

COLOUR TERMS IN CATALAN: AN
INVESTIGATION OF EIGHTY INFORMANTS,
CONCENTRATING ON THE PURPLE AND BLUE
REGIONS¹

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(Received 17 June 1994; revised 20 January 1995)

ABSTRACT

We set out to establish the 'basic' colour term inventory of Catalan, and to see if the inventory was consistent with Berlin and Kay's theory of colour universals. Pilot work had indicated that, like Russian, Catalan might have more than the maximum eleven 'permissible' basic colour terms allowed by Berlin and Kay's theory, and have more than one basic term for blue. A sample of adults and a sample of children performed a colour list task (in which they were asked to give as many colour terms as they knew) and a colour naming task. The list task provided a general indication of the likely basic colour terms, and the naming task indicated the referents of these terms. The results show that Catalan is best described as a standard stage seven Berlin and Kay language with just eleven basic colour terms. However, it has more than one salient term in the blue region and these correspond to the exceptional blue terms of Russian. Furthermore, whilst Catalan has a basic term for purple, its focus is unusually displaced from Berlin and Kay's 'universal' focus for purple, and this may be related to the way in which Catalan segments the blue region.

1. INTRODUCTION

Berlin and Kay's (1969) theory of colour universals is one of the most important theories in the field of colour categorisation. A main

contention of the theory is that all languages will have between two and eleven basic colour terms selected from the set shown in Figure 1 (a fuller account of Berlin and Kay's theory is available in Corbett and Davies 1995). The theory continues to stimulate research and to arouse controversy: see, for example, MacLaury (1991, 1992), Lucy (1992:127–187) and Hardin and Maffi (forthcoming). A statement of Berlin and Kay's current position can be found in Kay, Berlin and Merrifield (1991). By and large most languages described since Berlin and Kay's monograph was published fit the theory to at least a first approximation. Berlin and Kay (1969:35–36, 98–99) considered the possibility of a language having more than eleven basic colour terms. Russian proves particularly interesting in this respect, in that it clearly has twelve basic colour terms; for data see Corbett and Morgan (1988), Morgan and Corbett (1989), Davies and Corbett (1994). The extra term arises because Russian has two basic terms for the blue region – *sinij* 'dark blue' and *goluboj* 'light blue'. Although Russian is the clearest case of a language with more than eleven basic terms, there are suggestions that several languages may at least be close to having two basic blue terms: Bolton, Curtis and Thomas (1980:317) state that, in their work on Nepali, *akāshi* 'sky, light blue' was 'the most commonly elicited secondary term', and there is evidence that *celeste* 'light blue' may be acquiring basic status in Guatemalan Spanish (Harkness 1973:177) and Peruvian Spanish (Bolton 1978:293–294). Further, European Spanish and other Romance languages, such as Italian and Catalan, have at least two terms for blue whose status merits investigation (see Kristol, 1978: 250–263; 1979; 1980; and Vincent 1983).

We report on the Romance language Catalan; the study was carried out mainly to establish what the basic colour terms of Catalan are, but with a particular focus on the blue and purple regions. Catalan was one of the languages included in Berlin and Kay's (1969) account of colour terms; they suggested that it had nine basic terms (with no basic term for orange or pink, 1969:92–93)² and there were some doubts about black (1969:42). However, the data appear to have been obtained from a single informant; they were reported in Corson (n.d.). Berlin and Kay make clear, particularly in view of the questions raised about Catalan, that 'more

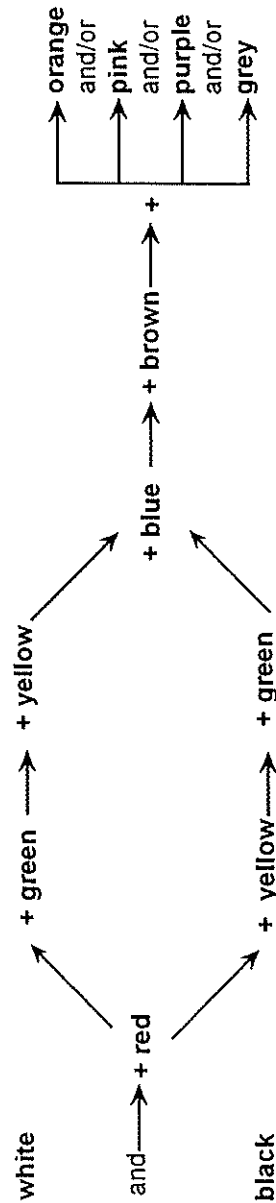


Figure 1. The Berlin and Kay hierarchy of basic colour terms

data are clearly needed from additional Catalan speakers' (1969:42).

A first investigation suggested to us that Catalan had in fact eleven basic colour terms – *blanc* 'white', *negre* 'black', *vermell* 'red', *verd* 'green', *groc* 'yellow', *blau* 'blue', *marró* 'brown', *lila* 'purple', *rosa* 'pink', *taronja* 'orange' and *gris* 'grey' – which match the eleven universal colour categories. The most uncertain of these contenders for the basic slots was *lila* 'purple'. There are three main Catalan terms that denote purple colours: *lila* 'purple', *porpra* 'mauve' and *violeta* 'violet'. Although these terms are normally glossed as 'lilac', 'purple' and 'violet' respectively, using the cognate forms (see for example Oliva and Buxton 1986, Colomer 1992), we have used the glosses given above because our data suggests that these are the most apt. We use these glosses throughout, although the justification for this will not be given in detail until the discussion section, where we also return to differences between our account and that reported in Berlin and Kay. In addition to the eleven terms given above, Catalan also has two further terms for blue – *blau marí* 'navy blue' and *blau cel* 'sky blue' which are used relatively frequently, and evidently deserve careful investigation. For a more general study, including diachronic material and a superb bibliography, see Grossmann (1988).

Before describing our method, we must first outline the concept of basic colour term, and then the distinction Kay and McDaniel (1978) drew within the basic terms of the hierarchy – primary and secondary terms. The concept of basic colour terms is central to Berlin and Kay's theory. Basic colour terms are simple, in the sense that their meaning is not derivable from constituent parts; their signification is not included in that of another term; their use is not restricted to a narrow range of objects; and they are psychologically salient. These criteria have been contested by Crawford (1982), Moss (1989b) and Ratner (1989); we return to the notion of basicness in section 4. We assume, as do most investigators, that a crucial property of a basic colour term is that there should be good agreement across speakers on the best instances of what a term denotes – its focus in other words; there will be less agreement among speakers in the boundary areas.

