THE SIGN AND ITS SUBSTANCE

A coloured view

Sven Platzack

Contents: 1. the Model
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A simple model will be constructed and used for studying the relation between signs and their substances. The model consists of a system of discrete values ordered in signs, and a simple topological system defined by an ordering relation. These two systems are then connected by a primitive relation, denotation, for which a rule is given. In the second part, this model is used to formulate some tentative laws for human linguistic behaviour. (See for example Malmberg 1977.) No attempt will be made to prove these laws, they are just illustrated by some examples. The laws are thought to be universally valid - i.e. they describe any human linguistic behaviour whatsoever. They can consequently be refuted by examples from any language.

1. the Model

The model we are going to work with recieves its structure from the definitions. It is very simple - obviously too simple for a complete language description. But it can be used to formulate some laws about how a sign is related to its substance. The definitions are valid only for the constructed model. They are not an attempt to describe real language. They have no real content. Their only function is to give the model its structure.

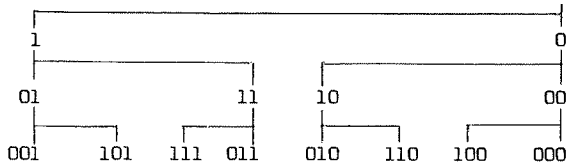
The concepts to be defined are: value, sign, language system, purport, to specify, to denote, substance; also, a rule is given.

We will use "=df" for 'is defined as'.

D1. value =df
1. an empty place is a value
2. if v is a value, then 1v and 0v are values
3. there are no other values than those you get by using 1. and 2..

i.e. if you have a value, you can get a new one by concatenating either of the marks "1" and "0" to the left of the value.

The values are generated in the following way:



and so on.

Values are symbolized with:

1. letters x, y, z, w, . . . , a, b, c, . . . , k, l, n, m, . . .
2. words horse, "horse", 'horse' (the word is normally thought of as a substitute for its value in the language)

D2. sign =df if x and y are values, then $\overset{x}{\underline{y}}$ is a sign.

A sign is composed of two values. For example: $\overset{0110}{\underline{11011}}$ is a sign. Sometimes we will use a word between ".." to symbolize the lower value in a sign, and the same word between '...' to symbolize the upper value. The whole sign is then symbolized by the word underlined, ____ . For example: horse is the sign $\overset{'horse'}{\underline{"horse"}}$.

D3. a significative value =df a value in a sign

If we have a sign $\overset{x}{\underline{y}}$, then the values x and y are significative.

D4. a language system =df a set of signs

So $\left\{\overset{x}{\underline{y}}, \overset{v}{\underline{u}}, \overset{y}{\underline{w}}, \overset{z}{\underline{u}}, \overset{a}{\underline{y}}, \overset{c}{\underline{e}}\right\}$ is a language system. A sign belongs to a language system, if and only if it belongs to this set.

D5. purport =df anything that can be structured (divided, articulated).

We will use figures (and sometimes words) to represent the purport. The figures will be such that it is possible to divide them. Below there are some examples of purports that will be used.

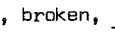
We will often use an area,  , as a purport. This area can be divided:  but if not, it is an undivided continuum.

The purport can be a "hilly" area:  an area with "mountains" and "valleys" – a three-dimensional area. This is also a continuum, but a continuum with potential "cuts" in it.

The purport can be a coloured area:

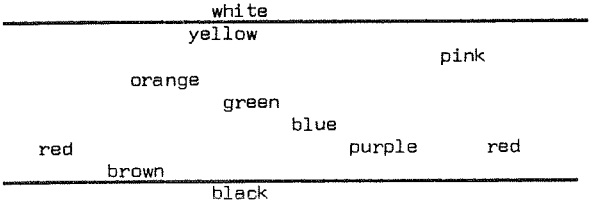
violet	blue	green	yellow	orange	red

(the readers are to replace the words with the spectrum), and any other area you can think of, because an area can easily be structured, divided.

The purport can be a line, _____ . It is easy to divide a line. The line can be curved,  , broken, ,  , connected,  ,  ,  , or shaped in any other way - it is just as easily divided.

