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KILIVILA COLOR TERMS*

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> Die eigenen Bedeutungen der Worte wiegen schwer. Aber diese gehen in jenen nicht auf, sondern werden in sich betroffen vom Zusammenhang... Nur der genügt dem, was Sprache erheischt, der ihrer Verhältnisse zu den Einzelworten in deren Konfigurationen sich versichert.
>
> Theodor W. Adorno (1964, 51)

This paper documents the results of a study of color terms produced by Trobriand Islanders. Eleven color Stimuli were presented to 60 informants in five different age-groups ranging from approximately 4 to 75 years. These informants, native Speakers of Kilivila, live in Tauwema village on Kaileuna Island, one of the Trobriand Islands in Papua New Guinea.

The paper first describes the method and the aims of the study. It then discusses the strategies of language production used by the informants, presents the inventory of the lexical set of color terms in Kilivila, and describes the semanttc scope of these terms. Finally it discusses aspects of language change in progress that affect this lexical set of color terms in a rather dramatic way.

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1. *Jntroduction*

The study of color terms in different cultures and languages has had a relatively long history (see: Berlin, Kay: 1969, Appendix 2). It draws on such different scientific disciplines as physics (e.g.: Optical Society of America: 1953), concept theory (e.g.: Cohen, Murphy:1984), literary sciences (e.g.: McManus:1983), physiology (e.g.: Hering:1920; de Valois:1973), neurology and neurobiology (e.g.: Zollinger:1983), botany (e.g.: Conklin:1955), psychology (e.g.: Sun:1983), ethnology/anthropology (e.g.: Burgess, Kempton, MacLaurey:1983), psycholinguistics (e.g.: Clark, Clark:1977, 524-527), ethnolinguistics (e.g.: Landar, Ervin, Harrowitz: 1960), and, of course, linguistics in general (e.g.: Kikuchi, Lichtenberk:1983; Lyons:1968, 9.4.5. & 6.; Gipper:1972, 18-32).

In linguistics the study of color terms has until recently most often been connected with discussion of Sapir's and Whorf s theories and their implication for the search for semantic universals. The most important results of this discussion are presented in Berlin and Kay's book on "Basic Color Terms" (1969) and Kay and McDaniel's (1978) extension of the arguments advanced there. That the discussion is still going on is documented by Kay and Kempton (1984; see also Lyons: 1981, 245-250).

It is one thing to consider these issues at the desk in one's study and another to face the problem of "color terms" in a foreign language one is studying in the field. This paper deals with color terms in Kilivila, as it is spoken by the inhabitants of Tauwema, a village on the northern tip of Kaileuna Island, one of the Trobriand Islands.

Kilivila is one of the Austronesian languages with VOS-word Order (Senft:1985). Typologically it belongs to the "Papuan Tip Cluster" group (Capell:1976, 6, 9). Kilivila is spoken by the inhabitants of the Trobriand Islands; these islands are situated in the south-east of Papua New Guinea in Milne Bay Province in the middle of the Solomon Sea. The islands became famous especially in anthropological circles because of Bronislaw Malinowski's masterpieces on aspects of Trobriand culture.

The study presented here is based on 15 months of field research carried out in Tauwema village on Kaileuna Island in 1982-1983. One of the aims of the research project "Ritual Communication on the Trobriand Islands" was to write a grammar and a dictionary of Kilivila (Senft:1982; 1985; in press). In collecting lexicographic data, I became interested in the color terms of Kilivila at quite an early stage of my acquisition of the lan-

guage. In February, 1983, I collected systematic data on Kilivila color terms. Before I discuss the methodological aspects of collecting these data, I will first discuss briefly the aims of this study.

2. *Aims of the Study*

In initial elicitation of data on color terms, I found some discrepancies in the reactions of informants of different age and sex. The rather incoherent result of eliciting, checking, and counter-checking color terms with different informants suggested that it would be worthwhile to study these color terms on a larger scale as a lexicographic and semantic problem in its own right.

Besides being inspired by the general hope of getting order out of the chaotic sample of color terms, the study was designed to answer the following questions:

- What is the inventory of color terms in Kilivila?
- What color terms are used to signify what colors?
- What is the semantic scope of Kilivila color terms?
- Are there any differences in color terms and their semantic scope according to age and sex of informants?
- If so, why are there these differences?
- Does the process of acquiring color terms give us some clues to the differences in color terms used by Kilivila Speakers of different sexes and ages?
- Is it possible to speak of language change in progress in connection with color terms in Kilivila?
- If so, what is this language change in progress like?

Answering these questions requires some methodological considerations. The following section presents a brief discussion of the methodological aspects of my study on Kilivila color terms.

3. *Method*

In collecting lexicographic data, a pictorial dictionary proved a useful tool. Starting the lexicographic data collection in Tauwema I used Pheby and Scholze's "Oxford Duden Bildwörterbuch". This pictorial dictionary contains a plate on "color" (Pheby, Scholze:1979, Plate 343, 600f.); from this plate I chose the 9 color Squares presented there: red (1), yellow (2),

blue (3), pink (4), brown (5), azure/sky blue (6), orange (7), green (8), violet (9), and the two color sectors in figure 10 and figure 12, namely white (11) and black (12), as a means for eliciting color terms.

These 11 colors can in principle elicit 10 of Berlin and Kay's 11 basic color terms (Berlin, Kay:1969, 4; Kay, McDaniel:1978, 614f., 639); the basic color term that cannot be elicitated with these colors chosen from Pheby and Scholze's plate is "grey". Berlin and Kay's color-label "purple" is identical with Pheby and Scholze's color-label "violet". The color-label "azure/sky blue" in Pheby and Scholze is the only color term that Berlin and Kay do not list as a basic color term (but see Kay, McDaniel:1978, 640).

Readers familiär with previous studies on color terminology will realize that procedures used for eliciting color terms are different from those used in other studies in the Berlin-Kay tradition. Berlin and Kay used 329 color chips provided by the Munsell Color Company (Berlin, Kay:1968, 5), and Burgess et al. (1983, 135) used 330 Munsell Color Standards, 1976 issue, to cite just another of the more recent studies using these color chips as color Stimuli.

The explicit aim of studies like Berlin and Kay's (1968, 2), Kay and McDaniel's (1978, 610), and Burgess et al.'s (1983, 133) was to get some Information on "color-category-structure". To reach this aim, they confronted their obviously attentive, highly cooperative, and indefatigable informants with this enormous number of color Stimuli. However, this was not the aim of the study presented here, nor could it be, because the research project was not equipped with Munsell Color Standards. As stated above, the aim of this study was primarily to examine the scope of the lexicographic inventory of color terms in Kilivüa and to infer mechanisms of language change in progress and their possible explanation. These aims neither exclude possible Information on the domains of Kilivila color terms nor do they block the possibility of referring to studies like those mentioned.

