Chapter 6.   Understanding information

The learning aim of this chapter is to be able to determine the representation system and correspondence issues in topics to be taught, and to identify levels of understanding of representation system and correspondence. Also, the chapter aims at providing skills in the representation system used for slide design.

There is no end to the types of domains which can be represented by information, and each of them has their own structure. Regardless of all differences, we are dealing with a domain, a system of representation, and the correspondence between domain and the information which is expressed in the system of representation. For instance, the domain can be health, the information consists of numbers, and the correspondence can be expressed like "there were 178 cases of malaria in the community."

For all representations, we can identify ideal types of competence which only concern the information or which only concern the correspondence between information and domain. We will explain this through an example.

Consider the data in Figure 25, where the number of malaria cases for four areas are represented in a line graph. The data has been typed in some computer system, which has generated the graph.
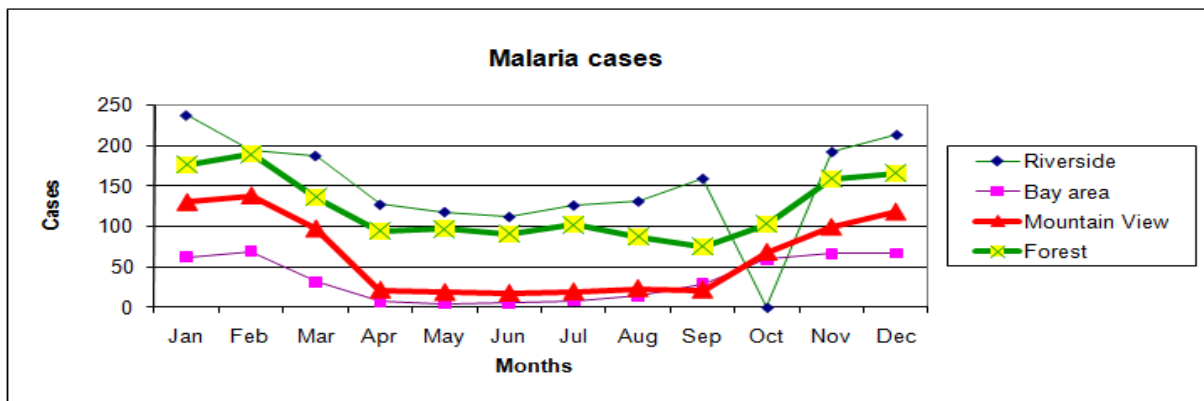

Figure 25. Information representing health issues in four areas in a district.

6.1.   Representation competence

Reproduction skills. Emi has typed the data and made the computer system produce the graph. She knows nothing about the domain represented here, namely malaria epidemics. Also, she is ignorant about criteria for data quality like consistency and completeness, so when she checks the output from the system with her data source, she checks all numbers and does not consider the data for October in Riverside in particular. Emi has reproduction skills

Representation system skills. Ibrahim is also ignorant about malaria epidemics, but he is a statistician, so he notices the trends of less malaria during April-October. He also sees that the data for October in Riverside is an outlier, so he checks that he has actually typed this number in accordance with the source he has received from the health personnel. Since he is fluent with the type of representations used but not necessarily with the domain being represented, we say that he has representation system skills.

Representation competence concerns the system of representation, and not the domain being represented or the correspondence between these. Gabriela, who speaks Portuguese, has the representation system skills when typing a report in Portuguese from a script, since she can correct the grammar and the spelling. However, since she does not know English, she would not be able to spot misspellings in the original when typing an English manuscript, so she would only have the reproduction skills when typing English with a word processor.

Representation system understanding. If Gabriela in addition to correcting grammatical errors also can explain what the grammatical rule says, she understands the structure of the Portuguese language, or more general, the representation system. Similarly, Ibrahim would also be at this level if he could explain the statistics of outliers, referring to standard deviations, etc.

We will call the whole process *externalisation of representations*.

6.2.   Correspondence competence

The *externalisation of correspondence* process deals with the ability to make the information match the reality to be represented.

