Cross-Cultural and Cognitive Research on Color Categorization and Naming

Chair
Kimberly A. JAMESON, *University of California, Irvine*

This symposium revisits a classic controversy in psychological anthropology: The suggested universality (or, alternatively, cultural relativity) of color categorization across individuals from the same ethnolinguistic group, and across different ethnolinguistic societies. Presentations will survey new findings and innovative multidisciplinary advances in the area. Recently the controversy's debate has strengthened as new empirical results have emerged -- some strongly in support of universalism, while other results support a culturally relative view. As a result, new perspectives on color categorization behaviors have arisen, and are beginning to clarify well-established views in the area (e.g., Berlin & Kay 1969, Kay & Regier 2003, Regier et al 2005). This progress has a strong potential for advancing psychological anthropology's general understanding of natural-kind categorization behaviors in individuals, and our understanding of the formation of semantic categories that are shared cross-culturally. The research discussed also bears directly on classical prototype theory, computer modeling of category processing in artificial systems, and the study of cultural and psychological universals. Symposium participants include four distinguished research scientists empirically studying color categorization in the field, laboratory and using computer modeling. They represent the wide multidisciplinary expertise needed to survey the current state of color categorization phenomena found in the literature. Their specializations include: Cognitive Psychology, Cross-cultural investigations, Animal cognition (Jules Davidoff); Cross-cultural linguistics, Color naming theory and Cognition (Paul Kay); Perceptual physiology, perceptual psychology, and environment/behavior interactions (Angela Brown); Visual psychophysics, Perception, and Cross-cultural investigations (Delwin Lindsey). These researchers are leaders the field, actively publishing original research findings in top-tier scientific journals during the last decade. Their recent work reflects an exceptional level of excellence and significance for the symposium topic. By attending this symposium the audience will learn about the *state-of-the-art* investigations in this multidisciplinary research area.

Walpiri Color Terms

Paul KAY, *University of California, Berkeley*

The analysis of Warlpiri color terms that is to appear as one of the 110 analyses of individual color term systems in the forthcoming World Color Survey (WCS) ms. is summarized. The color terms of this Central Australian language (Pama-Nyungan family) are particularly interesting because of the presence in Warlpiri of some of the social features creating unusual variation and diversity within overlapping Central Australian language communities. Despite the great inter-speaker and intra-speaker variability, universal

patterns in color naming are evident. The analysis depends not only on the WCS data, gathered in 1978 by S. and B. Swartz, but also on extensive discussion with two Australianist linguists, D. Nash and D. Wilkins and study of (we believe) all published and unpublished primary sources relating to Warlpiri color terms. The presentation will exemplify and explain several of the analytical tools used and displays exhibited in the forthcoming WCS monograph. For purposes of this abstract, it is assumed the reader is familiar with the WCS stimulus palette. A reproduction is available at http://www.icsi.berkeley.edu/wcs/data.html.

Symbol	Term	Gloss	Users	BCT
-	*maru, marumaru*	black, dark, blackish	21(8)	+
+	*kardirri*	white	16	+
=	*yalyuyalyu*	red	20	+
o	*karntawarrakarntawarra*	yellow	20 (4)	+
#	*yukuriyukuri*	green, grue	15 (1)	+
/	*walyawalya*	earth colored	7 (2)	+?

Figure 1. Warlpiri basic color terms.

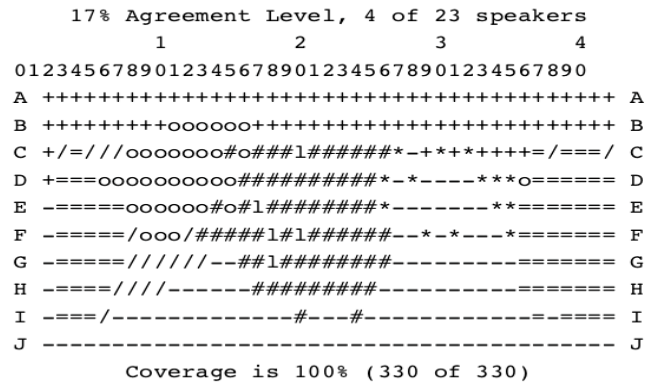

Figure 2. 100% coverage naming aggregate.

