Cognitive co-construction in mother-child interaction
Mayo, A.Y.

Citation for published version (APA):
Cognitive Co-Construction in Mother-Child Interaction

A.Y. Mayo
Cognitive Co-construction in Mother-Child Interaction

ACADEMISCH PROEFSCHRIFT

ter verkrijging van de graad van doctor
aan de Universiteit van Amsterdam
op gezag van Rector Magnificus
prof. mr. P.F. van der Heijden
ten overstaan van een door het college voor promoties ingestelde commissie,
in het openbaar te verdedigen in de Aula der Universiteit

op donderdag 25 november 2004, te 10.00 uur
door Aziza Yogini Mayo
geboren te Santa Rosa, V.S.
Promotiecommissie:

Promotor: prof. dr. D. A. V. van der Leij
Copromotor: prof. dr. P. P. M. Leseman

Overige leden: prof. dr. M. Deković
prof. dr. E. P. J. M. Elbers
prof. dr. J. M. A. Hermanns
prof. dr. G. F. Heyting
dr. H. M. Y. Koomen

Faculteit: Faculteit der Maatschappij- en Gedragswetenschappen
Contents

Prologue .............................................................................................................................................. 1

1 Co-constructing human development through microgenetic episodes of proximal processes .................................................. 5
  1.1 Introduction ................................................................................................................................. 5
  1.2 Framing human development ................................................................................................. 7
  1.3 Human development on a phylogenetic timescale .............................................................. 8
  1.4 Human development on an ontogenetic timescale .............................................................. 11
    1.4.1 Cultural aspects of the environmental context ............................................................. 12
    1.4.2 Biological aspects of the organism context ................................................................. 14
  1.5 Human development on a microgenetic timescale ........................................................... 16
  1.6 Discussion .................................................................................................................................. 19

2 Mother-child problem-solving as cognitive co-construction .................................................................................. 23
  2.1 Introduction ................................................................................................................................. 23
  2.2 Method ........................................................................................................................................ 27
    2.2.1 Subjects and procedures ........................................................................................................ 27
    2.2.2 Measures .................................................................................................................................. 27
  2.3 Results .......................................................................................................................................... 31
    2.3.1 Descriptives ........................................................................................................................... 31
    2.3.1.1 Behavioral mode .................................................................................................................. 31
    2.3.1.2 Intersubjective cooperation ............................................................................................... 33
    2.3.1.3 Cognitive content and cognitive distancing ................................................................. 34
    2.3.1.4 Summary ............................................................................................................................ 34
    2.3.2 Exploring influences on children’s cognitive distancing behaviors ...................... 34
      2.3.2.1 Verbal expansions .......................................................................................................... 36
      2.3.2.2 Verbal extensions ............................................................................................................ 37
      2.3.2.3 Nonverbal distancing ..................................................................................................... 37
    2.3.2.4 Summary ............................................................................................................................ 37
  2.4 Discussion ..................................................................................................................................... 38
    2.4.1 Limitations ............................................................................................................................... 38
    2.4.2 Main findings .......................................................................................................................... 38
  2.5 Conclusions ............................................................................................................................... 40
### Expressions of individualistic and collectivistic beliefs in Surinamese-Dutch, Dutch middle-class, and Dutch working-class mother-child interactions

3.1 Introduction

3.2 Development through interaction

3.3 Method

3.3.1 Sample and procedures

3.3.2 Measures

3.3.2.1 Parenting beliefs

3.3.2.2 Socioeconomic status

3.3.2.3 Co-constructive interactions

3.4 Results

3.4.1 Descriptive results

3.4.1.1 Cultural beliefs and socioeconomic status

3.4.1.2 Co-constructive interactions

3.4.1.3 Intersubjective cooperation

3.4.1.4 Cognitive content

3.4.1.5 Comparing the picture task and the block task

3.4.2 Discriminant function analyses

3.4.2.1 Picture task

3.4.2.2 Block task

3.4.3 Regression analyses

3.4.3.1 Picture task

3.4.3.2 Block task

3.5 Discussion

3.5.1 Main findings

3.5.2 Conclusions

---

### Developmental changes in cognitive co-construction in Dutch, Surinamese-Dutch and Turkish-Dutch mother-child problem-solving interactions

4.1 Introduction

4.2 Method

4.2.1 Subjects and procedures

4.2.2 Co-constructive interactions

4.2.2.1 Multi-dimensional coding scheme

4.2.2.2 Composite measures

4.2.3 Interviews

4.2.3.1 Socioeconomic status

4.2.3.2 Parenting beliefs
<table>
<thead>
<tr>
<th>Section</th>
<th>Title</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>4.3.3</td>
<td>Cognitive developmental level</td>
<td>72</td>
</tr>
<tr>
<td>4.4</td>
<td>Results</td>
<td>72</td>
</tr>
<tr>
<td>4.4.1</td>
<td>Share in task</td>
<td>72</td>
</tr>
<tr>
<td>4.4.2</td>
<td>Intersubjective cooperation</td>
<td>73</td>
</tr>
<tr>
<td>4.4.3</td>
<td>Cognitive skill-level</td>
<td>75</td>
</tr>
<tr>
<td>4.4.4</td>
<td>Changes in contribution to co-construction</td>
<td>75</td>
</tr>
<tr>
<td>4.4.5</td>
<td>Stability of between-subjects differences</td>
<td>77</td>
</tr>
<tr>
<td>4.4.6</td>
<td>Relationships with children’s cognitive test scores, SES, and parenting beliefs</td>
<td>78</td>
</tr>
<tr>
<td>4.5</td>
<td>Discussion</td>
<td>81</td>
</tr>
<tr>
<td>4.5.1</td>
<td>Main results</td>
<td>81</td>
</tr>
<tr>
<td>4.5.2</td>
<td>Conclusions</td>
<td>83</td>
</tr>
<tr>
<td>5</td>
<td>General conclusions and discussion</td>
<td>85</td>
</tr>
<tr>
<td>5.1</td>
<td>Cognitive co-construction</td>
<td>85</td>
</tr>
<tr>
<td>5.2</td>
<td>Co-construction in context</td>
<td>87</td>
</tr>
<tr>
<td>5.3</td>
<td>Overtime changes in co-constructive interaction</td>
<td>90</td>
</tr>
<tr>
<td>5.4</td>
<td>Limitations</td>
<td>91</td>
</tr>
<tr>
<td>5.5</td>
<td>Recommendations</td>
<td>93</td>
</tr>
<tr>
<td>References</td>
<td></td>
<td>95</td>
</tr>
<tr>
<td>Summary</td>
<td></td>
<td>105</td>
</tr>
<tr>
<td>Samenvatting (Summary in Dutch)</td>
<td></td>
<td>111</td>
</tr>
<tr>
<td>Dankwoord (Acknowledgements in Dutch)</td>
<td></td>
<td>117</td>
</tr>
</tbody>
</table>
Cognitive Co-construction in Mother-Child Interaction. Mayo, A.Y.
Amsterdam: SCO-Kohnstamm Instituut van de Faculteit der Maatschappij- en Gedragswetenschappen, Universiteit van Amsterdam (Proefschriftenreeks nr. 1).

