1. Semantic Fields and Componential Analysis

1.1. Color Terms

1.1.1. Why Color Terms?

There is a huge body of research on color terminology, carried out not only by linguists but also by anthropologists and psychologists. Why color terms? This seems to be a particularly interesting area, as we can assume that the physiology of color perception is roughly the same across language communities, but the way how colors are categorized differ widely.

Color terms were cited as an area in which we clearly find evidence for **linguistic relativity**, the thesis of Sapir and Whorf that linguistic categories determine our experience of the world. For example, Gleason (1961), a standard structuralist textbook, says (p. 4):

> There is a continuous gradation of color from one end of the spectrum to the other. Yet an American describing it will list the hues as red, orange, yellow, green, blue, purpose, or something of the kind. There is nothing inherent either in the spectrum or the human perception of it which would compel its division in this way.

However, it turns out that the categorization of color is not random at all, at that there are remarkably stable laws across culture.

1.1.2. The Study of Berlin & Kay (1969)

The book *Basic Color Terms: Their Universality and Evolution* Berlin & Kay (1969) reports on the first large-scale systematic study of color terms in a wide variety of languages.

Method.

Speakers of a wide variety of languages were confronted with a set of 329 color chips[1], varying in forty equally spaced hues and eight degrees of brightness (all with maximal saturation) and nine chips of neutral hue (white, black, gray), mounted in an array (a technique used by Lenneberg & Roberts 1956 in a comparison between English and Zuni color terms).

First, the **basic color terms** of the language were elicited (that is, simple color terms like English *red* or *yellow*, not complex terms, terms motivated by objects, or terms restricted to certain objects, like *bluish, salmon-colored, crimson, gold, blond,* or *blue-green.* Recent loans were excluded. [There is some debate about which color terms are basic. What about *orange*, for example? See Corbett & Davies 1997 for a recent discussion.]

Then informants were asked to (a) delineate the area that falls under each color terms, and (b) name one chip as the best representative of a color (focal colors). (Each informant performed the task three times, with time intervals of more than one week in between). Number of informants one to forty per language, mostly residents of the San Francisco area, initially 20 languages. Later a considerably larger sample was used, and speakers were tested in their communities (98 languages).

1 The so-called Munsell Color Chips, developed for precise communication between artists, go back to *Munsell Book of Color* (1929), Munsell Color Company, Baltimore. See Sivik (1997) for color classification systems.

Results.

One striking result was that the **focal colors** of the basic color terms were relatively close to each other, across speakers of different languages (see chart on p. 9, which names the areas in English, but the dots represent focal colors for a variety of speakers. Differences between languages were not greater than differences between speakers of the same language.

The **category boundaries** on the other hand vary widely, even for the same speaker at different occasions.

Languages can differ widely in terms of the set of basic color terms (from two to eleven). It is predictable, to a large degree, which basic color terms a language will have, given the number of basic color terms:

(1)

$$\begin{Bmatrix}\text{white}\\ \text{black}\end{Bmatrix} < \text{red} < \begin{Bmatrix}\text{green}\\ \text{yellow}\end{Bmatrix} < \text{blue} < \text{brown} < \begin{Bmatrix}\text{purple}\\ \text{pink}\\ \text{orange}\\ \text{grey}\end{Bmatrix}$$

A correlation of color terminology and **cultural complexity** was stipulated; languages of highly industrialized societies (Europe, Asia) all having the most complex system. Examples:

(2) Stage I (white, black): Reported for languages of New Guinea
Stage II (white, black, red): Melanesia, Australia, Africa, parts of America
Stage IIIa (white, black, red, green) Africa, Philippines, Australia
Stage IIIb (white, black, red, yellow) Africa, Australia
Stage IV (white, black, red, yellow, green) many languages, including Mayan lg.
Stage V (+ blue) Africa, southern India, Philippines, Mandarin (?)
Stage VI (+ brown) sparsely represented; southern India, Africa, North America
Stage VII (20 of the 98 languages, no clear order of adding pink, orange, purple, gray.