Kay and McDaniel (1978) drew a distinction between 'primary'

basic colour terms – the first six terms in the hierarchy (white, black, red, green, yellow and blue) – and ‘derived’ basic colour terms – the remaining five terms (brown, orange, pink, purple, grey). This distinction was in part based on visual physiology, which lent support to Hering’s (1920) opponent process theory of colour vision (see Jameson 1985 for further detail). This theory ascribed central status to the six primary colours as ‘perceptual primitives’, which were not reducible to other colours. Derived colours are perceptual ‘blends’ of two primary colours; for example, orange is a blend of red and yellow. In assessing the degree of association between the positions of the basic terms on the hierarchy and their degree of basicness as indicated by a range of linguistic and behavioural measures, Corbett and Davies (1995) found that there was a stronger support for grouping basic colour terms into primary and derived groups than there was for making the finer-grained distinctions indicated by the hierarchy. We have developed a procedure for establishing the likely basic colour terms of a language which we have used in the field in southern Africa, Indonesia, and Russia (see for example, Davies, McDermid, Corbett, McGurk, Jerrett, Jerrett and Sowden 1992, on Setswana, the main language of Botswana). The procedure involves two main tasks: a colour list task in which respondents are asked to say or write down as many colour terms as they know (this is used as a measure of the salience of colour terms as suggested by Berlin and Kay); and a colour-naming task which allows us to ‘map’ the colours denoted by colour terms and to establish the degree of consensus over their use.

A complementary approach to studying the repertoire of colour terms in adults is to look at the order in which children acquire colour terms; if the universality of the set of basic colour terms derives from universal neurophysiological mechanisms as suggested by Kay and McDaniel (1978), then the order in which children acquire colour terms is likely to indicate which terms are basic: the most basic terms should be acquired early, and at the other extreme, non-basic terms should be acquired relatively late. Most studies of languages which have the full set of basic terms have found that primary basic terms are learned before derived basic terms, which are in turn learned before non-basic terms, although the precise sequence does not match the Berlin and Kay hierarchy at a more

detailed level (see for example, Heider 1971, Andrick and Tager-Flusberg 1986).

In summary, we used the procedure outlined above on two samples of Catalan speakers: an adult sample and a sample of eleven- and twelve-year-old children, in order to determine what the basic colour terms of Catalan are, and whether these might include more than one basic term for blue.

2. METHOD

2.1. *Subjects*

The adult sample consisted of 40 people, 33 women and 7 men, whose ages ranged from 17 to 50 years, with a mean age of 25 years. There were also 40 in the sample of children, 18 girls and 22 boys; they were either 11 or 12 years old with a mean age of 12;2. The members of both samples lived in Barcelona or Majorca, in both of which regions it is normal for Catalan to be the first language.³ However, none were monolinguals: all spoke Spanish as well, as is usual for Catalan speakers (Wheeler 1988:207).

2.2. *Stimuli*

In the tile-naming task for the adults, there were 65 coloured ‘tiles’ used as stimuli. Each tile was 5cm square and 0.4cm thick, and consisted of a rigid wooden base covered with coloured paper, selected from the Color-Aid Corporation range of colours. The colours were selected as an evenly spread sample of ‘colour space’; these tiles were used as part of a large cross-cultural study of colour categorisation, and further details of the rationale for their selection can be found in Davies et al. (1992). Their Color-Aid codes and CIE coordinates are shown in Table 1, and their distribution in CIE chromaticity space is shown in Figure 2; the main reason for giving the CIE values is that they allow translation into other colour description systems such as Munsell or OSA (see for instance, Newhall, Nickerson and Judd 1943).⁴ Figure 2 also includes the loci of the eleven ‘universal’ colour foci – the modal exemplars of the universal colour categories – taken from Heider (1971).

Table 1 Colour-tiles used in the adults' colour-naming task
The Color-Aid codes and CIE coordinates for each colour-tile

Color-Aid Code		CIE coordinates Y (brightness)	x (red)	y (green)
Y	HUE	64.77	.47	.48
	S2	16.99	.41	.44
YOY	HUE	47.48	.50	.43
	T4	55.63	.45	.41
	S2	22.08	.36	.38
YO	HUE	39.52	.51	.41
	T3	47.02	.48	.41
	S3	10.72	.36	.41
OYO	HUE	26.51	.54	.37
O	HUE	25.00	.54	.37
	S1	14.34	.50	.37
	S3	9.15	.42	.36
ORO	HUE	18.87	.57	.34
	T3	36.88	.46	.35
	S3	26.51	.33	.32
RO	HUE	16.22	.58	.33
	T3	32.66	.45	.32
	S3	4.19	.37	.34
ROR	HUE	15.23	.53	.31
	T3	29.82	.42	.30
	S3	20.71	.34	.28
R	HUE	11.71	.50	.29
	T4	24.34	.40	.27
	S3	4.81	.33	.30
RVR	HUE	9.11	.42	.24
	S1	12.79	.35	.25
	S3	28.43	.36	.28
RV	HUE	6.97	.33	.19
	T2	14.51	.31	.19
VRV	HUE	6.71	.30	.19
	S3	28.42	.36	.28
V	HUE	4.67	.26	.17
VBV	HUE	4.13	.24	.17
	T4	19.05	.25	.20
BV	HUE	4.21	.22	.19
	S2	7.88	.25	.26
BVB	HUE	4.80	.19	.13
	S3	26.65	.26	.23
B	HUE	9.51	.18	.16
	T1	19.02	.20	.19
BGB	HUE	9.62	.19	.19
	T3	23.08	.20	.23

Table 1 (cont.)

Color-Aid Code		CIE coordinates Y (brightness)	x (red)	y (green)
BG	HUE	8.93	.20	.25
	T1	16.57	.19	.25
	S2	7.42	.21	.26
GBG	HUE	10.69	.23	.37
	S2	20.79	.20	.25
G	HUE	11.99	.24	.42
	S3	6.10	.26	.33
GYG	HUE	12.89	.25	.44
	T4	31.14	.26	.41
	S1	15.59	.26	.31
YG	HUE	14.66	.28	.48
	S3	5.78	.30	.34
YGY	HUE	18.92	.30	.51
	S3	35.87	.35	.43
ROSE RED		17.63	.41	.24
WHITE		81.40	.32	.33
SIENNA		13.31	.44	.36
BLACK		3.59	.34	.33
GRAY 2		30.59	.32	.33
GRAY 1		47.55	.32	.33
GRAY 4		18.88	.31	.31
GRAY 6		11.20	.31	.31
GRAY 8		4.53	.31	.32

Twelve tiles were used in the colour naming task for the children. They were of the same size and construction as the adult tiles and the colours were also from the Color-Aid range; their Color-Aid codes and CIE coordinates are shown in Table 2. This smaller set of twelve tiles was used in a cross-cultural developmental study of colour-term acquisition (see Davies, Corbett, McGurk and Jerrett 1994); the stimuli are good examples of the universal categories: white, black, red, green, yellow, brown, purple, pink, orange and grey. In addition they included two examples of blue – dark blue and light blue – which were good examples of the Russian terms *sinij* 'dark blue' and *goluboj* 'light blue', as well as being acceptable examples of the English term *blue*.

