

Cambridge University Press

052141265X - Nonverbal Vocal Communication: Comparative and Developmental Approaches - Edited by Hanus Papousek, Uwe Jurgens and Mechthild Papousek
Frontmatter/Prelims

[More information](#)

Studies in Emotion and Social Interaction

Paul Ekman
University of California, San Francisco

Klaus R. Scherer
Université de Genève

General Editors

Nonverbal vocal communication

What is the meaning of the wordless vocal expressions of animals and human infants? Are they merely expressions of affect or are they related to human speech? Specialists from several disciplines discuss this question and review the present knowledge on neural substrates of vocal communication, on primate vocal communication, on precursors and prerequisites of human speech, on the way human infants learn their mother tongue, and on some aspects of speech disorders. There is evidence that parents are well fitted to support infant communicative development. Their capacities represent a primary, biological model of didactic educational support.

Cambridge University Press

052141265X - Nonverbal Vocal Communication: Comparative and Developmental Approaches - Edited by Hanus Papousek, Uwe Jurgens and Mechthild Papousek
Frontmatter/Prelims

[More information](#)

Studies in Emotion and Social Interaction

This series is jointly published by the Cambridge University Press and the Editions de la Maison des Sciences de l'Homme, as part of the joint publishing agreement established in 1977 between the Fondation de la Maison des Sciences de l'Homme and the Syndics of the Cambridge University Press.

Cette collection est publiée co-édition par Cambridge University Press et les Editions de la Maison des Sciences de l'Homme. Elle s'intègre dans le programme de co-édition établi en 1977 par la Fondation de la Maison des Sciences de l'Homme et les Syndics de Cambridge University Press.

Cambridge University Press

052141265X - Nonverbal Vocal Communication: Comparative and Developmental
Approaches - Edited by Hanus Papoušek, Uwe Jürgens and Mechthild Papoušek
Frontmatter/Prelims

[More information](#)

Nonverbal vocal communication

Comparative and developmental approaches

Edited by

Hanuš Papoušek

Max Planck Institute for Psychiatry, Munich

Uwe Jürgens

German Primate Center, Göttingen

Mechthild Papoušek

Munich University



CAMBRIDGE
UNIVERSITY PRESS

and

Editions de la Maison des Sciences de l'Homme
Paris

Cambridge University Press

052141265X - Nonverbal Vocal Communication: Comparative and Developmental Approaches - Edited by Hanus Papousek, Uwe Jurgens and Mechthild Papousek
Frontmatter/Prelims

[More information](#)

Published by the Press Syndicate of the University of Cambridge
The Pitt Building, Trumpington Street, Cambridge CB2 1RP
40 West 20th Street, New York, NY 10011-4211, USA
10 Stamford Road, Oakleigh, Victoria 3166, Australia
and
Editions de la Maison des Sciences de l'Homme
54 Boulevard Raspail, 75270 Paris, Cedex 06

© Cambridge University Press 1992

First published 1992

Library of Congress Cataloging-in-Publication Data

Nonverbal vocal communication : comparative and developmental approaches / edited by Hanuš Papoušek, Uwe Jürgens, Mechthild Papoušek.

p. cm. – (Studies in emotion and social interaction)

Includes indexes.

ISBN 0-521-41265-X

1. Nonverbal communication in children. 2. Interpersonal communication in children. 3. Parent and child. 4. Psychology, Comparative. I. Papoušek, Hanuš. II. Jürgens, Uwe. III. Papoušek, Mechthild. IV. Series.

BF723.C57N66 1992

153.6'9 – dc20

91-43005

CIP

A catalog record for this book is available from the British Library.