12-term systems: Hungarian (two basic terms for red, *piros* 'light red', *vörös* 'dark red') and Russian and other Slavic languages (two basic terms for blue, *siniy* 'dark blue', also 'blue' in general; *goluboy* 'light blue').

There are a number of exceptions, especially with the integration of terms at the right-hand side of the scale.

1.1.3. The World Color Survey

In 1976, a large-scale project was started (first reports in Kay, Berlin, & Merrifield (1991), a more recent report in Kay, Berlin, Maffi, & Merrifield (1997), the final report is still unpublished).

Method

The investigation was carried out on a larger basis by field workers, for more languages (110) and with more speakers (typically 25 per language), if possible monolinguals. The speakers were not presented with a pre-arranged array of colors sorted along the dimensions of hue and brightness, but with individual color chips (330 color patches + 10 levels of neutral lightness). Speakers were asked to categorize the color chips according to the basic color terms of their language, and to point out the best example for each color. For the determination of color terms, “aggregates” were formed on the level of 30% agreement, 70% agreement and 100% agreement between speakers (*see example for Buglere, a language in Panama).

Results

The World Color Survey lead to some important changes and refinements of the original theory of Berlin & Kay.

There are six “fundamental” colors, W,R,Y,Bk,G,Bl, that are physiologically motivated.

Two-color systems were not reported for any language in the sample, but for quite a few speakers of languages. These systems should not be characterized as “black” vs. “white”, or “dark” vs. “light”, but rather as “warm” (W/R/Y) vs. “cool” (Bk/G/Bl), called the **white/warm channel** and the **black/cold channel**.

Paying greater attention to the boundaries of colors, the development of color systems is not described as adding more named colors, but as unfolding composite color categories.

The unfolding of the warm channel and the unfolding of the cold channel should be described as independent processes:

(3) Development of the warm channel:

$$[\text{W/R/Y}] \rightarrow \begin{bmatrix}\text{W}\\ \text{R/Y}\end{bmatrix} \rightarrow \begin{bmatrix}\text{W}\\ \text{R}\\ \text{Y}\end{bmatrix}$$

Development of the cold channel:

$$[\text{Bk/G/Bu}] \rightarrow \left\{\begin{matrix}\begin{bmatrix}\text{G/Bu}\\ \text{Bk}\end{bmatrix}\\ \text{or}\\ \begin{bmatrix}\text{G}\\ \text{Bk/Bu}\end{bmatrix}\end{matrix}\right\} \rightarrow \begin{bmatrix}\text{G}\\ \text{Bu}\\ \text{Bk}\end{bmatrix}$$

A problem of this theory of separate channel unfolding: There exist a few languages with combined Y/G categories.

The first division is always in the warm channel (establishment of R/Y as the third basic color), the last division is in the cold channel. That is, divisions in the warm channel precede divisions in the cold channel. Also, development in this channel is more tightly constrained.

In particular, the following stages can be distinguished; there is also evidence for languages being on the transition between one stage and another.

(4)

Stage I	StageII	StageIII$_{G/Bl}$	StageIII$_{Bk/Bu}$	StageIII$_{Bk/G/Bl}$
$\begin{bmatrix}\text{W/R/Y}\\ \text{Bk/G/B}\end{bmatrix}$ individual speakers, e.g.of	$\begin{bmatrix}\text{W}\\ \text{R/Y}\\ \text{Bk/G/B}\end{bmatrix}$	$\begin{bmatrix}\text{W}\\ \text{R/Y}\\ \text{G/Bu}\\ \text{Bk}\end{bmatrix}$	$\begin{bmatrix}\text{W}\\ \text{R/Y}\\ \text{G}\\ \text{Bk/Bu}\end{bmatrix}$	$\begin{bmatrix}\text{W}\\ \text{R}\\ \text{Y}\\ \text{Bk/G/Bu}\end{bmatrix}$
Martu–Wangka, Australia	e.g.,Ejagham, Niger–Congo	Mura–Piraha, Brazil	Konkomba, Niger–Congo	Kwerba, NewGuinea

