Intersubjective Communication and Emotion in Early Ontogeny

The concept of 'intersubjectivity', explicit or implicit, has emerged as a common denominator in approaches to interpersonal engagements in early infancy and children's understanding of others' thought and emotion. This book brings together for the first time some of the most senior international figures in psychology, psychopathology, sociology, primatology and neuroethology to address the key question of the role of intersubjectivity in early ontogeny. Together, they offer a new understanding of child development, learning and communication and important comparisons with processes in autism and in infant ape development. Theory and findings are integrated in the following domains: intersubjective attunement in human infancy; companionship and emotional responsiveness in early childhood; imitation, emotion and understanding in primate communication; and intersubjective attunement and emotion in language learning and language use. The book is an invaluable resource for researchers in emotion and communication across the social and behavioural sciences.

Stein Bråten is Professor of Sociology at the University of Oslo and Chairman of the Theory Forum on the Foundations of Intersubjective Communication, Centre for Advanced Study at the Norwegian Academy of Science and Letters.

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Preface

This is a source book in virtue of two characteristics. First, the authors are themselves sources of findings and conceptions challenging traditional theories of child development and certain comparative distinctions. Second, taking stock of their findings from complementary positions and proposing testable explanatory principles attuned to these new empirical grounds, they invite new directions for research and theoretical studies for which this book can serve as a cross-disciplinary source of references.

Thanks to the authors' unfailing support of this project from the very beginning, this book can now be offered as a foundation and framework for further research on intersubjective attunement and understanding in early child development and pertinent comparative domains. The project crystallized when some of us (Patrick Bateson, Judy Dunn, Andrew Meltzoff, Andrew Whiten and I) were invited to a King's College Research Centre Workshop on the Perception of Subjects and Objects, in Cambridge, September 1992. There, they asked Andrew Meltzoff and me to open by dialogue the general discussion on intersubjectivity. I realized then that the time was ripe for a source book integrating theory and findings from complementary perspectives.

The invited authors met – many of them for the first time – in August 1994, in a preparatory symposium in the Norwegian Academy of Science and Letters, Oslo. Some of them (Carolyn Edwards, Mikael Heimann, Ragnar Rommetveit and Colwyn Trevarthen) followed up by joining my group in the Academy's Centre for Advanced Study in the academic year 1996–7, and some others (Paul Harris, Patricia Kuhl and Andrew Meltzoff) by joining us for workshops or a briefer stay in that period.

Among the authors, I owe special thanks to Colwyn Trevarthen for many lively conversations and disputes. We first met in August 1987 at a workshop on Intersubjective Communication, Department of Cognitive Psychology, University of Bergen, which I organized (with Tordis Dallan Evans) upon my arrival there as invited professor of cognitive science. We were both delighted, I think, to discover the fit

between his findings on infant intersubjectivity and my dialogical systems postulate of an inborn virtual other. Only much later did we realize our disagreement on whether or not there is a higher-order level of mental simulation of other minds, which I had proposed in the seventies. Our fruitful disputes in this respect have sharpened my intention with this book: to invite dialogue between conflicting positions, examining whether in the end they may reveal themselves to be complementary. That pertains, for example, to the gap between the social-emotional *communicative* perspective and the social-cognitive *mindreading* perspective. This book purports to bridge some of that gap by providing for the first time a comprehensive examination from *both* these perspectives of the nature, nurture and perturbation of intersubjective attunement and understanding in early child development and pertinent comparative domains.

Through all the stages of preparation and finalizing of this book I have had unfailing support, including finance, from these institutions with which I am associated: the Department of Sociology and Human Geography, and the Faculty of Social Sciences, University of Oslo; the Norwegian Academy of Science and Letters, and its Centre for Advanced Study, Oslo. In addition, I gratefully acknowledge financial support of the preparatory symposium from the Norwegian Research Council Program for Youth Research (UNGFORSK). In organizing that meeting I would also like to thank my colleagues at the University of Oslo and fellow members of the Theory Forum network's organizing and reference group: Jon Roar Björkvold, Rolv Blakar, Dagfinn Föllesdal, Signe Howell, Karsten Hundeide, Inge Lönning and Ragnar Rommetveit.

