Outline

- Summary last lecture
- Text – a visual sign system
- Image – a different visual sign system
Intro knowledge - summary

Investigated

- The concept of context

Findings

- The access of information depends on the personal, spatial and temporal context in which a user is situated.
- Context requires the synchronisation of several models (e.g. user, presentation, knowledge, location, etc).
- Modelling context requires a clear understanding of the tasks performed by the user, as it is them that determine the detail required in the content description of the media items => one approach towards restricting descriptions (reduce complexity).
- Keeping track of events in time is essential to allow a system to adapt to the user through learning (history model).
Knowledge and symbolic communication

Knowledge:
expertise, and skills acquired through experience or education

Signal Source — Signal — Observer

p = perceive

p = conceive
Knowledge example - Colour

Colour

• Physical phenomenon
• Psychological phenomenon
• Social phenomenon
Knowledge example - Colour

Sapir-Whorf Hypothesis: Connection between thought and language.

If you haven't got a word for it, you won't think about it (linguistic relativity).

If you don't perceive it as a concept, you won't invent a word for it.

In English there are 11 basic colour names (that is, roughly speaking, words that we teach our children):

Red, orange, yellow, green, blue, purple, brown, pink, black, white, grey

Orange example provided by courtesy of Steven Pemberton
So do you think that the colour orange is named after the fruit, or the fruit is so-called because of its colour (England)?

In fact there was no colour orange in English until the introduction of the fruit in the 16th century. Until then it was just a reddish-yellow.

The progression of the name was unsurprisingly gradual. After the introduction of the fruit, you find people talking of things having an "orange hue" (where "orange" still refers to the fruit), and it wasn't until around 1600 that people started using the word orange as a free-standing colour name.
It turns out that how the colour spectrum gets divided into names is largely cultural.

For instance Ao (青) is a Japanese color that covers English blue and green: in Japan, green traffic lights are ao shingo, blue skies are ao zora, and green apples are ao ringo.

The African Himba language and the Mexican Tzeltal language are examples of other languages that do the same.
Knowledge and symbolic communication

Representing knowledge in media-based systems requires:

- Relevant conceptual models
- A language to represent the models
- Interpretation mechanisms
Text – a visual sign system
Saussure, Ferdinand de  - (1857-1913) Swiss linguist. His *Course in General Linguistics* (1916, posthumous) is generally considered to be the foundation of modern linguistics. He envisaged the development of semiology as a science of signs.

Peirce, Charles S.  - (1839-1914) American scientist and philosopher. One of the foremost philosophers of 'pragmatism' - no object or concept possesses validity or importance in its own right. Its significance lies only in the practical effects of its use or application. For Communication and Media students, his importance lies primarily in his development of semiotics.
Approaching text

- **Text**
  - **written or spoken**

- **lexis**
  - the total vocabulary items in a language

- **morphology**
  - the form and structure of words, and their derivation and change over time

- **syntax**
  - the combination and arrangement of words within larger structures such as phrases, clauses and sentences

- **psycholinguistics**
  - the interpretation of utterances in the context in which they are used

- **phonology**
  - the sound system of language

- **semantics**
  - meaning, changes in meaning and the principles that govern the relationship between words and sentences and their meanings

- **stylistics**
  - characteristic choices in language use made by different individuals or groups

- **graphology**
  - the writing system of a language
A code is a rule-governed system of signs, whose rules and conventions are shared amongst members of a culture, and which is used to generate and circulate meanings in and for that culture.

A set of **signs** that carry meaning.

A set of agreed **rules** for combining those signs together:

- Perceptual (e.g. Typography)
- Syntagmatic (e.g. Grammar)
- Paradigmatic (e.g. Ontology)
- Social (e.g. Word use)
Syntagms are often defined as 'sequential' (and thus temporal - as in speech and music), but they can represent spatial relationships. The plane of the syntagm is that of the combination of 'this-and-this-and-this' (syntax).