StageIV$_{G/Bl}$	StageIV$_{Bl/Bu}$	StageV
$\begin{bmatrix}\text{W}\\ \text{R}\\ \text{Y}\\ \text{G/Bu}\\ \text{Bl}\end{bmatrix}$	$\begin{bmatrix}\text{W}\\ \text{R}\\ \text{Y}\\ \text{G}\\ \text{Bl/Bu}\end{bmatrix}$	$\begin{bmatrix}\text{W}\\ \text{R}\\ \text{Y}\\ \text{G}\\ \text{Bu}\\ \text{Bl}\end{bmatrix}$
Sironó, Tupí	Martu–Wangka, Australia	Kalam, NewGuinea

Colors beyond the six fundamental colors are seen as mixes between those colors, e.g. orange – mix of R and Y (derived colors).

The model does not only describe developments for languages, but also for speakers within a language.

There is a category of desaturated or “bad” color, typically including gray, which might occur relatively early (also, brown?). The borders of these colors are particularly fuzzy.

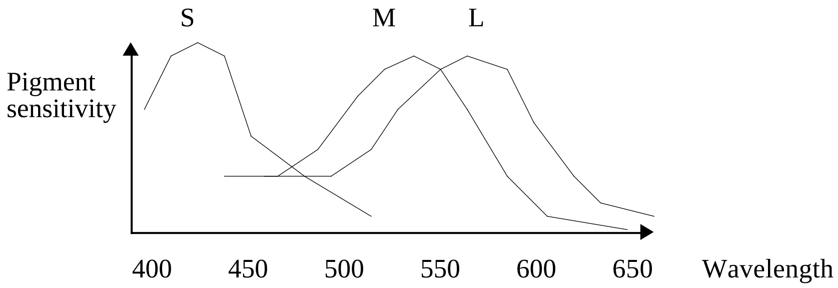
There are basic colors can be characterized as “peripheral red” (pink, orange, maroon, brown, purple, lavender). (Cf. Hungarian, above). (This is another point that supports the central status of red.)

1.1.4. Color Physiology

Color terms that come relatively late in the development may represent cultural influences, but it is quite likely that the basic color terms, and in particular the fundamental color terms, reflect properties of the visual system of humans (cf. Wooten & Miller (1997), also Kay & McDaniel (1978)).

As it is well-known, there are two kinds of receptors on the retina, rods (for light/dark contrasts, especially under low-light conditions) and cones (for color contrasts in brighter light). There are three types of cones with different photopigments, making them most sensitive (roughly) for the colors (with peaks at wavelengths of 420 nm, 540nm and 570 nm (S, M and L)). As the wavelength sensitivity of these rods roughly has the property of Bell curves, many hues can be distinguished by the fact that they excite the cones in a differential way.

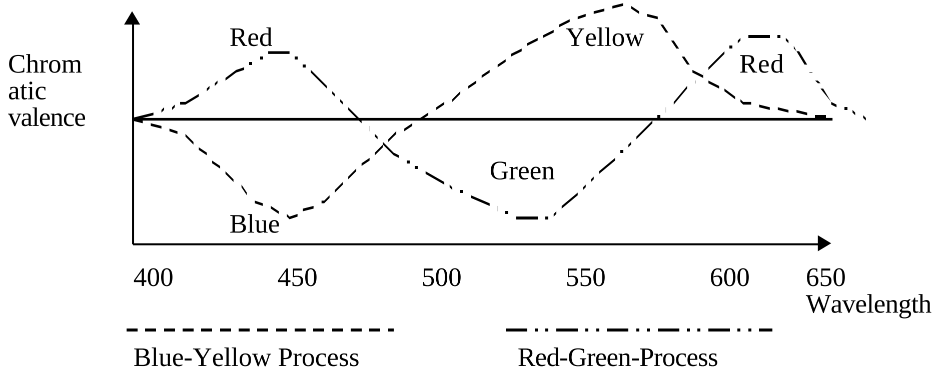
(5)



This finding corroborates a guess by Thomas Young (1801) that there are three basic color receptors at the retina, which was verified only in the 1960’s. Young saw that the number of color receptors should be low, as a high number would interfere with the ability to locate points. Among other things, this explains the three different types of color blindness. .