ISBN 0-521-41265-X hardback

ISBN 2-7351-0447-8 hardback (France only)

Transferred to digital printing 2004

Cambridge University Press

052141265X - Nonverbal Vocal Communication: Comparative and Developmental
Approaches - Edited by Hanus Papousek, Uwe Jurgens and Mechthild Papousek
Frontmatter/Prelims

[More information](#)

*To
Detlev Ploog, in appreciation
and
David Symmes, in commemoration*

Cambridge University Press

052141265X - Nonverbal Vocal Communication: Comparative and Developmental Approaches - Edited by Hanus Papousek, Uwe Jürgens and Mechthild Papousek
Frontmatter/Prelims[More information](#)

Contents

<i>Preface</i>	<i>page ix</i>
<i>List of contributors</i>	xv

Part I Systems of communication

Introduction and review	3
UWE JÜRGENS	
1 The evolution of vocal communication	6
DETLEV W. PLOOG	
2 On the neurobiology of vocal communication	31
UWE JÜRGENS	
3 Vocal affect expression as symptom, symbol, and appeal	43
KLAUS R. SCHERER	

Part II Noncategorical and categorical signals in primate communication

Introduction and review	63
KIM A. BARD	
4 Animal signals: Motivational, referential, or both?	66
PETER MARLER, CHRISTOPHER S. EVANS, AND MARC D. HAUSER	
5 Noncategorical vocal communication in primates: The example of common marmoset phee calls	87
JOHN D. NEWMAN AND PHILIPP GOEDEKING	
6 Categorical vocal signaling in nonhuman primates	102
MICHAEL J. OWREN, ROBERT M. SEYFARTH, AND STEVEN L. HOPP	
7 Vocal development in nonhuman primates	123
DAVID SYMMES AND MAXEEN BIBEN	

Cambridge University Press

052141265X - Nonverbal Vocal Communication: Comparative and Developmental Approaches - Edited by Hanus Papousek, Uwe Jurgens and Mechthild Papousek
Frontmatter/Prelims[More information](#)viii *Contents*

Part III Development of nonverbal vocal signals in humans: From cry to speech sounds	
Introduction and review	143
REBECCA E. EILERS	
8 No language but a cry	145
BARRY M. LESTER AND C. F. ZACHARIAH BOUKYDIS	
9 Development of vocal signaling in human infants: Toward a methodology for cross-species vocalization comparisons	174
D. KIMBROUGH OLLER AND REBECCA E. EILERS	
10 Disorders of vocal signaling in children	192
HEDWIG AMOROSA	
Part IV Development of nonverbal vocal signals in humans: Interactive support in preverbal dialogues	
Introduction and review	207
REBECCA E. EILERS	
11 Didactic interactions: Intuitive parental support of vocal and verbal development in human infants	209
HANUŠ PAPOUŠEK AND MARC H. BORNSTEIN	
12 Early ontogeny of vocal communication in parent– infant interactions	230
MECHTHILD PAPOUŠEK	
13 Meaningful melodies in mothers' speech to infants	262
ANNE FERNALD	
<i>Author index</i>	283
<i>Subject index</i>	291

Cambridge University Press

052141265X - Nonverbal Vocal Communication: Comparative and Developmental Approaches - Edited by Hanus Papousek, Uwe Jurgens and Mechthild Papousek
Frontmatter/Prelims

[More information](#)

Preface

Books on communication may elicit ambivalent feelings. Postmodern society suffers from social satiation, and excessive communication is believed to be one of the causes. Conversely, communication has occupied a remarkable area of scientific research, beside technology and mass media, and continues to nourish a growing interest within the biological, psychological, and medical disciplines. It has gradually become obvious that misuse of communication should not lead to underestimation of something that belongs to innate needs, functions as a means of evolutionary adaptation, and is vital to social coexistence.

Interest in human communication used to be narrowly focused on verbal communication, and the presence of speech was viewed as a categorical attribute of human beings. There was no room for consideration of phylogenetic or ontogenetic continuities or for precursors of verbal communication and, consequently, no space for a proper interpretation of speech acquisition. That situation has changed, and as in many other areas of research, static, two-dimensional concepts have made way for dynamic, interactionistic thinking, even concerning human languages. The old question of whether languages are products of culture or, like culture, are codetermined by nature has been reapproached, owing to improved communication, on a higher level of the critical interdisciplinary forum, where data mean more than mere speculation.