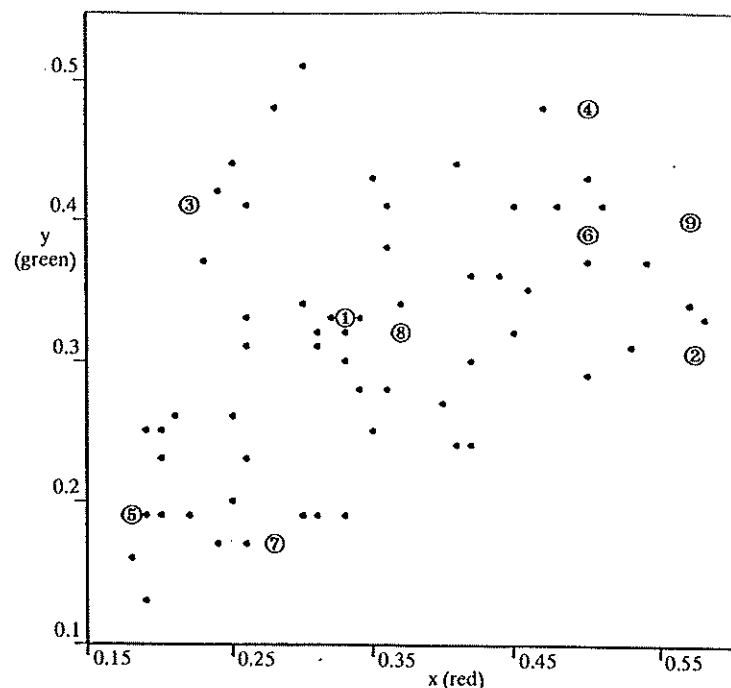


Figure 2. CIE coordinates for the tile-colours and the 'universal' foci. (Where tiles have identical x,y coordinates, only one 'dot' is shown.)

Symbols for the universal foci:

- 1 = achromatic
- 2 = red
- 3 = green
- 4 = yellow
- 5 = blue
- 6 = brown
- 7 = purple
- 8 = pink
- 9 = orange

Table 2 Colour-tiles used in the children's colour-naming task
The Color-Aid codes, dominant English term, and CIE coordinates for each colour-tile

Color-Aid Code	Dominant English term	CIE coordinates Y (brightness)	x (red)	y (green)
WHITE	white	81.4	.32	.33
BLACK	black	3.6	.34	.33
RO HUE	red	16.2	.58	.33
YG HUE	green	14.7	.28	.48
Y HUE	yellow	64.8	.47	.48
BGB T2	blue (light)	22.1	.20	.23
B S2	blue (dark)	6.2	.22	.20
O S3	brown	9.2	.42	.36
V HUE	purple	4.7	.26	.17
R T4	pink	24.3	.40	.27
YO HUE	orange	39.5	.51	.41
GRAY 4	grey	18.9	.31	.31

2.3. Procedure

The experimenter (Bayo Margalef) speaks Catalan and all instructions were given to the subjects in Catalan. All subjects did the list task first. They were asked to write down as many colour terms as they knew, in columns, so that the order in which they wrote could be recovered. The maximum time allowed was five minutes, but in practice most subjects finished within four minutes. In the tile-naming task, subjects were shown one tile at a time, in a random sequence, and asked to name the tile. The tiles were shown on grey cloth, in natural daylight, indoors, avoiding direct sunlight or deep shade. The experimenter recorded the subject's response, removed the tile and then displayed the next tile, and so on until all tiles (65 for the adults and 12 for the children) had been displayed. The tile-naming task took about 15 minutes for the adults and about three minutes for the children (who named the smaller set).

3. RESULTS

3.1. *The list task: children*

On average, the children offered 22.9 terms; the girls offered significantly more terms than the boys (means = 25.6 and 20.7, $t = 1.97$, $p < .05$). Many of the terms offered were single colour terms with a general modifier such as *fort* 'strong', *fluix* 'weak' and *clar* 'light'. Some children systematically applied these modifiers to most of the simple colour terms. On average, the children offered 13.3 simple terms; the girls offered significantly more such terms than the boys (means = 14.8 and 12.1; $t = 2.86$, $p < .01$).

Table 3 shows all the terms that were offered by at least five children, the number of children that offered each term (the frequency), and the mean position in the lists for each term; the terms are ordered by their frequencies.

It can be seen that the ten most frequent terms – *negre* 'black', *blanc* 'white', *groc* 'yellow', *vermell* 'red', *blau* 'blue', *taronja* 'orange', *gris* 'grey', *marró* 'brown', *verd* 'green', and *rosa* 'pink' – match ten of the eleven universal categories. The next two most frequent monolexemic terms are *violeta* 'violet' and *lila* 'purple' which are, as we said in the introduction, possible basic terms for purple. The scores for the two terms were very similar: *violeta* 'violet' scored 20 and *lila* 'purple' scored 18. In the majority of cases, *violeta* 'violet' and *lila* 'purple' were offered mutually exclusively: *lila* 'purple' was offered ten times without *violeta* 'violet'; and *violeta* 'violet' was offered twelve times without *lila* 'purple'; and they were both offered by the same child in eight instances. The next most frequent simple term was *granat* 'garnet' which scores three lower than *lila* 'purple'. Turning to the two blue terms which we indicated as deserving special attention, we find that *blau marí* 'navy blue' comes nineteenth equal in terms of frequency (and is only the seventh most frequent modified term), while *blau cel* 'sky blue' scores even lower with a frequency of just six. These two terms for blue are not the most frequent modified blue terms; *blau fort* 'strong blue' and *blau fluix* 'weak blue' score higher than both *blau marí* 'navy blue' and *blau cel* 'sky blue'.

The pattern in the frequency data is generally supported by the list

Table 3 Children's lists (40 subjects).