The purport can be a set. A set is easily divided in subsets.

A purport we will use several times, to illustrate different points, is a coloured area:



This is the three-dimensional colour solid projected on to a two-dimensional rectangle, by the omission of degrees of saturation. The neutral colour grey is not represented (Berlin and Kay, 1969, see Leech 1974). The words in the area are to be replaced with colours, in such a way that a continuum results.

Note: a purport is defined by its potentiality - it can be divided. It is not defined as amorphous, unstructured, or the like.

D6. to specify =df to divide a purport and select one of the parts thereby created.

We will use " > " for "to specify". Some examples:

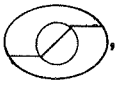
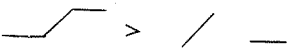
If the purport is a set, it is specified to any of its subsets - including the elements in the set (= the subsets with only one element).

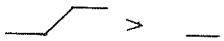
a set > a subset, a set > one of its elements

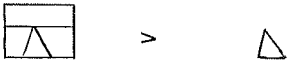
If the purport is a circle,  , and we divide it as  , then it can be specified either to the inner circle, or to the margin between the circles.

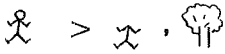
 (the inner circle is removed)

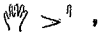
If the purport is a line,  , it can be specified to any part of this line: 

If the purport is a broken line,  , and this broken line is divided as  , then it can be specified as 

or as 

If the purport is an area,  , and this area is divided in parts:  then the purport can be specified to any of these parts. For example: 

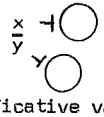
Other specifications:  (a tree> its trunk)

Sometimes we will use words for the purport. Then we have specifications as: a colour > yellow, a sound > a vowel, a human being > his soul, a human being > his body, a hand > a finger,  , an activity > its agent, an activity > its object, a thing > its attributes, a change > what was before.

D7. to denote =df to connect a significative value and a specified purport

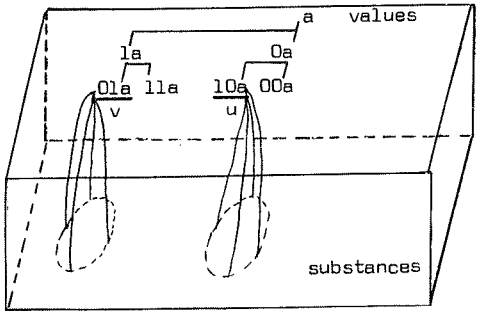
We will use " ⊣ " for "to denote". If x is a significative value, and z is a specified purport, then x ⊣ z, or z ⊢ x, is a denotation.

D8. z is a substance =df there is a denotation x ⊣ z.

i.e. a substance is a purport formed by, specified by, a significative value. To every sign, $\frac{x}{y}$, there are two substances: 

In order to state which part of a purport a significative value denotes, we will use lines that connect the value with its substance: 

– the value x denotes the inner circle.



Let 'red' and "red" be two values, and $\overline{\overline{\text{'red'}}}$ $\overline{\overline{\text{"red"}}}$ a sign. Let the purport be the spectrum, a continuum: violet - blue - green - yellow - red - .

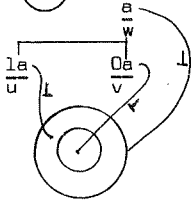
Then we have: $\overline{\overline{\text{'red'}}}$ $\overline{\overline{\text{"red"}}}$ - violet - blue - green - yellow- orange - (red) -

We will also need a connection between the inner structures of the values, and the relations between their substances.

R1. Rule: If k, nk, are significative values, and k → a, nk → c, then a > c.

(nk is the value obtained by concatenating n to a given value k)

For example: if $\overline{\overline{u}}$ a , then $\overline{\overline{v}}$ ca



a denotes the whole circle,
1a denotes the margin,
and 0a denotes the inner circle

This rule means that we build into the model the fact that brown horses are a part of all horses, that poodles are a subset of all dogs, that to run fast is more specific than to run, that to go by car is more specific than to go, that . . . It is a severe restriction of the usefulness of the model.

Thereby the model is complete. We will now proceed to use it.