The Young/Helmholtz theory stood in contrast with the theory of Ewald Hering (1878), who proposed that color vision can be described as involving three opposites, light-dark, red-green, and blue-yellow. For example, there are no “bluish yellows” or “reddish greens”, and the afterimage of red is green, and of blue, yellow. The human color experience can be described by assuming that the Red/Green sensitivity and the Blue/Yellow sensitivity are distributed over the spectrum as follows:

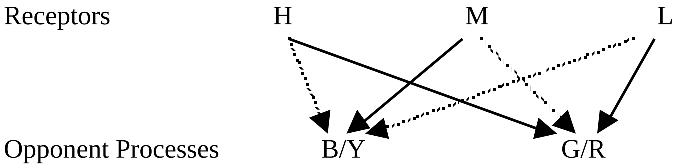
(6)



This theory explains, among other things, why the colors on both ends of the spectrum appear quite similar (deep red vs. purple), i.e. why color experience can be arranged in a circle.

Both theories can be combined by assuming that Hering’s opposites reflect combinations of receptor input (a proposal by Jameson and Hurvich, 1955).

(7)



Notice that the opponent processes (B/Y and G/R) reflect the fundamental colors in the study of color terms. Hence there is a relation between the neurophysiology of color perception and the structure of the color term lexicon.

However, there is no obvious neurophysiological motivation for the prominent status of red as the “third” color, or of the more. [Perhaps it is related to the fact that there are two receptors that are sensitive for the lower end of the spectrum and just one for the higher end, leading to a greater sensitivity for the lower end?]

1.1.5. A Fuzzy-Set Analysis

Kay, et al. (1978) propose an analysis of the development of basic color terms in terms of fuzzy set theory, a theory developed by Lofti Zadeh and used for other purposes as well (we will discuss this theory and problems in greater detail later).

In fuzzy set theory, membership of an element is not absolute, but a matter of degree, measured in real numbers between 0 (no membership) and 1 (full membership). This is expressed by a characteristic function f_A for a set or concept A that maps entities to real numbers between 0 and 1.

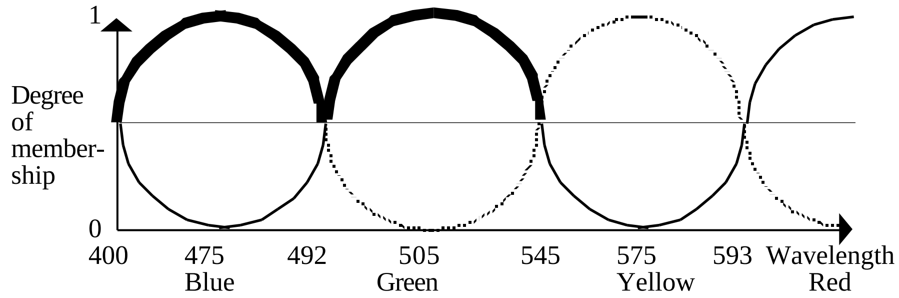
We can define the usual set-theoretic notions of union and intersection in terms of fuzzy sets:

(8) $f_{A \text{ or } B} = \mathrm{Max}[f_A, f_B]$, the function that maps every x to the maximum of $f_A(x)$ and $f_B(x)$

$f_{A \text{ and } B} = \mathrm{Min}[f_A, f_B]$, the function that maps every x to the minimum of $f_A(x)$ and $f_B(x)$

Fuzzy-set union can be used to model composite colors. For example, many languages do not distinguish between green and blue (“grue”). The function for grue can be seen as the fuzzy-set union of the functions for green and blue.

