

FOCAL COLOUR TERMS: ELEMENT OF COLOUR - NAMING AMONG CHILDREN

by

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ABSTRACT

An examination of colour term saliency among children is provided in this paper. This discussion is organized around the notions of colour term development noted in the literature and with experiments conducted by researchers in the distinction of colours by children. This review suggests that colour recognition, colour naming and that focal colours are cognitively recognized before hue colours, as a result of their saliency with respect to the colour spectrum.

RESUME

On trouvera dans cet article un examen de l'identification du vocabulaire relatif aux couleurs chez les enfants. Ce débat est organisé autour de la notion de développement du vocabulaire relatif aux couleurs dans la littérature et inclut des expériences réalisées par des chercheurs sur la distinction entre les couleurs chez les enfants. Cette étude indique que les couleurs sont reconnues avant d'être nommées et que les couleurs focales sont reconnues de façon cognitive avant les couleurs nuancées, à cause de leur identification par rapport au spectre des couleurs.

INTRODUCTION

It has been hypothesized by Berlin and Kay (1969) that there are eleven basic colour terms manifesting themselves in an evolutionary scheme in all languages. Furthermore, the development of a colour lexicon in a language is correlated with the complexity of technological development of that society. Therefore it could be said that the universality of the development of basic colour terms has cross-cultural validity in measuring the complexity of technological developments in societies throughout the world. However, it is not the intention of this paper to examine cultural complexity using colour lexicons as criteria.

It is the purpose of this paper to focus on the notion, with respect to Berlin and Kay's discoveries, that even within basic colour categories there are differences between colour terms based on their saliency. Colour term recognition is based on the location of those colours best exemplifying the foci of a colour boundary within a colour spectrum, and that colour recognition proceeds the naming of colours.

With existing data gathered, using children as subjects in experiments, evidence shows that not only is colour recognition prior to colour naming, but that "focal" colours are recognized prior to colours further away from the foci of colour boundaries. Focal colours are not only universally distinct, they are also perceptual-cognitively salient. Children have a greater tendency to produce focal colours than nonfocal ones prior to their acquisition of the terms representing these colours. Maturity and education are significant in the development of colour naming among children in later years approaching adulthood as it is demonstrated that colour term borrowing increases with age and education.

A brief history of the study of colour will be presented, preceding a general discussion of "focal" colour saliency. The last section of the paper will be devoted entirely to experimental data conducted in the areas of colour naming and colour recognition using children as subjects.

BACKGROUND

While collecting evidence to support a hypothesis based on intuitive experience in languages concerning the codability and

recognizability of basic colour categories, Berlin and Kay (1969:2) propose the following:

It appears now that, although different languages encode in their vocabularies different numbers of basic colour categories, a total universal inventory of exactly eleven basic colour categories exists from which the eleven or fewer basic colour terms of any given language are always drawn. The eleven basic colour categories are white, black, red, green, yellow, blue, brown, purple, pink, orange, and grey.

These eleven colour categories (i.e. black, white, red, etc.), are the best representations of their range in a colour spectrum. These eleven colour terms are the most "focal" of their related colours known as "hue" colours (e.g., colours such as crimson, scarlet, blond, rusty, salmon-coloured, etc.). According to Berlin and Kay, colours that are the best instances of colour terms "focal colours" appear to be universal. "Even though languages provide varying numbers of colour words and the range of colours to which any term refers varies from language to language, the focal areas recur over and over again" (Dale 1976:187).

Berlin and Kay saw these eleven basic colour categories as "pan-human perceptual universals", and that the utilization of these basic categories is related to the forces of cultural evolution. To them, there is a lack of physical or physiological reasons that suffice to explain why these eleven colours in particular, are universally utilized in particular (1969:109). Conditional to the determination of "basic" colour terms, Berlin and Kay (1969:6), argue that each of these terms must exhibit the following characteristics:

1. It is monolexemic;
2. It does not possess the same number as another hue;
3. Its application must not be restricted to a narrow class of objects;
4. It must be psychologically salient for informants.