ISBN 90-6813-755-7

Alle rechten voorbehouden. Niets uit deze uitgave mag verveelvoudigd en of openbaar gemaakt worden door middel van druk, fotokopie, microfilm of op welke wijze dan ook, zonder voorafgaande schriftelijke toestemming van de uitgever.

All rights reserved. No part of this publication may be reproduced, stored in a retrieval system, or transmitted, in any form or by any means, electronic, mechanical, photocopying, or otherwise, without the prior written permission of the publisher.

Uitgave en verspreiding:
SCO-Kohnstamm Instituut
Wibautstraat 4, Postbus 94208, 1090 GE Amsterdam
Tel.: 020-525 1201
http://www.sco-kohnstamminstituut.uva.nl
© Copyright SCO-Kohnstamm Instituut, 2004
Prologue

I have a clear memory of myself sitting in front of one of Claude Monet’s paintings when I was perhaps five years old. I was completely mesmerized by the colors and shapes in front of me. I was aware that the creation of those stripes, twirls, and dots of paint had taken not much more than a man, a few paintbrushes, some paint, and a canvas. But what puzzled and excited me was that those simple stripes, dots and whirls of paint instantly transferred me from the hard wooden bench in the museum into a field with poppies and grains, and that I felt the wind blow through my hair and the sun warm my face. Although I did not consciously formulated it at the time, I was in fact asking myself a question that I have later on asked myself many times and with regard to many different subjects: What makes the whole become more than the just the sum of the individual parts?

As I worked on my thesis during the last three years I asked myself this particular question over and over again, this time in relation to the process of cognitive development of young children. The amazing repertoire of skills and knowledge children develop in the first years of life, the tremendous rate at which these cognitions develop, and the relative ease with which children seem to develop them, seems more than what we would or could expect based on the individual nature and nurture parts involved in this process. What makes the process of human cognitive development more than a simple additive outcome of biological and cultural aspects of life? How do the individual nature and nurture aspects influence this process, and thus the outcome of cognitive development? Would it be possible to identify one or several mechanisms -x-factors if you like- that influence the magnitude involved in the process?

Fortunately studying these questions can satisfy more than just personal curiosity. What makes the answers to these questions particularly relevant for educational sciences and to society in general, is that understanding the basic mechanisms and aspects of the process of cognitive development can aid us to develop a clearer understanding of why certain children’s cognitive development stays behind in comparison to other children’s development, even when no obvious differences seem to exist with regard to the primary biological and cultural parameters of development. In the Netherlands for instance, as well as in a number of other Western-European countries, significant differences are found in cognitive
Cognitive Co-construction in Mother-Child Interaction

development between children from different social and ethnic groups within a society by the time they start with their formal schooling at the age of four. An important question that all researchers of human development should ask themselves thus seems to be: why is it that somehow ‘the whole’ becomes more for some individuals than for others?

Fortunately many researchers of human development before me have asked themselves similar questions. Their theoretical conceptions and empirical inquiries nowadays immediately direct our research on cognition development to one of the most prominent and universal characteristics of human life and development: interaction. From the first until the last moments of their lives human beings engage in a never-ending series of interactions with their physical, social, and cultural environmental contexts. It simply never stops.

Among the wide variety of types of interaction, social interactions with other human beings are widely acknowledged as a particularly powerful generator of human development (cf. Tomasello, 2000). During ontogenetic development social interaction with others, especially more knowledgeable ones, offers individuals the opportunity to tap into the knowledge and skills of their interaction-partners and to use these cognitions to co-construct new or more comprehensive knowledge and skills (cf. Rogoff, 1998). This process of cognitive co-construction perfectly demonstrates how the whole can become more than the sum of the individual parts. Descartes stated: “I think therefore I am”. However, it seems that in order for human beings to ‘become’ anything at all they must first interact. Therefore it seems that if we want to enhance our understanding of cognition, of the process of cognitive development, of what factors shape these processes, and what factors might contributes to the significant differences that are found in the cognitive development of young children already in the preschool years, we should study these co-constructive interaction processes in detail.

Although social interaction in general forms a leitmotif throughout the thesis presented in the following chapters, the main focus lies with a very particular subset of social interactions: microgenetic episodes of co-constructive interactions between young children and their mothers. Studies show that parenting across early childhood plays an unique role in children’s social and cognitive skill and knowledge development (see for instance Landry, Smith, & Swank, 2003; cf. Fagot & Gauvain, 1997). For many children in Western cultures mothers provide a very significant part of the early in life social interactions that gradually
introduce young children to the practices and beliefs of the more distal social and cultural communities of their life, and that provide them with opportunities to develop the necessary knowledge and skills for independent functioning within these contexts (Maccoby, 1992; cf. Gauvain, 2001).