Example:
shoes socks pants sweater scarf hat

A paradigmatic structure represents potential substitutions in which a range of candidates can take the place of a sign in the syntagmatic structure. The plane of the paradigm is that of the selection of 'this-or-this-or-this' (semantics).

Example:
knickers short
shoes socks pants sweater scarf hat
kilt
tights
Text – a sign system III

Representation and Transformation mechanisms

**Syntagm**
- Spatial relations (horizontal and vertical axi, centre and margin)
- Logical order (grammar)
- Exposition (proposition, evidence, justification)
- Narrative space (exposition, retardation, digression, omission, redundancy)
- Narrative time (ellipses, compression, insertion, dilation)

**Paradigm**
- clusters (e.g. synonyms)
- doublets (e.g. oppositions)
- proportional series (e.g. a series of oppositional doublets such as female - male, passive - active, etc.)

=> Taxonomy
- hierarchies (ordered semantic units based on relations of inclusion or exclusion, e.g. Pekinese/dog/animal/living thing).

=> Thesaurus

Semantic field: '...a conceptual structure which organises potential meanings in relation to others'
=> Conceptual graph, semantic network, ontology
Text – Description languages/mechanisms

• **XHTML(5)** is a markup language that has the same depth of expression as HTML, but also conforms to XML syntax.

• **XHTML Basic** is an XML-based structured markup language primarily used for simple (mainly hand-held) user agents, typically mobile devices.

• **DATR** is a language for lexical knowledge representation. The lexical knowledge is encoded in a network of nodes. Each node has a set of attributes encoded with it.

• **CyCL** is a declarative language based on classical first-order logic, with extensions for modal operators and higher order quantification.

• **RDF** a general method of modelling information, through a variety of syntax formats

• **RDFa** adds a set of attribute-level extensions to HTML, XHTML and various XML-based document types for embedding rich metadata within Web documents.

• **RDFS** is an extensible knowledge representation language, providing basic elements for the description of ontologies

• **OWL** is a family of knowledge representation languages for authoring ontologies that are based on Description Logics.

• **Dublin Core** is a standard for cross-domain information resource description. It provides a simple and standardised set of conventions for describing things online in ways that make them easier to find.

• **FOAF** is a machine-readable ontology describing persons, their activities and their relations to other people and objects.
Text is a sign system strong on **arbitrariness**, proposing the autonomy of language in relation to reality.

Text emphasis on internal structures and thus does not 'reflect' reality but rather *constructs* it.

Text is **conventional** with an emphasis on the types *index* and *symbol.*
Representing Text in a media-based system:

**Conceptual models for:**
- Typography
- Layout
- Writing system (e.g. Alphabet)
- Syntax (e.g. grammar, markup languages, ....)
- Dictionaries
- Semantics (e.g. taxonomy, thesaurus, ontology, conceptual graph, etc.)
- Style (e.g. frame, template, script,....)
- Genre (e.g. template, conceptual graph)

**Interpretation depends on the task:**
- Search (e.g. text understanding, word matching and/or ranking)
- Generation (e.g. text understanding, question-answering, ....)
- Comparison (e.g. Syntax (pattern matching) or semantics (clustering, distance evaluation, etc.)
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Shelley Jackson's brilliant, unforgettable hypertext novel *Patchwork Girl* is one of the great achievements of literary hypertext. What if Mary Shelley herself made the

**Cultures in Web**

*Cultures in Web*, by Roderick Coover. A challenging and compelling study of new directions for cross-cultural media arts and film production. West African dance,
What’s new at Cycorp:

- **Cyc Training**
  The next Cyc 101 training course will be held from May 5th through 7th, 2008. Training on advanced Cyc topics will be offered from May 8th through 9th. A course description and registration information are available here. We also offer on-site training on semantic knowledge management and ontology development, tailored to your organization’s needs; contact us at cyc101@cyc.com for additional information.

- **Cyc 1.0 is now available**
  OpenCyc 1.0 and ResearchCyc 1.0 are now available and they’re bigger and better than ever!

- **Play to help Cyc learn**
  Now everyone can participate in the global effort to develop the world’s most comprehensive knowledge base!
  Play The FACTory, a fun trivia game, and help improve Cyc’s thinking.