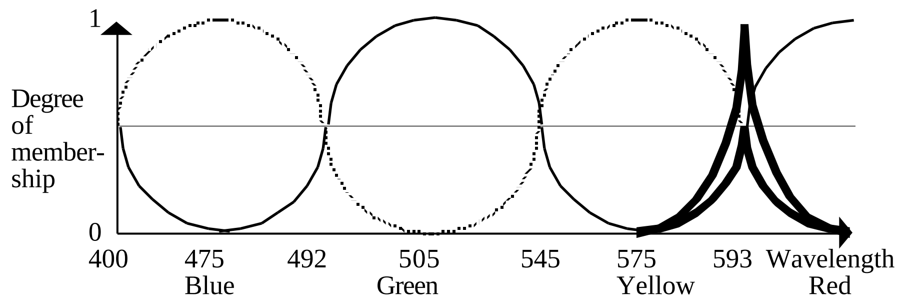
(9)



Notice that the function has relatively low values in the middle (492 nm). This may appear counterintuitive; however, it has been reported that languages with a color word for “grue” assign colors between blue and green a lower value than pure blues or pure greens.

Fuzzy-set intersection can be used to model derived colors, such as orange. However, it is not quite sufficient, as it would not allow for any clear cases of orange, with value 1. Kay & McDaniel suggest that concept intersection is calibrated (here by factor 2) that allows for clear cases.

(10)



Quick Project

There are several criteria to identify basic color terms, in contrast to non-basic ones, and there is linguistic evidence that the six fundamental colors (Bl, Bu, G, Y, R, W) are different from other basic colors, like pink, brown, or orange. (See Corbett & Davies (1997)). One of the criteria is **frequency**. Determine the frequency of the fundamental color words, the basic color words, and an assortment of 10 non-basic color words in the BNC (the British National Corpus), and discuss the result. (Notice: Use the tag AJ0 for adjectives to identify, for example, the adjective uses of *silver*).

1.2. Other Semantic Fields

While color terms are perhaps the best researched semantic field, there are quite a few others that have caught the attention of linguists and anthropologists.

1.2.1. Ceramics

Kempton (1981) investigates the structure of terminology to describe ceramic vessels, a type of utensil that is very widespread across cultures. (The investigation was mainly confined to Mexican Spanish).

Kempton used drawings of ceramics that varied systematically with respect to width-to-height ratio (measured by the position of the neck), the presence of one handle, of two handles, or of one handle and a spout.

Informants were first asked to volunteer words (by presenting them with the drawings), and then to identify the extension of the terms by drawing circles around the set of objects that fits a term. Also, best examples were solicited.

The basic terms investigated are *olla*, *jarra*, *jarro*, *florero* and *cazuela*. There was considerable variation between speakers, and for the same speakers between different occasions, especially about the borders. But there is considerable agreement what are “focal” examples. Kempton also investigates male/female differences, the judgment of experts (potters), and issues of language change (older vs. younger subjects). There is evidence for a gradual change of the meaning of *jarra* towards the meaning of *pitcher*, of *jarro* to *mug*, and of *taza* to *cup*.

Kempton argues for a **prototype** model of categorization, according to which categories are defined in terms of distance with respect to focal members, and against a **feature** model of categorization, according to which category membership is defined by features that are characteristic for a concept. For many speakers, the features of the drawings (like spout/no spout) did not lead to sharp differentiations.

