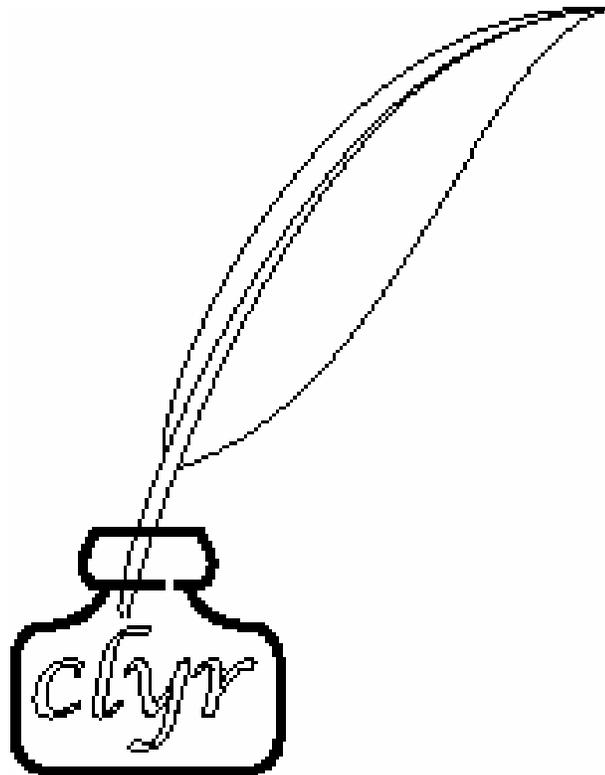


# Semeiognomy Basics

## (Document W003)



## Semeiognomy Basics

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## 1 Introduction

There have long been projects devoted to the description of the symbolic web, resulting in lexical resources such as thesauri, dictionaries, and encyclopedias. Some teams have tried to reconstruct the symbolic web as a set of ontological principles. It is easy to understand how these projects have continued to grow, because there is *always* something left to describe about the world, but for this same reason, it is difficult to see how any of these projects could ever be complete. It would be necessary to feed a prohibitively vast number of semantic relationships into a machine, including such commonsense notions as that things fall down rather than up, that glass breaks, and so on.

It seems more reasonable to build a basic framework on which a machine could grow language by itself. Rather than trying to describe *everything* that there is to know about the world, a representation of the web could be created that described *enough* of the world in a *human enough* way that the right kind of machine could grow its own symbolic web over time, as it interacted with its world through language. As the machine learned, its symbolic web could be used to create an improved basic framework, which would grow an improved symbolic web, and so on iteratively. A discussion of basic semeiognomic principles will demonstrate how we are creating the first incarnation of our *cognitive image lattice* (or *yimage lattice*), by describing our technical approach to diagramming representations of individual conceptual images.

## 2 Form: a Word Shape

We use the term *form* to refer to the physical properties of *any* thing, such as:

- Sensation (shape; color; sound; taste; texture; temperature...);
- Position (location; orientation; sequence; motion...)
- Complexity (componentiality; resolution...)
- Intensity (how loud; how hard; how bright...); and so on.

Clyr's ymage technology (*Clyr*) extracts the meaning underlying *sequential* forms such as text or speech files, but it could theoretically be extended to work with *summary* forms, such as pictures or more general sound recordings. If sign language could be recorded in sequential form, then it would be susceptible to Clyr processing.

### 3 Concept: a Thought Feeling

The term *concept* is used informally to refer to internal states like thoughts and feelings, and in casual conversation it means *notion* or *idea*. Anything that you can think or feel is a concept; such as: [PLEASURE]; [DOGS]; and [LAUGHING]. *Conceptual structure* is a more technical term, and refers to a formal representation of an electrochemical event processed in a body as it thinks and feels. Concepts vary in the way that forms do, in their content, organization, and ties to other concepts. Fit together like multidimensional pieces of a jigsaw puzzle, these concepts define a human language model of reality.

Concepts are ultimately grounded in human sensorimotor experience, such as the sensory modality of proprioception, or of vision. Each of these modes of experience defines a conceptual space; for example, in the space determined by visual experience, some areas will be defined by experiences of brightness and others by experiences of color. There are higher-order, analogous spaces defined by more abstract areas of human experience as well (e.g. [INTUITION]). Some complex concepts (e.g. [WHAT HAPPENS IN A THEATER]) can draw upon many different areas within this linguistic reality model.

### 4 Semantics: a Thought's Contents

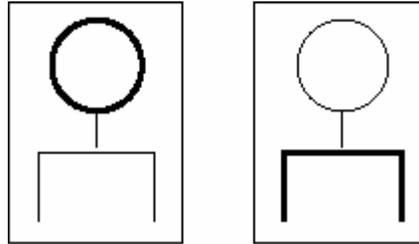
When a person signs or speaks a linguistic expression like 'dog', lookers or listeners will think of dogs, and will mentally process a conceptual structure that holds information about dogs (i.e. [DOGS]). They will bring that concept to mind. There are ways to bring concepts to mind other than by using language; for example, feeling a breeze can make you think [WIND]. In this example, [WIND] is a conceptual structure, as is [DOG], but [DOG] is *also* a *semantic* structure, because we said explicitly that it had been evoked by a linguistic expression. Only those concepts specifically evoked by language are semantic structures, and so semantic analysis is a *part* of conceptual analysis.

### 5 Ymage Base: A Diagrammatic Semantic Structure

A diagrammatic representation of a semantic structure is the *base* of an *ymage*. This base defines the concept (e.g. a dog typically has four legs and so on), including its *advanced cognitive relationships* (ACRs) with other concepts (e.g. a dog is a canine). Our *ymage lattice* is defined by the way in which these ACRs make yimages interlock.