- **R&D in A.I.**
  Cyc was founded in 1994 to research, develop, and commercialize Artificial Intelligence. Cycorp’s vision is to create the world’s first true artificial intelligence, having both common sense and the ability to reason with it. More...

- **Potential applications**
  - Text Understanding
  - Knowledge Management
  - Question Answering
  - Expert Systems
  - Knowledge Extraction
  - Intelligent Search
  - Sematic Integration
  - “Active” Menu and Forms
  - Intelligent Search
  - More....

- **Cyc in the News**
  “Entrepreneurs See a Web Guided by Common Sense”

- **The Cyc Foundation**
  The Cyc Foundation, a nonprofit organization to manage and grow the OpenCyc ontology, has been launched! Please visit www.cycfoundation.org to find out how you can participate.

- **#$Cyclify-Austin**
  Cyclify Austin meets on the second Thursday of each month in Austin, TX. All are welcome. For details, contact us at openyc@cyc.com

- **What does Cyc know?**
  Watch a recent presentation by Cycorp.
Image – a different visual sign system
Approaching an image

"Legend of Orpheus & Eurydice", 2001, The Werner Collection
http://www.wernercollection.com/WorldView1.htm
Approaching an image

Concept

Mental perception of media

SIGN

Signifier (material)

Signified (meaning)
Approaching an image

Mise en scene
Framing
Genre

Distance
(foreground - background)

Meaning

Colour
Object
Materiality

Frank Nack
Kennisgebaseerde media
Image – a sign system I

Perceptual codes
• perceptive codes (establish the condition for effective perception)
• recognition codes which are blocks of signifieds we use to recognize objects
• transmission codes which construct the determining conditions for the perception of an image (dots that make up a newspaper image)

Textual codes
• tonal codes address the prosodic features by connoting them with particular intonation of the sign
• Iconic codes (figures, signs, semes)
• Iconographic codes connote more complex and culturalized semes that are immediately identifiable and classifiable, such as "the four horsemen of the Apocalypse".
Social codes
- verbal language
- bodily codes (bodily contact, physical orientation, gaze, gestures and posture);
- commodity codes (fashions, clothing, cars);
- behavioural codes (protocols, rituals, role-playing, games)
- ideological codes (encoding' and 'decoding' information by using theories such as individualism, liberalism, feminism, materialism, capitalism, socialism, etc.)

Syntagmatic - paradigmatic codes
- scientific codes, including mathematics;
- aesthetic codes (poetry, drama, painting, sculpture, music, etc.)
- genre, rhetorical and stylistic codes (e.g. in narrative: plot, character, action, dialogue, setting, etc.),
- mass media codes (e.g. in photography, TV, film, radio, newspaper and magazine, etc.)
Denotation describes the 'literal' or 'obvious' meaning of a sign. Thus, denotation of a representational visual image is what all viewers from any culture and at any time would recognize the image as depicting.

Denotation is the first level of **signification**.

**Sensory system** → **Media**

- Perceptual codes
- Textual codes
- Social codes

**Sign I**

(denotative sign with signifier and signified)
Connotation refers to the socio-cultural and 'personal' associations (ideological, emotional etc.) of the sign. These are typically related to the interpreter's class, age, gender, ethnicity and so on.

Connotation is the second level of signification.
Image – a sign system V

The third level of **signification**.

Sign II \(\rightarrow\) value \(\{\)
- Social codes
- Syntagmatic codes
- Paradigmatic codes

\(\downarrow\)

Sign III
(valued signifier and signified)
Image – Description methods

ISO

MPEG-1
MPEG-2
MPEG-4
MPEG-7
MPEG-21

W3C

User Interface & applications
Trust
Proof
Unifying Logic
Query: SPARQL
ontology: OWL
Rules: RIF
RDF-S

Data interchange: RDF
XML
URI
Unicode
The **Moving Picture Experts Group**, commonly referred to as simply MPEG, is a working group of ISO/IEC charged with the development of video and audio encoding standards.