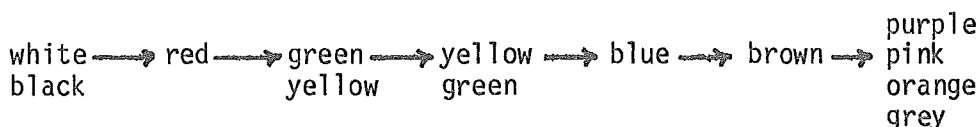
And that the existence of these terms poses an interesting question of evolution.

The second major finding by Berlin and Kay was that "there appears to be a fixed sequence of evolutionary stages through which a language must pass as its basic colour vocabulary increases" (1969:14). In the evolutionary scheme proposed by Berlin and Kay, there are seven stages

based in part on the universality of the eleven basic category foci, and "the traditional relativist position has derived in part from a confusion of noncomparability of descriptions of systems with random variation of structure among the systems themselves". With data collected from 98 languages, Berlin and Kay postulate the seven following evolutionary stages:

1. All languages contain terms for black and white;
2. If a language contains three terms, then it contains a term for red;
3. If a language contains four terms, then it contains a term for green or yellow (but not both);
4. If a language contains five terms, it contains a term for both green and yellow;
5. If a language contains six terms, then it contains a term for blue;
6. If a language contains seven terms, then it contains a term for brown;
7. If a language contains eight or more terms, then it contains a term for purple, pink, orange, grey, or some combination of these (Berlin and Kay 1969:2-3).

Illustrated in graphic form it is as follows:



A third postulate made by Berlin and Kay was their claim that "there appears to be a positive correlation between general cultural complexity (and/or levels of technological development) and complexity of colour vocabulary" (1969:16), so that the total vocabulary of languages spoken by people who subsist in societies with simpler technological development tends to be smaller than ones spoken in highly complex societies. However, the substantiation of such a claim, and the correlation will be difficult to establish until such terms as "levels of technological development", or "degree of cultural complexity" can be more precisely made in a statistical analysis.

The works of Berlin and Kay (1969) on the universality and evolution of basic colour terms has recast a longstanding interest among anthropologists in how colours are named in different cultures. The history of the study of colour dates back to Rivers' work at the Torres Straits at the beginning of the century. Little had been done to further that interest until the work by Brown and Lenneberg (1954)

with Zuni informants. Istomina (1963) was the first to have concentrated on the task of colour naming and colour recognition among young children; and Bohannan (1963) provided data on comparative colour space mapping between Tiv, English, and Welsh colour naming schemes. It was not, however, until the work by Berlin and Kay (1969) that the study of colour became a full-fledged exercise among psychologists and anthropologists alike.

Rivers (1901) was the first anthropologist to have developed the notion of an evolutionary order of colour nomenclature. Berlin and Kay (1969) comments on Rivers' work in reference to their own universal and evolutionary schemes:

Rivers' work was the last attempt to discuss the evolution of colour nomenclature until the present study nearly seventy years later. A concern with evolutionary schemes fell into scientific disrepute in American ethnology and linguistics during the first half of the century, due primarily to the extreme cultural relativism of Franz Boas and his students. Thus the ethnographic and comparative work on colour nomenclature of the 1950's was carried out within the framework of the linguistic relativity hypothesis (1969:149).

Without question, Rivers had broken the ground for Berlin and Kay in 1901 among the Todas. As much as there are certain criticisms from Berlin and Kay of Rivers' inability to gather information directly from his informants except through interpreters, there is little doubt that Rivers was the originator of an evolutionary scheme in viewing colour nomenclature. Slobodin (1978:98) comments:

For better or worse, this conclusion (Berlin and Kay's) is not so very far from that of Rivers. "The special characteristics of primitive colour language appear, then, to be the following: the existence of a definite name for red...a name for orange and yellow; indefinite nomenclature for green; absence of a word for blue, or confusion of blue and green, and absence of a word for brown (Rivers 1901:50).

