

Categorical perception

How do we sort the objects, people, events, and ideas in the world into their proper categories? What transforms the “blooming, buzzing confusion” that enters our eyes and ears when we are born into the orderly world we eventually experience and interact with? These most basic of questions about human (and animal) perception and cognition are the subject of *Categorical Perception*, an exhaustive survey and synthesis of a diverse array of pertinent findings.

Categorical Perception brings together all the known examples of categorical perception, from research on humans and animals, infants and adults, in all the sense modalities so far investigated; hearing, seeing, and touch. The perceptual findings are interpreted in terms of the available cognitive and neuroscientific theories of how categorical perception is accomplished by the brain: Is it inborn? Is it learned? What is it that the mind does to the incoming continuous information to sort it into the discrete categories we can see, manipulate, name, and describe? Work on elementary perceptual and psychophysical categories (colors, sounds) is then compared with work on higher order categories: objects (tables, chairs), patterns, abstract concepts (goodness, truth). From a focus on the most thoroughly investigated case of categorical perception—speech perception—the book proceeds to an integrative view of categorization in general.

Categorical perception occurs when the continuous, variable, and confusable stimulation that reaches the eyes and ears is sorted out by the mind into discrete, distinct categories whose members somehow come to resemble one another more than they resemble members of other categories. The best-known example is color categories. Physically speaking, colors differ only in their wavelengths, which gradually become shorter across the spectrum of visible colors. What we see, however, are qualitative changes from red to orange to yellow to green, and so forth. The same is true of musical pitches: Gradually increasing frequencies can come to be heard as categorical changes from C to C-sharp to D to E flat. A lesser-known example is “stop consonants”: “ba,” “da,” and “ga” also vary along a physical continuum, yet we hear them as three qualitatively distinct and discrete categories. In all three cases, perceptual *boundaries* have somehow arisen along the physical continuum, dividing it into discrete regions, with qualitative resemblances *within* each category and qualitative differences *between* them. These bounded categories may provide the groundwork for our higher-order cognition and language.

Cognitive scientists, neuroscientists, psychophysicists, developmental and comparative psychologists, behavioral biologists, linguists, anthropologists, and philosophers interested in the problem of categorization will all find *Categorical Perception* an invaluable resource.

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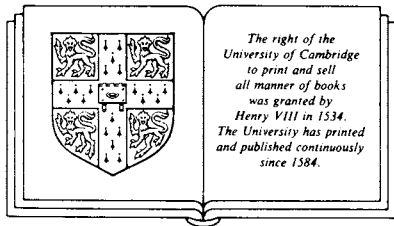
Categorical perception

The groundwork of cognition

Edited by

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Preface

How do we sort the objects, people, events, and ideas in the world into their proper categories? What transforms the “booming, buzzing confusion” that enters our eyes and ears at birth into that orderly world we ultimately experience and interact with? These most basic of questions about human (and animal) perception and cognition are the subject of this exhaustive survey and synthesis of the findings from a diversified area of research on what has come to be called “categorical perception.”

Categorical perception occurs when the continuous, variable, and confusable stimulation that reaches the sense organs is sorted out by the mind into discrete, distinct categories whose members somehow come to resemble one another more than they resemble members of other categories. The best-known example is color categories: Physically speaking, colors differ only in their wavelengths, which gradually get shorter across the spectrum of visible colors. What we see, however, are qualitative changes, from red to orange to yellow to green, and so forth. The same is true of musical pitches: Gradually increasing frequencies can come to be heard as categorical changes from C to C-sharp to D to E-flat. A lesser-known example is “stop-consonants”: (synthesized) “ba,” “da,” and “ga” also vary along a physical continuum, yet we hear them as three qualitatively distinct and discrete categories. In all three cases, perceptual *boundaries* have somehow arisen along the physical continuum, dividing it into discrete regions, with qualitative resemblances *within* each category and qualitative differences *between* them. These bounded categories may provide the groundwork for higher-order cognition and language.

This book brings together all the known examples of categorical perception, in humans and animals, infants and adults, in all the sense modalities that have been studied: hearing, seeing, and touch. The perceptual findings are then interpreted in terms of the available cognitive and neuroscientific theories about how categorical perception is accomplished by the brain: Is it inborn? Is it learned? What is it that the mind does to the incoming continuous information to sort it into the discrete categories we can see, manipulate, name, and describe? This research on our elementary perceptual and psychophysical categories (colors, sounds) is then inte-

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grated with the work on higher-order categories: objects, patterns, abstract concepts. From a focus on the most thoroughly investigated case of categorical perception – speech perception – the chapters proceed to an integrative overall view of category cognition.

The objective of the book is to survey and unify the diverse and interdisciplinary experimental and theoretical work on categorical perception and to guide future research on categorization in general. The volume will be of general interest to cognitive scientists, neuroscientists, developmental and comparative psychologists, behavioral biologists, linguists, anthropologists, and philosophers. It will be especially useful to experimentalists, theoreticians, and students who are concerned with any aspect of category representation: from threshold psychophysics, speech perception, and animal signaling systems to perceptual learning, language acquisition, and concept formation.

Stevan Harnad