I am also grateful to Susan Powers, University of Oslo, for her dedicated efforts in administrative help and in language polishing and printing preparation of the symposium pre-proceedings, and to Rune Engebretsen who, while at the Centre for Advanced Study, found time to assist me in the language polishing of chapter 5 of this book, teaching me in the process to appreciate the music in the English language. I would like to thank the Cambridge University Press commissioning editor, Catherine Max, as well as the publisher's series editors and evaluators, for valuable advice, including desiderata on volume size, which has been a challenge in view of the rich source material contained herein. I also thank my research assistant, Anders Nöklestad, for dedicating himself – between our efforts at connectionist explorations of egocentric and altercentric perception – to splendid assistance in the preparation of the book in electronic form.

Stein Bråten
Centre for Advanced Study, Oslo, August 1997

Introduction

Stein Bråten

In recent decades the concept of *intersubjectivity* has emerged – explicit or implicit – as a common denominator of approaches to interpersonal engagements in early infancy and children's understanding of thought and emotion in others. In this source book, seminal authors of new conceptions and empirical findings in conflict with traditional theories of child development and certain comparative distinctions in psychopathology and primatology examine and define the foundations of intersubjective attunement and understanding in early ontogeny. In their examination, at least three meanings of intersubjectivity may be distinguished.

First, there is the immediate, albeit unconventional, sense of *interpersonal communion* (Buber, 1958; Marcel, 1950; Stern, 1985) within and between persons who mutually attend and attune to one another's emotive states and expressions. Trevarthen (1979a), for example, has found 'primary intersubjectivity' in this embodied sense of motivated subject–subject connectivity to characterize dyadic protoconversation in early infancy.

Second, there is the more conventional sense of *joint attention* to objects of reference in a shared domain of extra-linguistic or linguistic conversation (Habermas, 1970; Stout, 1903/1915), for example found by Tomasello (1988) to play a critical role in early language development. This is intersubjectivity in the triangular sense of subject–subject–object *relatedness and aboutness* (Hobson, 1993a) in a shared world of object reference and manipulation.

Third, there is the first- and second-person *reflective and recursive* intersubjectivity in the sense of communicative understanding mediated by (meta)representations, including symbolic references to actual and fictional worlds of imagination or joint pretence, for example by the 2-year-old's declaring 'I a Daddy' (Dunn and Dale, 1984). The capability to draw inferences about intentions, beliefs and feelings in others (Gopnik and Meltzoff, 1997) – probably evoked when communicative understanding is perturbed, and certainly in attempting or discerning deception – indicates a second-order mode

involving imagining, simulating or reading the mental states or processes in others (Astington, Harris and Olson, 1988; Bråten, 1974; Humphrey, 1984; Whiten, 1991).

From their different positions and foci, the contributors to this volume examine the nature, nurture and perturbation of intersubjectivity in the above meanings.

Examples of findings by the source book authors inviting a new understanding

These authors are sources of experimental, ethological and cross-cultural findings and models inviting a new understanding of the foundations of intersubjective communication and emotion in child development and in the comparative domains of psychopathology, neuroethology and animal communication. They take stock of their experimental, ethological and cross-cultural findings and propose reconceptualizations and testable and tested explanatory principles attuned to the empirical grounds that have emerged in the recent decades from their research. That comprises *inter alia* studies of infants' attunement to the movements, sounds and emotive expressions of others, studies of children's understanding of others' minds and emotions, studies of autism, and neuroethological and systems modelling of learning in infants and non-human primates.

For example, neonatal imitation has been uncovered by experimental procedures (Kugiumutzakis, 1985b, 1993; Meltzoff and Moore, 1977, 1989; Heimann and Schaller, 1985). Sensitive person-oriented procedures have revealed imitation of sounds and movements even in the first hour after birth (Kugiumutzakis, 1985a; this volume). In the first weeks of life, the reciprocal nature of parent–child interplay, exhibiting mutually attuned emotional expressions and synchronized rhythmic movements, has been documented (Murray, 1980; Murray and Trevarthen, 1985; Trevarthen, 1974a, b). Comparative studies of speech perception in 6-month-old infants reveal them to be culture-sensitive in disregarding distinctions that make no sense in their familiar culture (Kuhl *et al*., 1992; Kuhl, this volume). These findings have brought into focus the precursory and nurturing role of early intersubjective attunement for sociocognitive development and learning later in infancy (cf. Parts I, II and IV in this volume).