Much of the criticism given to Berlin and Kay center around the particular aspects of their evolutionary scheme. Durbin (1971) thought that it was too coincidental that Berlin and Kay's geographical and language-family groupings coincide with the evolutionary stages they proposed. Others (e.g. Hickerson 1971) thought that Berlin and Kay lacked detailed knowledge of the languages they studied and that they

also lacked specific information on the languages which they have chosen as data examples. Furthermore, they failed to take into consideration that the most frequently occurring characteristics of pigmentation of colours involve natural objects such as blood, foliage, fruit, ashes, etc., which are considered by Berlin and Kay as doubtful representations of psychologically salient colours.

Contrary to the seven stage evolutionary stages proposed by Berlin and Kay, Durbin (1971) proposes a two stage scheme where black, white, red, green, yellow, and blue belong to languages of the primitive people with brown, pink, purple, orange and grey added on to the more advanced languages.

Bolton (1978) agrees with the evolutionary scheme proposed by Berlin and Kay. He concludes:

First,...most colour lexicons do fit into one of the seven types described by Berlin and Kay originally (even fewer exceptions remain when a proposed revised set is employed). Second, these seven types can be arranged into an evolutionary sequence of stages that correlates with societal complexity. Third, colour lexicons expanded by adding new basic colour terms in the order predicted by the evolutionary hypothesis. And fourth, the learning of colour terms by individuals follows essentially the same sequence as the evolutionary one (1978:288).

FOCAL COLOUR SALIENCY

K. Heider (1970) postulates that there are colour areas in a colour spectrum that are universally distinct (or salient). These colours were ones which were most accurately remembered in a recognition task. E. Heider (1971:447) thought that such saliency is probably based upon physiology of colour vision, while others such as Lenneberg (1967) illustrated that colour saliency is a prime example of "the influence of underlying perceptual-cognitive factors on the formation and reference of linguistic categories" (Heider 1971:447).¹ E. Heider regards the lack of information on the transition from cognitive to linguistic categories--that is, an account of how perceptual-cognitive saliency of certain areas of colour space might lead to the development and maintenance of the universal core meaning of colour names" (1971:447)--as perhaps responsible for universal cross-cultural information of colour recognition. Furthermore, she assumes that "it is not unreasonable,...to suppose that the same areas are (equally) salient to young children" (1971:448).

Heider (1971) illustrated a possible developmental scheme for the evolution and the maintenance of some universal aspect of colour naming. It is also shown that focal colours are as perceptually distinct for children as they are for adults, and that the primary (or the initial) colour naming belongs to colours in the most salient areas. Focal colours, according to Heider, are more frequently chosen than nonfocal ones, as they are also better matched by school children. However, it is not certain whether the recognition of the saliency or the naming is prior. Both Heider and Berlin and Kay claim that focal colours are learned as core meaning of colour terms. Linguistic evolution is also entertained by Heider as another cause for colour naming since there exist distinct possibilities of the prior linguistic term to the evolution of the changing saliency of certain colour areas. Works by Heider (1971, 1972b) provide evidence that the focal points of basic colour terms represented areas of the colour space which possessed a particular perceptual-cognitive salience to colour naming. Rosch has hypothesized that the primary areas of the colour domain are named prior to the adjoining areas. With experiments conducted among the Dani people of New Guinea, who totally lack chromatic colour terms, Rosch (Heider 1972a; Rosch 1973) has demonstrated that the focal regions of a colour domain are the most salient.

The author agrees with Heider's notion that children possess the same ability as adults in recognizing "focal" or "salient" colour areas, and:

as children learn basic colour names, the name might first be attached to the most salient colour areas; those areas which form the core meaning of the colour terms. Assuming the same areas to be visually salient cross-culturally, such a developmental sequence would explain why colour terms should evolve with the same core meanings in different languages and why the core meanings should remain constant over time, even though the terms themselves were subject to linguistic change (Heider 1971:448).

What is a salient colour? Why is a focal colour more salient than a hue colour? While conducting experiments with informants from various cultural backgrounds, Berlin and Kay (1969) found that most of the informants were able to choose the same Munsell chip for a colour best exemplifying the focus of a specific colour spectrum.

Where several neighboring chips are marked by the same letter, each was judged to be an equally good representative of the focus of a category...[A] brute summary of the data...show the considerable extent to which the foci of colour categories are similar among totally unrelated languages (1969:10).

