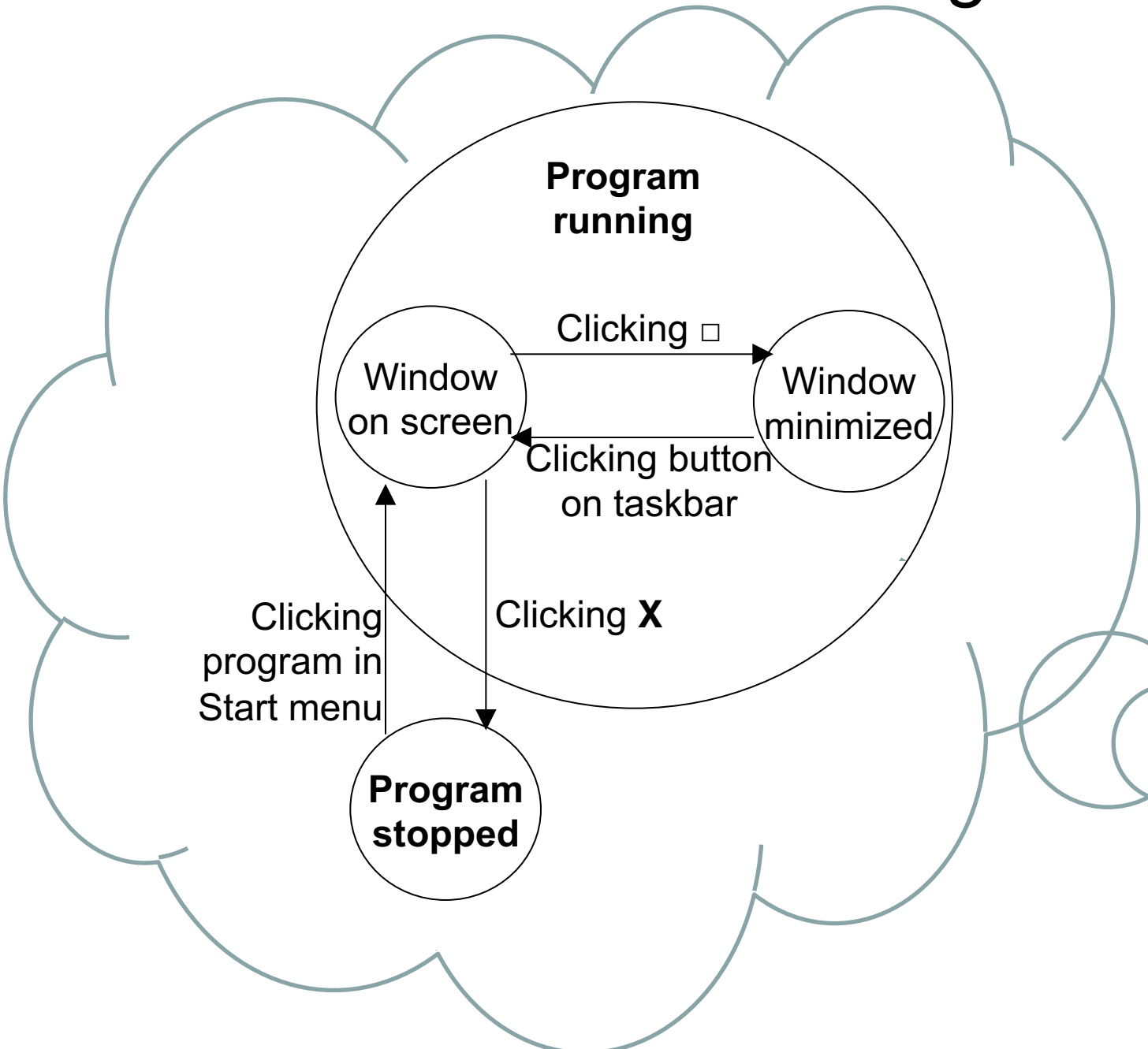
With this you can minimise the window

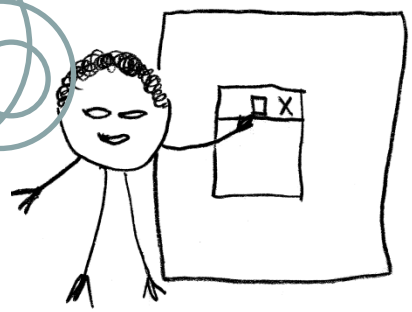


Oh, I can use this one also



The functional understanding of the teacher





Confronting misconceptions

I just completed the form, and now its lost! See, the Data Set Report from August is empty. The internet must be down.