Interpretation skills. Janine knows the malaria epidemics, so she is familiar with the trends of less malaria in the dry season. Seeing the line graph, she explains:

During the dry season, there are fewer mosquitoes, hence less malaria. That is why the number of malaria cases are low during March to October, and high during the rest of the year. Interestingly, there were no malaria cases in Riverside in October.

 Janine can interpret the information, so she has interpretation skills.

Validation skills. Angelique knows that the variation in malaria incidents for Riverside from September to November is impossible, so she identifies the October data as an error. She could correct it by entering a number for October in between the values for September and November, but then she would utilise representation system skills. Validation skills would require that the clash is rectified by aligning the information with reality. In this case, that would require a recount of the patients being treated for malaria in Riverside in October.

In case of information which signifies activities or transactions to take place, the correspondence between information and reality would be achieved by changing the reality according to the information.

Validation understanding. Again, the understanding level requires the ability to express the idea of validation. Instead of recounting, Angelique contacts those who have produced the data source, discusses the mistake and arrives at a plausible figure. Being able to bring the representation in line with the reality through expressing her concern about the clash, Angelique has the validation understanding.

We will take a quite different example, which is uploading a video onto YouTube. Assuming that you are familiar with uploading files, YouTube does not surprise you, so your analogy with previous applications works out. After uploading has completed, some fields to fill are displayed, see Figure 26.
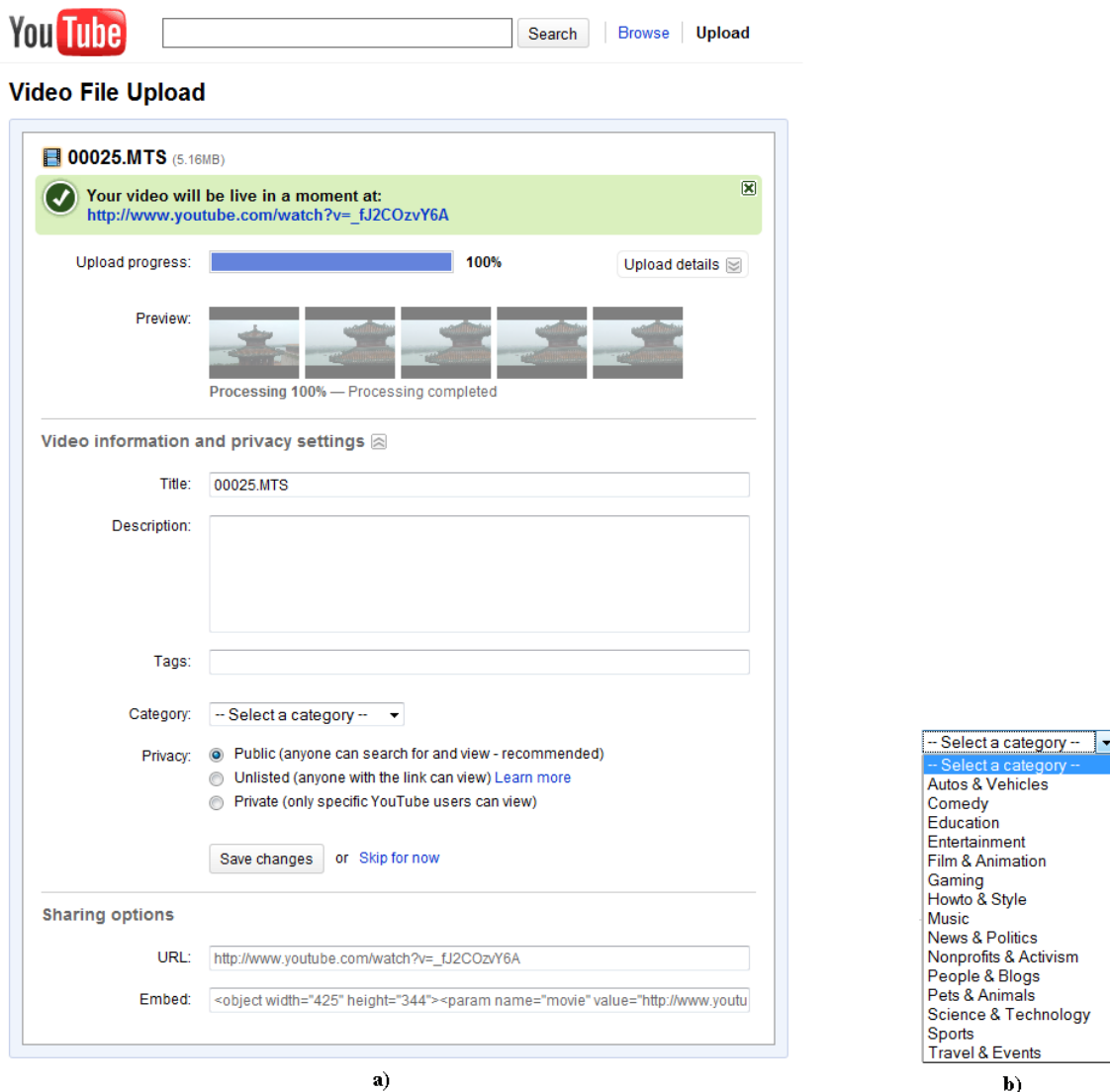
Figure 26. a) Fields to fill about a video which has been uploaded. b) The available categories to select.