The results of this finding by Berlin and Kay reaffirmed their hypothesis that "colour categorization is not random and the foci of basic colour terms are similar in all languages"...(1969:10).

With similar experiments, Harkness (1973:182) found her results

show areas of high agreement which may correspond to "focal" areas for each basic colour term. However this agreement falls off drastically when the informants were called upon to name colour chips with increasing distance from focal areas.

Rosch (1973) agrees with Berlin and Kay (1969) that informants from diverse cultural environments tended to choose the same focus of a colour space. She argues further that previous results of cross-cultural investigations of colour naming was derived from the "boundaries of colour names--a more variable aspect of categorization than focal points" (1973:331). Harkness (1973:199) supports Rosch by stating that:

While cultural differences in the boundaries of colour terms have long noted and supported these data, it may be that the cognitive meaning of colour term is connected not to the boundaries but to foci, or best examples.

Mervis, et al. (1975) also lay claim to the fact that colours, as a part of semantic categories, are structured by a focus/boundary organization.

With evidences to date (Berlin and Kay 1969; Heider 1971, 1972b; Rosch 1973; Harkness 1973; Mervis et al. 1975), it is clear that focal colours are the most salient in a colour spectrum and experimental results show that they are the first ones to be recognized and named by informants. Harkness (1973:199) takes such argument one step further and postulates:

Developmental trends in colour naming, which show extensions of colour boundaries while best examples remain stable in location, also suggest cognitive primacy of best examples over boundaries in colour concepts.

Mervis *et al.* (1975) too, support the notion that there is validity by assuming that focal colours in specific colour boundary within a colour spectrum are acquired prior to non-focal ones.

Results support the hypothesis that the colour domain, where the category has been shown to be structured in terms of a focus-boundary organization, the focus of the category is learned first, the limit of the category learned later (1975:60).

Such is the notion of "prior to naming" developed by Rosch (1973:331), which states:

"Prior to naming" can be taken in two senses: developmentally, Heider (1971) showed that 3 year old American children oriented towards focal colours in preference to nonfocal colours. Cross culturally, Heider (1972) demonstrated that the Dani of New Guinea...remembered focal colours more accurately than nonfocal colours--both in short-term recognition task similar to that used by Brown and Lenneberg (1954) and in long-term memory task.

Other than the assumption of primacy of focal colour naming, Bolton (1978) points out that older focal colour terms, when examined cross-culturally, are found to be shorter than the newer ones. Durbin (1971) speculates that the more salient the term is, the shorter the term should be. Thus it could be pointed out that children acquire competence in recognizing focal colour terms more readily than the nonfocal ones not only due to the saliency of the colour content, but also due to the shortness of the lexemic terminology. In an effort to further substantiate Berlin and Kay's findings, it was discovered by Hays, *et al.* (1972:1118) that the length of the more widely distributed lexemic term is less than the length of the rarer ones, and that the frequency of a term in a single language correlates strongly with the earliness of that term in Berlin and Kay's evolutionary sequence. Therefore, one can presumably predict that as the result of the above mentioned findings, the shortening of the more frequently used colour terms and the frequency of certain terms in the evolutionary schemes of Berlin and Kay, will account for the manner in which pre-school children are able to learn and recognize salient colour terms.

COMPETENCE OF COLOUR NAMING AMONG CHILDREN

It has been shown through existing evidence that colour naming and recognition is an important area in the study of semantic category in

languages. With reference to colour spectrum, focal colours are more readily recognized and learned than nonfocal ones. The results of experiments conducted by Brown and Lenneberg (1954), by K. Heider (1970), by Rosch (1973), and by Melkman, *et al.* (1976) have generally agreed that adults from culturally distinct groups such as the Zuni, Navaho, or the Dani possess the same ability to recognize and to name focal colours as adults from more technologically complex societies even when the existing colour lexicon is rather limited. Results have shown that focal colours were produced more often than would have been predicted by chance among adults and children. In addition, colour terms may be learned first by being attached to the focal colours and later generalized into other hue colours. However, the question remains as to whether the recognition and naming of "focal" colour terms among children has cross-cultural applicability. If so, then what does it say about human cognition in general? Dale (1976:187) states:

Given cross-cultural similarities in focal colour naming and the special status of focal colours in the attending and matching behaviour of preschoolers, it seems most reasonable to assume that the focal colours are defined by unknown perceptual and cognitive factors common to all human beings. The development of colour naming then builds on these focal colours.