In order to pursue the various aims of this study, I had to decide on a sample of informants. I focused my research on the language variety of Kilivila that is spoken by the inhabitants of Tauwema village on Kaileuna Island.

Tauwema has 239 inhabitants (120 adults: 58 women, 62 men; 119 children: 52 girls, 67 boys). I decided on a sample of 60 informants, 30 female/ 30 male, representing 5 different age groups ranging from approximately 4

to 75 years. This sample is shown in Table 1. There is no official or reliable registration of dates of birth on the Trobriand Islands; therefore the age of all informants had to be estimated. Pretesting had shown that there was no point in trying to elicit color terms from children younger than 4 years; children start to acquire these terms around the age of 5 (± 6 months); within all 5 age groups I tried to balance the informants according to sex and age, especially with the two adult groups that encompass age-spans of 19 and 30 years (see also Senft:1983, 4ff.).

Table 1: Informants

age group		informants female	male	all
children ageapprox.:	4- 7	6	6	12
school children ageapprox.:	8-14	6	6	12
adolescents age approx.:	15-24	6	6	12
adults I age approx.:	25-44	6	6	12
adults II ageapprox.:	45-75	6	6	12
	Total:	30	30	60

Having made these basic methodological decisions, I approached children and adults in Tauwema that belonged to one of the 5 age groups at random. I first asked them whether they would like to work with me. All the persons asked agreed to cooperate. Then I told them in Kilivila: "I want to know the name of the color" ("Magigu banukwali yagala noku"). I then pointed at one of the colors on page 600 in Pheby, Scholze (1979) and asked them: "What is this?" ("Avaka beya?"). I always started with the color Stimulus "WHITE"[1], then went on to "BLACK", then "RED, YELLOW, BLUE, PINK, BROWN, AZURE, ORANGE, GREEN, and VIOLET",

in this order. If the informant reacted, I noted down his answer on a sheet of paper; if he did not react, I noted that and then asked him: "Don't you know it?" ("Gala kunukwali?"). The answer to this question was always: "Yes, I don't know it" ("E, gala anukwali") or "Yes" ("E"), or "No" ("Gala") — implying: "No, I don't know it". This answer was noted down, too. My questions and the informants answers were also tape-recorded.

The color-stimuli were presented to all the informants in the shade to ensure a relative constant intensity of light for all Speakers.

Although the standardized introduction and questions, the list, and the tape-recording marked the Situation as quite formal, my informants in general did not seem to be bothered at all, but were highly cooperative, even the children, to whom the whole test seemed to be a kind of a new game.

4. *Kilivila Color Terms*

In the following I present the results of my study on Kilivila color terms. I first document and discuss the informants' reactions to the color Stimuli in all 5 age groups. Then an attempt is made to describe the inventory of color terms in Kilivila altogether. Finally I discuss the results of the study in connection with the problem of language change in progress.

4.1. *Kilivila Color Terms in 5 Age-Groups*

The total set of color terms produced by the informants, and numbers with which they will be indicated in subsequent tables, are listed in Table 2. The responses of the informants in each age group are shown in Tables 3-7. In these tables the first 6 informants are always male and the last 6 female. After the informant's name, his or her approximate age is given in brackets. Some informants produced two color terms for one Stimulus; these are both shown in Tables 3-7, separated by a slash. Dashes indicate that the informant did not know a color term for the color Stimulus presented.

Table 2: Color Terms Produced and their Numerical Abbreviations

1 = pupwakau	2 = bwabwau
3 = bweyani	4 = digadegila*
5 = kwinin	6 = veravera*
7 = white	8 = black
9 = red	10 = yellow
11 = green	12 = blue

13 = brown	14 = orange
15 = pink	16 = dararugu*
17 = pepol	18 = uravera*
19 = (ya-)botova*	20 = gana'uga*
21 = bulum	22 = siluedala*
23 = gisivoyala*	24 = budakola
25 = vau*	26 = tauvau*
27 = kwegulini	28 = pipimata*
29 = sinigeyata*	30 = kasikesi*

* Terms marked with an asterisk (*) are otherwise used to refer to certain flowers and to the blossoms of certain trees (see: 4.2.).

One example will be given: If we look at 6-year-old Tovabiu's reaction to the stimulus "WHITE" in Table 3, we find the numbers 1 and 7. 1 is the abbreviation for the color term "pupwakau" and 7 is the abbreviation for the color term "white". This means that this boy produced both the Kilivila color term and the English color term for the first color stimulus presented.

Table 3 presents the responses of the 4- to 7-year-old children.

Apparently children first acquire the color terms for "WHITE" and "BLACK", then for "RED", and then for "YELLOW".[2] Some of these children also have acquired English color terms. Two children could produce the term "green" correctly. The term "bwabwau" is used very broadly to refer not only to "BLACK" but also to "BLUE, AZURE", and "VIOLET"; the English term "blue", on the other hand, is used by one boy to refer to "BLACK".

Table 4 presents the data from the school-children, who ranged in age from 8 to 14 years. Compared to Table 3 it shows a dramatic increase in the number and variety of color terms.

The results indicate the following trends: The majority of the 12 informants could produce the appropriate Kilivila and English color terms for "WHITE, BLACK, RED", and "YELLOW", and the correct English color terms for "BLUE". Only 2 boys but 5 of 6 girls could also use the correct English term for "GREEN". Hence, it appears that children probably learn the color terms for "WHITE, BLACK, RED, YELLOW, BLUE", and "GREEN" between the ages of 8 and 11 1/2; girls, but not boys also seem to acquire the Kilivila word for "YELLOW", namely "kwinin".[3] We again find that "bwabwau" is used broadly for "BLACK, BLUE/AZURE", and "BROWN". Knowledge of English color terms is quite good, although some usages do not correspond to Standard English. The girls' inventory of

Table 3: Color Terms Produced by Children (Age approx.: 4-7)