Support video/audio "objects", 3D content, low bitrate encoding and Digital Rights Management. Several new higher efficiency video standards.

Transport, video and audio standards for broadcast-quality television.

Initial video and audio compression standard. Later also the standard for Video CD, and MP3.
MPEG describes this standard as a multimedia framework.

A multimedia content description standard.
The goals of the Multimedia Semantics Incubator Group is to explain the advantages of using Semantic Web languages and technologies for the creation, storage, manipulation, interchange and processing of image metadata.

In addition, it provides guidelines for Semantic Web-based image annotation, illustrated by use cases.

Relevant RDF and OWL vocabularies are discussed, along with a short overview of publicly available tools.

http://www.w3.org/2005/Incubator/mmsem/
An image is a dominantly **iconic** sign system, proposing a union in relation to reality.

The **denotative** power of an image, the optical pattern, communicates a precise knowledge, which releases the audience from the process of decision making but leaves a problem of interpretation (signification process).
Representing an Image in a media-based system:

Conceptual models for:
- quantitative or qualitative characterization of optical pattern (feature extraction (colour, texture, light, angle, etc.), pattern recognition (line, shape region, etc.), multi-scale signal analysis, ...)
- Spatial dimensions
  => textual metadata
- Semantics (e.g. taxonomy, thesaurus, ontology, etc.)
- Semantic markers (key word, tag, schema, ....) to express higher semantics, such as forms, styles, genres, aesthetics, social codes.

Interpretation depends on the task:
- Search (e.g. retrieval by example)
- Generation (e.g. Qualitative support on features and higher semantics)
- Presentation (e.g. browsing through collage)
- Automatic art generation
Kennisgebaseerde media
Image – Applications II

Kennisgebaseerde media
Image – Applications III

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Media Streams
Video annotation and editing system
By Marc Davis, Brian Williams, and Golan Levin

[Note: Media Streams was conceived by Marc Davis and developed between 1995 and 1997 at the Machine Understanding Group of the MIT Media Laboratory and at independent Research Corporation for Media Data, digital animations, and digital imagery. I was involved from the project's inception as the principal designer of its iconic visual language and as a contributing designer of its interface and interaction.]

Media Streams is a system for annotating, retrieving, repurposing, and automatically assembling digital video. It uses a stream-based, semantic representation of video content with an iconic visual language interface. Hierarchically structured, composable, and searchable primitives, Media Streams addresses problems of annotation convergence and human-computer communication by creating a standardized, computationally readable and writable visual language for representing consensus interpretations of video content.

The Media Streams video content annotation system uses a vocabulary of more than 6000 icons to represent the characters, objects, behaviors and settings of the broadcast universe. Because they are combined in a grammar with a syntax and semantics—permitting meaningful combinations numbering in the hundreds of millions—the Media Streams icons are not merely an iconography but a true visual language. This generative and searchable language supports gestalt information visualization, quick recognition and browsing of annotations, the potential for global use, and the representation of semantic, relational and temporal video content. Creating the Media Streams lexicon involved knowledge-engineering a sensible relational hierarchy of thousands of concepts, and inventing a consistent and readable set of recombinable sub-iconic graphic elements.

The Media Streams iconic annotation language has numerous advantages over traditional keyword annotation systems, including its ability to describe relations between descriptions, its ability to clearly render overlapping and contained actions, its ability to refer more directly to the intrinsic visual qualities of the video medium, and its ability to serve as a "consensus" language for multimedia professionals.

More information on Media Streams can be found here.
Image – Applications V b

Machine Drawings

Exhibitions of Drawings

Antwerp, FineAvenue, May 1985. 1/5000 comic by The Mastereasy.

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Both text and images refer to the same modality and domain knowledge but they establish different sign systems.

Both differ on the denotative level of signification.

Both differ on their paradigmatic processes.

Text can be used for text to provide metadata (semantic representations) in automatic processes.

Images rely on textual metadata to facilitate automatic processes on the 2nd and 3rd level of signification => mixed processes and representation structures.