Certainly, the greater saliency of focal colours has been substantiated through their being more accurately matched, being consistently selected to represent the colour names (Heider 1972), being more quickly recognized and remembered better (Heider 1972b) than nonfocal colours. In addition that the distinction of the focal colour is acquired prior to the colour terms themselves. Less certain, however, is the actual order of acquisition of the basic colour terms. The sequence suggested by Berlin and Kay (1969) was not always replicated in terms of the saliency of focal colours, the matching of colours, nor the frequency with which such colours were chosen to represent the colour categories. However, with the exception of the colour orange (which fell between the colours of red and yellow), such ordering was obtained in a colour recognition task using chromatics only (Heider 1971).

More difficult than the recognition task used by Heider, is one which required the naming of colours. In this task, children not only had to recognize the colours but also were required to name them correctly. Istomina (1963:43) agrees:

Analysis of the material shows that the finding of a colour by name is exceedingly difficult for a small child. The number of

errors is greater than the number of correct answers.

Istomina further states that:

It was demonstrated by earlier research that the selection and grouping of colours by "perception" develops earlier (among children), and is performed more successfully than "by name". It might be stated that sensory generalizations precede verbal.

Using both recognition and matching tasks, with children as subjects, Dale (1969:1140) found that there was a clear relationship between "the name given to a child and the way which the colour was manipulated by the child in the matching and recognition tasks." When a name of a colour was given as stimulus to a child, whose system of colour terminology had not yet fully developed, the subject tended not to produce a name for response that was different than the stimulus.

While testing two year old children, Istomina (1963) discovered that dark colours such as red, black, green, and yellow were chosen the most. Colours such as orange, light blue and violet were the least likely to be chosen. In the same experiment, a large number of orange coloured circles were chosen to match the red ones. And the same choice occurred when children were called upon to match orange with yellow. Istomina observes that the more salient the colour is, it is more easily matched by children, and that the cases of confusion usually occurred with colours that were more adjacent in the colour spectrum than ones that were further apart:

In the children of the older sub-group (2½-3), mismatching of colours was less frequently observed. Error in this group was almost exclusively in the category of adjacent colours closely related...(Istomina 1963:41)

Dale (1969:1141) also found a strong tendency among children to respond with a colour possessing the same name as the stimulus given.

The matching task appeared to be quite simple, involving no memory, and yet there was a correlation with the colour names. There was delay in the recognition task which, on the basis of most previous studies, should have led to increased reliance on verbal storage. However, this was not the case (ibid.).

As many have argued that colour recognition is prior to the naming of colours, and that focal colours are recognized prior to nonfocal ones, Melkman, *et al.* (1976) argues that form salience is even prior to focal colour salience and that "developmental studies have consistently reported a gradual increase in form salience with age" (*ibid.*:1045). The earliest report concerning the development of colour forming was done by Brian and Goodenough in 1929. There had been little interest in the study of colour-form preferences among children until the study done by Melkman, *et al.* in 1976. According to them "the relative salience of a dimension is affected by, and may in turn affect, the amount of discriminative exposure to that dimension" (*ibid.*). Others such as Lee (in Melkman, *et al.* 1976) proposed that the reinforcement of form discrimination in learning to read is responsible for the increased form salience in school age children (*ibid.*:1045).

The attractiveness of focal colours among young children has been hypothesized and agreed upon by most of the experimenters as universally applicable in most of the cultures of the world. Even more, it is generally agreed that children have a tendency to strongly recognize and acknowledge colours that best represent specific colour boundaries. Dale (1976:187) sums up his findings in focal colour recognition using children between the ages of three and four:

Given 3-year-olds, who do not yet use colour words systematically, find the focal colours more attractive. When asked simply to "show me a colour", they are more likely to select a focal colour than would be predicted by chance. When 4-year-olds were asked to pick colours from an array that matched simple colour chips, they were significantly more accurate with focal colours than with nonfocal colours. Furthermore, the colours selected to match nonfocal colours tended to err in the direction of focal ones.