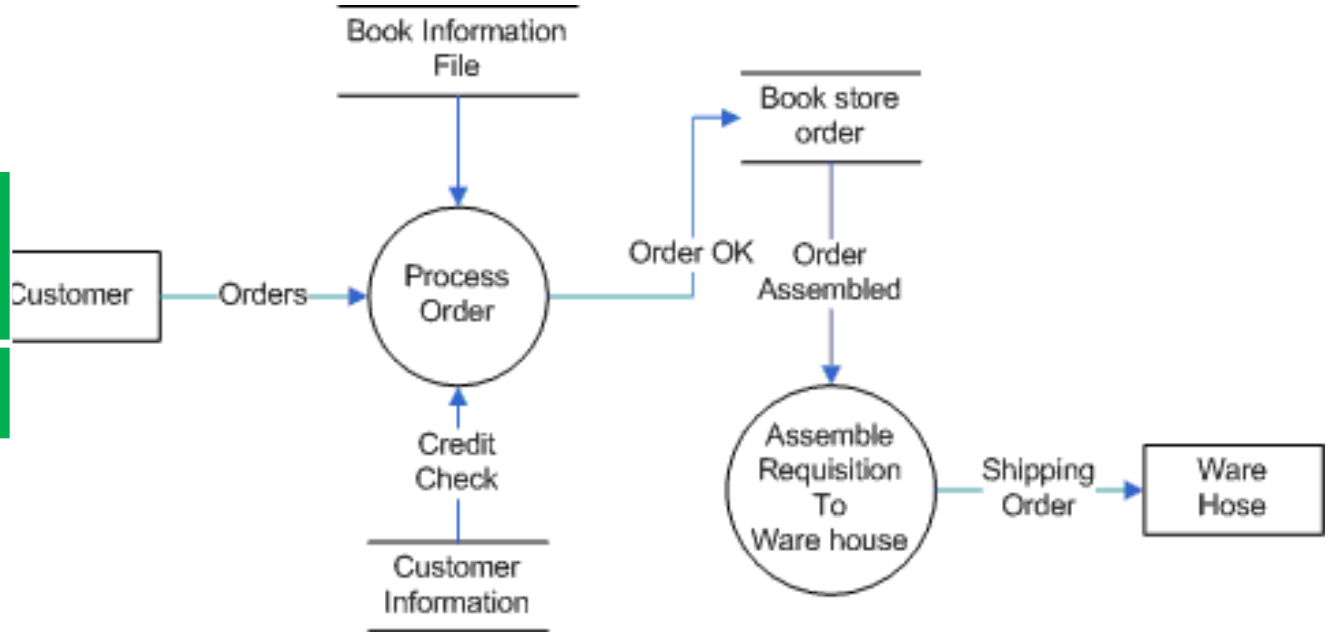
No, you see, data is not available in the reports until tomorrow. DHIS has to process them during the night.