For English: See example “mug” and “coffee cup”, p. 102/210

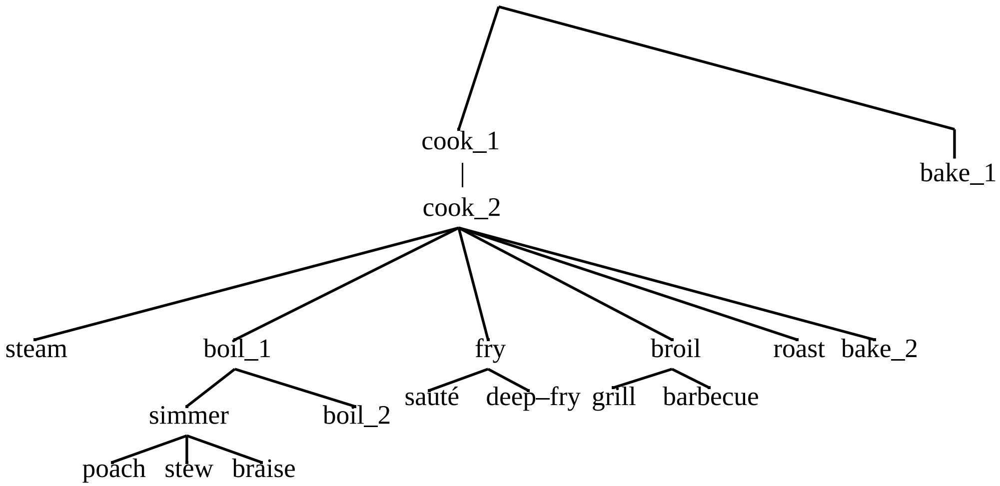
A problem in Kempton’s investigation is that he did not consider features like size, material and functional use.

1.2.2. Cooking Terms

Lehrer (1974), a general study of semantic fields and the structure of the lexicon, contains a discussion of cooking terms in English and other languages.

Lehrer gives the taxonomy of cooking terms as follows (she gives it not as a tree, but in box notation; also note that this was written in the 1970’ies, so don’t look for things like *microwave*; Lehrer excludes more specific technical terms like *flamber*, *oven-poach* etc.).

(11)



Here, $cook_1$ is the most general term to refer to the preparation of meals, and $bake_1$ for the preparation of bread, pasta, cookies etc. Only those occur intransitively (e.g. *John cooked*, **John simmered*). The difference between $cook_1$ and $cook_2$ is that the latter is meant as a transitive verb. [Notice that there are other ways of preparing a dish, like building a sandwich, that do not involve heat; English does not have a common term for that.]

The terms $boil_1$ and *steam* (which some speakers see as a hyponym of $boil_1$) denote cooking with water or a water-based liquid. The term *simmer* differs from $boil_2$, an autohyponym, insofar as the liquid is just below the boiling point (without large bubbles). Its hyponym *poach* specifies that the food is slowly cooked so that its shape is preserved, *stew* refers to a long cooking time, usually till great softness is achieved, and *braise* to a process where the food is first browned (e.g., by frying) and then cooked slowly in a covered pot with little water. *Steam* and *boil*_1 should form a covert category, it refers to cooking of food in raising vapor.

The term *fry* indicates the presence of fat or oil, *deep-fry* the presence of a large amount of oil, and *sauté* to quick frying with a small amount of fat. *Broil* refers to cooking by direct exposure to fire or another heat source. The term $bake_2$ refers to cooking food by exposure to hot air in an oven (this is quite similar to the preparation of foods described by $bake_1$). The term *roast* used to refer to roasting on an open fire on a spit, and is now better described as a hyponym of *broil* or $bake_2$, applicable to big-sized food pieces.

Lehrer investigates the cooking terminology of a number of other languages (French, German, Persian, Polish, Japanese, Chinese, Jacaltec, Navaho, Amharic, Yoruba) and attempts to come up with “Cooking Universals”, for example:

All the languages have a category for cooking with water, and within this the difference between boiling/non-boiling is the most important. (Counterexample: Paiyala, New Guinea, with three basic cooking words meaning ‘roast in hot ashes’, ‘bake in covered pit by means of hot stones’, and ‘cook over an open flame’). (p. 165).

The specifics of cooking terms obviously depend on cultural practices, which makes it perhaps more promising to compare the cooking terms of language communities with very similar practices.

[Note: Cf. for vessel shapes also Labov (1973).

