

FORMATION OF COLOR CONCEPTS IN CHILDREN'S SPEECH: A PSYCHOLINGUISTIC APPROACH

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Abstract

This article investigates the psycholinguistic processes underlying the formation of color concepts in children's speech, tracing the developmental trajectory from early perceptual discrimination of color to the full acquisition of color lexicon and the culturally mediated conceptual structures associated with it. The article further examines the relationship between color naming errors, overgeneralization, and conceptual restructuring as diagnostic windows into the developing child's cognitive and linguistic system.

Keywords: psycholinguistics, color concept formation, children's speech, color term acquisition, language development, cognitive development, linguistic relativity, color categorization, caregiver input, conceptual mapping

Introduction

Among the many milestones in early language acquisition, the learning of color terms stands out as one of the most studied and, paradoxically, one of the least fully understood. Children typically begin producing color words between the ages of two and three, yet they frequently use them incorrectly well into their fourth or even fifth year -a lag that has puzzled researchers for decades and generated a rich body of theoretical debate.

This article aims to provide a comprehensive psycholinguistic account of how color concepts form in children's speech. It proceeds from a discussion of early perceptual development and pre-linguistic color discrimination, through the stages of color term acquisition and the characteristic errors children make, to the role of cross-linguistic variation and cultural context in shaping the developmental pathway.

Psycholinguistics and Conceptual Development

Psycholinguistics, as a discipline, is concerned with the psychological processes that underlie the acquisition, production, and comprehension of language. In the domain of lexical acquisition -the learning of words and their meanings -a central question is how children establish the mapping between phonological forms (word sounds) and the concepts those words encode. This mapping problem is deceptively complex: a child who hears the word "red" applied to an apple must determine, from a potentially infinite range of hypotheses, that "red" refers to the color of the apple rather than to the apple's shape, size, texture, or any number of other properties.

Early theoretical accounts of lexical acquisition, drawing on the rationalist tradition, proposed that children are equipped with innate constraints that limit the hypotheses they entertain -for instance, the "whole object assumption" (the tendency to assume that a novel word refers to the whole object rather than a part or property) and the "taxonomic assumption" (the tendency to extend a word to objects of the same kind). These constraints, while useful for learning object names, complicate the acquisition of property terms such as color words, which require the child to attend selectively to a single dimension of an object while ignoring others [5. P. 162].

The Universalism–Relativism Debate

The study of color term acquisition has been significantly shaped by the broader debate between universalism and linguistic relativity. The universalist position, associated most influentially with Berlin and Kay's (1969) landmark cross-linguistic survey of basic color terms, holds that color categories are grounded in universal features of human visual perception and neurophysiology, and that languages carve up the color space in broadly predictable ways. Berlin and Kay proposed a developmental hierarchy of basic color terms -beginning with black and white, proceeding through red, then yellow or green, then blue, and so on -which they argued reflected universal perceptual salience [2. P. 82].

For children's color term acquisition, the relevant question is whether the developmental sequence is universal (driven by perceptual salience) or language-specific

(shaped by the structure of the child's native language). As will be discussed below, the evidence suggests a complex interaction between both factors.

The Concept–Label Mapping Problem

A distinctive feature of color term acquisition, identified by Bartlett and subsequently elaborated by numerous researchers, is the apparent dissociation between perceptual and conceptual competence on one hand and linguistic competence on the other. Children as young as four months show evidence of categorical color perception, grouping colors in ways that correspond broadly to adult color categories. Yet they may continue to mislabel colors well into their fourth year, apparently knowing the word "blue" and the concept it refers to but systematically applying the label to the wrong color [1. P. 51].

This dissociation has generated several competing explanations. One influential account, proposed by Carey and later developed by others, holds that children learn color words as "placeholders" before they have fully mapped them onto the correct color categories -they know that "blue" is a color word but have not yet determined precisely which region of color space it denotes [3. P. 93]. Another account, proposed by Sandhofer and Smith, emphasizes the role of linguistic input: children may fail to acquire color terms correctly not because of conceptual confusion but because color words are less consistently and less frequently foregrounded in caregiver speech than object names [4. P. 132].

Pre-Linguistic Color Perception (Birth to Approximately 12 Months)

Research in infant perception has established that the capacity for categorical color discrimination emerges very early in development, well before the onset of language. Studies using habituation and preferential looking paradigms have demonstrated that infants as young as two to four months perceive color categorically -they generalize within color categories and discriminate across them in ways that mirror adult color perception, even before they have had significant exposure to color language [6. P. 40].