2. the Laws

The laws given below are thought to be universally valid. They allow of no exceptions. If there seem to be apparent counter-examples to some of the laws, as for example the phenomena pars pro toto to the law of specification, then these counter-examples will turn out to be no real counter-examples on a closer analysis.

L1. The Law of Metaphor

A significative value can denote completely different substances.

You can use a word like warm about: a temperature, "It is warm in here.", a feeling, "He feels warm.", something that warms, "The coat is warm", something that is warm, "The water is warm.", a character, "a warm person", and so on.

A significative value does not denote a single substance, but picks out different substances in different purports. It is consequently not possible to describe the denotation by lists of value-substance assignments. You have to find the laws behind it - you have to find out how a given significative value picks a substance out of a given purport.

L2. The law of Specification

If a significative value x denotes a substance s, $x \dashv s$, then it can also be used for an r, such that $s \geq r$. But x can not be used for an r, such that $s \leq e$.

i.e. it is possible to use a sign for a substance that is more general than the thing meant, but not vice versa. If the thing meant is the inner circle in  , and we have a significative value for the whole circle, then this value can be used also for the thing meant.  $> \bigcirc$

We can use animal for a horse, but we can't use horse for an arbitrary animal. the set of animals $\geq$ the set of horses. do can be used for 'to log', but not vice versa. Because 'do' denotes a more general substance than 'log' does. man can be used for a specific man, the man in the brown coat, but you can't use man in a brown coat for an arbitrary man. A phoneme that denotes a substance s can be used for an allophone r, if $s \geq r$. red can be used for carmine, but not vice versa.

L3. Corollary. The law of Substitution

If a language system has two signs $\underline{\underline{u}}^{ak}$ and $\underline{\underline{v}}^{k}$, then $\underline{\underline{v}}^{k}$ can be used as a substitute for $\underline{\underline{u}}^{ak}$, but not inversely.

This is a consequent of the law of specification and the rule R1.

man can be substituted for policeman, but not vice versa.

he can be substituted for the long man, but not vice versa.

do can replace log, dog can replace poodle, and so on.

L4. Corollary. The law of Pronominalization

If a language has pronouns, then the substances of those pronouns must be so general that they are easily specified to the thing meant.

he denotes more persons than the long man we saw yesterday does and can therefore be used instead of it. The more specific a pronoun is, the more difficult it will be to use it.

L5. Corollary. The law of Selectional Restriction

If two signs are so used, that one of them speaks about the substance of the other, then this sign must be easy to construe in such a way, that its substance is more general than the substance spoken about. If not, the language user perceives a violation against a selectional restriction, and will have difficulties in understanding the construction.

*The horse scattered. horse speaks about the substance that is scattered. But this substance is a set of individuals, while the horse denotes a single individual. a set of individuals $>$ a single individual. It is difficult to construe the horse so that it contains a set of individuals. We perceive a violation against a selectional restriction.

The Swedish bordsben, table-leg, is easier to construe than benbord, legtable, because a table $>$ its leg, and the first part of the compound word is used to speak about the substance of the second part. It is difficult to see what leg $>$ table refers to.

L6. The law of Completeness

Given a thing meant, there is always a sign in a language system, that can be used for the thing meant.

This law is a consequence of the law of specification, and that we try to

use the system we have. The law of Specification means that a limited system can be put to an unlimited use. We use our language to cover the whole purport.

You can speak about all colours in a language with four, eight, twelve, . . . colour words. What you can't do is separate the colours.

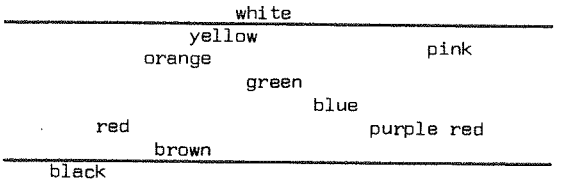
Say you want to speak about your father's mother. The English language lacks a word for this concept, which in Swedish would be rendered as farmor. But an Englishman can use grandmother to denote the person, in spite of the word's being too general. grandmother > father's mother.