1.3. Semantic Fields and Categorization

1.3.1. The notion of semantic fields

The notion of semantic fields (or word fields) goes back to the historical linguist Jost Trier. His first work concerned the development of terms referring to cognitive facilities in German (Trier (1931)). See for discussion Öhman (1953), Lyons (1977) vol. 1 250ff.) He argued that it is mistaken to consider the development of the meaning of single words. Rather, the meaning of a word is determined by the contrasts in which it stands to other words that denote related expressions. We often find that the way how a range of possible meanings is cut up remains quite constant, but the terms that denote the phenomena change. (More on that in the section on historical linguistics and lexical meaning).

The basic tenets of Trier’s theory are the following:

(i) The meaning of a word is dependent on the meaning of other words that denote phenomena in the same domain. (E.g., with color words, the meaning of a color word with focal color RED includes the yellow domain if the language does not have a word with focal color YELLOW; it excludes it if it does have a word with focal color YELLOW).

(ii) The words of a semantic field cover a whole spectrum of phenomena without gaps and overlaps, just like a mosaic. Trier also claimed that different semantic fields can be composed to ever-larger fields, thus comprising the whole gamut of human experience.

(iii) Changes in the meaning of one word in a semantic field involve changes in the meaning of other words in the field.

Trier’s basic ideas still form an important core of lexical semantics. But the claim that there are no gaps between meanings and no overlaps are clearly wrong (see discussion of color words, vessel terms, etc.)

1.3.2. Componential Analysis

To say that a semantic field distinguishes between a range of phenomena of a particular type is not very enlightening. We want to know about the criteria that are applied in distinctions. For color words, we have found that the criteria include hue and brightness, two continuous dimensions. For many other fields we do not find continuous dimensions, but discrete dimensions. For dimensions of this type analyses in terms of discrete components have been proposed.

Componential analyses are well-known in structuralist (and then generativist) phonology (e.g. the use of features like [+voice], [-front], etc. for the description of phonemes). They have also been applied to semantics (Goodenough (1956)), for example to kinship terminology Lounsbury (1963).

As an example of a componential analysis, consider the following analysis of the terminology for cattle in the German dialect of Siegerwald (after Reichmann, in Trier (1972)).

	young	3/4 years	1-2 years	adult	male	female	male/ female	castrated	not castr.	castr. or not	has calved	hasn’t calved
Büllesche n		+	+		+				+			
Fahrochse				+	+			+				
Jungfern-tier			+			+						+
Kalb	+											
Kemelkalf	+					+						
Kuh				+		+						+
Lüpper		+	+		+			+				
Ochse				+	+							
Och-senkalb	+				+							
Reitochse				+	+				+			
Rind			+			+					+	
Rindchen		+				+						
Vieh				+			+			+		

Notice that there are gaps in the system, that is, possible feature combinations that make sense biologically but that are not represented by a separate term.

One problem of this type of feature analysis is that we have nearly as many features as there are terms, so there is hardly any simplification of the overall description. But notice that we can simplify the feature description, as quite a few features are dependent on each other. For example, an animial that is male cannot be female, and vice versa; hence we can reduce that to a binary gender feature, say FEMALE, and write [+FEMALE] for female, and [-FEMALE] for male. Also, gender-neutral terms can be described with the same dimension, by introducing a neutral value ±, as [±FEMALE]. We can do the same with the three terms referring to whether the animal is castrated (a dimension that is valid only for [-FEMALE]).

Also, there are connections between the four age features; but these terms cannot be expressed by binary features. We either have to assume a feature AGE with four values that are ordered.

The use of binary features is illustrated for basic English kinship terms (after Bierwisch (1969)):

	relative	parents	father	mother	sibling	brother	child	son	daughter	uncle	aunt	cousin	nephew	niece
DIRECTLY REL.	±	+	+	+	+	+	+	+	+	-	-	-	-	-
SAME GENER.	±	-	-	-	-	+	+	-	-	-	-	+	-	-
OLDER	±	+	+	+	-	-	-	-	-	+	+	-	-	-
FEMALE	±	±	-	+	±	-	+	-	+	-	+	±	-	+

Notice that the four features allow for a relatively compact representation of the meaning of kinship terms. With one more feature, say, REMOVED, we can also cover terms like *grandmother*, *granddaughter*, *grantaunt* etc. We also find that the same or similar features are recurrent in many languages. But there are important differences. For example, German has a male/female distinction for *cousin* that English lacks. Many languages distinguish between relatives on the father's side and on the mother's side, a distinction that English lacks. But even for a universal description of kinship terms the number of necessary features is relatively small.