The studies presented in the following chapters are done with a subset from a dataset collected in 1991 and 1992. This dataset included video recordings of mother-child interactions, interviews with mothers, and cognitive development assessment of the children. The data were collected at three measurement periods over the course of a year. The first data were collected when the children were three years old. Measurements were repeated twice, each time with half-a-year interval. The original sample consisted of 44 Dutch middle-class families, 31 Dutch working-class families, 27 Surinamese immigrant families, and 28 Turkish immigrant families. Female research assistants of the same ethnic group collected the data at the homes of the dyads. For the three in-depth studies presented in the following chapters, a total of 73 mother-child dyads from the original sample was used. More information regarding this particular sample and instruments used to assess co-construction, cultural parenting beliefs, socioeconomic status, and children’s cognitive development will be provided in each of the three empirical chapters of this thesis.

The following five chapters will address the process of cognitive co-construction in the following way. Chapter 1 presents an overview of current studies and theoretical concepts regarding co-constructive aspects of human development. This chapter discusses how biological and cultural aspects together constitute a dynamic system for human development on a phylogenetic, an ontogenetic, and a microgenetic timescale. The mutually influential roles of these aspects are a central point of focus and the presented findings direct our attention towards the significance of microgenetic episodes of organism-environment for co-constructive cognitive development of young children. Chapters 2, 3, and 4 are empirical studies of a very specific type of such microgenetic episodes of organism-environment interaction, which are thought to play a particularly crucial role in the cognitive developmental process of preschool children: mother-child interactions.

Chapter 2 presents a study that operationalizes the co-constructive process of mother-child problem solving. Two main dimensions of this process are distinguished and analyzed: a social dimension referred to as ‘intersubjective
Cognitive Co-construction in Mother-Child Interaction

cooperation’, and a cognitive dimension referred to as ‘cognitive distancing behavior’.
The third chapter describes a study in which the relationship between cultural parenting beliefs of Dutch and Surinamese-Dutch mothers, and their co-constructive interactions with their child are addressed.
In Chapter 4 developmental changes in co-constructive interaction processes between mothers and their child over the course of the year prior to kindergarten enrollment are addressed.
Finally, Chapter 5 summarizes and discusses the empirical findings of the forgoing chapters and concludes with limitations and recommendations for future research.
1 Co-Constructing Human Development through Microgenetic Episodes of Proximal Processes

Mayo, A.Y., & Leseman, P.P.M.

Phylogenetic, ontogenetic, and microgenetic timescales are part of a dynamic system of mutually influencing nature and nurture processes that co-construct human development. Over the course of phylogenetic time the human species have biologically and culturally developed their ability for intersubjective understanding with other human beings, and thereby created a basis for human-unique forms of cultural learning. The accumulated developmental changes of the species are handed down to newborns in the form of genetic and cultural legacies, which form basic building blocks for ontogenetic developmental processes. During an individual’s lifetime biological, behavioral, and cultural changes are gradually constructed as an individual accumulates experiences during moment-to-moment interactions with the physical, social, and cultural environment of his particular developmental niche. These interactions are microgenetic episodes of proximal processes and are regarded as the crucible of biological and cultural aspects of human development.

1.1 Introduction

For decades human development has been considered the product of an additive two-factor model with seminal nature factors—such as an individual’s genetic make-up—, and more complementary nurture influences—such as educational experiences. More recently however, a paradigm shift appears to be taking place as researchers of human development more and more perceive organism and environment as mutually adaptive, intrinsically and dynamically interrelated, complementary, and bidirectional in their influence on each other (see for instance Bronfenbrenner & Ceci, 1994; Gauvain, 2001; Gottlieb, 2001; 2002; Greenfield, 2002; Keller, 2002; Li, 2003; Mascolo & Fischer, 1999; Miller & Goodnow, 1995; Rogoff, Paradise, Mejia Arauz, Correa-Chávez, & Angelillo, 2003; Rogoff & Toma, 1997; Tomasello, 1999). This particular concept of human
Cognitive Co-construction in Mother-Child Interaction

development has several implications for research. For one, it seems that the dynamic-transactional interaction between organismic and environmental processes should be the primary focus of attention of developmental studies, rather than single nature or nurture components of development, such as genetic mechanisms, neurobiological structures, educational practices, or cultural practices. Distinguishing the particular nature and nature components and determining their intrinsic properties certainly continues to be an important aspect of developmental studies. However, the way in which these components together form complex dynamic developmental systems and generate, instigate, and direct individual human’s ontogenetic development while adapting to particular sociohistorical contexts, should become the leading question of developmental research (Tomasello, 1999).

In this paper we examine the well-known concept of Vygotsky in which he referred to the concrete socially structured and -directly and indirectly- guided interaction of the individual with the cultural tools of his community as the crucible of biology and culture, in this way integrating nature and nurture during phylogenesis, ontogenesis, and microgenesis (in: Wertsch, 1985). Although this particular type of interactions typically involve seemingly trivial daily life events, such as daily reoccurring bedtime rituals between a parent and a child, they somehow seem to contribute significantly to the awesome changes that are brought about during the ontogenetic development of human individuals. Our present approach involves piecing together different theoretical concepts of human development to form a framework in which these concrete socially structured interactions can be related to biological, cognitive, and cultural changes on microgenetic, ontogenetic, and phylogenetic timescales. Our basic premise holds that nature and nurture construe a complex and dynamic developmental system, in which developmental changes are thought to gradually evolve from microgenetic episodes of proximal organism-environment interaction. Component information referred to in this paper, regarding nature and nurture aspects of development and the developmental processes related to them, was derived from empirical and theoretical studies rooted in neuro-constructivist and sociocultural approaches and will be positioned within the framework. The main objective of the present paper is to explore whether this approach can expand our understanding of the role of moment-to-moment organism-environment interaction in the dynamic process human development.
1.2 Framing Human Development