The terms offered by at least five children, their glosses, total frequencies and mean list positions

Term	Gloss	Frequency	position
negre	black	40	11.4
blanc	white	38	8.0
groc	yellow	37	4.0
vermell	red	37	5.4
blau	blue	37	7.1
taronja	orange	36	9.7
gris	grey	36	6.5
marró	brown	35	12.8
verd	green	33	7.5
rosa	pink	25	7.7
verd fort	strong green	24	13.8
violeta	violet	20	10.5
verd fluix	weak green	19	14.5
lila	purple	18	11.2
blau fort	strong blue	17	13.4
blau fluix	weak blue	17	15.2
marró fluix	weak brown	17	18.9
marró fort	strong brown	17	20.7
blau marí	navy blue	16	12.6
blau turquesa	turquoise blue	16	12.9
granat	garnet	15	16.1
carn	flesh	14	14.9
groc fort	strong yellow	13	9.5
taronja fort	strong orange	13	14.5
gris fort	strong grey	13	19.0
groc fluix	weak yellow	12	7.2
fúcsia	fuchsia	12	15.8
gris fluix	weak grey	12	22.4
taronja fluix	weak orange	11	13.1
argentat	silverish	10	15.0
marró clar	light brown	10	18.6
daurat	golden	9	12.6
vermell fort	strong red	9	15.2
or	gold	9	15.6
rosa fort	strong pink	8	15.1
verd clar	light green	7	14.1
argent	silver	7	15.7
blau cel	sky blue	6	10.8
blau clar	light blue	6	14.0
salmó	salmon	6	15.7
transparent	transparent	6	16.0

Term	Gloss	Frequency	position
verd pistatxo	pistachio green	5	11.4
rosa fluix	weak pink	5	12.2
blau fosc	dark blue	5	13.0
vermell fluix	weak red	5	14.4
beige	beige	5	20.4
lila fluix	weak purple	5	22.0

position data; the most frequent terms tend to have the lowest position scores. For example, *granat* 'garnet' the most frequent of the simple terms which are probably not basic, has a mean position of 16.07 compared to 12.8 for *marró* 'brown', the lowest ranked of the probable basic terms.

The terms offered which were modified (whether by a general modifier, such as *fluix* 'weak', or by a specific modifier, such as *marí* for *blau*) were almost exclusively the putative basic terms. But there were considerable differences between the putative basic terms in their readiness to take modifiers: *blau* 'blue' was offered with a modifier most frequently (83), followed by *verd* 'green' (64), *marró* 'brown' (47), *groc* 'yellow' (32), *taronja* 'orange' (26), *gris* 'grey' (31), *vermell* 'red' (19), *rosa* 'pink' (19), *lila* 'purple' (9) and *negre* 'black' (6); the only other terms which were offered with a modifier were: *violeta* 'violet' (2) and *porpra* 'mauve' (2).

3.2. The list task: adults

The adults offered 26.5 colour terms on average and they offered 162 different terms in total. Table 4 shows the equivalent data to Table 3; that is the terms offered by at least five subjects together with their frequency and mean list position.

There are a number of similar patterns in the data to those in the children's data. First, nine of the most frequently offered terms were the same as the most frequent terms offered by the children, these were: *blanc* 'white', *negre* 'black', *vermell* 'red', *groc* 'yellow', *verd* 'green', *marró* 'brown', *rosa* 'pink', *taronja* 'orange' and *gris* 'grey'. Second, these terms also tended to have relatively high list positions.

Table 4 Adults' lists (40 subjects).

The terms offered by at least five people, their glosses, total frequencies and mean list positions

Term	Gloss	Frequency	position
vermell	red	40	5.5
blanc	white	40	7.5
groc	yellow	39	7.0
negre	black	38	9.4
gris	grey	36	12.7
marró	brown	35	12.9
rosa	pink	35	13.2
lila	purple	33	10.4
blau cel	sky blue	32	11.5
blau marí	navy blue	32	11.8
taronja	orange	31	10.1
granat	garnet	28	15.3
verd	green	27	8.3
beige	beige	27	15.6
blau	blue	24	6.8
fúcsia	fuchsia	24	13.5
violeta	violet	17	15.8
blau turquesa	turquoise blue	15	10.5
ocra	ochre	15	14.8
verd fosc	dark green	15	15.6
verd poma	apple green	15	16.7
argentat	silverish	15	21.4
carabassa	pumpkin	14	13.9
caqui	khaki	14	23.1
verd clar	light green	12	16.0
daurat	golden	12	21.1
blau fosc	dark blue	11	11.9
porpra fosc	dark mauve	11	16.7
marró fosc	dark brown	11	20.8
salmó	salmon	10	14.6
blau elèctric	electric blue	10	18.8
marró clar	light brown	8	20.8
ivori	ivory	8	21.3
or	gold	8	21.8
carn	flesh	8	23.4
argent	silver	8	23.4
blau mar	sea blue	7	16.8
gris marengo	marengo grey	7	22.9
blanc trencat	broken white	7	23.7
crema	cream	6	14.8
porpra	mauve	6	18.3

Term	Gloss	Frequency	position
gris fosc	dark grey	6	21.7
verd pistatxo	pistachio green	5	10.8
verd oliva	olive green	5	14.8
carmí	carmine	5	20.2
rosa clar	light pink	5	23.4

Third, *blau* 'blue' and *verd* 'green' were the terms most frequently offered with modifiers: *blau* 'blue' was offered 120 times with a modifier (with 11 different modifiers); *verd* 'green' was given with a modifier 78 times (with 13 different modifiers). The next most frequently modified term was *groc* 'yellow' which was modified 22 times.

There were five main differences from the child data. First, the frequency of *blau* 'blue' was relatively lower, and the frequencies of the modified blue terms – *blau marí* and *blau cel* – were much higher than for the children. Second, *lila* 'purple' was offered more frequently than *violeta* 'violet'. Third, there were a number of terms offered by the adults relatively frequently which were offered less commonly by the children; the following terms were offered by more than a quarter of the adult sample and were much more frequent than for the child sample (the adult frequencies are given in brackets): *granat* 'garnet' (28), *beige* 'beige' (27), *fúcsia* 'fuchsia' (24), *ocra* 'ochre' (15), *caqui* 'khaki' (14) and *carabassa* 'pumpkin' (14). The first three of these terms had higher scores than the probable basic terms *blau* 'blue' and *verd* 'green'. Fourth, *blau marí* 'navy blue' and *blau cel* 'sky blue' had higher frequencies than *blau*; they both scored 32 with ranks of 9.5 and their list positions were higher than those for *gris* 'grey', *marró* 'brown' and *rosa* 'pink'. The next most frequent qualified terms were *verd poma* 'apple green', *verd fosc* 'dark green' and *blau turquesa* 'turquoise blue', which all scored 15, less than half the scores for *blau marí* and *blau cel*. Fifth, the adults used general qualifiers such as *fort* 'strong' much less commonly than the children.

3.3. Tile-naming: children

Table 5 shows the terms used by the children to name the tiles. The children mostly used simple colour terms to name the tiles, but some modified forms were used, particularly for the two blue tiles. In Table 5 we give the combined frequency of the simple and the modified forms for each term and for each tile; the number in brackets is the frequency with which modified forms were used, and we also give the particular modifiers together with the frequency with which they were used, for those used at least twice.