	Color Informant	WHITE	BLACK	RED	YELLOW	BLUE	GREEN	BROWN	AZURE	PURPLE	ORANGE	PINK	VIOLET
m	Tomdoya(4)												
	Yabilosi(5)		_	_	-	_	_	-	_	-	-	_	_
	Tokurasi(5)		1	3	-	-	-	-	-	-	-	9	2
	Tovabiu(6)	1/7	2/12	-	4	-	-	-	-			11	
	Baiga'ega(6)		_	_	_	_	_	_	_	_	_	_	_
	Dudauvelu(7)	1		2 3		1 0		-	-	-	2	-	-	-
f	Vesali(4)		_	_	_	_	_	_	_	_	_	_	_
	Nakekwabu (4)	—		-	-	-	-	-	-	-	-	-	-
	Ibutu(4)		_	_	_	_	_	_	_	_	_	_	_
	Bomtula(5)	1		2	-	-	-	-	-	-	-	-	-
	Igiobibila (6)			1	-	3	-	2	-	-	-	-	-	-
	Namili'eva (7)	1		2	3	4	-	-	-	-	-	1	1	-

m = group of male informants f = group of female informants

Table 4: Color Terms Produced by School Children (Age approx.: 8 - 14)

Color Informant	WHITE	RED	BLUE	YELLOW	GREEN	BROWN	BLACK	ORANGE	GREEN	VIOLET
Luluwasi (8)	1/7	2/8	3/9	-	12	-	-	-	-	11	-
Galabagula (9)	1	2	3	11	-	-	-	-	-	-	-
Dukuta'isi (11)	-	-	3/9	1/10	12	-	-	-	-	-	-
Kwelava (12)	1/7	2/8	3/9	10	12	-	-	-	-	-	-
Morakum (13)	1	2	3	-	-	-	-	-	-	-	-
Gumsakapu (14)	1/7	2/11	3/9	10	12	15	13	-	17	11	-
Mokulakoma (10)	1/7	2/8	3/9	5/10	2/12	15	6	12	14	4/11	16
Bolubatau (11) •	1/7	2/8	3/9	10	12	-	-	-	-	-	-
Imkubul (11)	1/7	2/8	4/9	5/10	2/12	-	2/13	12	-	11	15
Namyogai (12)	1/7	2/8	3/9	5/10	2/12	-	2/8	2	-	11	15
Senubesa (13)	1/7	2/8	3/9	5/10	12	-	-	-	3/9	11	-
Iluboku (14)	1/7	2/8	3/9	5/10	12	-	13	-	-	11	15

m = group of male informants f = group of female informants

Table 5: Color Terms Produced by Adolescents (Age approx.: 15 - 24)

	Color Informant												
m	Moyadi(18)												
	Mo'agava (18)	II	2	3	5	—	—	—	—	—	—	—
	Gayoboda (19)	IL	2	3	5	-	-	-	11	-		-
	Tomwawai (20)	L	2	3	-	-	-	-	-		-	-
	Mogega (23)	I	2	3	11	2	23	-	4	20		-
	Simia (24)	I	2	3	11	4	-	11	-		-	3
f	Bomsamesa (16)	I	2	3	5	-	-	-	4	-		-
	Namnabai (16)	L	2	3	5	-	-	-	-	-	-	16
	Itakeda(17)	L	2	3	5	-	-	-	-		-	-
	Asinata (18)	L	2	3	5	-	-	-	-	-		-
	Ibonoma (19)	L	2	3	11	2	20	-	10	-		-
	Kapatu (23)	II	2	3	5	21	-	-	-	-		-

m = group of male informants f = group of female informants

English color terms is much more elaborate than the boys' inventory. This is probably the most striking feature of Table 4.[4]

Let us now turn to the 15- to 24-year-old adolescents and young adults (Table 5).

The majority of the male informants produced the correct Kilivila terms for the first three color stimuli. Most of these informants also produced the English term "green", but always in a way that would be inappropriate for a native speaker of English. There was only one male who produced the names of flowers and blossoms to refer to certain color stimuli. The majority of the female informants, on the other hand, produced the correct Kilivila terms for the first four color stimuli, and two of them also produced the names of flowers and blossoms for certain color stimuli. The fact that four males and two females of this age group produced English color terms may be related to the fact that some of them went to school in Kaduwaga. However, these terms were usually used incorrectly, indicating that the education was not a big success at least for the first generation of Tauwema pupils.

Table 6 shows the results for informants between 25 and 44 years of age.

There are the following trends: The majority of the informants produced the correct Kilivila terms for the first four stimuli. Two male informants were also able to produce English color terms correctly along with the appropriate Kilivila color terms, possibly because of their position as local village priests who had some schooling and education. We note furthermore that 5 informants also knew the correct use of the English term "green" and that two female informants produced English loan words[5] in the mould of Kilivila word formation. Moreover, male and female informants used the names of flowers or blossoms of trees to refer to certain color stimuli.

Table 7 presents the results for the 45- to 75-year-olds.

All the informants produced Kilivila color terms to refer to the first four stimuli. There were just a few informants who produced English color terms or English loan words with Kilivila word-formational markers. The informants used "digadegila" and "bwabwau" to refer to a wide range of stimuli. Especially the women in this age group produced a variety of Kilivila terms that in their more basic use refer to blossoms or to flowers.

Given these results, I can now start to answer the questions I asked at the beginning of this study (see section 2).

Table 6: Color Terms Produced by Adults I (Age approx.: 25 - 44)

	Color Informant	WHITE	BLACK	RED	YELLOW	BLUE	PINK	BROWN	AZURE (SKY BLUE)	ORANGE	GREEN	VIOLET
m	Moligogu(26)		2	3	-	4	-	-	-	-	-	-
	Mo'akwana (27)		2	3	4	-	-	6	11	-	22	-
	Tokuyumila (36)		2	3	5	11	-	-	-	-	-	-
	Gembara (39)		2	3	4	2	6	-	-	-	-	3
	Stephen (40)	1/7	8/24	9/25	10/26	2/12	6	13	22	-	11	16
	Mokelobu (43)		2/12	3/9	10/26	2/12	-	-	-	-	-	-
f	Italu (25)		2	3	5	-	-	-	-	-	11	16
	Naukwatai (26)											
	Yebwaku (27)		2	3	5	2	-	-	-	20	27	16
	Bwetagava (29)		2	3	5	-	4	-	-	-	11	16
	Bokamata (32)		2	3	4/11	2	19	-	21	-	11	-
	Silena (42)		2	3	4/5	2	6	19	-	-	-	-

m = group of male nformants f = group of female informants

Table 7: Color Terms Produced by Adults II (Age approx.: 45 - 75)

	Color / Informant											
m	Tomtava(46)	1	2	3	4	22	28	—	—	29	—	—
	Vapalaguyau (48)	1	2	3	4	21	-	-	-	-	4	-
	Tokunupei (56)	1	2	3	4	2	22	-	-	-	-	-
	Bwema'utila (56)	1	2	3	4	-	-	-	-	-	-	-
	Bwegima (68)	1	2	3	4	2	1	2	4	3	21	3
	Tolagala (75)	1	2	3	4	2	-	-	-	-	-	-
f	Kadawaya (48)	1	2	3	5	21	6	22	-	-	-	-
	Sibwesa (58)	1	2	3	4	2	18	18	19	20	4	18
	Ibova (66)	1	2	3	4	2	4	-	-	-	-	-
	Isilena (66)	1	2	3	4	2	1	2	2	4	2	3
	Kipotu (66)	1/7	2	3	5	21	30	-	11	20	-	16
	Sedaka (74)	1	2	3	4	2	6	-	-	20	-	16

m = group of male informants f = group of female informants

4.2. *Kilivila Color Terms - The Inventory*

In this section I discuss the first three questions raised in connection with Kilivila color terms:

- What is the inventory of color terms in Kilivila?
- What color terms are used to signify what colors?
- What is the semantic scope of Kilivila color terms?