As another instance of componential analysis, cf. the analysis of cooking terms by Lehrer (p. 63). Notice that only some features lend themselves to a binary analysis.

	water	**oil or fat**	**vapor**	**heat source**	**action**	**utensil**	**purpose**	**speed**
boil$_1$	+	-	-		.			
boil$_2$	+	-	-		vigor.			
simmer	+	-	-		gentle			
stew	+	-	-		gentle		soften	slow
poach	+	-	-		gentle		shape	
braise	+	+	-	small		pot		
steam	+	-	+			rack		
fry	-	+				pan		
saute	-	+		small				fast
deep fry	-	+		large				
broil	-	-						
grill	-	-				grill		
charcoal	-	-						
bake	-	-				oven		
roast	-	-						

1.3.3. Problems of the Componential Analysis

The componential analysis is well suited for certain semantic fields, like kinship terminology. It has been championed as a framework for semantic analysis in generative grammar by Katz & Fodor (1963) and in later work of Fodor, Katz, and Postal.

But it is less clear how useful it is for many other semantic fields.

First, componential analysis allows for a particularly compact representation of meaning if the features are binary, or have a small number of values. But binary features are not always the best way of analyzing a semantic field; cf. e.g. the age components in the cattle terminology and in the kinship terminology. We could of course construct such distinctions by binary features, but we would loose the ordering inherent in age, which appears relevant (see e.g. the term *Lüpper* that refers to animals of two adjacent ages.

A more serious point is that the componential analysis leaves no room to capture **prototypicality effects**, which appear to be crucial in categorization (see Taylor (1995), and discussion of prototype theory below). Prototypicality refers to the fact that certain objects are considered particularly good examples of a category, whereas other examples, while still falling under the category, are considered less good.

We encountered prototypicality effects with color terms and with vessel terms, that is in an area in which there is a continuous variation of the phenomena involved (by hue and brightness for color, by relation between opening and body for vessels). But we also find prototypicality in cases of discrete variation, like with biological taxonomies or types of furniture.

Prototypicality has been explored in particular by Elaine Rosch for a variety of areas and with a variety of methods (e.g., Rosch (1975)). For example, if subjects are asked for "typical" examples of a category, they are fairly consistent. Typical examples are identified quicker as belonging to a category (especially by children).When subjects are asked to enumerate examples of a category, typical examples are named before less typical examples. There are priming effects (e.g., after the presentation of the word *furniture*, the words *chair* and *chair* are recognized more quickly as the same than, say, *telephone* and *telephone*).

But prototypicality may be compatible with the classic componential analysis (see discussion in Smith & Medin (1981)). One plausible way is to assume that less typical examples of a category have additional features. For example, we can capture the fact that robins are considered more typical birds than chicken as follows (schematically and without going into details):

(12)	*Animal*	*Bird*	*Robin*	*Chicken*
	F_1	F_1, F_2	F_1, F_2, F_3	F_1, F_2, F_3, F_4

Prototypicality is judged by similarity of features with a hyponym, where the prototypicality of α increases (with respect to a category β) with the number of features α shares with β (hence a robin is more prototypical as a bird than as an animal) and decreases with the number of features not present in the target.

The most serious criticism levelled against the componential analysis is that many categories can only be described in terms of what Wittgenstein has called **family resemblance**. This means that α, β and γ may fall under a category not because there is something that they all have in common, but because α and β have something in common, and β and γ have something in common. Wittgenstein explained that with the example *play* (German *Spiel*).

(Wittgenstein (1978): 31-33). For example, not every play involves that people interact (cf. patience), not every play involves winning or loosing (cf. a child playing ball), not every play is amusing (cf. professional chess players playing chess), etc.

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