Several theoretical models and frameworks incorporating nature and nurture aspects of human development have been proposed over recent years, such as the bioecological model by Bronfenbrenner (1979; Bronfenbrenner & Morris, 1998), the developmental-psychobiological systems framework by Gottlieb (1992; 2001), and more recently the cross-level dynamic biocultural coconstructivistic framework by Li (2003). These theories are holistic approaches that allow for a perception of human development as a process of simultaneously occurring and mutually constituting biological and cultural changes. Although they often emphasize either nature or nurture components, they commonly approach human development as a process that takes place within a constellation of genetic, neural, behavioral, and proximal and distal sociocultural components. All of these components are thought to influence each other more or less directly as the developing organism actively engages with its surrounding physical, social, and cultural environment. Basically these models perceive developmental processes to proceed while the organism gradually accumulates experiences during its engagement with environment. When discussing her framework of development Li for instance states that “the effects of a series of interconnected culture- and context driven and neurobiology driven interactive processes and developmental plasticity at different levels are continuously accumulated via the individual’s moment-to-moment experiences so that, together, they implement concerted biological and cultural influences in tuning cognitive and behavioral development throughout the life span” (Li, 2003; p. 171). Organism and environment interaction within the most direct or proximal process contexts are thus perceived as primary mechanisms of development.

Bronfenbrenner and Ceci (1994) proposed that proximal processes provide the biological organism with culturally regulated experiences through which its genetic potential becomes actualized. They defined proximal processes as progressively more complex reciprocal interactions between an active, evolving individual and human, symbolic, or material representatives of the surrounding culture. Certain characteristics of proximal processes -influenced both by biological and cultural aspects- are associated with the impact factor of proximal processes on development (Bronfenbrenner & Ceci, 1994; Bronfenbrenner & Morris, 1998). These characteristics can be labeled as quantity, quality (Leseman
& Van den Boom, 1999), and content aspects of proximal processes. The quantity aspect has to do with time. For changes to be brought about by proximal process interactions these processes need to reoccur frequently, and last long enough to become increasingly more complex (see for instance Chen & Siegler, 2000; cf. Landry, Smith, & Swank, 2003; Gunnar & Cheetham, 2003). The quality aspect of proximal processes has to do with reciprocity of interactions and sensitivity of partners towards the others needs and intentions, as seen in for instance children’s active participation in the proximal processes, parents awareness of their children’s needs and abilities, and parents’ ability to tailor their support and instructions to the child’s zone of proximal development (see for instance Rogoff, 1998; Kumpulainen & Kaartinen, 2003). If the content of interaction processes is culturally or developmentally appropriate, development is stimulated because the processes offer learning experiences that match needs and abilities of the individual and deal with demands and opportunities of the environment (Gauvain, 2001; Hatano & Wertsch, 2001; Rogoff, 1998).

In the following sections the dynamic and interrelated processes of human’s biological, cultural, and cognitive development will be discussed on the phylogenetic, ontogenetic, and microgenetic timescales respectively. As each timescale is discussed a basic introduction is given to place the particular timescale within a greater system of human development. For this purpose we metaphorically describe this system of human development as a circular ripple effect generated by an object thrown into a pool of water.

1.3 Human Development on a Phylogenetic Timescale

The complete configuration of expanding circular ripples from the center outwards that would become visible as an object disappears under the water surface represents the phylogenetic timeframe of organism and environment development. Within the phylogenetic timeframe the evolutionary process of the human species slowly unfolds as human's biological and behavioral adaptations and cultural transformations accumulate. Over phylogenetic time organism-environment interaction has altered the nature of both human biology and human culture (Tomasello, 1999).
Accordin gg  t o  Gottlieb (2002) evolutionar y  chang e  follow s  fro m  natura l selectio n
go f  ne w  behaviora l variatio ns  an d  fro m  adaptatio ns  b y  indivi dua ls, brough t  abou t
by  chang e s  i n  the  pr eenatal-  an d  postnatal-developmen tal  rearin g  environme nts.
Over  evolutio nary  tim e  th e  hum a n  specie s  ha s  develope d  significan t  brai n
plasticity  an d  th e  capacit y  t o  lear n  throug h  graduall y  processin g  inf ormatio n,
received  fr o m  eithe r  the  bio logica l  sta te  o f  th e  organis m  itsel f  o r  fro m  th e
sociocul tur a l  environme n t (Karmiloff-Smith, 1998; Stiles, Moses, Passarotti,
Dick & Buxton, 2003). Neurobiologically this learning capacity is supported by
the protracted period of postnatal brain development (see for an overview Quartz,
1999; Johnson, 1998). During this period, progressive neocortical specialization
and hierarchical-representation construction occurs as information, gained
through organism-environment interactions, is processed (Nelson et al., 2002;
Quartz, 1999; Quartz & Sejnowski, 1997). Dramatic changes in cognitive ability
during childhood, for instance concerning visuospatial capacities, face and
location processing, memory proficiency, language acquisition and speech
recognition, object permanence, and planning capacities, are mirrored by
comparably significant changes in the developing brain structures (for an
overview of studies see Johnson, 1998; Stiles et al., 2003). Consequently of the
protracted period of cortical developmental human infants go through a prolonged
period of great vulnerability and increased dependency on conspecifics (Quartz,
As an adaptive, evolutionary response to this challenging condition, it is
suggested that humans as a species have become ultra social (Tomasello, 1999).
Not only do humans already as infants show natural sociability and social
intelligence (Trevarthen & Aitken, 2001), but also their cultural practices have
evolved in such a way that they offer considerable care and stimulation to the
vulnerable and dependent developing child. This sociability seems closely linked
to a skill that is exclusively found with human beings—i.e. intersubjectivity—,
which in turn seems to play a crucial role in human species specific social and
cultural learning processes.
According to Trevarthen and Aitken (2001) the infant is born with primary
intersubjectivity. Primary intersubjectivity is the awareness of and sensitivity to
subjective states of others (i.e. person-person awareness). During the first year of
life the infant develops subjective skills (i.e. the ability to exhibit to others at least
the rudiments of individual consciousness and intentionality) and intersubjective
Cognitive Co-construction in Mother-Child Interaction