To answer these questions I will primarily rely on the production of color terms documented in the previous section; nevertheless, some terms that were not produced will also be discussed to give an as coherent and exhaustive a picture of the inventory of Kilivila color terms as possible.

In explaining the aims of the study to the informants I used the Kilivila term "noku" as the generic term for "color" (see section 3). This term is also used to refer to a bush the women use to produce a reddish dye for their skirts. Dixon (1977, 52) cites the term "nokunoku" for the color "red", but I never heard this color term on either Kaileuna Island or Kiriwina Island and I assume it is either a rather archaic term with very special rules of reference or an expression typical for the Kavataria variety of Kilivila (Dixon's informant Ralph Lawton did his work on Kilivila in Kavataria and Oyabia). In any event, "noku" is the generic term for "color" in Kilivila now, as all my informants told me unanimously and as I could verify during my lexicographical work on Kilivila. Let me add that I also found the loan word "penita" for "paint".

The color terms discussed above can be divided into the following different categories:

- The Kilivila terms "pupwakau, bwabwau" and "bweyani" were produced most often by the informants. "Pupwakau" is closely related to the noun "pwaka", which means "lime"; for the other two terms, however, I could find no similar relation. These three terms seem to be something like "basic color terms" for Kilivila, though they do not fit properly in Berlin and Kay's definition of a "basic color term" (Berlin Kay: 1969, 6). I will come back to this problem later in this section.
- The informants produced many terms that in their more basic sense refer to certain flowers or to the blossoms of certain trees. The most frequently used term belonging to this category is "digadegila". Other more rarely used flower or blossom terms are "dararugu, veravera, gana'uga, siluedala, botova/yabotova, uravera, gisivoyala, vau, pipimata, sinigeyata, kasikesi", and "tauvau". I was not able to translate these obviously folk taxonomical

terms into a European standard botanical taxonomy.
- One informant produced the Kilivila noun "budakola", "charcoal", for the color stimulus "BLACK".
- Four English loan words were produced in response to color stimuli: "kwinin" (the name of the old anti-malaria drug "Quinine") for the color stimulus "YELLOW", "bulum" for "BLUE", "pepol" for "ORANGE", and "kwegulini" for "GREEN". The last two terms were each produced once by a single informant. These loan words are produced in the mould of Kilivila word formation.
- Certain English color terms were produced by the native speakers of Kilivila as foreign words in response to the color stimuli presented: "white, black, red, yellow, green, blue, brown, orange", and "pink".

These five categories of terms that were produced as a reaction to the color stimuli presented can be interpreted as representing five different strategies the informants used to cope with the test situation:

- Use "basic color terms" in an appropriate way.
- Use terms belonging to the lexical set of "folkbotany" (see Conklin:1955, 339) if you want to be more specific in referring to color stimuli.
- Use names for objects that characteristically have that color (Berlin, Kay: 1969, 6)
- Use loan words (i.e. color terms borrowed from English, transformed and produced in the mould of Kilivila word formation).
- Use foreign words (i.e. English color terms).

We will look now at each of the color terms produced and check how often all the informants used a specific color term to refer to a specific color stimulus. Table 8 represents the result of this way of ordering the data.

It allows us to describe the inventory of Kilivila color terms, their use, and
- to a certain extent — their semantic scope.

1. "pupwakau" (1) is the Kilivila term for "WHITE". It is also used once to refer to "YELLOW" and twice to refer to "PINK". With these three color stimuli we find the following common features: "WHITE" and "PINK" are so-called "mixed colors", but "YELLOW" is not; it is defined by having wavelengths between 580 - 640 milimikron (mu) in the spectral scope (Pohl:1954, 21). However, Kay and McDaniel (1978, 630, 637) list the "Neural Response Categories f *white* OR *red* OR *yellow"* as the "semantic category based on fuzzy union" under the label

Color-Term-Abbr.:	WHITE	BLACK	RED	YELLOW	BLUE	PINK	BROWN	AZURE (SKY BLUE	ORANGE	GREEN	VIOLET
1	51			1		2					
2		49			19		4	3		1	1
3		1	47						2		4
4			1	16	2	2		3	1	3	
5				19							
6						5	2				
7	12										
8		9					1				
9			12						1	1	
10				12				1			
11		1		5	1		1	3		13	
12		2			12			2			
13							4				
14									1		
15						2					3
16											8
17									1		
18						1	1				1
19						1	1	1			
20						1			5		
21					4			1		1	
22					1	1	1	1		1	
23						1					
24		1									
25			1								
26				2							
27										1	
28						1					
29									1		
30						1					

Table 8: Usage and Scope of Kilivila Color Terms

"light warm". I do not want to discuss Kay and McDaniel's procedure here; I just want to hint at the features shared by "WHITE" and "PINK" on the one hand and "WHITE" and "YELLOW" on the other hand, which define the scope of the Kilivila term "pupwakau".