Thus, the need for the mutual exchange of information, especially about methodological procedures, has become obvious to students of communication in both animal and human research. Primatologists are using psycholinguistic methods; psychologists and researchers in human development are considering biological aspects of communication. Interdisciplinary cooperation has proved useful and has motivated the contributors to the present volume to discuss developmental and com-

Cambridge University Press

052141265X - Nonverbal Vocal Communication: Comparative and Developmental Approaches - Edited by Hanus Papousek, Uwe Jurgens and Mechthild Papousek
Frontmatter/Prelims[More information](#)x *Preface*

parative aspects of nonverbal or preverbal vocal communication, where some interesting discoveries have been reported recently.

The original impetus for this discussion came from a group of Central European scientists, especially an interdisciplinary team at the Max Planck Institute for Research in Psychiatry in Munich. The director, Detlev W. Ploog, an advocate of biologically oriented psychiatry and an eminent neurologist, realized very early the decisive role of communication in both human mental development and mental health. He brought together neurophysiologists, psycholinguists, developmentalists, and psychiatrists engaged in either experimental or clinical research on communication in humans and other primates. Some of the American contributors to the present volume participated in this research as guest researchers in Munich and now work at the National Institutes of Health in Bethesda, Maryland. The engagement of both institutes clearly indicates the significance attributed to comparative and developmental research on communication by clinicians in medical fields.

The Max Planck Society generously enabled the entire group of contributors to meet at an editorial symposium in the society's magnificent conference center, Ringberg Castle in the Bavarian Alps. There our chosen conceptual frame of reference found a most pleasant physical setting. It would be much easier, of course, to describe the beauty of the landscape than to capture the scholarly atmosphere of the meeting.

Comparative and psychobiological approaches made us aware of the general position of communication in the animate world as an important means of evolutionary adaptation. In many species, living in social groups increased the survival rate. At the same time, some kind of communication had to develop to allow sharing of tasks, space, and food and to establish most adaptive forms of social integration. Taking into account the rich variety of communication, including the use of abstract symbols in honeybees and categorical vocal signals in some primates, we necessarily have to admit both phylogenetic and ontogenetic continuities with the presence of precursors of speech in preverbal forms of communication.

Human speech not only had biological roots in animal communication; it also led to biological adaptive consequences affecting survival and resistance to biological dangers. Biologically relevant means of adaptation are generally characterized by a number of mechanisms securing their effectiveness: They are based upon innate, relatively stable and universal programs; they develop rather early during ontogeny; and they find adequate behavioral counterparts that coevolved in social partners,

Cambridge University Press

052141265X - Nonverbal Vocal Communication: Comparative and Developmental Approaches - Edited by Hanus Papousek, Uwe Jürgens and Mechthild Papousek
Frontmatter/Prelims[More information](#)*Preface*

xi

often in surplus. Similar assumptions can be legitimately applied to human speech, if we view it as a crucial means of biological adaptation. However, the application points out gaps in evidence, rather than sets of solid data.

Psychological and clinical interest in preverbal communication mirrors several complexes of problems: (1) Since Sigmund Freud's time, the effects of early experience on later development have gained increasing attention, but communicative development has been neglected in conceptual domains and underresearched in science. (2) The study of the early ontogeny of speech acquisition allows an insight into the process of speech evolution that escapes paleontological investigation. Comparative approaches play a particularly useful role in this connection. (3) Biogenetic factors of behavioral regulation are usually more visible during early development. Their evidence may serve as indirect proof of innate predispositions for human speech which escape direct experimental verification in human subjects. (4) Early dependence of human infants on caregiving draws attention to social interactions between infants and caregivers and reveals gaps in knowledge on a potential support to speech acquisition which may be included in caregiving behaviors. Cross-cultural adoptions make it evident that social environment guides speech acquisition in infants; however, the mechanisms of this guidance have long remained unknown.

Obviously, the present state of research on nonverbal communication confronts us with findings that contradict some former concepts and raise questions requiring investigation. Yet this circumstance does not contradict the need to review periodically the state of the art and consider new directions and methods. At such opportunities, participants also learn by using the same, or at least a commonly understandable, working vocabulary in an area with a surprising redundancy.