In view of such experimental evidence, traditional questions about young infants' responsiveness have been replaced by questions about the impact of limited responsiveness by caregivers, for example when suffering from postnatal depression, or as studied in perturbed infant–parent communication (Murray, 1980, 1991; this volume). The

shaping and differentiating role of early companionship and social-emotional relationships has been highlighted, and studied across families and cultures. For example, empathy and prosocial behaviours have been found in toddlers and shown to decline in some cultures and contexts with age as a function of parental influence (Whiting and Edwards, 1988). Even where prosocial behaviour is rare between siblings, Dunn (1988) has found the second-born 18-month-old to be as likely as a 4-year-old to attempt to comfort a sibling in distress (cf. Part II in this volume).

When children's emotional and social responsiveness to imitate, learn and participate in communicative and pretend activities is compared to subjects with autism, or to non-human primates exhibiting tactical deception, some of the results evoke a re-examination of earlier comparative distinctions (Byrne and Whiten, 1988, 1991; Gómez *et al*., 1993a; Hobson, 1993; Tomasello *et al*., 1993). For example, Bard (this volume) reports emotional and imitational responsiveness to foster parents by newborn chimpanzees, while Byrne and Byrne (1993) have found that young wild mountain gorillas learn complex feeding skills from their elders, inviting a redefinition of levels in imitative learning (cf. Part III in this volume).

As for the human species-specific capacities for cultural learning, speech and dialogue, laboratory studies in the first six months of infancy have uncovered prespeech efforts, as well as attentive and discriminative attunement to speech patterns in the familiar linguistic culture (Kuhl *et al*., 1992; Kuhl and Meltzoff, 1982; Trevarthen, 1990b). Children's acquisition of emotional word meanings (Rommetveit, 1968; Rommetveit and Hundeide, 1967), beginning in the second year to predicate (Akhtar and Tomasello, this volume) and to participate in joint pretence (Dunn and Dale, 1984; Harris, 1994b), indicates an intersubjective basis for the development of symbolic and dialogical thought, retaining an emotive accompaniment even in adult fiction and discourse (cf. Part IV in this volume).

Authors of such pertinent findings join in this book with proponents of models and comparative distinctions from pathology and primate studies to take stock of results, to examine potential mechanisms and ontogenetic implications from their different positions, and to propose reconceptualizations attuned to the emerging empirical landscape which they have helped to reshape.

Organization of the book

The volume's organization reflects to some degree the circular or spiral structure of interaction between natural, nurtural and cultural

factors in communicative development and intersubjective understanding. Maintaining a sequential progression, consistent with the subject of development, the chapters are grouped in four parts according to domains and levels of development. In accordance with the interlaced nature of intersubjective communication and emotion, there are also interconnections across the four parts. Thus, the beginning of Part I connects to the beginning of Part II. The last two chapters in Part III connect to Part I, and Part IV recursively closes the circular connection to Part I

Part I recounts and offers explanations of infant attunement to caregiver or experimenter – from neonatal imitation and protoconversation to imitational learning and realization of target intentions from exposure to unrealized acts. Ontogenetic implications are spelt out and possible underlying mechanisms are indicated. The motivational or emotional nature of such early intersubjective attunement is emphasized, as are results that demonstrate the communicative and identity-probing role of imitation in human infancy, and infants' capacity for participation in others, compared to subjects with autism.

Part II focuses on the development of empathy and emotional understanding in children, and on the role that companionship and local cultural conditions play in the nurturing and hampering of prosocial tendencies and caring behaviours towards others in need. The reciprocal nature of early mother–child interplay is demonstrated. The possible impact of lack of responsiveness by the caregiver, caused by postnatal maternal depression, is studied. Here is further examined how differences of interpersonal relationships make an individual difference in children's understanding of others.

Part III examines communication, imitation and the development of understanding in normal children, in children with autism, and in non-human primates. Perspectives are brought to bear from neuroethological modelling and from concepts of mindreading or theory of mind. Domains for such concepts of children's social-cognitive understanding of others are partly distinguished from the social-emotional domains of infant intersubjectivity. Studies of emotional responsiveness to learn in young chimpanzees are reported, and implications are spelt out for learning by imitation entailed by the discovery of complex feeding skills in mountain gorillas.