It can be seen that in almost all cases there was a strong consensus – at least 38 out of 40 – over the simple form used to name the tiles,

Table 5 Tile-naming – children

The most frequent terms used for each tile, the frequency, the frequency of modified forms (in brackets) and the modifiers with their frequencies. (Where there was more than one modifier, only those with a frequency greater than two are shown.)

Code	Dominant English term	Catalan term		Modifiers
WHITE	white	blanc	39 (0)	
		gris fluix	1	
BLACK	black	negre	38 (1)	brilliant 1
		gris	2	
RO HUE	red	vermell	38 (4)	fluorescent 2
YG HUE	green	verd	40 (15)	fluix 9, clar 3
Y HUE	yellow	groc	40 (1)	fort 1
B S3	dark blue	blau	40 (26)	fort 20, marí 12, fosc 3
BGB T3	light blue	blau	40 (27)	cel 13, fluix 9, clar 8
O S3	brown	marró	40 (8)	fluix 3, fort 3
V HUE	purple	lila	21	
		violeta	14	
R T4	pink	rosa	39 (6)	fluix 3
YO HUE	orange	taronja	39 (12)	fluix 5, clar 4
GRAY 4	grey	gris	40 (6)	fort 3

and the terms used were amongst the most frequent terms in the list task. The clear exception is the purple tile, to which we return below. It should be noted, however, that while *blau* 'blue' was used by all the children to name both blue tiles, about two thirds of them added a modifier. The most frequent modifier for the dark blue tile was *fort* 'strong' and *cel* 'sky' was the most frequent modifier for the light blue tile. *Verd* 'green' was the term with the next highest use in modified form with a score of 15. As already noted, the purple tile was the only tile for which there was no strong consensus over the appropriate simple form to use. *Lila* 'purple' was used by just over half of the children (21) but *violeta* 'violet' was used by about a third (14) of the children and two other terms *blau fort* 'strong blue' and *morat* 'reddish purple', were also used. In the list task, *violeta* 'violet' was offered more frequently than *lila* 'purple', but their rank orders have reversed in the tile-naming task.

3.4 Tile-naming: adults

Out of a possible 2600 responses, 2493 responses were made; that is, on average each subject offered no name for about three tiles. Of the total responses, 91.2% were colour terms either in their simple form or with a modifier; the remaining responses were combinations of two colour terms, such as *blau-verd* 'blue-green'.

Although a wide range of terms was used by our respondents, much of this variability was due to the range of general modifiers used. If just the simple form of the term is considered, then there was a reasonable consensus over how a tile should be named; over half of the subjects agreed on the appropriate simple form for 48 out of 65 tiles. In Table 6 we give the two most frequent simple forms used to name each tile, together with the frequency with which they were used and the frequency with which they were used in a modified form. The simple frequency was arrived at by summing all uses of the term, that is, its frequency of unmodified use, its use with general modifiers such as *fort* 'strong', and with specific qualifiers such as *canari* 'canary', as in *groc canari* 'canary yellow'. Combinations of colour terms, such as *blau-verd* 'blue-green', were not included in the total. The only exceptions to the summation procedure just described are that we have not combined *blau marí* 'navy blue' and

Table 6 Tile-naming – adults
The most frequent terms used to name each tile and their corresponding frequencies (f). (The frequency includes 'simple' terms and 'modified' terms; the number of modified terms is shown in brackets.)

Code	HUE	Term	f	Code	Term	f	Code	Term	f
Y	HUE	groc	40 (17)				S2	caqui	18 (1)
YOY	HUE	taronja	11 (4)	T4	groc	18 (10)	S2	verd	17 (15)
YO	HUE	groc	11 (10)	T3	taronja	4 (4)	S3	caqui	17 (4)
OYO	HUE	taronja	18 (8)		taronja	18 (8)		verd	17 (18)
O	HUE	carabassa	13		groc	9 (6)		caqui	19 (3)
ORO	HUE	taronja	23 (4)	S1	marró	30 (17)	S3	verd	18 (13)
RO	HUE	carabassa	13		rosa	13 (12)	S3	marró	39 (12)
ROR	HUE	carabassa	22 (6)	T3	taronja	9 (2)	S3	gris	6 (3)
R	HUE	vermell	29 (7)	T3	rosa	32 (23)	S3	lila	4 (3)
RVR	HUE	vermell	36 (11)	T3	rosa	38 (19)	S3	vermell	29 (7)
RV	HUE	vermell	34 (5)	T4	rosa	38 (15)	S3	lila	12 (8)
VRV	HUE	vermell	16 (12)	S1	porpra	12 (2)	S3	rosa	35 (12)
	HUE	granat	10 (2)	T2	lila	5 (2)		rosa	9 (6)
	HUE	fucsia	8 (1)		lila	9 (4)		marró	10 (9)
	HUE	porpra	6 (4)		porpra	8 (8)		rosa	36 (20)
	HUE	porpra	15 (14)		lila				
	HUE	lila	13 (7)		porpra				
	HUE	lila	22 (7)						
	HUE	porpra	8 (8)						

for all terms that were used on at least five occasions. (Recall that 40 informants were shown 65 tiles; thus several different tiles might reasonably be named with the same term.) It can be seen that there were just 22 terms which were used on five or more occasions and that the most frequent terms tend to be the same terms offered frequently in the list task. With the exceptions of *blanc* 'white' and *blau marí* 'navy blue', the terms we gave in the introduction as the contenders for the basic slots in Catalan are the most frequently used terms in the tile naming task. *Blanc* 'white' has a score of 40, which is lower than the scores for *porpra* 'mauve' and *carabassa* 'pumpkin'; *blau marí* 'navy blue' also scores lower than *porpra* 'mauve'.

Frequency of use is an important indicator of basicness, but it is contingent on the particular colours in the sample. Our colours were a representative sample of colour space, but even so the relatively low scores for *blanc* 'white' and *negre* 'black' are more a product of the colour samples than a reflection of their low degree of basicness. The phenomenon of colour contrast ensures that only the brightest and darkest of the achromatic colours in a set will appear white and black; the rest, in contrast, will appear grey.