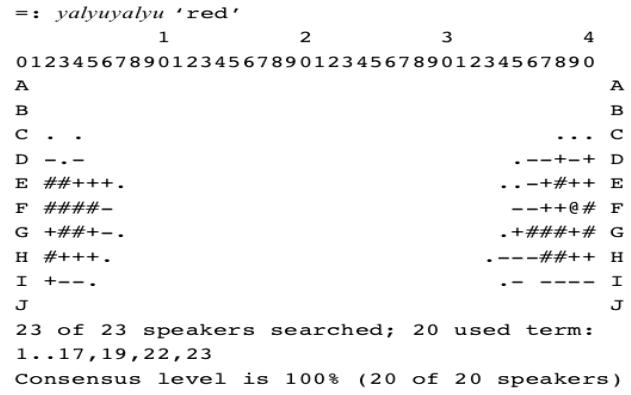

Figure 3. Term map for *yalyuyalyu* 'red'.

Each cell in Figure 2 shows the symbol of the term representing the modal response for the color chip represented by that cell. The visual density of the symbol in each cell in Figure 3 represents the proportion of participants who used the term yaluyayu 'red' for any chip who used yaluyayu for the chip in that cell.

Universal color categories in the World Color Survey

Delwin T. LINDSEY, *Ohio State University*
Angela M. BROWN, *Ohio State University*

The most important data set for studying cross-cultural color naming is the World Color Survey (WCS; Kay et al. 1997), based on 2616 observers, each speaking one of 110 languages. The main challenge presented by the WCS and other data sets of this sort is that they have proved difficult to analyze. We have investigated two statistical approaches to this problem: k-means cluster and concordance analyses. We used K-means, an unsupervised classification program, to sort the WCS chromatic color naming patterns into K categories. Gap statistical analysis showed that K=8 was the maximum number of WCS chromatic categories. Inspection of the color categories revealed by 2 â‰¤ K â‰¤ 8 showed that (1) the

average color naming patterns of the clusters all glossed easily to single or composite English patterns: RED, GREEN, YELLOW-OR-ORANGE, BLUE, PURPLE, BROWN, PINK, and GRUE, (2) there was considerable variation in how similar the color naming patterns were, within color categories, and (3) the structures of the K-means clusters unfolded in a hierarchical way that was reminiscent of Berlin and Kay's classic sequence of color category evolution. Analysis of concordance in color naming within WCS languages revealed small regions in color space that exhibited statistically significantly high concordance across languages. These regions agreed well with five of the six classic Hering primary colors. Concordance analysis also revealed boundary regions of statistically significantly low concordance. These boundary regions coincided with the boundaries that separate WARM and COOL. Our analyses have accomplished two goals. (1) They have allowed us to examine the WCS data set using an automatic, computerized method, establishing the relatedness of color names within each cluster. (2) They have established that the color terms used in the WCS gloss easily to each other and to primary and composite color terms in English.

Kay, P., Berlin, B., Maffi, L. & Merrifield, W. (1997). Color naming across languages. In C. L. Hardin (Ed.) In *Color Categories in Thought and Language.* (Pp. 21-56). Cambridge, United Kingdom: Cambridge University Press.

Worldwide distribution of color terms: The dictionary project

Angela M. BROWN, *Ohio State University*
Delwin T. LINDSEY, *Ohio State University*