Oral

Levels of ease of structuring data

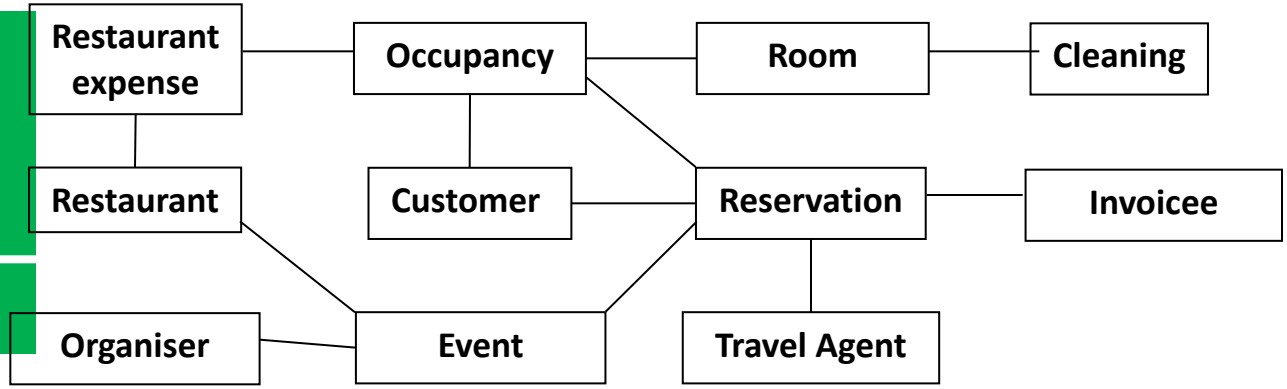
Process modeling

Easy



Data and object modelling

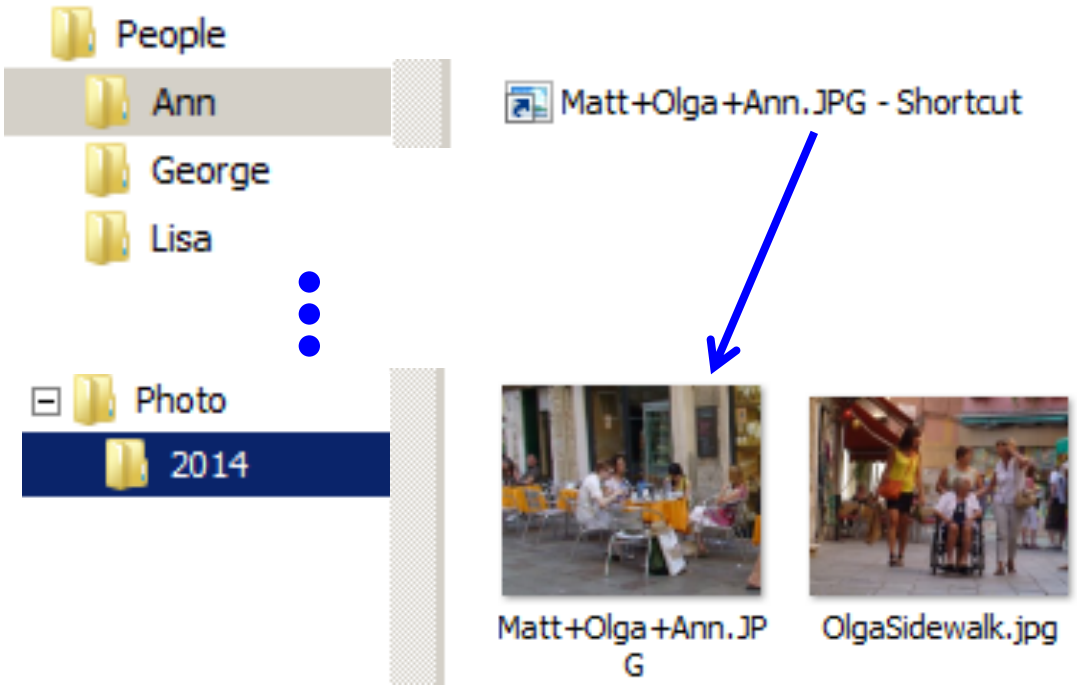
Difficult



Vessey & Conger, 1994

Structural models – scaffolds for structural understanding

- Recognisable
- Simple
  - Only essentials



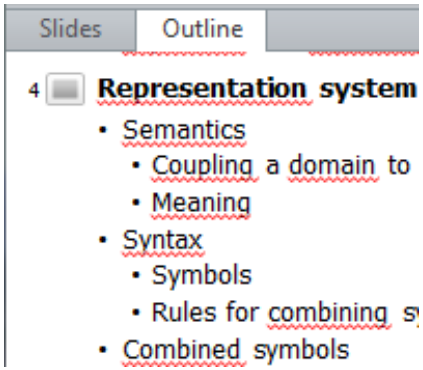
Data structures

- 1-many relationship between customer and address
  - Not explicitly stated

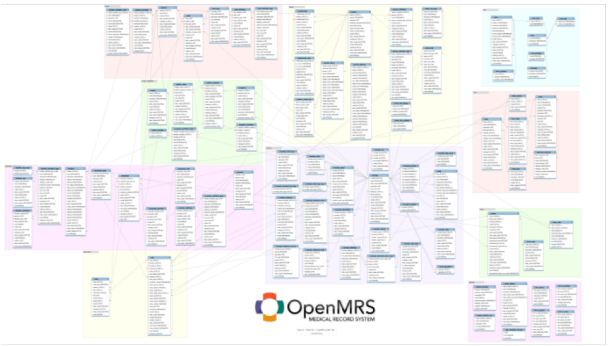
Restrictions on values

1. Find the data structures

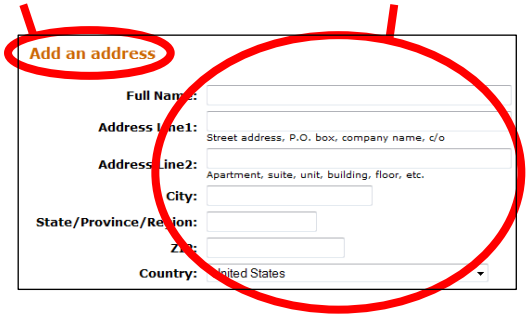
- Outline views



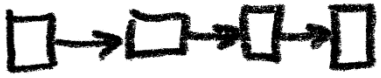
- Data models



- Deduce from user interface

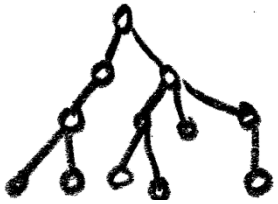


2. Decide main and sub structure types

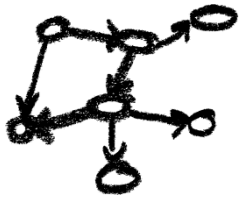


- Sequence

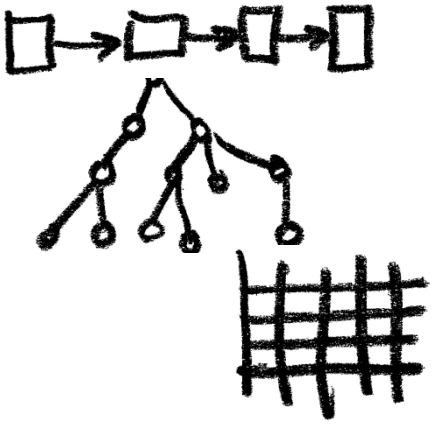
- Grid (array, matrix)



- Hierarchy



- Network



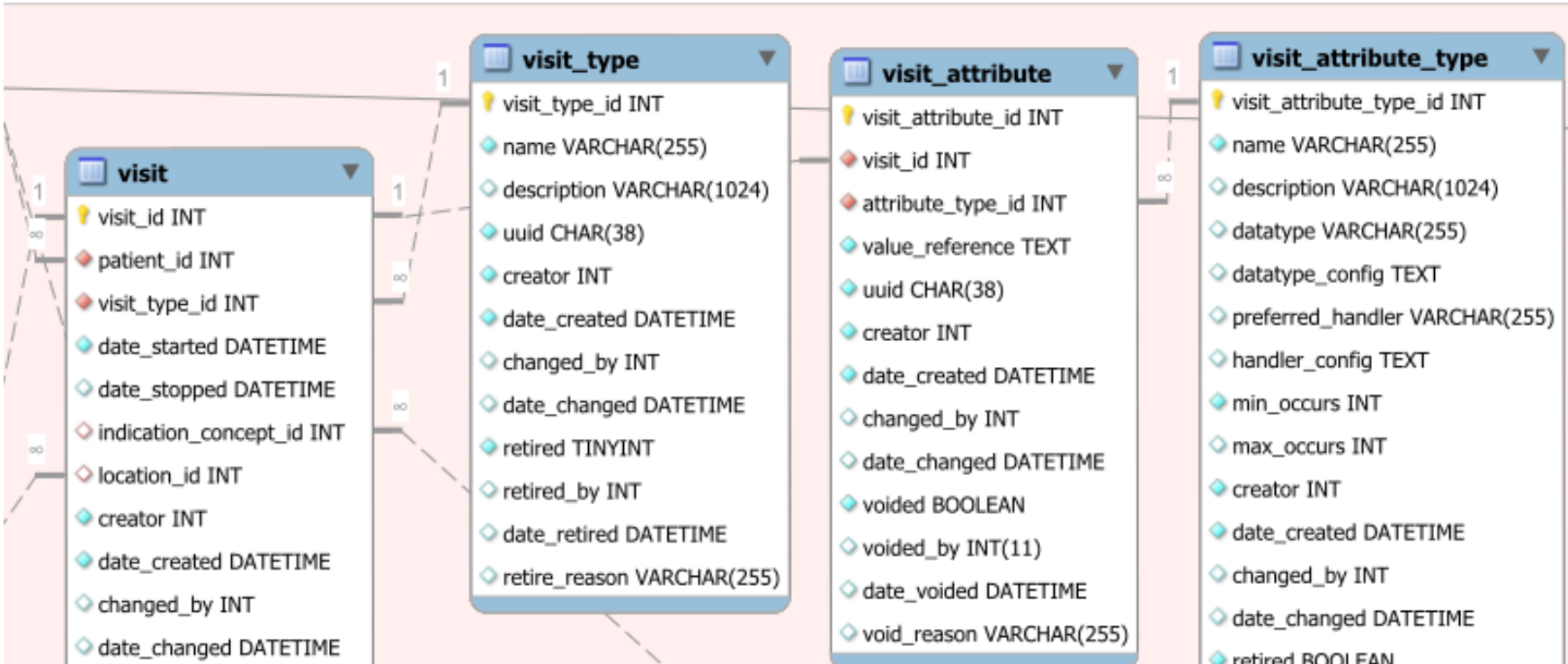
Combinations?