A second indicator of basicness is the degree of agreement over the foci – the best examples – of colour terms. There should be at least one tile which evokes a high consensus response from respondents for each basic colour term. Column 4 in Table 7 (headed 'most frequent'), gives the number of tiles for which each term was the most frequently used term. There are just 15 terms which achieve this 'most frequent status': they are the 13 terms given in the introduction, plus *porpra* 'mauve' and *fúcsia* 'fuchsia'. Column 5 (headed 'di .5') gives a more stringent measure of the degree of consensus, the dominance index; this is the number of tiles for which a given term was used by at least half of the respondents – it was the dominant name. (For more details on these indices see Davies and Corbett 1995.) Now it can be seen that the eleven terms corresponding to the eleven universal terms, plus *blau marí* and *blau cel*, are the only terms to have non-zero dominance indices. Column 6 (headed 'di .75') shows a yet more stringent measure of consensus, a second dominance index based on the criterion of three-quarters of the sample using the same term to name a given tile. Now it can be

seen that the two additional blue terms fail to reach this stricter level of dominance, but so too does *taronja* 'orange'.

The final two columns of Table 7 show the specificity indices derived from the two dominance indices; the specificity index is the frequency with which a term was used to name the tiles for which it was dominant, divided by its total frequency of use; it is a measure of consensus which is relatively independent of the frequency of use; it can take values from 0 to 1, with high scores indicating specific and consensual use. Most of the putative basic terms have high specificity scores, with *blanc* 'white', scoring close to the maximum. It is notable however, that the three blue terms have the three lowest scores on both indices, and that *lila* 'purple', also has a low score on the .75 index, although *groc* 'yellow' also fares badly.

3.5 Combined measures

Finally, for this section, we look at the inter-relationship between the measures and the terms by analysing the full measures-by-terms data matrix using correspondence analysis (Weller and Romney 1992). This technique looks for a structure underlying the matrix and represents the structure in the form of a 'space' whose axes are the structural 'vectors' made up of weighted combinations of the component measures or terms. Each vector accounts for a given proportion of the 'inertia' in the data matrix; the greater the proportion of inertia accounted for, the more important that vector is (analogous to the proportion of variance accounted for in classical regression). Within the space, the closer the elements (in this case terms or measures) are to each other the more similar they are to each other (see Corbett and Davies 1995 for a more detailed account of correspondence analysis and further examples of its application).

The following measures on the 19 most prevalent colour terms (the first 19 terms in Table 7) were subjected to correspondence analysis: the frequency and list position measures for the adults and children (Tables 3 and 5); the frequency of naming measures for the children (Table 4); the frequency of naming measure, the dominance index for the .5 criterion and the equivalent specificity index – all measures derived from the naming task for adults (Table 7). The

correspondence analysis revealed two major vectors underlying the matrix: the major vector accounted for 68% of the inertia in the matrix and the second vector accounted for 24% of the inertia; both vectors were significant at $p < .00009$.

Figure 3 shows the terms plotted as a function of the scores on the two vectors; the major vector is on the horizontal axis. It can be seen that the terms corresponding to the 11 universal terms are found in the left of the plot towards the top. There is a second group which occupies the region in the centre of the plot, extending towards the right and bottom; this group consists of the terms which are probably not basic, but have moderately high scores on some of the indicators. The position of five terms is of particular interest. First, the blue terms: *blau* 'blue' (number 6) is clearly in the basic group, but *blau cel* 'sky blue' (number 7) seems to be at least a peripheral member of the same group; *blau marí* (number 8) is probably the central 'secondary' group, but it is the closest of this group to the basic group. Second, of the possible basic terms for purple, *lila* 'purple' (number 10) is placed in the basic group, whereas *violeta* 'violet'

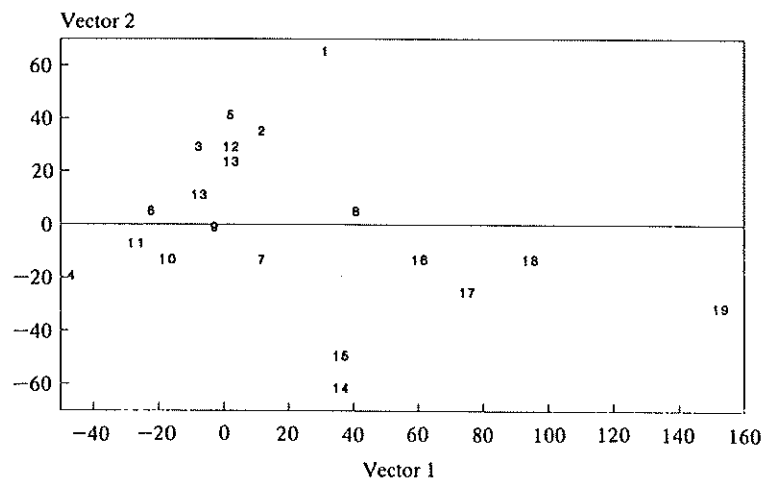


Figure 3. Correspondence analysis of colour terms. (Numbers represent terms as in Table 7.)

(number 16) is placed in the competing group, along with *porpra* 'mauve' (number 14).

4. DISCUSSION

The main purpose of this study was to establish the likely basic terms of Catalan and to see if these included more than one basic term for blue. In the introduction we suggested, tentatively, that the basic colour terms of Catalan were: *blanc* 'white', *negre* 'black', *vermell* 'red', *verd* 'green', *groc* 'yellow', *blau* 'blue', *marró* 'brown', *lila* 'purple', *rosa* 'pink', *taronja* 'orange' and *gris* 'grey'; in addition, we suggested that the two terms, *blau marí* 'navy blue' and *blau cel* 'sky blue', might be equivalent to the two blues of Russian: *sinij* 'dark blue' and *goluboj* 'light blue'. Our data unequivocally support the basic status of the terms: *blanc* 'white', *negre* 'black', *vermell* 'red', *verd* 'green', *groc* 'yellow', *marró* 'brown', *rosa* 'pink', *taronja* 'orange' and *gris* 'grey'. In both tasks (lists and tile-naming), for both samples, the nine terms just given have high scores on most measures. The pattern across the measures converges to support the basic status of these nine terms; in general they were offered frequently in the list task, occurred early in the lists, were used frequently in the tile-naming task, and had high dominance and specificity indices. In the cases where a term had a low score on one measure, such as *blanc* 'white' on the frequency measure, this 'deficiency' was compensated for by high scores on another measure, such as the specificity index.

When we compare our findings concerning these terms with those of Berlin and Kay, we find that both adults and children provide clear evidence for recognising basic terms for orange and pink (contrary to Berlin and Kay 1969:92–93). Furthermore, we did not find any evidence to suggest that the status of *negre* 'black' was problematic.