This early perceptual competence is grounded in the physiology of the human visual system. The three types of cone photoreceptors in the human retina, sensitive to different regions of the visible spectrum, provide the biological basis for color perception. The processing of cone signals in the visual cortex gives rise to opponent-color channels -the

red-green and blue-yellow opponent processes -which correspond broadly to the primary color distinctions found across human languages.

The existence of categorical color perception in pre-linguistic infants provides strong evidence for the universalist position: the perceptual foundations of color categorization appear to be species-specific and largely language-independent.

Early Color Word Production (Approximately 18 Months to 3 Years)

Most children begin producing color words sometime between eighteen months and three years of age, though the timing varies considerably across individuals and linguistic communities. Early color word production is characterized by a high degree of instability and apparent randomness: children frequently apply color terms without consistent reference to the color properties of objects, using "red," "blue," and "green" apparently interchangeably for any colored object they wish to label.

Two characteristic error types are observed in this early period. The first is random application, in which the child uses any known color term to label any colored object without regard to the object's actual color. The second is consistent but incorrect mapping, in which the child assigns a particular color term consistently to a particular color -but the term they use is the wrong one (for instance, consistently calling blue things "green"). Both error types suggest that the difficulty lies not in perceiving colors but in mapping linguistic forms onto color categories.

Overgeneralization and Conceptual Narrowing (Approximately 3 to 5 Years)

As color term acquisition progresses, children's errors become more systematic and theoretically revealing. A common pattern is overgeneralization: the child learns a color term -most commonly a basic color term such as "red" or "blue" -and extends it to a broader range of colors than the term correctly denotes in the adult system. A child who has acquired "blue" may apply it to all cool colors including purple, teal, and grey; a child who has acquired "red" may extend it to orange and pink.

Overgeneralization in color term acquisition is the lexical analogue of overgeneralization in morphological development (the famous "goed" and "mouses" errors in English-speaking children) and reflects the same underlying process: the child has

extracted a form-meaning mapping from their linguistic experience and is applying it productively, but the category boundaries they have drawn do not yet match those of the adult system.

Over time, through continued exposure to color language in context, children refine their color categories -a process of conceptual narrowing in which overly broad categories are differentiated and more precise form-meaning mappings are established. This process is gradual and may extend well into the school years for less frequent or more culturally specific color terms.

Consolidation and Extension (Approximately 5 to 7 Years)

By the age of five to six, most children in English-speaking environments have acquired the eleven basic color terms of English (Berlin and Kay's basic color vocabulary) with reasonable accuracy, though individual variation remains substantial. The period from five to seven years is characterized by consolidation of basic color vocabulary and the beginning of extension into secondary and tertiary color terms -the acquisition of terms such as "turquoise," "maroon," "lavender," and the culturally specific color names that enrich adult color language.

This later stage of color lexical development is more explicitly tied to cultural and educational input: secondary color terms are learned not through the same implicit processes of exposure and mapping that govern basic color term acquisition, but through explicit instruction, exposure to artistic and aesthetic traditions, and participation in culturally specific practices (painting, craft, fashion) that make fine-grained color distinctions relevant and nameable.

The Role of Caregiver Input

The quality and quantity of color language in caregiver speech has been identified as a significant predictor of the pace and accuracy of color term acquisition in children. Research by Sandhofer and Smith and subsequent investigators has shown that caregivers who use color terms more frequently, more consistently, and in a wider variety of syntactic frames produce children who acquire color vocabulary faster and more accurately [4. P. 42].

Crucially, the syntactic frame in which a color term appears provides important information about its semantic category. When caregivers say "the red one" or "the red ball," they foreground the color term as a modifier -a property of the object rather than its identity. When they say "that's red" in the context of an explicit color-labeling interaction, they make the referential function of the color term even more explicit. Children whose caregivers provide this kind of rich, varied, and explicitly color-focused input show accelerated development of color vocabulary.

The formation of color concepts in children's speech is a complex, multistage, and culturally embedded developmental process that extends well beyond the simple learning of color labels. Beginning with pre-linguistic categorical color perception in early infancy, the developmental trajectory proceeds through a period of unstable and apparently random color word production, through systematic but often incorrect form-meaning mappings, through overgeneralization and conceptual narrowing, to the eventual consolidation of a rich and accurate color vocabulary in the early school years.

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