Jürgens's review of present knowledge of the neurophysiological structures involved in the perception and production of vocal signals offers a much-needed basis for discussions of the comparative and developmental aspects of vocal communication. Particularly interesting are evolutionary changes in the brain, since a phylogenetic comparison compensates to some degree for the missing fossil records of soft intracranial tissues. Careful analyses presented by Ploog allow detection of branch-points in cerebral evolution and throw a new light on the old question of the sequential primacy between phonatory and bodily gestures.

Nonverbal vocal signals have often been viewed as mere expressions

Cambridge University Press

052141265X - Nonverbal Vocal Communication: Comparative and Developmental Approaches - Edited by Hanus Papousek, Uwe Jurgens and Mechthild Papousek
Frontmatter/Prelims[More information](#)xii *Preface*

of affects. However, elaborating on Bühler's concept, Scherer stresses the threefold significance of vocal signals: a symptomatic expression of the sender's internal state; a symbolic representation of contextual aspects; and an appeal signaled to the receiver to answer the signal. Microanalyses of early social interactions illustrate convincingly that the process of preverbal communication cannot be interpreted satisfactorily if any of these three aspects is neglected.

The search for discrete categorical entities in vocal signals seems to be outweighed by attributional approaches, stressed in Newman and Goedecking's essay. The authors view vocal signals as multivariate complexes in which variability of individual subunits decreases with increasing signaling value. Similarly, as Marler, Evans, and Hauser argue, motivational and referential characteristics, which were formerly viewed as functioning independently in vocal signals, have been demonstrated to function in essential relation. Marler and coauthors recommend new methodological approaches for the analysis of meaning in animal signals.

Symmes and Biben reveal another new aspect of adult–infant communication in squirrel monkeys which immediately captured the attention of researchers in the field of communicative development and led to improved methodology. The authors show that the earliest face-to-face communication between an infant squirrel monkey and adults, which cannot occur between a mother and an infant sitting on her back, takes place between the infant and other female conspecifics. This finding indicates the importance of universal predispositions for caregiving stressed by Papoušek and Bornstein in relation to human infancy research. The participants in the symposium could not anticipate, however, that they were seeing David Symmes for the last time. To their deep regret, David Symmes died on April 8, 1990.

So far, the progress in research on nonverbal and preverbal vocal communication has been greatly influenced by methodological innovations. Methodological problems are still much in evidence, but awareness of these difficulties may spur further progress, as exemplified in the present volume: Scherer has profited from the work of Marler, Marler from that of psycholinguists, infancy researchers from Marler, and so on. New techniques are reported in the analysis of vocal signals; microanalyses are introduced in studies of early social interactions; and longitudinal observations are used in evaluating the role of social scaffolding in speech acquisition. Rather provocative findings reported by Owren, Seyfarth, and Hopp point out the role of acoustic processing in differences among

Cambridge University Press

052141265X - Nonverbal Vocal Communication: Comparative and Developmental Approaches - Edited by Hanus Papoušek, Uwe Jurgens and Mechthild Papoušek
Frontmatter/Prelims[More information](#)*Preface*

xiii

primate species and suggest that psychoacoustic analyses should be included in the methodology of research on vocal communication in general. In human infancy research, naturalistic strategies have been utilized to explore innate propensities, since direct experimentation is ethically inconceivable. Almost every chapter includes useful methodological recommendations or caveats.

The first form of human vocalization is typically crying. Lester and Boukydis outline the present methodological status of the field, as well as examining what clinical studies of crying have to offer. Detailed analyses of non-cry vocalizations and studies of the first vocal interchanges between infants and caregivers provide evidence of the developmental shift from crying to deliberate forms of non-cry vocalization, including an unpretended, specific preverbal vocabulary in prosodic elements, as reported by Mechthild Papoušek and Anne Fernald.

Two clinical syndromes – developmental retardation and early autism – were studied by Amorosa in order to illustrate the participation of separate functional systems in the development of vocal communication, as well as to point out gaps in our understanding of the nonlinguistic aspects of vocal development.

A new area of research, devoted to early vocal communication in human infants, requires microanalytic approaches employing audiovisual documentation, spectrographic analysis of vocal signals, adequate descriptive systems, and open conceptual systems. Oller and Eilers recommend replacing the former alphabetic description of sounds with an infraphonological system, which may be of particular interest to comparative researchers analyzing animal sounds.