Part IV examines the intersubjective foundations of thought and linguistic attunement, including early speech perception and emotional response to fiction. Here are reported findings of early intersubjective attunement to human speech patterns, from subsequent studies in the quest for underlying operational mechanisms, and from the use of new methods to elicit joint attention and inter-

subjective understanding in early language learning. The emphasis on dialogicity and intersubjective attunement in adult language usage and discourse returns to the levels of intersubjectivity, introduced in Part I, supporting operation at higher levels (cf. the concluding chapter).

From the history of ideas and findings

When considered together, the various parts of this volume offer a corrective to traditional theories of child development advanced earlier in this century, and reactivate certain pertinent questions raised at the end of the last century.

For example, in *The expression of emotion in man and animals*, Darwin (1872), who approaches emotional expression as a form of communication, finds similarities across human cultures, and raises the possibility of some common innate basis for emotional communication in children. Reporting, for example, how his 6-month-old son once immediately reproduced his nurse's sad expression, Darwin speculates about the possibility of an innate basis for the imitation of facial gestures. About 100 years later, laboratory results on neonatal imitation confirm his speculations (cf. Part I in this volume), and comparative and cross-cultural studies revive this concern with emotional responsiveness and communication (cf. Parts II and III).

Baldwin (1895) reformulates and reduces in terms of motor attitudes Darwin's principles of emotional expressions. Searching for a common denominator for ontogeny and phylogeny that would allow the principle of natural selection to be supplemented by mechanisms of communication and adjustment, Baldwin arrives at the concept of the self-repeating *circular reaction* (which Piaget adopts and adapts). Motions that are felt to be pleasant are reinforced through fine-tuning and repetition. Baldwin proposes that the infant's consciousness is infused with emotion, and that infants are able to feel what others are feeling by imitating their movements. Discarding a report (from Preyer) about imitation in 3-month-olds, he presents his model of manual gestural imitation in one of a series of articles in *Science*.

The discovery of neonatal imitation

Eighty-six years later, experimental results on neonatal imitation of manual and facial gestures were reported in the same journal. The Meltzoff-Moore results on neonatal imitation were at first met with scepticism – and with outright rejection by those who failed to replicate their findings. But gradually, replicative evidence began to

accumulate from a number of laboratories around the world, including Kugiumutzakis' records of imitation in 30-minute-olds. Meltzoff and Moore expanded their studies, for example by modelling novel movements to neonates as young as 42 minutes and by studying imitative learning throughout infancy. With their demonstration of how innate releasing mechanisms fail to account for the results, and their proposal of a representational space that enables *active intermodal matching*, the quest for explanatory mechanisms had begun. The role of imitation in children's learning and communicative development again came into focus (cf. Parts I and III in this volume).

Baldwin's point about imitation as a confusion between own and others' activities is taken up by Piaget (1926/1959) in his seminal book *The language and the thought of the child*. Here Piaget is also influenced by the Freudian attribution of an autistic-like autonomy to newborn infants (cf. Freud's (1911) metaphor of a bird's egg and his use of Bleuler's term). This attribution of 'normal autism', which Freud later abandoned, and which was falsified by Anna Freud's studies of young wartime children, came to be retained in some versions of Object Relations Theory. But a breakaway was signalled by Winnicott's (1953) discovery of infants' creative re-enactment of emotional communication by means of 'transitional objects'. In his theory, Piaget assumes an 'ego-centric' attitude and 'autistic thinking' as points of departure for higher-order stages. He thereby implies that the ontogenetic path towards intersubjectivity can only come by way of *decentration*.

Intersubjectivity and the discovery of protoconversation

Piaget's auto-centric point of departure was contested by Vygotsky (1934) who insisted, like G. H. Mead (1934/1986), upon the primacy of the interpersonal in the ontogeny of thought and language. For Vygotsky, occurrences of so-called 'ego-centric speech' are merely outward manifestations of the internal dialogue that characterizes thinking in problem-solving contexts. Mead points to the phylogenetic path from 'conversation by gestures' among animals and to children's ontogenetic path from inter-play to symbolic understanding of others by means of a developed generalized other. This is partly reflected in Rommetveit's (1968, 1974, 1990) approach to speech acts in terms of an intersubjective architecture that also opens for emotional aspects in the learning of word meanings. Neither Vygotsky nor Mead, however, addressed the theoretical issue of how the nurtured acquisition of such higher-order means for mediational intersubjectivity would require a primary socioemotional capacity to participate affectively in

others and learn from them in some unmediated mode of felt immediacy (Bråten, 1986, 1988a, 1989, 1993).