2. "bwabwau" (2) is used mainly to refer to the stimuli "BLACK" and "BLUE" (including "AZURE"); it is also used for "BROWN", and there is a single token each for "GREEN" and "VIOLET". In looking for common features of these color stimuli we find that Kay and McDaniel (1978, 630, 637) list the "Neural Response Categories f *black* OR *green* OR *blue"* as the "semantic category based on fuzzy union" under the label "dark-cool". "VIOLET" is a "derived category" in Kay and McDaniel's terminology (1978, 631). Berlin and Kay (1969, 145) have hinted that neighbouring colors like "BLUE" and "VIOLET" often cause confusion in linguistic expressions. This could explain the connection of "VIOLET" and "BLUE" that the scope of the Kilivila term may express to a certain extent. "BROWN" is also a "derived category"; Kay and McDaniel list the "Neural Response Categories f *black + yellow"* as the "semantic category based on fuzzy intersection" under the label "brown". This may be the connection between "BROWN" and "BLACK" that is incorporated in the definition of the Kilivila term to a certain extent.
3. "bweyani" (3) is the Kilivila term for "RED"; two informants also use this term for "ORANGE", a neighbour of this color in the color spectrum, and four informants use it for "VIOLET". Kay and McDaniel (1978, 632, 637) list the "Neural Response Categories f *red + yellow"* as the "semantic category based on fuzzy intersection" under the label "orange" and the "Neural Response Categories f *red + blue"* as the semantic category based on fuzzy intersection" under the label "purple" (= violet). The Kilivila term "bweyani" may express the role of "redness" in these categories to a certain extent.
4. "digadegila" (4) is most often used to refer to "YELLOW", however, it is also used to refer to "BLUE", especially "AZURE", and "GREEN"; there are also a few tokens for "PINK", "ORANGE", and "RED". At first sight these color stimuli seem to have no common features at all. However, .the literature on color terms shows that there is often confusion of "YELLOW" with "GREEN"; "GREEN" on the other hand is often confused with "BLUE" (Berlin, Kay: 1969, 143, 145). The Kilivila term "digadegila" also shows this pattern of confu-

sion. This observation, however, would seem to indicate that "digadegila" has at its focus "YELLOW". "RED, ORANGE", and "YELLOW" are all "long wave colors" (Pohl:1954, 21), but "PINK" is a so-called mixed color. Kay and McDaniel (1978, 637) define the "semantic category based on fuzzy intersection 'orange' and 'pink'" as the "Neural Response Categories f *red + yellow"* and "f *red + white".* Thus there seems to be a connection between the stimuli the informants of the study refer to with the term "digadegila".

5. "kwinin", another Kilivila word for "YELLOW", is a relatively old loan word.
6. "veravera" is used 5 times to refer to "PINK" and twice to refer to "BROWN". These two color stimuli have no features in common. Therefore we cannot properly define the scope of this term. We can only assume that it is the Kilivila expression for "PINK".
7. With respect to the use of English color terms (7-15) results can be summarized as follows:
   a. "white" is used to refer to "WHITE";
   b. "black" most often refers to "BLACK", but there is one token of its use for "BROWN";
   c. "red" is used primarily for "RED", but there is one token each of its use for "ORANGE" and "GREEN";
   d. "yellow" is used to refer to "YELLOW", with one token for "AZURE";
   e. "green" is used most often for "GREEN", but it is also used 5 times for "YELLOW" — this English term seems to be problematic for my informants, because they also use it to refer to "BLACK, BLUE, AZURE", and "BROWN";
   f. "blue" is used to refer to "BLUE" and "AZURE", and — interesting enough, if we compare its production with the production of "bwabwau" — also twice for "BLACK";
   g. "brown" is produced only 4 times, always correctly;
   h. "orange" is used once correctly;
   i. "pink" is used twice correctly, but three times to refer to "VIOLET".

   The semantic scope of each of the English color terms in the production of native speakers of Kilivila can be explained in the same way in which I tried to explain the scope of the color terms "pupwakau, bwabwau, bweyani", and "digadegila".
8. "dararugu" (16) is the Kilivila term for "VIOLET".

9. "pepol" (17), a loan word, is only used once in connection with the stimulus "ORANGE".
10. "gana'uga" (20) seems to be the Kilivila term for "ORANGE".
11. The loan word "bulum" (21) is used correctly for "BLUE" and "AZURE"; there is also one token of its use for "GREEN".
12. The loan word "kwegulini" (27) is used to refer to "GREEN".
13. "budakola" (24) also means "charcoal" in Kilivila; it is correctly used to refer to "BLACK", but only by one informant.
14. the data base is too small or too unclear to give any substantial comments in respect to their semantic scope for the terms "siluedala, gisivoyala, vau, tauvau, pipimata, sinigeyata, kasikesi, uravera, (ya-)botova", and "siluedala". I can only assume that "gisivoyala, pipimata", and "kasikesi" are pink flowers and tree blossoms, "sinigeyata" is an orange tree blossom, "tauvau" is a yellow blossom of a taro plant, and "vau" is a red tree blossom.[6]

The general picture, then is as follows: "pupwakaii, bwabwau, bweyani" and "kwinin" seem to be "basic color terms" in Kilivila. One might include "digadegila" in reference to the color "YELLOW" in this category, although its semantic scope is not as clear as the scope of the term "kwinin". Thus, Kilivila would have a "typical stage Hlb basic color lexicon" in Berlin and Kay's terminology (1969, 19f.).

This fact is nicely mirrored in the correct use of English color terms as foreign words by Kilivila native speakers. But the use of English color terms, on the other hand, indicates a change in the basic color lexicon of Kilivila native speakers. We also find the more or less appropriate usage of the English color terms "green" and "blue" — including the loan words "kwegulini" and "bulum" — and also a few tokens of the correct use of the English color term "brown". With this basic color lexicon we have a developing "typical stage IV" lexicon (Berlin, Kay: 1969, 20) in Kilivila native speakers. Thus, the use of English color terms as foreign words by the informants in this study becomes an important aspect in the discussion of the lexicon of color terms in Kilivila native speakers. Before turning to this, let me finish the interpretation of the results presented in Table 8.

The use of terms belonging to the "folkbotany" lexical set and of names for objects characteristically having that color seems to be of marginal importance only, although they provide the native speakers of Kilivila with a means to refer more specifically to colors when they want to. This strategy has been well known in the literature since Conklin's classic articles

(Conklin:1955; 1962). Nevertheless, I want to emphasize this strategy, because in reading the literature on basic color terms I have gotten the impression that a reader could easily be misled into thinking that if a language only has a few *basic* color terms, this means that speakers of that language can only perceive a few colors. This is definitely not so.

A few color terms were not produced by the informants during this study, but I observed them used by Trobriand Islanders to refer to colors in another context, namely, while discussing the art of traditional carvings like canoe-prows ("lagim" in Kilivila) and boards indicating the high rank (subclan) of a chief ("tataba" in Kilivila). These include the following:

- "pwaka", a noun which also means "lime", was used to refer to "WHITE". This can be explained by the fact that lime is used to paint the traditionally white parts of these carvings.
- "kwanasi" and the variant "pwanasi", which is very similar to the rather archaic noun "pwanosi" for "charcoal", was used to refer to "BLACK". This can be explained by the fact that a mixture of charcoal and a clay-like mud is used to paint the traditionally black parts of these carvings.
- "marakana", a certain fruit (as well as the tree it grows on) was used for "RED". A red paint is made out of a mixture of this fruit, water, oil, and a bit of reddish clay. "Marakana" is only used for painting the traditionally red parts of these carvings.