L7. Corollary. The law of Expansion

If a system is seen as an expansion of a simpler system, then the signs in the simpler system will change their denotation when we expand this system to the more complex one.

If you have two language systems, $\left\{ \frac{x}{y}, \frac{z}{w}, \ldots \right\}$ and $\left\{ \frac{x}{y}, \frac{z}{w}, \ldots, \frac{a}{n}, \frac{c}{m} \right\}$, differing in that the first system lacks some signs that are contained in the second system, then the second system can be seen as an expansion of the first one. As both systems are complete, L6, they can be used to denote the same things. A consequence of this is that the signs $\frac{x}{y}, \frac{z}{w}, \ldots$ in the second system only denote a part of that which the same signs denote in the first system.

Let us have a look at how a colour system can be constructed out of simpler systems. The purport can be rendered as a coloured area:



The most simple language system has just two colour words:

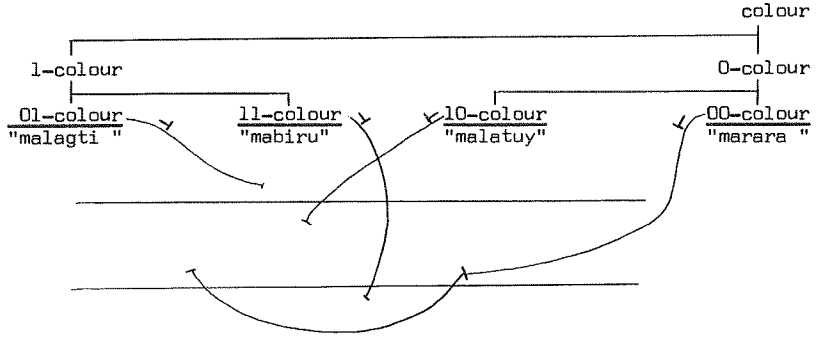
$$\underset{u}{\text{1-colour}}\ \underset{u}{\text{0-colour}} \cdot \underset{u}{\text{1-colour}} \succ \text{white, colourless (white and black)},$$

(colour)

$$\underset{v}{\text{0-colour}} \prec \text{red, coloured.}$$

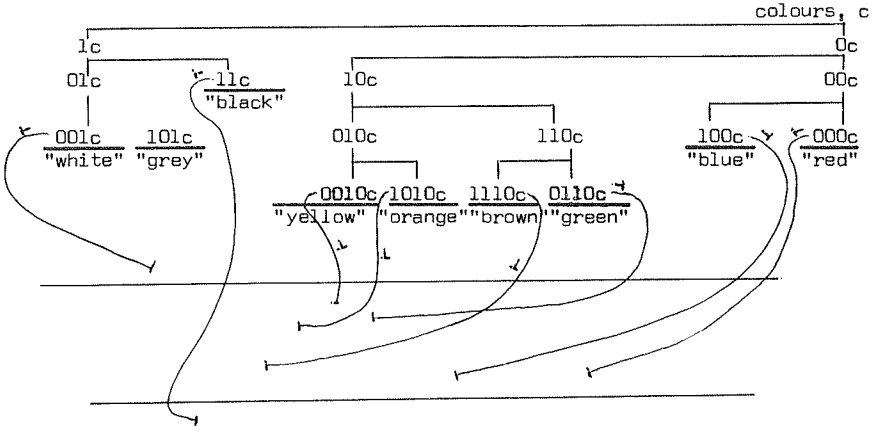
That is, the area is divided in two parts – a colourless part (white, grey, black), and a coloured part, "red".

This system may be augmented by dividing the colourless area into white and black, and the coloured area into red and yellow. The Philippine language of Hanunóo has this system:



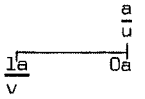
(i.e. 01-colour "malagti " = white, light tints of other colours, 11-colour "mabiru" = black, dark tints of other colours, 10-colour "malatuy" = yellow, light green, and light brown, 00-colour "marara?" = red, maroon, orange. [Leech 1974]). In order to make room for yellow, red has been divided. It is no longer the whole coloured area.