Such a primary capacity was to be documented in Mary Catherine Bateson's (1975) analyses of what she termed 'protoconversation' and in Trevarthen's (1974a, 1977, 1979a) descriptive analyses of infant–adult communication in terms of *infant intersubjectivity*. Informed by his brain research and on the basis of his micro-analyses of proto-conversations with 2-month-olds, Trevarthen (1974a, 1980) assumes the infant to be endowed with a cerebral system that enables direct alteroception and responsive attunement in delicate, emotionally regulated engagements with supportive others. This innate capacity for early subject–subject engagements he terms 'primary intersubjectivity'. Here again, as befits science, we have a case of initial scepticism and rejection of an attribution which breaks radically with the auto- and ego-centric assumptions in Freudian and Piagetian traditions. Guided by philosophers' use of the term 'intersubjectivity', many infant researchers found it difficult to apply Trevarthen's term to early engagements before the infant could share in joint attention to some object besides the other subject, which Trevarthen and Hubley (1978) term 'secondary intersubjectivity'. For example, Tomasello *et al*. (1993) point to joint attention as the critical criterion, and Stern (1985), demonstrating the critical role of 'affect attunement' in early mother–child communion, reserves the term 'intersubjective relatedness' for 7 to 9 months of age. The pivotal point of infant intersubjectivity theory, however, is that the mutual subject–subject attunement in earlier infant–adult engagements, attending one another's states, has that same motivational and emotionally regulated character of shared understanding of the other's intentional states as when, later in infancy, they can jointly turn to states of affairs in their surroundings.

The advance of theories of children's theory or simulation of other minds

The above focus on emotionally regulated intersubjective attunement contrasts with the cognitive focus of approaches to the understanding and deception of others in terms of children's theory of mind or their ability to imagine or simulate mental states in others. In its various versions, some of which employ computational metaphors, the focus here is on social-cognitive abilities to imagine or simulate others' minds and emotions (the simulation version of the 'theory of mind'), or to draw inferences from a theory of other minds (the theory version of the 'theory of mind'). Thus, the understanding of others' cognitive and emotional states is assumed to be mediated by a model or theory of other minds, or in virtue of imaginative or simulation processes

(Astington *et al*., 1988; Brown and Dunn, 1991; Butterworth *et al*., 1991; Dunn, 1988; Harris, 1989). Two different versions of this family of theories have been voiced. According to the theory version, children develop and employ a folk-psychological theory which they use for inferences, prediction and explanation of other people's minds (Gopnik and Wellman, 1995). Proponents differ with regard to learning and maturation. Leslie (1988:41), for example, speaks of the 'innate basis of theory of mind', while Gopnik and Meltzoff (1993) point to infant imitation as a 'theory-of-mind' tutorial. According to the mental simulation version (Goldman, 1989; Gordon, 1986; Harris, 1991) children imagine or simulate other's thoughts or emotions, putting themselves, as it were, in the shoes of the other.

In the social semantics of speech acts, similar ideas have been proposed by Grice (1975) and in Bråten's (1973, 1974) cybernetic model of mental 'co-actor simulation', influenced by G. H. Mead (1934) and explored in computer simulations and laboratory studies of perturbed dialogues in which interlocutors falsely believe they share the same definition of the task situation. While this seemed to evoke mental simulation of understanding from the other's perspective as a late or last resort, such a mode appeared to be insufficient for resolving such perturbed situations.