## 6 Meaning: the Construal of a Thought

The same ymage can depict different *meanings*; for example, the following yimages represent the semantic structures evoked by two similar phrases, respectively ‘ball over table’ and ‘table under ball’:



Meaning is *Construal* of Content

These semantic structures have identical conceptual *content* (i.e.: [BALL]; [TABLE]; [VERTICAL RELATION]), but the contents differ in how they are *construed* (i.e., a profiled ‘ball’ versus a profiled ‘table’). Meaning, therefore, is not just content, but rather it is the *construal* of content [1].

## 7 Ymage: a Construed Thought Shape

An ymage is completed when its base is assigned a profile, at which point it represents the meaning of an associated phrase.

There are two important points here: 1) a linguistic expression evokes conceptual content (i.e., a phrase makes a person think of something), thus imposing a construal (i.e., a phrase makes a person think of something *in a particular way*); therefore 2) *no* simple list of forms (either keywords *or* substituted codes) will produce search results that are as accurate as those that take these construals into account – and taking construals into account is precisely what Clyr technology does.

With Clyr, an ymage of the search phrase “What do mice eat?” will return hits about mice eating cheese (or about cheese being eaten by mice), but not irrelevant texts about cats eating mice. An English query will also retrieve French text (for example), if they have both been converted into yimages.

## 8 Symbol: a Form-Ymage Pairing

Yimages depict meaning (i.e. construed content), so a *symbol* is a form-ymage pairing, such as:

- a stop sign (a red octagon paired with [STOP]);
- the written English word ‘stop’ (a sequence of characters paired with [STOP]);
- the written Japanese word ‘止’ (a sequence of brush strokes paired with [STOP]);
- the spoken English word ‘stop’ (a sequence of sounds paired with [STOP]);
- the signed English word ‘stop’ (a sequence of hand shapes paired with [STOP]).

and so on. Language is thus a *symbolic* process, as studied by cognitive linguists.

Communication in general is also symbolic, as studied by semeionomists.

## 9 Iconicity: when Form is Ymage

A symbol is *iconic* when the qualities of its formal part tell you about its ymage; for example, a powerful font for a word like **BANG** evokes a meaning of a more powerful sensation, so you are increasing the symbol’s iconicity [2, 3]. The ASL sign for ‘stop’ uses a vertical chopping motion of the edge of one hand on the upraised, horizontal palm of the other, which is iconic because of the ‘cutting off’ shape of the motion; however, the street stop sign *is not* iconic, because there is nothing in the nature of an octagonoid, or in the color red, or in their coincidence, that naturally evokes the notion of [STOPPING]. The stop sign is not an iconic symbol then, but rather it is an *arbitrary* one.

When you vary the force used in the expression of a symbol, you vary the *power* or *precision* of the meaning that it evokes; for example: a bigger font indicates a bigger noise; a more frenetic gesture indicates a more energetic meaning; and when a word is pronounced with greater stress or volume, it can indicate a meaning that is more powerful or precise than normal. In the phrase, “*That* tree? I was expecting a TREE,” the expected TREE is probably bigger, but it might also more precisely approximate the person’s idea of the typical or perfect tree for the occasion. The symbol and the meaning are thus said to be in *direct iconic proportion* to one another [3], and that relationship is represented by the  $\diamond$  symbol. Even arbitrary symbols (e.g. “tree”) are subject to this proportion.

## 10 Summary of Clyr Terms

The information presented in this tutorial builds up to the following hierarchy of assertions:

- **Forms** are word shapes.
  - Forms have structure (i.e. sound shapes, hand shapes, written words).
- **Concepts** are thoughts and feelings.
  - Concepts have structured contents (i.e. **conceptual structures**).
- **Semantic structures** are those concepts that are evoked by linguistic forms (i.e., phrases make you think of things).
  - **Semantics** is, therefore, **conceptual** analysis.
- A cognitive image (i.e. ymage) **base** is diagrammatic semantic structure.
- **Meaning** resides in the **construal** of a concept's contents.
- **Yimages** are profiled bases representing meaning (i.e. meaning is ymagistic).
  - **Iconicity** is the amount that an external form is like an internal ymage.
- **Symbols** are pairings of forms and yimages.
- **Language** is a symbolic process.
  - Language forms (i.e. linguistic expressions) impose a specific construal on the contents that they evoke (i.e., phrases make you think about things in a particular way).

Now we can use these definitions in turn to more clearly define some of the terms introduced earlier in the *Introduction* white paper:

- **Synonyms** are symbols where one ymage has links to multiple forms.
- **Polysemes** are symbols where one form has links to multiple yimages.
- **Cross-reference** between multiple forms and multiple yimages changes over the course of a text.
- A proper search engine must account for construal, just as humans do.
  - Primitive search engines can only search for form, not meaning.
  - An ymagistic search accounts for construal (and therefore meaning).
  - Clyr is developing an ymage search engine.

This material summarizes *what* Clyr's ymage technology does (cf. *Illustrative Metaphor*), but even with the help of these definitions, it will still take a while to explain *how* Clyr technology will manage to perform these ymagistic searches (cf. *Technology Distinction*).

## 11 References

- [1] Langacker, Ronald W. (1987 and 1991) *Foundations of Cognitive Grammar* (Vols. I and II). Stanford, CA: Stanford Univ. Press.

(In particular, the notion of “meaning as construal” derives from this source.)

- [2] Mansfield, Tracy C. (2001) Issues Concerning Kohanim and Johnson’s “Using Images as a Foundation for Natural Language processing” *Computational Intelligence* 17(4):812-817.
- [3] Mansfield, Tracy C. (1997) *Prominence: from Sensation to Language*. Dissertation. La Jolla, CA: Univ. of California at San Diego.