3. Decide user group

- Most users
  - Entering and reporting → Only data

Visit
Visit-ID
Patient
Visit-type

- Superusers
  - Setting up data structures → Include types



4. Include abstract entities

- **Events** in the Domain represented by a record

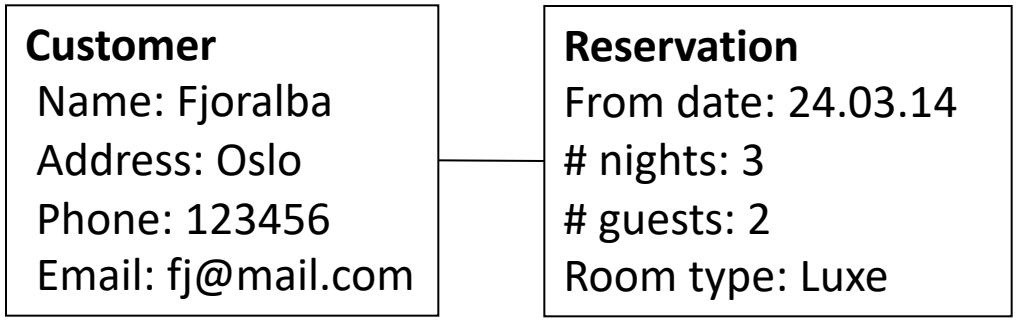
Occupancy
From date
nights
guests

- **Planned events**

Reservation
From date
nights
guests
Room type

5. Include examples

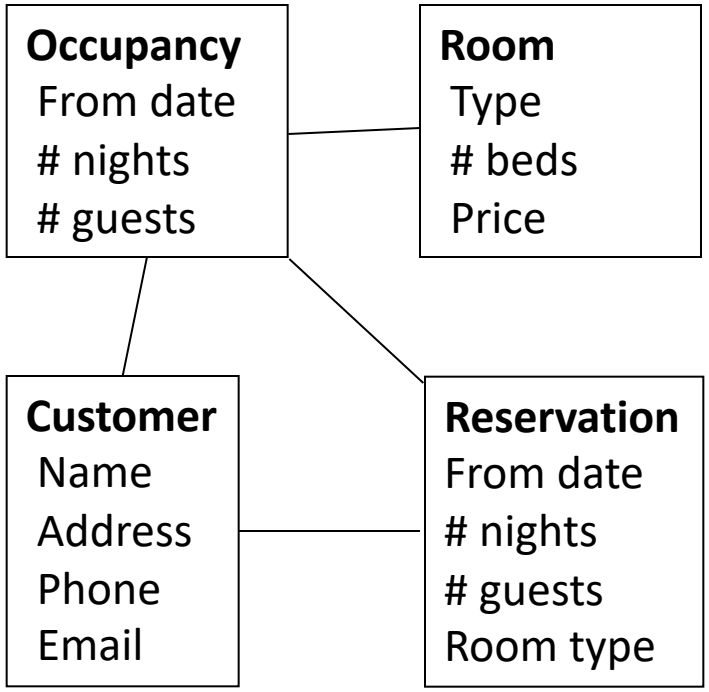
- In the model



- Relate to recognisable places in the user interface

New reservation	
Name	Fjoralba
# guests	2
From	24 March 2014
# nights	2
Room type	Luxe