Another matter is that of employing such a mode in deception, one of the key empirical issues for the concept of 'theory of mind'. The concept came independently into prominence when applied to young children's understanding, and to the comparative domains of autism and primate behaviour (Baron-Cohen *et al*., 1993; Leslie, 1988; Premack and Woodruff, 1978). This has evoked extensive debates, reflected *inter alia* by the distinction of fundamental issues by Whiten and Perner (1991) in terms of 'mindreading'. Harris (1991), for example, argues that children's mindreading should be seen in analogue with the biographer's imagination rather than the cognitive scientist's psychological theory. According to Harris (1989, 1994b) the child can understand emotions in others by mental simulation of their feeling states, and can understand pretend actions without needing a 'theory of mind'. Harris and Gross (1988) explain the ability of 6-year-olds to distinguish between feeling states and emotional expressions in terms of the same kinds of recursive processes that are involved in deception. Byrne and Whiten (1991) do not hesitate to talk of computation and mindreading in tactical deception by non-human primates.

The question 'Does the chimpanzee have a ''theory of mind''?' was later echoed in the same format with regard to autism and answered in the negative (Baron-Cohen *et al*., 1993). As stated by Leslie, should

it turn out that the logical machinery for pretence is fundamentally impaired, this will suggest a serious neurodevelopmental problem in autism – 'one that tragically strikes at the innate basis of theory of mind' (Leslie, 1988:41).

Two controversial issues inviting continuing dialogue

Between social-emotive and theory-of-mind positions

To this theory-of-mind position Hobson (1991a, 1993c) has strongly objected. In his theory, deficits in autism stem not from any logical deficiency but rather from an impairment in the innate capacity to interact emotionally with others. Arguing against the view that children develop a 'theory' about other people's minds, Hobson emphasizes that their understanding of other persons is grounded in their capacity for personal relatedness, partly constituted by innately determined perceptual-affective sensibilities towards the bodily appearance and behaviour of others. Hobson's position is congenial to how Trevarthen (1986) specifies in terms of 'alteroception' the innate motivational ground for intersubjective attunement in early infancy, consistent with Bråten's (1986) independent postulate of an innate 'virtual other' that complements the bodily self and enables (proto)-dialogic closure and 'altercentric participation' in the mode of felt immediacy – as distinct from higher-order mediation by mental simulation.

The nature and nurture of intersubjectivity is one of the fundamental issues with regard to which the contributors to this volume have taken different stands. Some have voiced positions (*P*) emphasizing the social-emotional nature of intersubjective attunement. Others have leaned towards (*Q*) positions emphasizing social-cognitive intersubjective understanding in virtue of mindreading, mental simulation or a 'theory of mind'. Yet others have rather reflected a complementary *R*(*P*,*Q*) position, pointing to a dialogical path of complementary capabilities in ontogeny, in which early bodily attunement and social-emotional communication is a precursory or enduring basis for higher-order capabilities. These different positions, being partly in the process of being transcended in this book, are reflected in Table 0.1.

By providing an intersubjective space in which these different perspectives are given room to be articulated in relation to one another, this book invites a dialogue – in the authors and the readers – to examine whether one can bridge or transcend the gap prevailing between the *communicative* (*P*) perspective, with its focus on social-emotional connectivity, and the *mindreading* (*Q*) perspective, with its

Table 0.1 *Some of the present authors' past foci and views on the nature and nurture of intersubjectivity*

(*P*) *Social-emotive focus on a primary motivational and affective communicative basis*	(*Q*) *Cognitive-oriented focus on perspective-taking, mindreading, mental simulation or theory of mind*	*R*(*P*,*Q*) *Dialogue-oriented foci on complementary* (*P*) *and* (*Q*) *relations in development*
Trevarthen (1974a, 1979a, 1992) postulates an innate motivational ground for infant intersubjectivity, defining levels of communication in culture in contradistinction to theory-of-mind notions.	Meltzoff and Gopnik (1993) point to a tutorial path from infant imitation (body similarity) to theory of mind (mental similarity), questioning whether others' emotions are directly perceived.	Rommetveit (1968, 1974) defines an intersubjective architecture of speech act understanding, specifying emotional activity as a part process in the act of symbolic reference.
Kugiumutzakis (1988, 1993) emphasizes the emotional nature of the neonatal imitation of gestures and sounds that he has recorded in the first hour after birth.	Dunn (1994) emphasizes how individual differences, reflected *inter alia* by the child's relationships, will make for individual differences in children's collaborative pretence and understanding of other minds.	Harris (1989, 1994a) explains children's emotional understanding by their imagining others' feelings, and how children can engage in pretence without any need of a theory of mind.
Murray (1980) studies with her replay design the socio-emotional sensitivities and expressive capacities of 2-month-old babies in communication with their mothers.	Byrne and Whiten (1988, 1991) report on deliberate tactical deception in non-human primates; Whiten and Perner (1991) define basic issues in theory-of-mind approaches in terms of mindreading.	Gómez (1993) examines the sensitivities of infants and anthropoid apes to conspecifics' expression of emotion, and points to a socio-emotional precursory to children's understanding of mind.
Hobson (1991a) argues against the theory of children's theory of mind from his emphasis on the affective grounds for interpersonal understanding.	Tomasello *et al*. (1993) distinguish levels of cultural learning in terms of simple perspective-taking in imitative learning in infants, representative theory of mind in 4-year-olds, and a mental state language in 6-year-olds.	Bråten (1988a, 1996a) distinguishes the primary mode of engaging with others in felt immediacy from the higher-order mode of mental simulation of processes in the other, evoked upon perturbation of conversation (Bråten, 1973, 1974).