Two areas, blue and purple, deserve more detailed discussion. In the blue area, we should first examine the term *blau* 'blue'. This is indubitably basic for the children: it occurs high in the list task and was frequently used in the naming task. The surprise was in the adults' responses in the list task, where the simple term *blau* 'blue' occurred only 24 times, as opposed to *blau cel* 'sky blue' (32) and

blau marí 'navy blue' (also 32). However, according to the other indicators (Table 7) *blau* appears to be basic. While the list experiment is simple and effective, it does not separate basic from non-basic terms infallibly: there are instances in other languages of non-basic terms being given more frequently than terms which are basic. Hence the interest of the situation in Catalan is not that it indicates that *blau* fails to meet the criteria for basicness, but rather that it highlights the unusual position of *blau cel* 'sky blue' and *blau marí* 'navy blue'. While *blau* 'blue' is the basic term, its two modified variants rank surprisingly highly. In the adults' tile-naming task all three terms were used dominantly and independently (that is, there was at least one tile for which each of the terms was used dominantly). Nevertheless both modified terms clearly fail Berlin and Kay's first criterion (1969:6), they are not 'monolexic'. Their meaning is predictable from the meaning of the parts, and so they cannot be basic colour terms. Not everyone accepts this criterion; Crawford (1982) is particularly critical of this part of Berlin and Kay's definition and excludes it from his. However, there is also the criterion of inclusion. It might appear obvious that the signification of *blau cel* 'sky blue' and *blau marí* 'navy blue' is wholly included in that of *blau* 'blue', which would mean that they cannot be basic. But our present data are insufficient to allow us to draw this conclusion. The problem clearly deserves further work.

We find an interesting situation too in the terms for the purple area. The data from the adults indicate that *lila* 'purple' is a basic term: of 40 adults, 33 included it in their list of terms, and it was the eighth ranked term. (Of the other contenders, the next was *violeta* 'violet' included by 17 adults and ranked 17th.) In the tile-naming task *lila* 'purple' was used 191 times, which made it the third most frequently used term over all. Indeed all the measures relating to naming suggest that *lila* is indeed basic, and that the other terms in this area, namely *violeta* 'violet' and *porpra* 'mauve', are not. Thus, though *porpra* 'mauve' is used 55 times in the tile-naming task, the instances where it is the most frequent term are for tiles where there is evident uncertainty. And the tiles to which it was applied are scattered through the purple region.⁵ Evidence from the children suggests that this area is less fixed than some others. In the list task, *violeta* 'violet' was ranked 12th, slightly ahead of *lila* 'purple' at 14th.

When offered the single tile in this colour region 21 children called it *lila*, and 14 called it *violeta*. Thus the data are much less clear-cut, but they are insufficient to cast serious doubts on the more substantial evidence from adult usage (where the naming experiment contained many more tiles).

The position of *lila* 'purple' as the basic term becomes more interesting when we examine more closely the tiles for which it is used. And here it is useful to draw on data from a colour-mapping task done by English speakers that used the set of stimuli that was used with our Catalan-speaking subjects (Davies and Corbett 1995). Figures 4 and 5 show the CIE coordinates of the tiles which were named by the various possible purple terms in either Catalan or English (all tiles that were given a purple term by their most frequent or second most frequent name). It can be seen that the focus of *lila* 'purple', at point 5, is some distance from the universal focus, point U; focal *lila* is lighter and redder than the focus of universal purple. The area in which *lila* has its focus is often described as *lilac* or *mauve* by English speakers (Davies and Corbett 1995). Thus *lila*

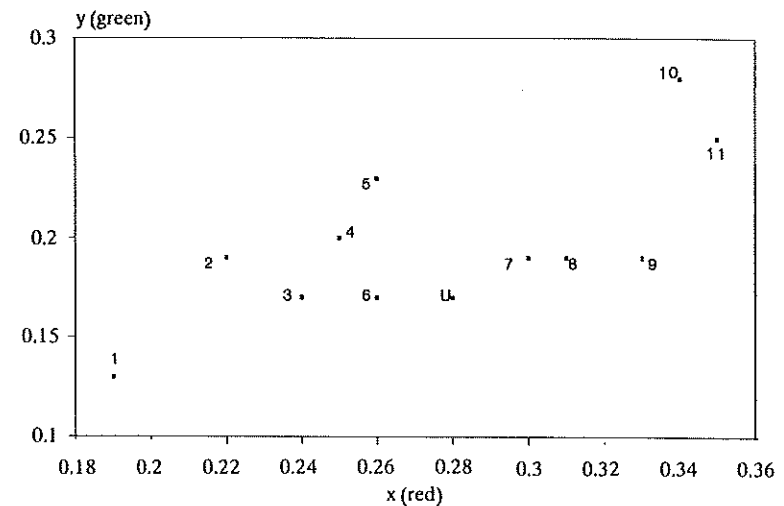


Figure 4. CIE coordinates (x, y) for the purple colours in Table 8

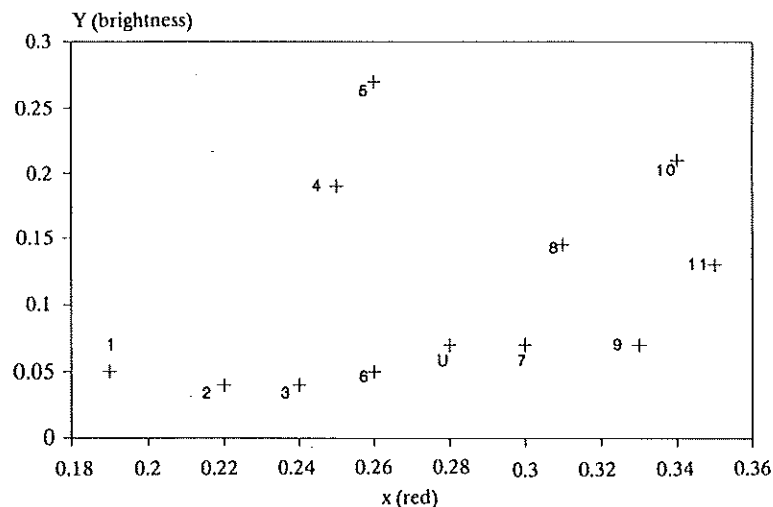


Figure 5. CIE coordinates (x, Y) for the purple colours in Table 8

appears to be the basic term for the purple region, yet its focus is at some distance from the universal focus. Berlin and Kay (1969:10) claim that the 'location of color foci varies no more between speakers of different languages than between speakers of the same language.' We are not in a position to confirm or challenge this claim directly. Nevertheless it is of interest that we have a clear instance of a particularly wayward basic term. It is tempting to speculate that the displacement of *lila* 'purple' in Catalan is connected with the unusual situation in the blue region. (In Russian, where there are two basic terms for blue, there is also an unusual situation in the purple region, with a basic term but also some further purple terms which occur relatively frequently; Davies and Corbett 1994.) Note that Berlin and Kay (1969:93, following Corson n.d.) give *morat* as the basic term for purple. As the tables show, *morat* hardly figures in our data. It has no claim to basic status.