Tzeltal has a colour system with one more word in it. 10-colour has been divided into yellow and green, in 010-colour and 110-colour. yellow no longer covers the green area. Plains Tamil divides 00-colour into red and blue, Nez Perce divides 110-colour into green and brown. And so on. The English system is:

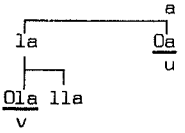


L8. Corollary. The law of Incomplete Systems

If there is no sign for a value, then another sign is used to denote what would have been denoted by the value if it had been significative.

In 

$\frac{a}{u}$ is used to denote, what a sign $\frac{0a}{y}$ should have denoted, had it existed.

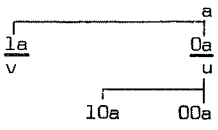
In 

one of the signs $\frac{01a}{v}$ and $\frac{0a}{u}$ must be used metaphorically to denote what a sign $\frac{11a}{y}$ should have denoted had it existed.

Every language system contains gaps, which have to be covered by the signs that exist. How a substance is divided by a language system depends on which expressed values there are in the system.

L9. Corollary. The law of Stepwise Construction

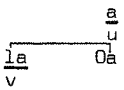
When a child learns a language system, he will step for step modify the system he has already learnt.



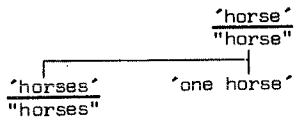
If the child learns a sign $\frac{10a}{w}$, then $\frac{0a}{u}$ will change its value to $\frac{00a}{u}$ as a consequence.

If a child uses dog for both dogs and horses, but learns to use horse to denote the horses, then he will as a consequence use dog only to denote dogs.

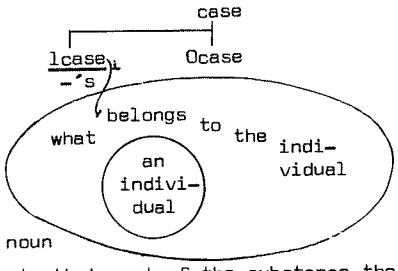
L10. Corollary. The law of Paradigm

If a language contains a paradigm like 

then $\frac{a}{u}$ will be used for that part of the substance that is not denoted with $\frac{1a}{v}$.



The existence of 'horses' "horses" in the language system is an indirect way to specify the substance of horse.



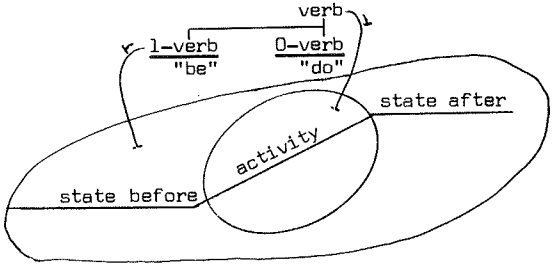
The base form of the noun will not be used to denote that part of the substance the genitive denotes.

L11. The law of Partition

If a language contains two signs $\frac{ak}{u}$ and $\frac{ck}{v}$, $a \neq c$, and if these two signs denote the substances y and z, $\frac{ak}{u} \rightarrow y$ and $\frac{ck}{v} \rightarrow z$, then $y \neq z$.

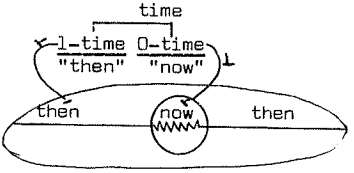
i.e. two signs in a paradigmatical relation to each other denote different substances when they are used in the same situation.

cat and dog are perceived as different animals, there is no animal that is both cat and dog. To walk is not to run, red is not yellow, long is not short, man is not woman, child is not adult, and so on.



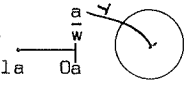
L12. Corollary. The law of Opposition

If there are two signs $\frac{la}{u}$ and $\frac{Oa}{v}$ in the language system, then they denote different substances.



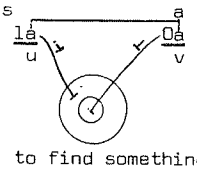
L13. Corollary. The law of Structuring

A language system is able to structure a purport.