It is one of the central facts of color naming that words for Blue are unevenly distributed geographically, with most of the non-Blue languages being spoken near the equator. The purpose of this project was to establish this fact on a more quantitative basis, and to compare the world distribution of Blue to the distribution of other color terms. Our data set was a list of color words from 301 living world languages from various sources, e.g., the website 'yourdictionary.com' and MacLaury, 1997. For each language, we obtained an online or printed dictionary, consulted a native speaker or scholar, or used published color naming data. We found the words that glossed to as many as possible of the 11 basic color terms in English, plus Grue. We also obtained the longitude and latitude for each language. Black, White, and Red were present in nearly 100% of the languages at all latitudes. Grue was distributed bimodally: it was present in about 25% of the dictionaries for languages spoken near +/-25° latitude, but was less prevalent near the equator and at higher latitudes. All other color names were less frequent in dictionaries for languages spoken between 25°S and 0° than at higher and lower latitudes. Of the classic Hering primaries, Blue was the least prevalent, especially near the equator, where it was present in about 30% of our dictionaries, a distribution most similar to the values we obtained for Brown and Gray. This contrasts with minimum prevalence around 50% for Yellow and Green. Although Blue varies with latitude more than other colors do, the prevalence of the other colors, except Black, White, and Red, also varied with latitude. Successful theoretical accounts of the worldwide distribution of color terms will have to account for the worldwide distributions of all the color terms.

MacLaury, R. E. (1997). *Color and Cognition in Mesoamerica: Constructing Categories as Vantages.* Austin, University of Texas Press.

Ontogenetic and phylogenetic evidence against universal color categories

Jules DAVIDOFF, *University of London, United Kingdom*

The question of whether language affects our categorization of perceptual continua is of particular interest for the domain of color where constraints on categorization have been proposed both within the visual system and in the visual environment. Our initial research in New Guinea (Davidoff et al, 1999; Roberson et al, 2000) found substantial evidence of cognitive color differences between different language communities, but concerns remained as to how representative might be a tiny, extremely remote community. That study has now been replicated (Roberson et al, 2004, 2005) extending previous findings with additional paradigms among a larger community in a different visual environment. Adult semi-nomadic Himba tribesmen in Namibia, also with a 5 term color language, carried out similarity judgments, short-term memory and long-term learning tasks. They showed different cognitive organization of color to both English and the New Guinea language. A group of Himba children was compared over a three-year period to a group of English children on color naming and comprehension, together with the ability to remember colors. Despite large differences in visual environment, language and education, children from both cultures appeared to acquire color vocabulary slowly and with great individual variation. The longitudinal studies confirmed the role of color labels in the acquisition of color categories both in Himba and English and provide further evidence of the tight relationship between language and cognition. Along with investigations of monkey color categories, they give no support to the claim that color categories are explicitly instantiated in the primate color vision system.

Davidoff, J., Davies, I. & Roberson, D. (1999). Colour categories in a stone-age tribe. *Nature, 298,* 203-204.
Roberson, D., Davies, I., & Davidoff, J. (2000). Color Categories are Not Universal: Replications and New Evidence from a Stone-Age Culture. *Journal of Experimental Psychology: General, 129*, 369-398.
Roberson, D., Davidoff, J., Davies, I.R.L., & Shapiro, L.R. (2004). The development of color categories in two languages: A longitudinal study. *Journal of Experimental Psychology: General, 133*, 554-571.
Roberson, D., Davidoff, J., Davies, I., & Shapiro, L. (2005). Colour categories in Himba: Evidence for the cultural relativity hypothesis. *Cognitive Psychology, 50,* 378-411.

Discussion Sunday, March 11, 10am – 12pm

A Discussion of New Interdisciplinary Research on Color Naming and Categorization Within and Across Ethnolinguistic Groups

Convener
Kimberly A. JAMESON, *University of California, Irvine*

Discussants
Jules DAVIDOFF, *University of London, United Kingdom*
Michael A. WEBSTER, *University of Nevada, Reno*
Don DEDRICK, *University of Guelph, Canada*
Kimberly A. JAMESON, *University of California, Irvine*

Participants
Paul KAY, *University of California, Berkeley*
Angela M. BROWN, *Ohio State University*
Delwin T. LINDSEY, *Ohio State University*

This session aims to summarize and discuss new and important details underlying a classic psychological controversy: What is the empirical basis for the universality of color representation and naming across individuals and cultures? Discussants will briefly survey recent advances for specific components of the proposed discussion topic. The goal of the discussion is to provide an up-to-date account of various views in the area, including some new perspectives that challenge and support the received theory of color categorization. Because participants represent a range of views, attendees will enjoy a balanced discussion of the controversy, and hear about new directions in an area they may have considered settled long ago.