The fields to be filled need validation skills, so that the information entered corresponds with the video. Also representation system skills are needed, so that the title and the description are

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expressed according to grammar and style. Selecting Category is done from a menu of fixed choices, so for this selection the reproduction skill of selecting a menu choice is needed in addition to the validation skill of selecting the category which fits the contents of the video.

Title and Description might be obvious, but what is a Tag, and how does it differ from Title, Description and Category? And what does Sharing options mean? Tags and Sharing options seem to be information about videos, thus representing the domain of this web site. However, the person who has never uploaded a video before may not even be at the level of interpretation skills for these fields.

Tags are not just information about videos; 'tags' is also a computer concept. The Externalisation of concepts model for levels of mastery of IT concepts learning could be used for characterising learning of any concept which is implemented in a computer. The skill of tagging would be the ability to write something in the Tag field. Functional understanding would be the ability to say that initially, the video has no tag, and after having typing something, is has a tag. At the level of IT understanding, the user should be able to use the tag concept when talking about other aspects of videos, for example saying that tags are used to alter the video appearance and format.

The example illustrates that for characterising levels of mastery of representations of domains; also the externalisation of concepts model may apply in addition to the representation competence and the correspondence competence.

Correspondence competence as described above assumes that there is straightforward connection between information and a phenomenon in the world which the information represents. For many reasons, this assumption has limited validity.

Consider the Indian tourist Ravi, who during his visit to Egypt publishes the picture in Figure 27 with the caption in his Facebook albums, so his friends at home can watch. Ravi assumes that his friends understand that the construction in the picture is actually not Taj Mahal, with which they are familiar, but the pyramids in Egypt. Further, Ravi wants to say that the pyramids are as magnificent as the Taj, and he hopes that the caption will communicate this. In general, we use a word which has a conventional meaning in a different way, and hope that the context will be sufficient for the reader to get the intended message anyhow. This example is from leisure life, but we find plenty of examples of metaphors and irony in business also. Metaphors require validation skills, not for adjusting the information or the reality, but for adjusting the interpretation of the information into something that makes sense compared to reality.

Figure 27. Today we visited the Taj Mahal here in Egypt.

When the figure in the accounting system does not match the one on the receipt, it is unlikely that the accountant intended the reader to interpret anything else than the figures recorded. It is either an intended or unintended mistake; the former would constitute a lie. Mistakes or lies which are out of the normal range might be found through representation systems skills or validation skills, but when the errors are smaller, routinely comparing the information against reality is the only way of finding out.

Normally, the author of a novel intends the book to be a complete lie, in the sense that there is no corresponding reality to the information provided in the book. Since the reader is aware of this, nobody gets confused. In some cases, readers may start discussing a fictional universe which the books refer to, in which case we can say that there is a correspondence; not between information and reality, but between information and an imagined world. Then we can consider correspondence competence in such a setting also.