skills (i.e. the ability to adapt or fit this subjective control to the subjectivity of others in order to communicate). Around nine months after the infant’s birth, equilibrium is achieved as the two skills are integrated into secondary intersubjectivity (i.e. person-person-object awareness) (Trevarthen & Aitken, 2001). Tomasello (1999) refers to the development of secondary intersubjectivity as the ‘nine-month-revolution’, which results in the development of a unique human social cognition, i.e. the understanding of other persons as intentional agents like the self. This secondary intersubjectivity (from now on simply referred to as ‘intersubjectivity’) is the skill to join partners in a process of creating shared understanding, establishing common ground, and defining boundaries during social interactions (for instance see Rogoff, 1998). Intersubjective understanding makes it possible for subjects to detect and change each other’s minds and behavior, by purposeful narrative expressions of emotion, intention, and interest (Trevarthen & Aitken, 2001; cf. Fogel, Koefer, Bellagamba, & Bell, 2002), but also for individuals to mentally place themselves in the position of other persons (Tomasello, 1999). Because of their ability to grasp the intentional significance of a tool or symbol for its user, human individuals can socially learn the conventional use of a tool or a symbol through participating in practices (Tomasello, 1999; cf. Gauvain, 1998; Rogoff, 1998). Cultural learning is a human-specific form of social learning in which novice learners and expert learners join in a co-constructive process; it can take the form of imitative-, instructed-, and collaborative learning processes (Tomasello, 1999; cf. Rogoff et al., 2003). In co-constructive interactions different individuals collaborate by sharing their individual knowledge and skills to create, modify, or elaborate cognitions and cultural practices. Cultural learning is the basis of sociogenesis; the process by which individuals from different generations collaboratively create what no one individual could have created on its own (Tomasello, 1999) through direct or virtual interaction processes. Through intersubjective co-constructive cooperation, humans can learn from others as well as through others and culturally evolve at a tremendous rate (Tomasello, 1999, 2000). Because of this ability to engage in co-constructive proximal processes, knowledge and skills can be passed on from one generation to the next - a process referred to as cultural transmission (Tomasello, 1999; Trevarthen & Aitken, 2001). Over historic time cultural transmission and sociogenesis have created a ratchet (Tomasello, 1999) by which material and symbolic artifacts could accumulate modifications,

What it comes down to is that the biological nature of the human organism itself, its social interactions, and its cultural environment have changed over time as humans developed the capacity for intersubjective understanding and co-constructive interaction. Rogoff refers to this developmental process of the human species as a “conversation begun in the primeval forests and extended and made more articulate in the course of centuries” (Rogoff, 1998, p. 679). Each human individual’s capacity to join in with this co-constructed conversation depends on his or her capacity for intersubjectivity. Although development of this human specific ability appears to be genetically passed on from one generation to the next, disorders such as autism show that it is not necessarily a preordained outcome of the human genetic legacy (see for instance Karmiloff-Smith, 1998; Tomasello, 1999; Frith, 2001; Fischer & Connell, 2000). Rather, for the genetic potential to become actualized input from within the organism as well as from the social, physical, and cultural environment are prerequisite conditions (Gottlieb, 2001). It takes a complex, reciprocal, and dynamic interaction process between mutually influential biological and environmental factors, such as genes, neurobiological aspects, proximal process interactions, and broader social, physical, and cultural aspects of the environment, to actualize the essential component of human development, referred to as intersubjectivity.

1.4 Human Development on an Ontogenetic Timescale

Bringing back to mind the conjured ripple effect, we can refer to each separate ripple within the configuration as an ontogenetic timeframe of human development. Ontogenetic development refers to the gradual transformation process of an individual from genotype to phenotype through organism-environment interaction (see for instance Rogoff, 1998). This developmental trajectory starts from a phylogenetically developed biological legacy -passed on in the form of genes and referred to as the human genotype- and an environmental legacy in the form of tools, symbols, and practices, referred to as culture (see for instance Gauvain, 2001; Li, 2003; Rogoff, 1998; Tomasello, 1999). Ontogenetic development takes place within an individual-specific developmental niche that
Cognitive Co-construction in Mother-Child Interaction

includes biological, social, and cultural components which structure and direct human development (Harkness & Super, 1992; cf. Gauvain, 1998; Greenfield, Keller, Fuligni, & Maynard, 2003; Laland, Odling-Smee, & Feldman, 2000; Tomasello, 2001). This niche is not rigid, rather it is a dynamic system that is gradually restructured as the organism and environmental contexts it encloses change through interaction. According to Laland and colleagues this process of niche reconstruction is dominated by socially learned knowledge and cultural legacies, but the actual human ability to acquire this knowledge and to pass it on to others is biologically rooted in the process of genetic evolution (Laland et al., 2000).

The developmental niche itself can be visualized as a structure of several nested activity layers. At the heart of the structure are biological, organism-related activities, involving for instance genetic and neurological processes. The outset of the structure is formed by distal environmental activities, such as cultural-historical processes. Closer to the organism activities the cultural activities concern more proximal processes, such as family interactions. Activities on one level effect activities on other levels, either directly or mediated through activities of their adjoining levels (see for instance Bronfenbrenner, 1979; Gottlieb, 2000).