Heider arrives at the following conclusions utilizing a series of three experiments (1971:448-453):

- (1) that focal colours attract the attentions of 3-year-old children more than nonfocal colours;
- (2) focal colours were more salient than nonfocal colours for 4-year-old children; and
- (3) that a colour name becomes initially attached to the focal colour area by a specific name because of the saliency of that focal area.

Istomina (1963:44) sums up his findings in the following manner:

- (1) By the time [children] reach the age of 2, normal colour vision may be regarded as having taken shape.
- (2) Children at this age are able to select and group colours on the basis of visual material, and confuse only adjacent or closely related colours.
- (3) Small children have some vocabulary or colour names, but as yet these names are in merely random and very unstable relationship to the colours.
- (4) These [unstable] connections are established earlier between the word red, yellow, green, and dark blue, and the [focal] colours they represent, and later between the word orange, light blue, and violet, and the [nonfocal] colours they represent.

Harkness (1973:188) sums up the following while interpreting her data in reference to the conceptualization of focal colour terms:

Thus my interpretation suggests that the 7-8's had concepts of the best examples of all the basic colour terms in Mam which did not differ significantly from those of adults....It is also noteworthy that white, black, red, which are the first colours of the evolutionary list, have apparently reached full definition in the 7-8's and not altered by the adults.

An interesting study to note in the area of focal colour naming is by Anyan and Quillian (1971:1631), who discovered substantial amounts of difference in the colour naming ability between male and female children of the same age group. Utilizing equal numbers of boys and girls between the ages of four to seven, they found girls were more successful in colour naming tasks than boys of the same age.

The colour naming ability of boys and girls were similar in the fourth year, began to diverge in the fifth year, became strikingly different in the sixth year, and did not vary in the seventh year....Among children 5-6 years of age, school children outperformed those who had not attended school. At this age, girls in each category were more successful than comparable groups of boys in the naming of colours. The 5-6-year-old boys who attended school named colours as well as girls of the same age who had not been to school.

Education has been considered by most of the experimenters to be a significant factor in focal colour naming abilities. Children who have

had educational opportunities have done more satisfactorily when required to perform tasks on colour naming and recognition than children of the same age group with less education. Upon testing young adults between the ages of eleven and twelve, Harkness (1973:193) concluded that the reason they were more capable in colour naming and recognition is that they are close to adults in educational experience, including the learning of colours. "However, the agreement on best examples suggests that the adults agree more on colour concepts than the younger age group" (197:193). Harkness (1973) further argues that colour term borrowing can be utilized as a criteria for the evaluation of the differences between adult and children colour naming abilities. Using Mam and Spanish speaking informants, Harkness showed that Mam adults, as results of better educational background, were able to borrow colour terms more readily from Spanish than Mam children. "The strongest tendency among the 7-8 borrowers was to borrow just one term...while among the adults there was a stronger tendency to borrow two or more terms" (Harkness, 1973:196). When applying colour borrowing to Berlin and Kay's (1969) evolutionary scheme, Harkness concluded that the borrowing of colour terms from Spanish by Mam children and adults suggested expansion to a Stage V lexicon by the children, and to Stage VI by adults.

CONCLUSION

In regard to colour naming competence among children, one is able to conclude that: (1) colour recognition, as it has been demonstrated through experimentation, proceeds colour naming, and (2) "focal" colours are cognitively recognized prior to "hue" colours due to their saliency with respect to the colour spectrum. Almost all the experiments conducted are done with Munsell colour chips. It is generally agreed that colour naming competence increases to a large degree with age, and to a lesser degree with education. However, it has also been demonstrated that education enables those who possess a simpler colour lexicon to gain more complex colour terms with respect to Berlin and Kay's evolutionary stages. Finally, it is usually the case that the expanded colour lexicon evolves from more "focal" colours to colours that are further away from the foci of colour boundaries.

NOTES

1. Unless otherwise noted, the name of Heider hereafter will refer to Eleanor Heider-Rosch, not Karl Heider.

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