Structural models for intermediate level users



Types and Instances

Type

•Description of a common set of symbols and operations

Integer

Number without decimals

Calculation operators

Instances

•A unit of data adhering to the type

234 -2 1 000 000

Class

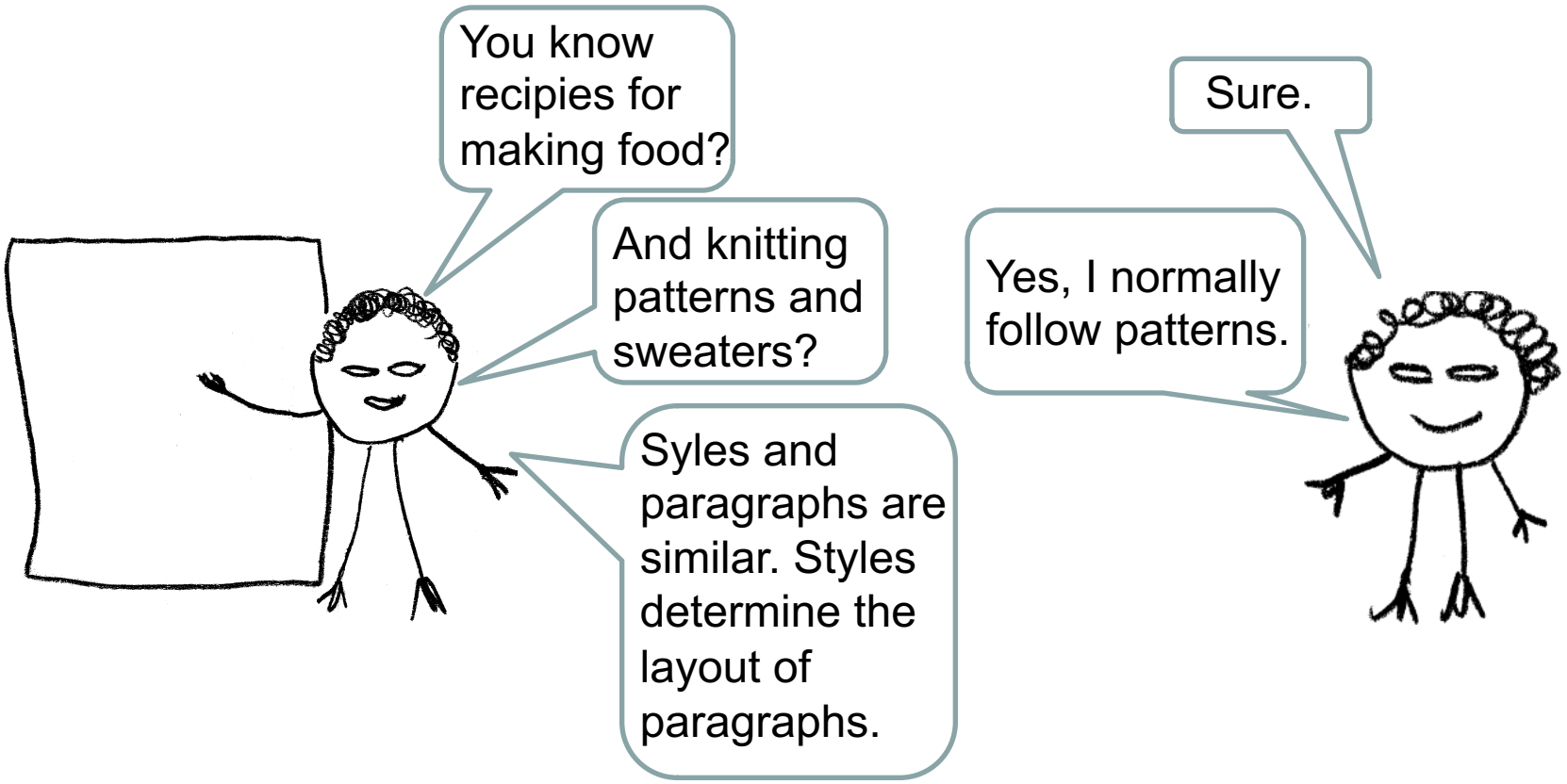
Account
Balance
Owner
Deposit
Withdraw

Objects

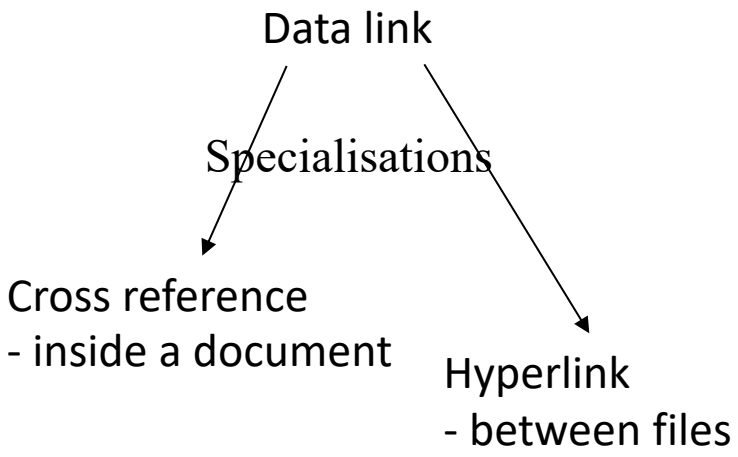
:Account
18 473.32
Kari

:Account
3 292.00
Ola

Obtaining a structrural understanding

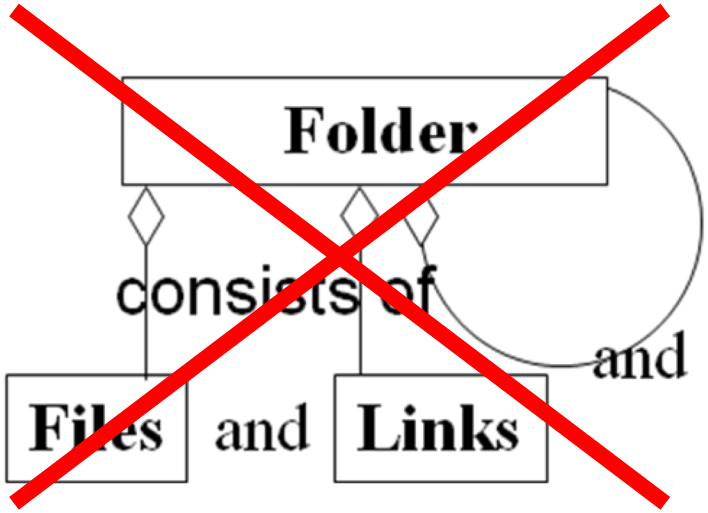