If a language contains 

, then there is just one word for la and Oa, i.e. $\frac{a}{w}$.

The language does not force us to divide the substance of a.

If another language has 

, then it forces us to divide the substance of a in order to be able to use the two signs $\frac{la}{u}$ and $\frac{Oa}{v}$.

The language forces us to find something in the substance that divides it into two parts.

L14. The law of the Prototype

A denominated substance can in most cases be specified to a prototypical instance.

i. e. in most substances there is a part that is perceived as the most typical instance of the substance. There is an ideal substance. A substance  contains a prototype  .

A specific red colour is perceived as the most typical red colour, the prototypical redness. We have a platonic idea horse, a horse-prototype. We know what a bird looks like - and it is not much like an ostrich. We have a clear conception of what a democratic society looks like. It is a socie-

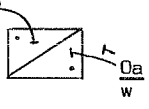
ty with a parliament, a capitalistic economy, newspapers owned by individuals, and so on. That is, a society like England, Sweden, USA, India, to a lesser degree like Mexico, Thailand, Brazil, and definitively not like the Soviet Union, Cuba, DDR.

The prototypical nouns are the names, the prototypical adjective stands for a quality, the prototypical verb for an activity, the prototypical adverb for a circumstance. The concrete nouns are the most typical nouns, more typical than the abstract nouns. Verbs for activities are more typical than verbs for states. In a syllable the prototypical part is the vowel. In a sentence it is the verb.

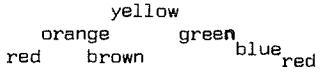
You can go through substance after substance and find a prototypical part of it. It is more difficult to find a substance without a prototype in it.

L15. The law of Maximal Contrast

> When a substance is divided by a language system, the prototype is taken as prototype for one of the parts, and a new prototype is created for the other part in such a way that the two prototypes are maximally apart.

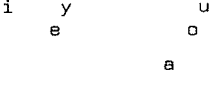
If we have $\underline{\underline{a}}$  (the point marks the prototypical part for a) and divide it in $\underline{\underline{1a}}$ and $\underline{\underline{0a}}$, then $\underline{\underline{0a}}$ has the same prototype as $\underline{\underline{a}}$, and a new prototype is created for $\underline{\underline{1a}}$ in the opposite corner: $\underline{\underline{1a}}$ 

In a coloured area



the prototypical part is the red colour. If the area is divided, the new prototypical part is yellow, i.e. the colour most distant from the red colour.

In the system of vowels:



the prototypical part is a.

The new prototypical part created in a division is i. That is, the vowel most distant from a.

L16. Corollary. The law of Hierarchy

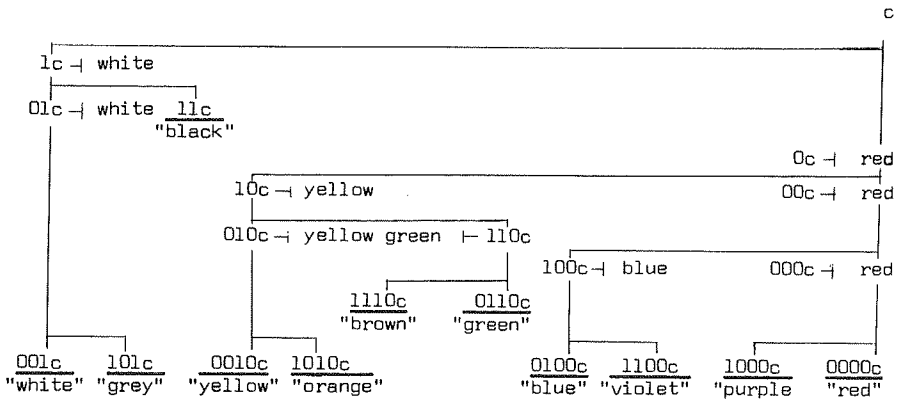
In many cases there is a natural order in which to divide a purport.