Most databases are intended to contain accurate representations, and in general they may actually do. However, quantities of data are always prone to small errors and incompleteness, which is acceptable as long as the essence is correct. For example, an address list may state that a person lives in New Iork, and the post office might send the parcel to New York. Assuming that the I was a typo for Y, the redundancy in the name enables the reader with sufficient representation systems skills and validation skills to correct the error.

A painting of a person is a representation of this person, informing the viewer of the person. Completely abstract, or nonfigurative art does not represent anything, so it is not informative, hence it is not information. Similarly, absolute music, for instance Beethoven's 7th symphony, is purely sound, without anything intended to be represented by it, not even in the title of the work or in the individual movements. The title is just informing about the form of music and how it is to be played, not about anything outside it. However, painting and music could be used for representing something, so the system of colours and tones could still be found in the art; hence representation competence would be relevant. On the other hand, when The Beatles

is performing "Yesterday," the lyric is informing us, possibly in the same way as the fiction author.

6.3.   *A representation system – slide design*

There is a large number of representation systems in daily use. In addition to spoken and written natural language, there are musical scores, dance notation, chemical formulas, knitting codes, and programming languages, to mention a few. We will present some principles and concepts for a representation system which is also useful in user training, namely slides. Being able to explain principles for slide design corresponds to the representation system level of understanding for slides, or 'slide design understanding' for short.

Slide design is not independent from other ways of representing the world; on the contrary, it brings in the written language and all possible kinds of illustrations. Using already known representation systems makes slide design appealing, since people do not consider that designing slides require any additional competence. However, this is also the pitfall of slide design; people use PowerPoint or Impress as if it were a word processor with page organisation of the text and easy manipulation of the format and figures. We use the products of presentation programs for accompanying a presentation or for displaying a slide show on its own, and both of these differ from the purpose of a written text, which is meant to be read at the readers' speed. Also, each of the two purposes of a slide show has its own design rules, and we will in this section address the design of slides which accompany an oral presentation. We will come back to design guidelines for design of independent slide shows in Chapter 9.

A main reason for using slides in a presentation is that it allows for more than one way of presenting the material at once. Since some people learn better by hearing, others through reading and still others through seeing a figure, all three groups in the audience can be satisfied at the same time. Moreover, most people learn even better through a combination of impressions, so that presenting in oral, written text and figures at the same time is advantageous for all the audience. This brings us to the first guideline:

1. Combine text and illustrations.

When we are listening to a presenter at the same time as reading the text on the slide, we would easily loose out on one or the other. In order to minimize this fall out, we would normally write text which is read very fast, and this would be seven words in one line. This line should present the essence of what the presenter is saying in a few sentences, which could constitute a paragraph if written. Copying full sentences from a textbook or a web page onto a slide, which some presenters are doing, is therefore a dysfunctional way of using slides. The slide in Figure 28 illustrates the result of copying full sentences into a slide. In order for the audience to grasp the message, the presenter has to read aloud the full text. The main message of this slide is rewritten in Figure 29. The text on the slide can be read in five seconds, and the design illustrates the process of producing the letters. After pointing to the four elements in this slide for explaining the essence of mail merge, the presenter can subsequently tell about how the list of recipients is stored and other details from the full text.

Mail merge

- **Mail merge** is a software function describing the production of multiple (and potentially large numbers of) documents from a single template form and a structured data source. This helps to create personalized letters and pre-addressed envelopes or mailing labels for mass mailings from a word processing document which contains fixed text, which will be the same in each output document, and variables, which act as placeholders that are replaced by text from the data source. The data source is typically a spreadsheet or a database which has a field or column matching each variable in the template. When the mail merge is run, the word processing system creates an output document for each row in the database, using the fixed text exactly as it appears in the template, but substituting the data variables in the template with the values from the matching columns

Figure 28. An inappropriate slide design. Text from Babylon Online Dictionary.

One master letter
A list of recipients

Mail merge

One letter per recipient
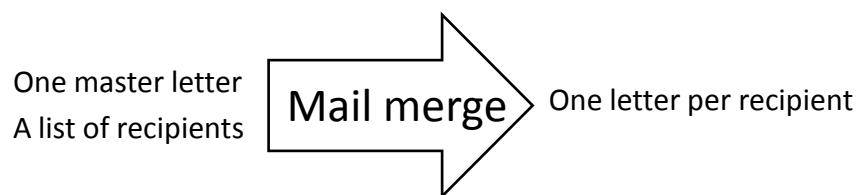
Figure 29. One point per line. Graphics illustrating a process.