focus on social-cognitive understanding. For example, Kugiumutzakis (this volume) suggests that there are two kinds of processes in harmonious operation already in neonatal imitation, one of conscious deliberation and one of spontaneous emotive connectivity, operating outside the conscious level of volition. Here is a precursory parallel to distinctions made by Bechara *et al*. (1997) and Damasio (1994) in their comparison of adult decision-makers with patients with prefrontal damage and decision-making defects (cf. Bråten, chapter 5, this volume). And in Parts III and IV, Gómez, Hobson, Harris, Rommetveit and Bråten indicate in various ways an ontogenetic path involving *R*(*P*,*Q*) complementarity at higher levels of thought, fiction and discourse, for which underlying modes of felt immediacy and affective relatedness continue to be operative. We are still far from understanding, however, the qualitative jump from early intersubjective attunement in a dyadic and triangular sense to children's higher-order understanding of others' minds and emotions.

Innateness

Another fundamental issue that remains unresolved, inviting rethinking in terms of connectionist perspectives (Elman *et al*., 1996) and inter-connectionist simulations, concerns innateness. The authors reflect different stands in the nature–nurture controversy, or transcend it by emphasizing mutual influences from the outset.

This issue is raised, for example, by Edwards (this volume) in her discussion about whether children's nurturing behaviour towards other children, exhibited across cultures, arises from innate releasing mechanisms, or is complemented by cultural learning. The question of innate factors in cultural learning was highlighted in a discussion in *Behavioral and Brain Sciences* in which seven of the contributors to this book participated. The authors of the target article, Tomasello *et al*. (1993), prefer to bracket natal factors in the nature–nurture–culture equation of cultural learning. Trying to avoid nativist assumptions, they would like to attribute all novel human behaviours to cultural learning. Quite apart from the human innately overriding predispositions for cultural learning implied by such an attribution, commentators objected: Gopnik and Meltzoff (1993c), for example, point to the apparent innate capacity for connecting the perceived movements of others to one's own internal kinaesthetic sensations that underpins the path from imitation to higher-order connectivity. Trevarthen (1993) emphasizes innate predispositions for reciprocal intersubjective attunement that nurture higher-order abilities, and Bråten (1993) suggests that the innate, not constructed, nature of the learner's virtual

other enables from the outset learning by socioemotional participation in actual others.

Bateson (1991) cautions, however, against unqualified attribution of innateness, and demonstrates the variety and complexity of influences and outcomes in the complex developmental behavioural matrix (cf. Fig. 10.1, this volume). This keynote warning from one who has brought neuroethology to maturity, pertains to the quest for possible mechanisms that underlie many of the phenomena uncovered by the contributions to this book. Bateson (1991, this volume) emphasizes the interaction between natural and nurtural factors all the way down to the neurological levels.

The triple helix of nature, nurture and culture in communicative development may never be fully charted, and the interplay of social-emotional and social-cognitive factors in intersubjective attunement and cultural learning may never come to be fully comprehended. Contributing, however, to redefining the landscapes by integrating theory and empirical findings, the authors in this source book point to new paths for further cross-disciplinary studies, and some of them offer falsifiable propositions that invite (dis)confirmation.