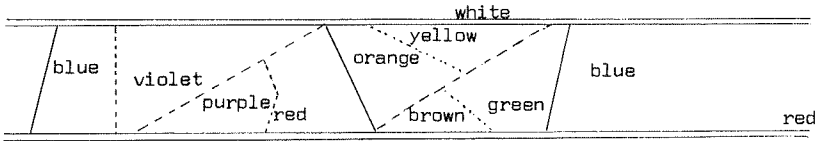
This is a consequence of the law of the Prototype, and the law of Maximal Contrast. As long as each division creates a prototype and a maximal contrast, there will be a natural order in which to divide the purport.

According to Berlin and Kay 1969 there is a natural order in which to divide the colours. Berlin and Kay's order is:

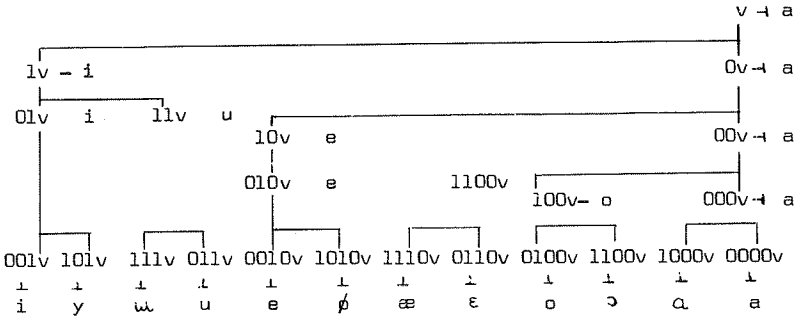
[white / black] ⟶ [red] ⟶ [green / yellow] ⟶ [blue] ⟶ [brown] ⟶ [purple / pink / orange / grey]

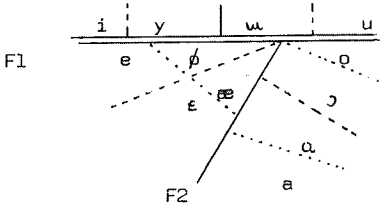
For any two colour categories [x] and [y], [x] ⟶ [y] means that if a language contains y, it must also contain x. See Leech 1974, p. 235. By using the law of the Prototype, and the law of Maximal contrast we arrive at the following value system: (the vertical order is Berlin and Kay's order)



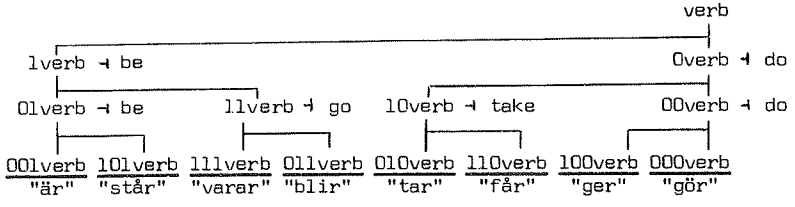


The same procedure applied to a vowel purport will give:





It is a little bit more difficult to apply the procedure to abstract systems, as the verbs:



or something like that. But there are better methods.

L17. The law of Value Likeness

It is sometimes possible, for some persons, to perceive a likeness between two different substances denoted by values that have the same place in their respective systems.

You can sometimes recognize values, in spite of their different substances. The perhaps most striking example of this is the photisms, auditions colorée. In hearing e some persons perceive a yellow colour, in hearing i a white colour, in hearing a a red colour, and so on:

white	grey	black	yellow	orange	brown	green	blue	violet	purple	red
001	101	11	0010	1010	1110	0110	0100	1100	1000	0000
i	y	u	e	ø	æ	ɛ	o	ɔ	ɑ	a

See for example Bos 1929, and references quoted there.

Most people are able to perceive a likeness between verbs and colours:

är	står	varar	blir	tar	får	ger	gör
001	101	111	011	010	110	100	000
yellow	orange	brown	green	blue	violet	purple	red

We have also sound symbolisms like yellow, in Swedish vit, blå, grön.

L18. Corollary. The law of Markedness

It is possible to perceive a likeness between 0a and 0c, 1a and 1c.

It is unnecessary to dwell upon the importance of this phenomena.

I have illustrated how the model can be used by giving some laws. It is easy to give more laws. But the reader can do that by himself.

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