1.4.1 Cultural aspects of the environmental context

The developmental niche contains distal cultural aspects and activities (for example the regime of the nation in which a child is born), and more proximal cultural aspects (such as the way families are composed) that influence organism development on the ontogenetic time scale. In general, culture reflects the intersubjective understanding of a community of individuals at a particular point in time. Culture is a developing, communally constructed configuration of shared beliefs, of practices reflecting, instantiating, and changing this shared understanding, and of social, psychological, linguistic, symbolic, material, and technological resources that are generated through these practices (for instance see Gauvain, 2001; Greenfield et al., 2003; Hatano & Wertsch, 2001; Laland et al., 2000; Rogoff & Angelillo, 2002; Tomasello, 1999). These cultural beliefs, practices and tools shape the social, proximal process environment in which a human individual develops knowledge and skills. The significance of these cultural aspects is underlined by studies that relate for instance cognitive development in general, socio-emotional functioning, and abstract reasoning
skills to the parenting beliefs, practices, and cultural tool use within the family context (see for instance McGillicuddy-DeLisi, 1992; Sigel, & Kim, 1996).

Cultural beliefs are generally implicit aspects of a culture; they are the ideas and values, -i.e. assumptions- on which subjects from a cultural community base their practices (see for instance Sigel & Kim, 1996). Beliefs of parents, especially those beliefs that concern child development (such as developmental goals, appropriateness of child behavior, effective parenting strategies, cultural tools use, and the developmental timetables of social, emotional and intellectual child cognitions) effect childrearing practices within families (see for instance Harkness & Super &., 1999). Although trends in parenting beliefs are found on the macro level of societies (for instance an individualistic value-orientation in Western cultures and more collectivist orientation in non-Western cultures; see for instance Kağıtçıbaşı, 1997), parenting beliefs are also related to family characteristics such as socioeconomic position and ethnic-cultural background, educational level (for instance see Leseman, Sijsling, Jap-A-Joe, & Sahin, 1995; Rosenthal & Roer-Strier, 2001).

Cultural practices are described as the repeated and shared actions of a social group (Miller & Goodnow 1995). Parenting practices refer to the day-to-day family interactions in which children are brought up and involve many different aspects of family life, such as dinner or bedtime rituals, the way family members address each other, the household activities that parents engage their children in, but also the teaching strategies they use when interacting with their child, etc. Young children become part of a society’s culture by participating at first in these practices of their families (Miller & Goodnow 1995; Rogoff, 1998; Tomasello, 1999). Through participation they learn what is accepted and expected from them, they appropriate material and the symbolic tools, and discover their meaning and also how they might be used in traditional and innovative ways (Miller & Goodnow 1995; cf. Gauvain, 1998; Herrenkohl & Wertsch, 1999). On the one hand children’s participation in cultural practices makes it possible for practices to be maintained and reproduced, while at the other hand their participation contributes to changes in these practices, as children and their partners adapt the practices to their specific needs, understandings, and abilities (see for instance Miller & Goodnow 1995; Rogoff, 1998).

Cultural tools are the symbolic (for instance a language) and material (for instance a hammer) instruments that communities have developed over historic
Cognitive Co-construction in Mother-Child Interaction

time. Although individuals are incapable of acting without cultural tools, cultural
tools do not mechanistically determine agents’ actions (Herrenkohl & Wertsch,
1999). Instead they are instruments that help people express their ideas,
intentions, knowledge, emotions, skills, etc., but also function to link developing
individuals to previous generations in processes of sociogenesis (Tomasello,
1999).

1.4.2 Biological aspects of the organismic context

According to Gottlieb (2000) genes operate at the lowest level of organismic
organization. The activation of the individual’s genetic potential depends on
internally and externally generated stimulation (see Bronfenbrenner & Ceci,
1994; Gottlieb, 2000, Karmiloff-Smith, 1998). Although genes play a significant
role in human development, they do not provide a blue print for human
development, as genetic activity does not produce finished traits or functional
components of cognition (see for instance Gottlieb, 1992; 2000; cf.
(Gottlieb, 2000; Johnson, 1998) and thereby influence the neurological structures
and activities of the individual (Webb, Monk, & Nelson, 2001). Gottlieb put
forward the concept of “probabilistic epigenesis”, which regards interaction
between genes, brain structures, and human behavior as bidirectional (1992).
From such a probabilistic perspective signals from the internal as well as from the
external environment are necessary to activate DNA to produce the appropriate
proteins (see for instance Gottlieb, 2001). The transformation process of
genetically given potentials into neurological structures, cognitions, and actual
behavior, thus appears to be a process of canalization that depends on the
biological and sociocultural experiences of the organism (see for instance

Neural development in the human body and brain is generated by genetic and
epigenetic events (Trevarthen & Aitken, 2001; Webb et al., 2001). From a
developmental or neuro-constructivist point of view neurological formations that
support knowledge and skills are not perceived as (genetically) pre-wired separate
modules of the brain. Instead, neural structures, the brain’s functional
specializations, or modularization of cortical pathways, are thought to
progressively emerge as the result of active engagements of the individual with
intrauterine and postnatal external environments (Johnson, 1998; Karmiloff-
Co-Constructing Human Development through Microgenetic Episodes of Proximal Processes