These three color terms belong to the class of terms that are also the names of objects characteristically having these colors and to the class of "folkbotany" terms; their application is apparently restricted to a single class of objects, namely traditional carvings (see Berlin, Kay:1969, 6).

4.3. *Kilivila Color Terms and Language Change in Progress*

If we compare the summaries of the color terms produced by the informants in each of the five different age groups as presented in Tables 3-7, it is obvious that there are differences across informants. In this section I will discuss these differences and try to explain them. In Table 9,1 give the absolute frequency of each of the 30 color terms produced, first for males, then for females, and finally for all informants in each of the five age groups.

These numbers again indicate the special importance of the "basic" Kilivila color terms "pupwakau" (1), "bwabwau" (2), "bweyani" (3), "digadegila" (4), and "kwinin" (5); the impact of these five color terms with their main semantic scopes of "WHITE" (pupwakau), "BLACK" and "BLUE" (bwabwau), "RED" (bweyani), and "YELLOW" (digadegila

Table 9: Absolute Frequency of Color Terms Produced
(* semantically problematic usage of one token)

Color-Term-Abbr.:	Number of Production in Age Group - I			II			III			IV			V			Total
	vol	*V*	all	m/	*il*	all	m/	*il*	all	*ml*	f/	all	*ml*	f/	all	
	3	3	6	6	6	12	5	6	11	6	5	11	7	7	14	54
	4	3	7	5	12	17	7	7	14	8	8	16	10	13	23	77
	*2**	2	4	6	6	12	6	6	12	6	5	11	8	7	15	54
4	1	1	2		*2%*	2	2	1	3	3*	3	6	81	71	15	28
5					5	5	2	5	7	1	4	5		2	2	19
6					1	1				3	1	4		2	2	7
7	1		1	3	6	9				1		1		1	1	12
8				2	7	9				1		1				10
9	1*		1	4	7	11				2		2				14
10	1		1	3	6	9		1*	1	2		2				13
11	1	1	2	41	5	9	41*	1*	5	3*	4*	7		1*	1	24
12	1		1	4	8	12				3		3				16
13				1	2	3				1		1				4
14					1	1										1
15				1	41	5										5
16					1	1		1	1	1	3	4		2	2	8
17				1*		1										1
18														3	3	3
19											2	2		1	1	3
20							1	1	2		1	1		3	3	6
21								1	1		1	1	2	2	4	6
22										2		2	2	1	3	5
23							1		1							1
24										1		1				1
25										1		1				1
26										2		2				2
27											1	1				1
28													1		1	1
29													1		1	1
30														1	1	1
Tokens Total:	15	10	25	40	79	119	28	30	58	47	38	85	39	53	92	379
Types Total:	9	5	9	12	16	17	8	10	11	18	12	22	8	15	17	30

(kwinin)) is mirrored in the frequencies of the corresponding English color terms (including the loan word "bulum")- The frequencies of English color terms also show the relevance of the color term "green" (including the single token for the loan word "kwegulini") and the tendency to produce the term "brown" to refer to "BROWN". As for the other Kilivila color terms, the terms "dararugu" (violet) and "gana'uga" (orange) appear to be clearly defined; we can infer that they also may be of some importance in the Kilivila color terminology.

All the other color terms produced are unclear with respect to their semantic scope and definition, as we have seen in the previous section. However, their low frequency of production during my study indicates that they are only of minor importance for Kilivila native speakers.

In section 4.2., I already mentioned the impact of English color terms as foreign words in the lexicon of color terms of certain Kilivila speakers and their potential force as agents of language change. In pursuing this possibility, we need to return to our initial questions about the differences between male and female informants in different age groups in their production of color terms. To answer them let us look at the distribution of color terms produced in the five age groups. Here we find the following results:

1. The first three color terms were produced by the majority of the informants in groups II - V; the two color terms for "YELLOW" — "digadegila" and "kwinin" — were also produced by most of the informants in groups III - V. Some of the youngest informants in group I could also produce the Kilivila terms "pupwakau" (1) and "bwabwau" (2), and we have a few tokens of "bweyani" (3) and "digadegila" (4) as well. The children in group I did not produce the term "kwinin", nor did the male informants in group II; however, the majority of the female school-children in group II did.
2. We find tokens for English color terms (7 -15) and for loan words based on English color terms (17, 21, 27) in all five age groups. But the informants of age groups III and V use them rarely and with often unclear semantic scope. In these same two age groups we also find most of the few tokens for loan words.[7] The children of age group I also produced a few tokens of English color terms to refer to four different stimuli. Especially with the male informants of age group IV we find a similar picture of the type/token relation of color stimuli and English color

terms and loan words, but most of the tokens of correctly-used English color terms are produced by two male informants who are local village priests. The tokens produced by all informants of this group concern 8 types of color stimuli. The broadest distribution and highest frequency of English color terms is found in age group II, the schoolchildren. Here the girls produce more tokens of English color terms than the boys.

3. With two exceptions, both due to 10-year-old Mokulakoma, tokens for folkbotany terms (6, 16, 18, 19, 20, 22, 23, 25, 26, 28, 29, 30) and for terms that are also names of objects having a characteristic color (24) were produced only by informants of group IV and especially by the female informants of group V; the female informants in age group III only produced a few tokens belonging to these two categories.

In interpreting these results, let us start with our oldest informants, those in age group V. I will now use their performance as a base of reference, thus assuming that the language production of the informants belonging to five different age groups represents five more or less different diachronic stages of Kilivila language varieties (see Labov:1972a, 160-182).

The informants in age group V produced 92 tokens and 17 types of color terms. The women produced more types and tokens than the men. The first four "basic" color terms "pupwakau, bwabwau, bweyani", and "digadegila" were produced quite often, with the terms "bwabwau" and "digadegila" encompassing a relatively broad semantic scope. The fact that these informants produced the term "digadegila" more often than the term "kwinin" indicates that "digadegila" is the traditional term and "kwinin" is a loan word acquired only later to refer to the color stimulus "YELLOW"

If we define these four color terms as "basic", then this age-group of Kilivila speakers show the color term repertoire of a "typical stage Hlb basic color lexicon" (Berlin, Kay:1969,19f.).

We find only two tokens of English color terms and four tokens of the loan word "bulum". The women in this age group produced a relatively wide variety of tokens of folkbotany terms to refer to certain color stimuli. We can explain the use of this strategy by reference to the fact that women of this age group used — and some still use — substances of trees, bushes, flowers, and fruits for dyeing their skirts, which are made out of banana leaves (Weiner:1976, 240f.). The production of these "doba", as the skirts are called in Kilivila, plays an important role in the everyday life of a Trobriand woman; girls start to learn how to make "doba" at a very early age.