Present theory attributes to the preverbal phase of human vocal communication quite new dimensions, for instance, the presence of a “primary, intuitive didactic support” for speech acquisition, revealed by Papoušek and Papoušek, or the use of prosodic contours as primary categorical messages prior to the first verbal categorical messages.

Didactic support concerns not only the production and use of vocal signals but also, and perhaps more importantly, the training of integrative processes involved in the structuring or decoding of vocal signals. In fundamental aspect, those processes have been shown to function at birth or very soon thereafter. However, they function rather slowly at the beginning and have to function much faster to cope with the rapid strings of messages in speech at the end of infancy.

On the whole, preverbal vocal interchanges in humans appear in the concluding essays in a new light, revealing their dual and crucial signif-

Cambridge University Press

052141265X - Nonverbal Vocal Communication: Comparative and Developmental Approaches - Edited by Hanuš Papoušek, Uwe Jürgens and Mechthild Papoušek
Frontmatter/Prelims

[More information](#)

xiv *Preface*

icance: On the one hand, communication per se serves the need of co-existence within a social group; on the other hand, it provides the infant with numerous teaching experiences, which facilitate learning and enhance the cognitive processes of mental integration. Experimental verification of the effects of social support on early integrative growth and speech acquisition is difficult, and yet Bornstein reports encouraging data from a “natural experiment” involving the mothering of twins.

Last but not least, the smooth course of the symposium and subsequent interchanges were facilitated by the quiet and effective cooperation of three colleagues: Kim Bard, Charles Rahn, and Roberta Turner. Their help is gratefully acknowledged.

The new conceptual and methodological framework offered at the symposium opens important avenues for further research, both animal and human, and both experimental and clinical. It was this belief that motivated the participants to share the results of the interdisciplinary discussions with a broader community of readers.

Hanuš Papoušek

Contributors

Hedwig Amorosa
Hecksche Klinik – Solln
Munich, Germany

Kim A. Bard
Yerkes Regional Primate Center
Emory University
Atlanta, Georgia

Maxeen Biben
National Institute of Child Health
and Human Development
Bethesda, Maryland

Marc H. Bornstein
National Institute of Child Health
and Human Development
Bethesda, Maryland

C. F. Zachariah Boukydis
Brown University Program in
Medicine
Bradley Hospital
East Providence, Rhode Island

Rebecca E. Eilers
Mailman Center for Child
Development
University of Miami
Coral Gables, Florida

Christopher S. Evans
Department of Zoology
University of California
Davis, California

Anne Fernald
Department of Psychology
Stanford University
Stanford, California

Philipp Goedeke
National Institute of Child Health
and Human Development
Bethesda, Maryland

Marc D. Hauser
Department of Zoology
University of California
Davis, California

Steven L. Hopp
Department of Psychology
Emory and Henry College
Emory, Virginia

Uwe Jürgens
German Primate Center
Göttingen, Germany

Barry M. Lester
Brown University Program in
Medicine
Bradley Hospital
East Providence, Rhode Island

Peter Marler
Department of Zoology
University of California
Davis, California

Cambridge University Press

052141265X - Nonverbal Vocal Communication: Comparative and Developmental Approaches - Edited by Hanus Papousek, Uwe Jurgens and Mechthild Papousek
Frontmatter/Prelims

[More information](#)

xvi *Contributors*

John D. Newman
National Institute of Child Health
and Human Development
Bethesda, Maryland

D. Kimbrough Oller
Mailman Center for Child
Development
University of Miami Medical School
Miami, Florida

Michael J. Owren
Department of Psychology
University of Colorado
Denver, Colorado

Hanuš Papoušek
Free University
Amsterdam, The Netherlands

Mechthild Papoušek
Institute for Social Pediatrics
University of Munich
Munich, Germany

Detlev W. Ploog
Max Planck Institute for Research in
Psychiatry
Munich, Germany

Klaus R. Scherer
Department of Psychology
University of Geneva
Geneva, Switzerland

Robert M. Seyfarth
Department of Psychology
University of Pennsylvania
Philadelphia, Pennsylvania

David Symmes (deceased)