Smith, 1992; Oliver, Johnson, Karmiloff-Smith, & Pennington, 2000; Quartz & Sejnowski, 1997, Trevarthen & Aitken, 2001; Webb et al., 2001). Two major organizational periods of neurological development are distinguished (Huttenlocher, 1979b in Webb et al., 2001). The first has its onset at conception and includes major histogenetic events such as neurulation, proliferation, migration, and differentiation. This primary developmental period is thought to supply an initial overproduction and redundancy of synaptic connections and is followed by a process of pruning, during which the neural structures of the human cortex are sculpted and reorganized. Although this second period has its onset at gestation, neurobiological reorganization into progressively more efficient and effective structures continues during postnatal development, possibly even throughout the 2nd (see for instance Webb et al., 2001) or even the 3rd decade of life (see for instance Fischer & Bidell, 1998). This reorganization includes dendrite and axon development, synapse production, neural and synaptic pruning, and changes in neurotransmitter sensitivity (Webb et al., 2001). Although initiation of this reorganization is influenced by endogenous spontaneous neural activity, further neural maturation is primarily influenced by exogenous sensory input (Webb et al., 2001; see also Fischer & Bidell, 1998; Siegler, 2000). During development neural networks grow in cycles, developing from an initial period of discontinuity and even competition among neural structures, into systems of structures (see for instance Johnson, 1998; cf. Mascolo & Fischer, 1999). Eventually neural systems as a series group together into complex neural networks or tiers (i.e. higher-order recurring cycle of growth) as skills or knowledge are consolidated (see for instance Bell & Fox, 1996; cf. Fischer & Bidell, 1998; Greenough, Black, & Wallace, 1987; Li 2003; Mascolo & Fischer, 1999). Greenough and colleagues (1987) suggested that the functioning of neural systems could be experience-expectant or experience-dependent. In the case of experience-expectant systems development is based on the expectation that appropriate experiences will provide the information that the brain needs to select the appropriate subset of synaptic connections. With experience-dependent systems on the other hand, development is unique to each person and according to them it most likely involves the active formation of new synaptic connections throughout the life span (see for instance Webb et al., 2001). In this case language development is a process that involves gradual selection and fine-tuning of existing connections resulting from being in the presence of other language users,
Cognitive Co-construction in Mother-Child Interaction

while for an individual’s vocabulary to develop actual new synaptic connections are generated as a result of the particular words that are used by others, the way conversations are held, the way symbolic tools such as books newspapers, television, computers are available and used, etc. This last type of life experiences is a typical example of a proximal process interaction between the developing organism and its sociocultural environment.

1.5 Human Development on a Microgenetic Timescale

As a wavelet of water moves outwards new ripples are formed. These ripples appear gradually over the course of many consecutive microscopic movements of the water mass. Similarly, human ontogenetic development in general, and development of human skills and knowledge (i.e. cognition) in specific, can be regarded as a process of microgenesis (Fischer & Bidell, 1998; c.f. Chen & Siegler, 2000; Mascolo & Fischer, 1999; Rogoff, 1998; Siegler & Svetina, 2002; Yan & Fischer, 2002). That is, developmental change is brought about as an individual gradually accumulates experiences during microgenetic episodes of proximal processes. Each single episode of a proximal process constitutes a microgenetic timeframe.

Microgenetic episodes of development can be part of proximal processes that are actual -when two or more individuals engage in direct interaction with the aid of cultural tools such as language-, or virtual, i.e. when individuals interact over a stretch of time through cultural tools for instance a book written by one and read by the other (Rogoff, 1998; Tomasello, 1999). When these processes are collaborative, in the sense that participants make an effort to (re)create intersubjective understanding, they offer participants an opportunity to make use of each other’s cognitions to (co-)construct completely new cognitions or modifications of existing ones. The cognitions that evolve as a result of participation develop according to the demands of the specific context and activity of that particular proximal process. As a result, developing knowledge and skills are situation and action-specific (Mascolo & Fischer, 1999). Because situation and context in turn are related to the characteristics of the developmental niche in which they take place, cognitions are culture-specific and culturally defined as well. In other words, the skills and knowledge a child develops, depend
Co-Constructing Human Development through Microgenetic Episodes of Proximal Processes

very much on the cognitions the socio-cultural environment demands and offers through its practices. Recurring participation in certain practices reinforces the cognitions that are needed to perform well in those particular practices, but also the cognitions that are valued in their society’s culture (Hatano & Wertsch, 2001; cf. Chen & Siegler, 2000; Greenfield et al., 2003; Rogoff, 1998; Gauvain, 2001). According to Hatano and Wertsch “participation in practice does not merely facilitate or inhibit some kind of fixed course of cognitive development that would occur otherwise. Instead it gives rise to cognitive development and defines what cognition is by providing participants with materials with which they can reconstruct the knowledge and skills available in community” (2001, p.79). For instance, in Western societies a substantial part of children’s development takes place during special child-focused activities in segregation from everyday adult life. Children have their special toys, books, tv- programs, daycare centers, playgrounds, schools, etc. In many non-Western cultures on the other hand, children’s lives take place as they participate in the daily practices of their families. As a result their daily activities might consist of aiding their father in his shoemaking business, working the land with their mother, preparing food, taking care of siblings, collecting fire wood, etc. So when a five-year-old girl growing up in Ghana would start chopping up vegetables with a large knife to contribute to the preparation of the family dinner, people around her would most likely facilitate or even stimulate her efforts, as these are regarded appropriate. However, if a five-year-old girl in the Netherlands would do the same, she would most likely be scolded at for doing something considered dangerous and inappropriate for her age.

Although developmental change can occur during a single microgenetic episode of an activity, complex change processes that require a significant accumulation of experiences over the course of a great number of proximal process episodes might take months to occur (Fischer & Granott, 1995). As children’s knowledge and skills change the nature of their participation in practice changes as well (Gauvain, 2001; Landry, Smith, Swank, & Miller-Loncar, 2000; Miller & Goodnow, 1995; Rogoff, 1998). Cognitive microdevelopment thus is evident in the shifting roles, responsibilities, and understanding of an individual during episodes of proximal processes. As children’s cognitions develop and their participation transforms, they become equipped to engage in different kinds of activities, although perhaps related, and in more complex activities (Rogoff,
Cognitive Co-construction in Mother-Child Interaction