This fact may explain the difference between male and female informants of this age group.

The informants of age group IV produced 85 tokens and 22 types of color terms; here the men produced more types and tokens than the women. The first five "basic" color terms were produced quite often; the frequency of the term "kwinin" almost equals that of "digadegila"; thus it seems likely that the loan word "kwinin" got incorporated into the lexicon of Kilivila color terms with this generation[8] of native speakers. The process of borrowing words from English is also documented in the production of "bulum" (= "blue" (one token)) and "kwegulini" (= "green" (one token)). With this group of informants we also find 18 tokens and 8 types of English color terms. The term "green" is produced most often, although its semantic scope is rather unclear; its use may indicate the growing importance of this color term in the Kilivila lexicon. Taken together with the above mentioned "basic" color terms, the emergence of "green" may imply the beginning of a "typical stage IV basic color lexicon" (Berlin, Kay: 1969, 19).

But we must note again that the types and tokens of English color terms in this age group were primarily collected from two village priests who had got some education in English at their mission station. Nevertheless, this is an important result for our study, because it demonstrates the influence of male English-speaking missionaries on the Kilivila language.

Both the men and women of this age group produced folkbotany terms to refer to color stimuli. In this respect they are like the female informants in group V, who probably passed on their knowledge to male and female members of a younger generation.

The use of folkbotany terms, together with the male priests' production of English color terms may explain why the highest number of color term types is found in this age group.

The informants of age group III produced 58 tokens and 11 types of color terms, with the females producing more types and tokens than the males. The first three "basic" color terms and the loan word "kwinin" are produced quite often; the term "digadegila" is only of minor importance. We have only two types and 6 tokens of English color terms and only one token of the loan word "bulum". Among the English color terms the term "green" was produced most often, especially by male informants, although its semantic scope is unclear. Taking "green" together with the "basic" terms "pupwakau, bwabwau, bweyani", and "kwinin", we may attribute to this age group a developing "typical stage IV basic color lexicon" (Berlin,

Kay:1969, 19).

Although the informants of this generation were the first to go to school and to learn English, the influence of this education on their color term lexicon seems to be negligible.

Only three types of folkbotany terms were used for color stimuli by informants of this age group with two tokens from a male and one token from each of two females. Thus, this strategy, as well as that of using loan words no longer seem to play a role in the informants' production of color terms.

We could try to explain this pattern assuming that this generation, especially the men, simplify their lexicon of color terms as a prerequisite to foster the developing of a typical stage IV basic color lexicon. The fact that this stage is still developing is shown by the rather problematic semantic scope of the color term "green" in the usage of the informants of this age group, as well as of age group IV, in which this process of language change may have started. "Linguistic insecurity" in the use of a term is a typical phenomenon of language change in progress (Labov:1972a/b; Senft:1983).

The informants of age group II produced 119 tokens and 17 types of color terms, with the girls producing twice as many tokens and four times as many types as the boys. The informants produced the first three "basic" Kilivila color terms quite often; the girls also produced a few tokens of the term "digadegila", but five tokens of the term "kwinin". There were no tokens of either of these two types among the boys; however, the boys produced three tokens of the term "yellow" compared with 6 for the girls. The girls also produced more tokens than the boys of the English color terms "white, black, red", and "blue"; however, "pink" and "green" were produced almost equally often by boys and girls. There are also a few tokens of the English term "brown", one girl produced one token of "orange", and one boy produced one token of "pepol" (purple). Only one token each of two folkbotany terms ("veravera" and "dararugu") were produced, both by the same one girl.

To sum up, the schoolchildren, especially the girls, produced many tokens and a wide variety of types of English color terms. This is not surprising, since most of these children go to school regularly and learn English there.

However, the fact-that the boys in this age group did not produce Kilivila terms for the stimulus "YELLOW", the fact that none of the boys and only one of the 6 girls produced folkbotany terms, and the fact that the

girls produced a particularly large number of English color terms indicate a severe caesura in the lexicon of color terms for schoolchildren on the one hand and most of the older Kilivila speakers on the other hand.

Including the English color terms, the lexicon of group II informants consists of terms to refer to the color stimuli "WHITE, BLACK, RED, YELLOW, GREEN", and "BLUE"; some of the informants can also refer to the stimuli "BROWN", and even to "PINK" and "ORANGE". This broad variety of "basic color terms" indicates the process of a typical stage V basis color lexicon developing into a typical stage VII basic color lexicon (Berlin, Kay;1969,20, 22f.). This is a rather dramatic language change with respect to the inventory and usage of color terms. It is obviously initiated by the guided acquisition of English as a second language in school. Why it affects girls more strongly than boys is a question I cannot answer in a satisfying way. It may be that girls, like the old women in age group V, have a closer relationship to colors than boys (or men) in their everyday life since they dye or help their mothers dye skirts; this is speculation, however.

The youngest informants, those in age group I, produced 25 tokens and 9 types of color terms, with boys producing 5 more tokens and four more types than the girls. Although the data base is rather small, we can at least describe the following trends: children of this age start to produce the "basic" Kilivila color terms "pupwakau, bwabwau, bweyani", and "digadegila"; some of them , especially the boys, are also able to produce the English color terms "white, red, yellow, green", and "blue". It seems that English color terms thus are starting to play a role in the process of first language acquisition by Kilivila speakers. These children produced no folkbotany terms. To judge from the number of tokens, the terms "pupwakau" and "bwabwau" are acquired before the term "bweyani"; then the other Kilivila term "digadegila" and the English terms are gradually acquired.[9]

Let us now sum up the trends of the language change in progress affecting the lexicon of color terms of Kilivela speakers. Table 10 summarizes these trends.

1. Relying on Berlin and Kay's (1969) categorization of typical basic color lexica, we can conclude that the "basic" color lexicon of Kilivila speakers is changing from a typical stage Illb color lexicon, as found among informants of age group V, to a typical stage IV color lexicon, as found among informants of the age groups IV and III. The informants of age group II, the schoolchildren, have developed a typical stage V basic

Table 10: Summary Color Terms Produced by Kilivila Native Speakers and Trends of Language Change in Progress.

	Age Group i	ii	in	rv	V
Typical Stage of Basic Color Lexicon	-	V to VII	IV start	IV start	IIIb
Color-Term-Category	Number of Tokens Produced in Age Group I	II	III	IV	V
"Basic"-Kilivila Color-Terms (1-5)	19	48 +f	47	49	69
English Color-Terms (7-15)	6 -t-m	68 +f	6 +m	17 +m	2
Loan-words (17&21&27)	-	1	1	2	4
Folk-Botany Terms (6&16&18-20&22-26&28-30)	-	2 +f	4	17	17 +f
Tokens Total:	25	119	58	85	92

+m: male informants produce more tokens in this color term category than female informants

+f: female informants produce more tokens of this color term category than male informants

color lexicon that is starting to develop into a typical stage VII basic color lexicon.