While we have been mainly interested in the way in which the Catalan data relate to the Berlin and Kay claims, and so have used terms like 'purple area' for universal categories and not as English

terms, it is worth returning for a moment to the English glosses, which we noted were inadequate in dictionaries. We could argue that *purple* and *lila* should be treated as translation equivalents, because they occupy comparable positions in the systems of colour terms (each is the basic term in the purple area). Yet, as we have just seen, their foci are rather different. A Catalan speaker could describe an object as *lila* which an English speaker would be likely to describe as *mauve* or *lilac*. We can get a better idea of the relation between the terms if we compare the behaviour of Catalan and English speakers on the colour naming task (Davies and Corbett 1995). There were 47 monolingual English-speaking subjects, who participated in a similar experiment to the Catalan speakers. There were eleven tiles that were given a purple term as either the most frequent or second most frequent name by people from either sample. Table 8 gives the Color-Aid codes of these eleven tiles and the frequency with which the various purple terms were used to name each tile in each language. The CIE coordinates of the eleven tiles are shown in Figure 4; the loci of the tiles are labelled with the numbers for each tile given in the first column of Table 8. The terms were *lila*, *porpra*, *violeta*, *lilac*, *mauve*, *purple* and *violet*. In Table 9 we give the co-occurrence matrix for the terms used to name the eleven tiles. The co-occurrence score for a pair of terms is the sum of the co-occurrence scores for that pair across the eleven tiles. The co-occurrence score for a single tile is the lower of the two frequencies. For instance, from Table 8 it can be seen that tile number 3, VBV T4, has multiple co-occurrences; the frequency for *lila* is 19 and the frequency for *purple* is 28, which gives a co-occurrence score of 19 for that pair of terms for that tile. As three English purple terms and three Catalan purple terms are used for this tile, there will be a total of nine co-occurrence pairs across the languages and two sets of three within-language co-occurrence scores, one for each language. Thus, for instance, from Table 9 it can be seen there were a total of 92 instances of tiles being called *lila* by Catalan speakers and *purple* by English speakers. Table 9 confirms that *lila* and *purple* are indeed the nearest translation equivalents; they have the highest co-occurrence score, although the overlap is also high between *lila* and *mauve*, reflecting the fact that the focus of *lila* is lighter and redder than the universal purple focus. Of the remaining terms, the greatest

Table 8 Distribution of 'purple' terms across the colour-tiles.

Color-Aid codes and the 'purple' terms used, for all tiles for which a purple term was the most frequent or second most frequent term used by either Catalan or English speakers.

Number	Color-Aid code	Catalan		English	
		Terms	Frequencies	Terms	Frequencies
1	BVB HUE			purple	7
2	BV HUE	violeta	1	purple	7
3	VBV HUE	lila	19	purple	28
		violeta	3	violet	3
		porpra	2	mauve	2
4	VBV T4	lila	34	mauve	21
		violeta	3	lilac	13
				violet	4
5	BVB S3	lila	35	lilac	19
		violeta	1	mauve	17
		porpra	1	violet	5
6	V HUE	lila	21	purple	37
		porpra	7	mauve	3
		violeta	6	violet	1
7	VRV HUE	lila	22	purple	34
		porpra	10	mauve	7
		violeta	5		
8	RV T2	lila	9	purple	15
		porpra	8	mauve	11
		violeta	5	violet	2
9	RV HUE	porpra	15	purple	29
		lila	13	mauve	8
		violeta	5	violet	1
10	ROR S3	lila	12	mauve	5
		violeta	3	lilac	5
				purple	3
11	RVR S1	porpra	12	mauve	9
		lila	5	purple	9
		violeta	3	violet	1

Table 9 The co-occurrence matrix for 'purple' terms.

Cell entries are the sum of co-occurrences across the eleven tiles in Table 8. For a single tile, the co-occurrence score for a pair of terms is the lower of the two frequency-of-uses for that pair of terms.

	lila	violeta	porpra	purple	mauve	lilac
violeta	31					
porpra	53	26				
purple	92	31	55			
mauve	80	30	38	43		
lilac	18	6	0	3	35	
violet	18	12	6	8	18	9

cross-language overlap is between *porpra* and *mauve*; they overlap 38 times, and thus, although the match is far from perfect, we suggest that the best gloss for *porpra* is 'mauve'. Applying the same argument to the remaining terms, we are led to the conclusion that the best gloss for *violeta* is 'violet'. This process leaves the English term *lilac* without a Catalan partner. Our suggestions for appropriate glosses are necessarily compromises. This partly flows from the nature of non-basic terms. There is relatively low consensus over the referents of non-basic terms within a language. In addition, the relatively poor match of the two basic terms *lila* and *purple* carries over to reduce the correspondence between the secondary terms.

5. CONCLUSION

Catalan, despite tantalizing hints that it might be an exception to Berlin and Kay's theory of colour universals, fits the theory well. It has eleven basic terms, and these are exactly the terms predicted by the theory. Even so, our initial hunches are not without validity. The

'extra' blue terms of Catalan are the most basic of the non-basic terms, and they match the extra basic blue terms of Russian. Further, the interesting modulation of the purple region that we find in Russian has an analogue in Catalan.

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NOTES

1. This work was supported by the ESRC, grant numbers: R000 23 1958 and R000 23 3978. We gratefully acknowledge this support. We are also very grateful to Dr Max Wheeler for helpful comments on a draft and to two anonymous referees who provided constructive remarks and some useful references.

2. These are: *blanc* 'white', *negre* 'black', *vermell* 'red', *verd* 'green', *groc* 'yellow', *blau* 'blue', *marró* 'brown', *morat* 'purple' and *gris* 'grey'. For discussion of the status of *morat* 'purple' see section 4.

3. The medium of education in Barcelona has changed over the last 25 years. Before 1977 the formal medium was Castilian Spanish, although Catalan was also prevalent informally. Since 1977, the medium of education has changed to Catalan. Thus, all of the child sample were taught in Catalan, and those of the adult sample from Barcelona under 25 years of age (20 people) were also educated in Catalan. However, in Majorca the medium of education has remained Castilian Spanish; nine of the adult sample were from Majorca and were thus educated formally in Castilian Spanish.

4. Briefly, every colour we experience has a unique locus in three-dimensional CIE tri-stimulus-value colour 'space'. The x coordinate specifies the portion of 'red' in each colour; the y coordinate specifies the proportion of 'green', and by implication, the proportion of 'blue' is given as $1 - (x + y)$. The third coordinate, Y, is essentially a measure of brightness or reflectance. Note, however, that while each colour percept has a unique locus in CIE space, distances in the space do not correspond with perceptual 'distances'.

5. A similar problem with Russian *lilovij* 'lilac' is described by Moss (1989a:150).

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