In some cases, for instance when presenting a quote of a couple of sentences, we need to display the full text on the slide. To avoid fall out in such a case, the presenter should read the quote in full, so that the oral and visual impressions are synchronised. In general the guideline is:

2. Write each point on one line.

Simplicity is also an advantage concerning illustrations. They should display the essential of the point and avoid disturbing details. If the point of the illustration is to show the reality, a photo is appropriate, but unnecessary surroundings should be cut off to avoid distracting details. If the point is of a more abstract character, a drawing is better suited for communicating the essentials and avoiding the disturbances. In summary:

3. Keep illustrations as simple as possible

Text and figures displayed on a screen may look large for the presenter, but the audience at the back of the teaching room may have trouble reading the text. To ensure legibility, use minimum 18 points font size and sans-serif typeface Figure 30, since these are clearer when displayed on projectors than the serif fonts.
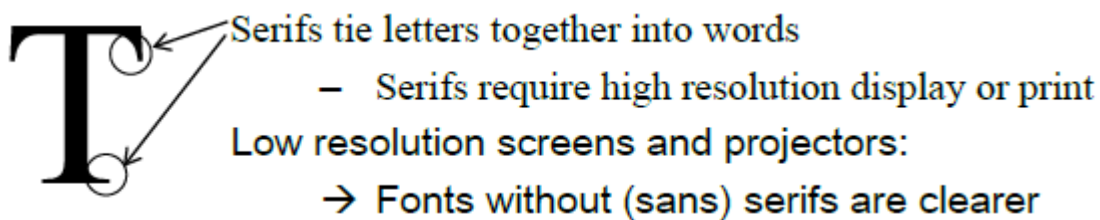

Figure 30. Typefaces with and without serifs.

Slides are also often printed as handouts and reduced in size to accommodate more slides on one page. Font size 14 on the original will then become tiny and difficult to read for the long-sighted, while the near sighted have trouble reading 14 point size on the screen. The conclusion is:

4. Minimum 18 point font size with a sans serif font.

The other factor which affects legibility is the contrast between the text and the background. Black on white or white on black are safe, but nearly all other combinations are reducing legibility. Also backgrounds which can be chosen in a commercial presentation program may hamper legibility. The yellow marker colour is the only background colour which actually improves legibility, and therefore it should be used for emphasizing. Black letters on a light blue background may help dyslectics, and this combination is also fine in general. Visibility of figures also require sufficient contrast, and even if the contrast looks good on a screen, a projector might require a larger difference between light and dark in order to deliver easy to see pictures. So,

5. Keep contrast between text/graphics and background close to black versus white.

More thorough introductions to slide design can be found in (Duarte, 2008) and (Reynolds, 2010). Many guidelines can also be found on the web, for example at SlideShare.

Exercises

1. Identify elements of Reproduction skills, Representation system skills and Representation understanding for the representation systems

   - Internet domain names
   - Musical scores
   - Bibliographic references

2. Provide examples of the difference between Interpretation skills and Validation skills for the information in

   - Credit cards
   - Cinema ticket system
   - Music database
   - eBay or another e-auction

3. Consider the following pie chart and the comments to it. Characterise the comments according to their levels of representation and correspondence competence if possible.
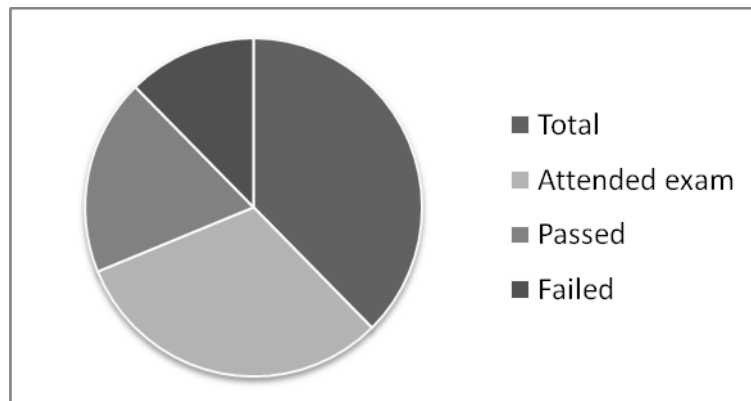
Domenico:

So the biggest proportion here is the total. That is like it should be.