Both these changes can be explained by the impact of the acquisition of English as a second language (see Landar et al.:1960, 379). The change in the color lexica of the informants in age groups III and IV can be explained at least in part by the influence of the local male priests, who acquired some English in missionary schools and introduced English color terms into the lexicon of Kilivila speakers; the change may also reflect the influence of the schoolchildren, especially the girls in age group II, who have more or less systematically learned the system and the concepts of English color terms at school. They could be agents of change by using the English color terms in their communication with adults, thus passing on English color terms to their parents and to their older brothers and sisters.

To sum up: the changing of the basic color lexicon stages is due to the adoption of English color terms and their integration into the lexicon of Kilivila (as foreign words).

2. This process of integrating English color terms into the Kilivila lexicon is especially marked in the color term production of male informants in the age groups III and IV, and also of boys in age group I. The production of English color terms by children, especially by the boys of age group I, indicates that children now start to acquire English color terms during the period of first language acquisition. The schoolchildren, especially the girls, are probably responsible in part for the adoption of English color terms by younger children, because their use of color terms also influences the lexicon of their younger brothers and sisters,
3. The process of integrating English color terms into the lexicon of Kilivila has completely replaced earlier attempts to incorporate English color terms as loan words into the lexicon of Kilivila, as indeed was done with the English term for the anti-malaria drug "Quinine" as the now "basic" color term "kwinin" to refer to "YELLOW".
4. The process of integrating English color terms as foreign words into the lexicon of Kilivila has only partly affected the use of the traditional "basic" color terms "pupwakau, bwabwau, bweyani, digadegila", and "kwinin". Their scope, which is very broad, especially in the informants of age group V, has become narrower among the informants in the age groups II - IV; the informants of these age groups also produced considerably fewer tokens of these color terms than the informants in age

group V. However, the language change in progress has not affected the acquisition of these "basic" Kilivila color terms. These basic color terms are thus produced together with their English equivalents to refer to the appropriate color stimuli (see Berlin, Kay:1969, 161f.).

5. The process of integrating English color terms as foreign words into the lexicon of Kilivila has affected the usage of folkbotany terms rather dramatically. The use of folkbotany terms for colors is probably a very old strategy used by Trobriand women, which probably arose in connection with the dyeing of skirts. As the "basic" color lexicon of Kilivila began to change, as reflected in the color term production of the informants in age group IV, the men also started to use the folkbotany terms. However, with the age group of informants who probably try to foster the developing of the previously started change of the basic color lexicon, the use and probably also the knowledge of these folkbotany terms has greatly decreased.

   The dying out of folkbotany terms can also be explained by the fact that Western dyes based on chemicals are becoming increasingly available to Trobriand women (these dyes are, incidentally, sold under a label presenting the specific English color term). The traditional knowledge of folkbotany for dyeing skirts is gradually becoming marginal.

5. *In Lieu of Concluding Remarks*

> Wie erkenne ich, daB diese Farbe Rot ist? -
> Eine Antwort ware, 'Ich habe Deutsch gelernt'.
>
> Wittgenstein Phil. Unt. § 381.

NOTES

1) From here on I will use capital letters to refer to color stimuli; thus, "white" refers to the color term and "WHITE" refers to the color stimulus.

"'white' refers to 'WHITE'" is the abbreviaton for the expression: "The color term "white" refers to the color stimulus "WHITE"".

2) I tried a scalogram analysis (Guttman) on the data in this table (as well as on the data in Table 4), but reordering the data did not produce a typical Guttman pattern. This means that the speculation that color terms are acquired in one fixed order is weakened.

3) "Quinine" was the name of a drug used against malaria at the end of the last century and at the beginning of this century; references to "quinine" can be found in Miklоucho-Maclay

(1975, 42, 102) and in Hemsheim (1983, 151, 158). Moreover, the root of this word is still found in the names of present day anti-malaria drugs such as "Camoquine, Chloroquine, Nivaquine" etc. (Schlesief:1984). "Quinine" tablets were yellow.

4) See footnote 2.

5) If English terms are adopted into the Kilivila lexicon in such a way that they are transformed to fit into the mould of Kilivila word formation, I call them "loan words".

If English terms are adopted into the Kilivila lexicon without any change, I call them "foreign words".

6) Following a suggestion by W.J.M. Levelt, I asked W. Kafka to help me with some statistics concerning the issue of codability of the data in Table 8.

W. Kafka's computing of the entropy function (H)

(h(i) = pWlog (p(i)) base k
(i) = index of summation of color stimuli (s)/responses (r)
(see: Khinchin, A.F. (1957): *Mathematical foundation of Information Theory* (New York, Dover))

gave the following results:

entropy functioii$_i$(h(i)=p(i)*log(p(i)) base k

k = 2

s	uncertainty
31	7027
32	11263
33	9462
34	21211
35	18571
36	31924
37	27077
38	28231
39	24513
40	18755
41	19259

This means that the possibilities of informants to find linguistic referents for "WHITE" are best and for "PINK" are worst:

(31) WHITE = o, 7027
(33) RED = o, 9462
(32) BLACK = o, 11263
(35) BLUE = o, 18571
(40) GREEN = o, 18755
(41) VIOLET = o, 19259
(34) YELLOW = o, 21211
(39) ORANGE = o, 24513
(36) PINK = o, 31924

For the uncertainty of responses to the stimuli we found the following results:

entropy function (h(i)=p(i)*log(p(i)) base k

k = 2

r	uncertainty	rel. uncertainty
1	3608	3284
2	14806	8263
3	7355	5306
4	20395	10481
5	0	certain
6	8633	12455
7	0	certain
8	4692	6769
9	7347	6688
10	3914	5647
11	18992	10600
12	10613	9661
13	0	0
14	0	certain
15	9710	14008
16	0	certain
17	0	certain
18	15852	14429
19	15852	14429
20	6502	9380
21	12520	113%
22	23220	14427
23	0	certain
24	0	certain
25	0	certain
26	0	certain
27	0	certain
28	0	certain
29	0	certain
30	0	certain

I just want to mention these statistics as another indication that reality, as documented by these data, keeps escaping the existing theoretical schemas. A detailed statistical analysis would yield interesting insights, but is beyond the scope of this paper.

7) See footnote 5.

8) For definitions of the term "generation" see: Berger (1960).

9) But see footnote 2.

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