Structural model of IT – Generalisation-specialisation

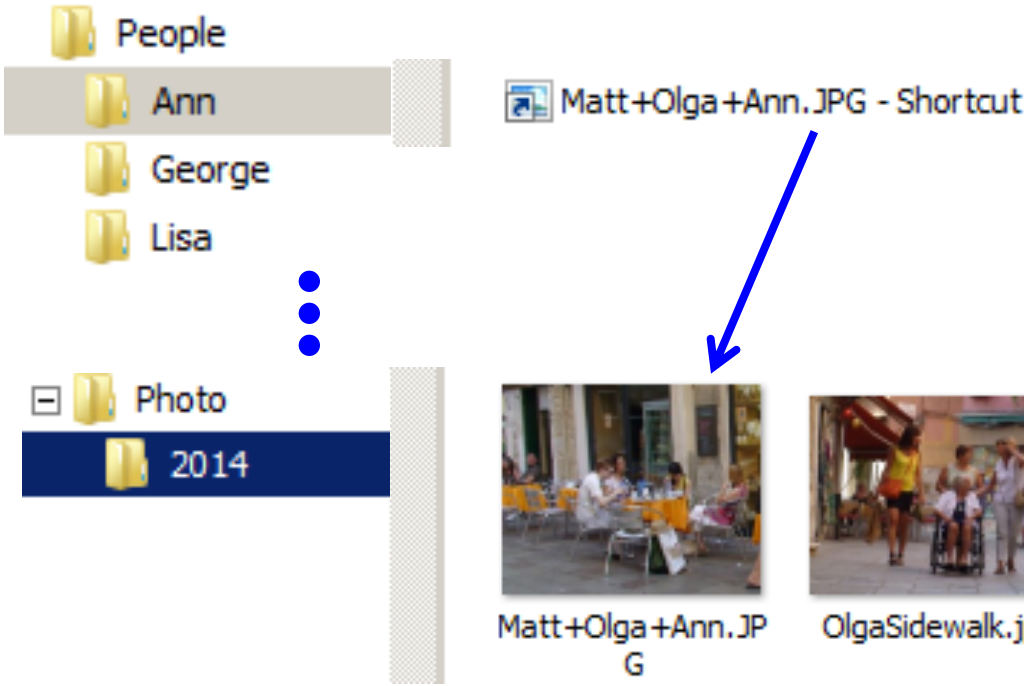


Graphics

- Recognisable
- Simple
  - Only essentials

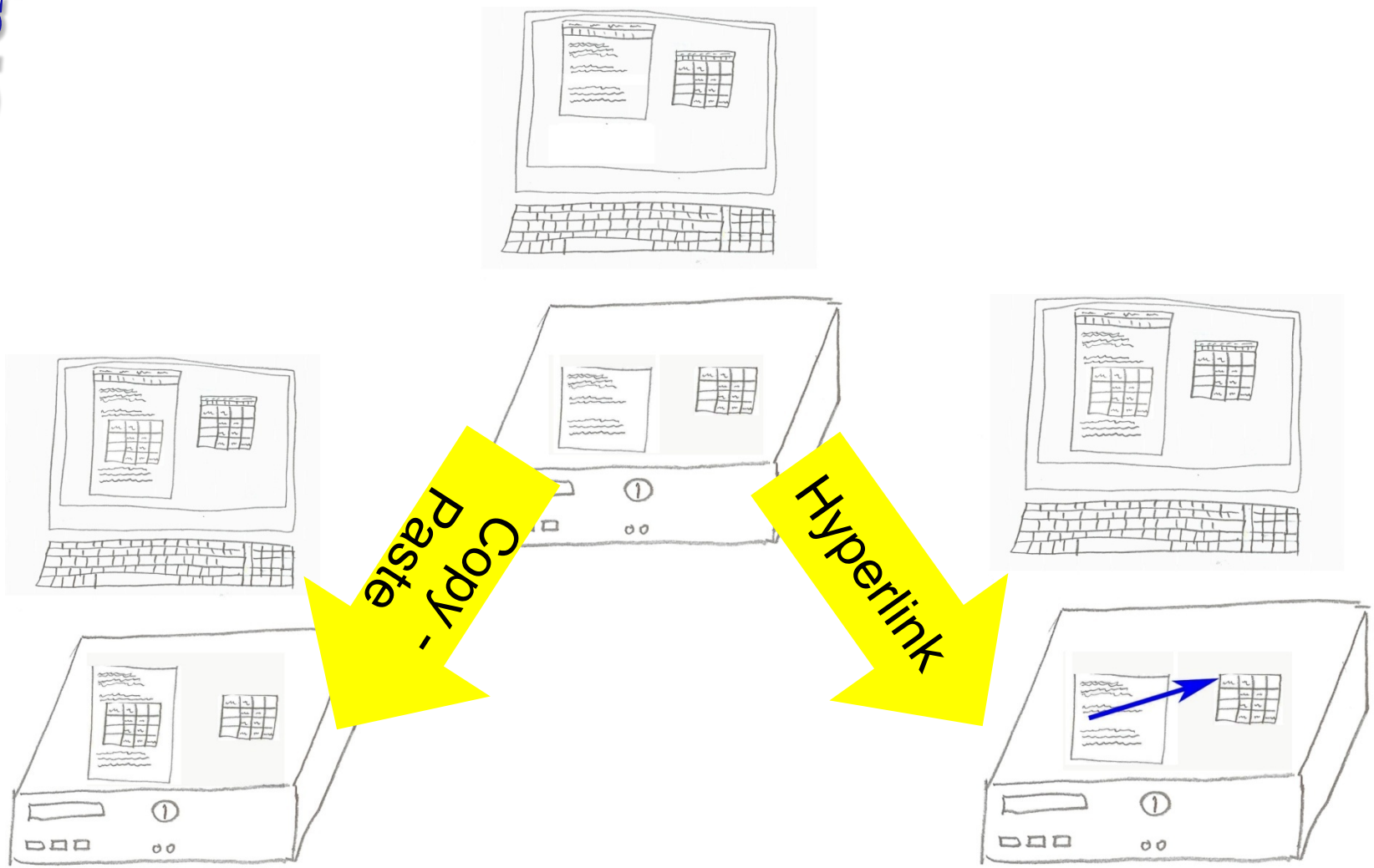


Unknown notation



Recognisable

Functional and Structural model of IT – Discrimination

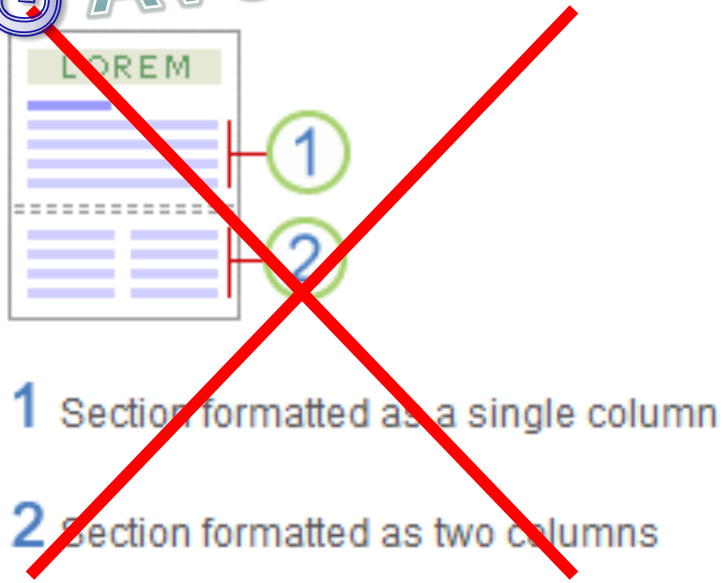


Inconsistencies when updating the spread sheet

Inconsistencies avoided

Graphics

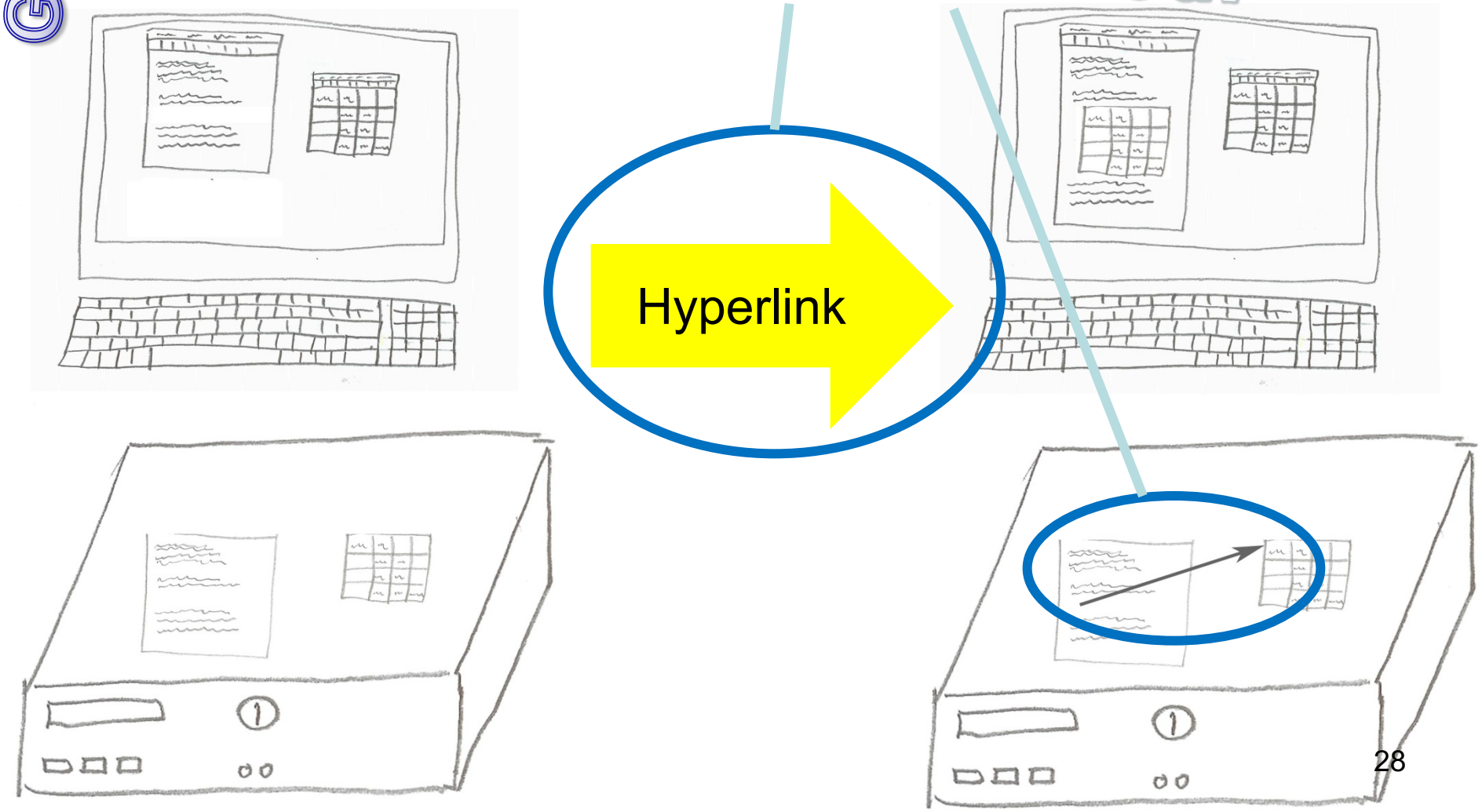
Avoid codes



Place related contents next to each other