Julia:

Oh, that is a terribly high failure rate. What can we do about it?

Kylie:

This diagram is completely rubbish. What was the purpose?

4. Ask your fellow students to explain when the following events will take place next time:

   - Leap day (29th February)
   - Vernal equinox

- Easter

- Eid ul-Fitr (Id al-Fitr)

- One of the Hindu New Year's days (Gudi Padwa, Ugadi, Vishu, Bihu)

Characterise the comments according to their levels of representation and correspondence competence

5. For the case of video uploading on YouTube, write explanations of

- Tags

- Sharing options

at the levels of representation system understanding and validation understanding.

6. Assess the following slides according to the guidelines given in this chapter.

Introduction

– The change must be compatible with existing cultures, and the organizational needs, Otherwise user of the new implemented information system may resist its use.

– Introduction of a new information system requires institutionalization of a new kind of culture.

– An implementer of an IS must be aware of the types of change, the impact of change to the user and the organization .

– In these case where user support was not adequately provided there might be resistance towards a new implemented IS use
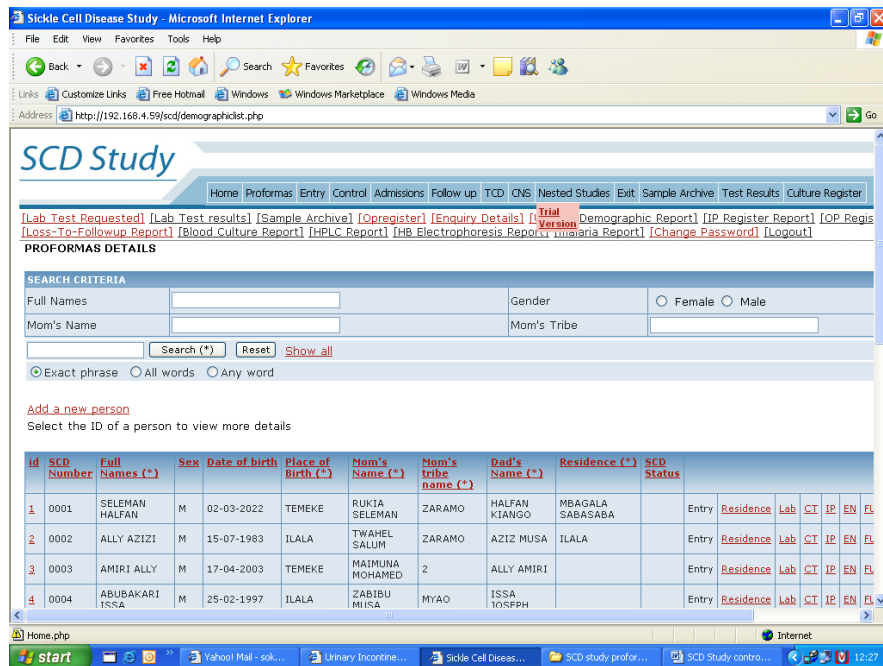
7. Compare the slide design guidelines in this chapter with other guidelines which can be found on the web. See e.g.

- TechRepublic http://www.techrepublic.com/article/10-slide-design-tips-for-producing-powerful-and-effective-presentations/6117178

- EllenFinkelstein.com http://www.ellenfinkelstein.com/powerpointtips/powerpoint_tip_tell_n_show_slide_design.html

Project

Identify the information competence which you need to include in your conceptual-practical training. Also, determine the information competence, which your teaching will build on. Which level of representation system and correspondence competence should be the learning goal of your session?

Define the information competence to be learnt and the targeted level of learning. Present your definitions on a slide.