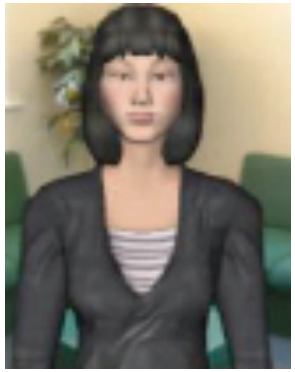
Microsoft Help
Word > Page breaks and section breaks
> Insert a section break

Make sure that symbols denoting different things vary in shape and colour

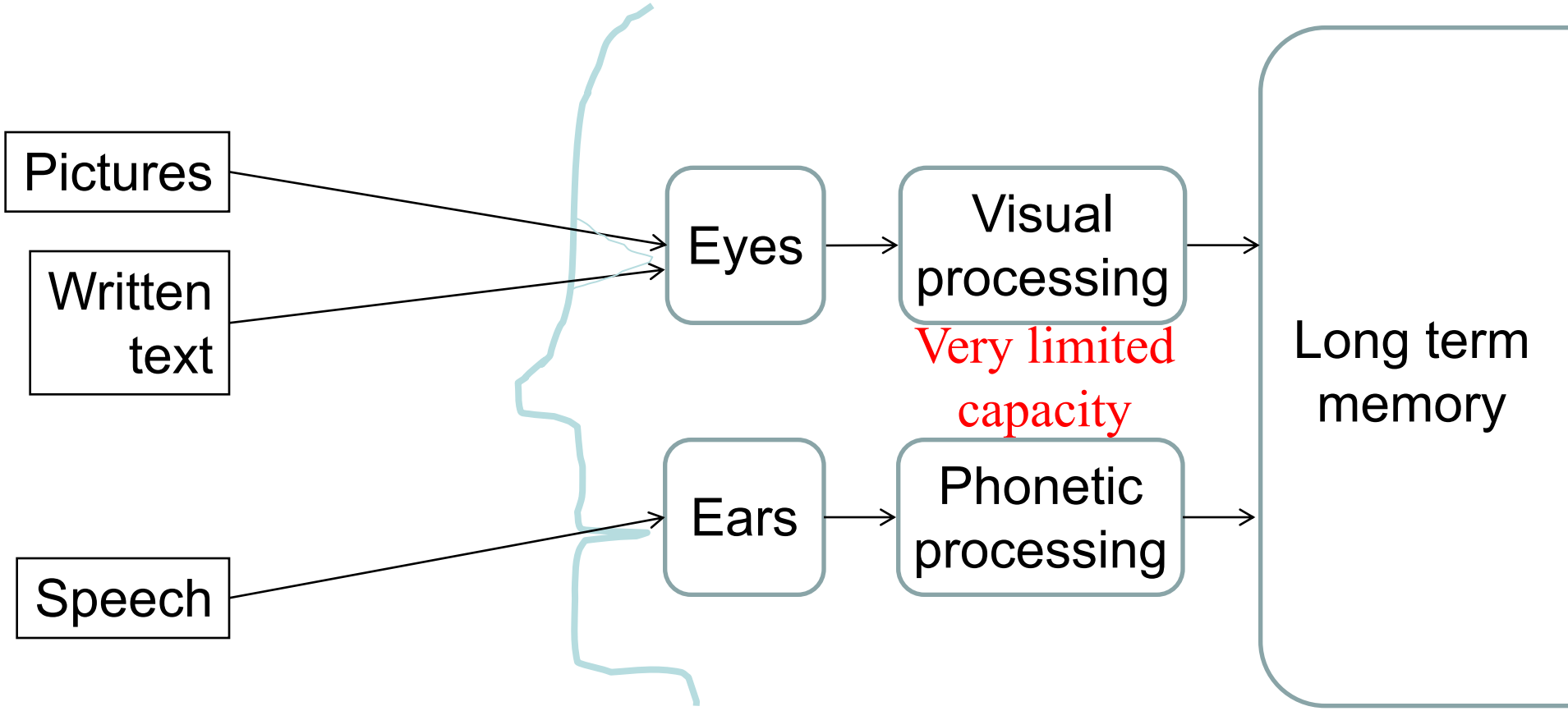


Video

- Make learners feel being in a conversation
  - We and you
  - Learning agent
  - Natural voice
- Describe complex visuals with audio only



Exploiting both the visual and oral channels



- Teaching and videos
  →Minimum of written text

Testing understanding

Questioning the learners

- What is a …
- What is the result of …
- What is the difference between …

A style is a …

a. document which looks good.
b. collection of formatting for a document.
c. common set of formatting for all paragraphs
d. collection of formatting for a paragraph.
e. sequence of characters of the same shape.
f. uniformly looking document.

Not

- How do you …
- Where do we find …

Summary

Which types of learning material does this Excel tutorial consist of?

3. Provide functional and structural models and confront misconceptions.