Baker-Smith, Lacasa, & Goldsmith, 1995). Previously developed context and situation specific cognitions then function as basic building blocks with which new knowledge and skills are gradually co-constructed (Fischer & Bidell, 1998). Mascolo and Fischer propose that (skill) development precedes over four hierarchical levels (i.e. from sets, to mappings, to systems, to systems of systems) on four hierarchical tiers (i.e. reflexes, sensorimotor actions, representations, and abstractions). Within each tier, a higher-order skill is the product of the hierarchical coordination of lower level cognitions, and the last level of each tier is equivalent to the first level of the next broad tier of development (Mascolo & Fischer, 1999, see table 11.1 p.237). During microgenesis of cognition higher-level cognitive structures are constructed by integrating and hierarchically coordinating previously established lower-level skills (Fischer, 1980). Mascolo and Fischer provide an example of a skill at the level of single representations. They state, “At this level, by coordinating two sensorimotor action systems, children can use one sensorimotor system to evoke or stand for an object, event, or person that is not actually present. This is reflected when children represent an absent event or characteristic in terms of a simple sentence, or when children perform simple acts involving pretend play. For example, at this level, a child can use a teddy bear to represent the action of walking. In doing so, he can coordinate one sensorimotor action system for skillfully manipulating the teddy bear through grasping and looking with another sensorimotor system for moving the legs and making the doll move forward.” (Mascolo & Fischer, 1999, p. 240).

In general individuals do not function at a single skill level at any particular point in development, but at a range of skill levels depending on the context of the proximal process (see for instance Chen & Siegler, 2000; Lawson, 2000). As young children interact with more skilled partners during episodes of proximal processes they can be stimulated and aided into applying more complex and abstract ways of thinking - cognitions on higher hierarchical levels. When a mother for instance tells her toddler, that the ducks they see in the pond and the robin they see in the tree all are birds, she helps her child to construct and use knowledge that goes beyond its functional developmental level (i.e. what he or she can do without support) towards his optimal level of development (i.e. the highest performance level with high support conditions; Fischer & Bidell, 1998). In fact what she is doing is making use of a microgenetic episode of a proximal process interaction to help her child integrate, combine, and generalize existing
cognitions into more complex cognitions. And by doing so creates an opportunity for the child’s genetic potential to become further actualized. Basically, interactions that take place during microgenetic episodes of proximal processes reflect more than the cognitions that organism and environment co-generate at that particular moment in time. They also mirror conditions and possibilities provided by the biological and cultural contexts for effective ontogenetic development, as can be seen for instance in the particular cognitions that are developed during these episodes, the time in life at which their development is stimulated, and the methods applied for their growth. Furthermore, the given that this particularly effective form of interaction is part of the human behavioral repertoire, and that human beings have the unique ability to join each other in processes of cultural learning and sociogenesis, is based on their phylogenetically developed ability for intersubjective understanding. In this sense microgenetic episodes of proximal processes reflect the process of nature-nurture cooperation over microgenetic, ontogenetic and phylogenetic time.

1.6 Discussion

Although human beings go through tremendous physical, mental, and behavioral changes throughout their entire lifespan, these changes are especially prominent during the first years of life as the human child develops from completely dependent infant to (relatively) independent schoolchild. Parental contribution to children’s developmental process is considered an important structuring factor during this period of development and is based on both biological and cultural aspects. Biologically their influence follows from the genetic basis they provide through conception, and culturally their influence is exerted through the microgenetic episodes of proximal process experiences they provide their child with. Basically, parents influence the biological and cultural legacies that together form the basic building blocks of the child’s developmental niche, but also the microgenetic episodes of proximal processes that take place within the developmental context and generate change. Social interactions with other human beings constitute a major part of human proximal process experience. During the first years of life most proximal processes take place directly between parent and child during day-to-day family interactions, but parents also direct and facilitate
the interactions between their child and others, and to a great extent stipulate which cultural tools, symbols, and practices a child experiences, and thus which cognitions develop. The importance of proximal process characteristics and the significant role of parents is underlined by studies which show that when caretakers for instance are consistent in their behaviors and sensitive to the needs and abilities of their developing child, (Landry et al., 2003; Gunnar & Cheatham, 2003) and offer stability and continuity over time (Bronfenbrenner & Ceci, 1994; Fagot & Gauvain, 1997) children’s cognition development progresses and cognitions become more generalized. Furthermore studies show that when caretakers tailor proximal process interactions to the child’s zone of proximal development, the child can discover, experiment, and practice, knowledge and skills beyond his functional level of development by using the cognitions of a more knowledgeable and skillful partner (Sigel, Stinson, & Kim, 1993). Nonetheless, it is not just the cultural aspects of the developmental niche that influence these developmentally optimizing aspects of proximal processes. Basic biological conditions seem to play an important role in the child’s susceptibility to environment experiences and his or her ability to use these experiences to his or her benefit. For instance, a child’s capacity to experience interaction partners as intentional agents, a cognition that enables him to optimally benefit from what others have to offer him through different forms of cultural learning, can be under- or even undeveloped due to biologically founded conditions, such as seen with children with autism.

In the foregoing paper it is suggested that human development, whether on a phylogenetic, an ontogenetic, or a microgenetic timescale, is produced through nature-nurture interaction and in the process generates change in both nature and nurture aspects. Although extreme situations and events leading to instant developmental changes are certainly imaginable, changes in human cognition, biology, or culture generally take time. When a person joins other people, objects, or symbols in co-constructive episodes of proximal processes, series of microgenetic changes are set in motion: protein production is stimulated; neurological connections in the human brain grow, become organized and specialized; social, emotional, and intellectual knowledge and skills are developed, readjusted, extended, and generalized; cultural tools, practices, and beliefs are appropriated, defined, redefined and adapted to new needs and circumstances. It is during this accumulation of microgenetic change processes
that the ontogenetic transformation process from genotype to phenotype is gradually constructed.

When considering how it is possible that participation in microgenetic episodes of seemingly trivial individual-environment interaction can amount to full-blown human life, the explanation appears rather straightforward: Human development, whether on a phylogenetic, ontogenetic, or microgenetic timescale, is defined by change generated as organism and environment actively adapt to each other. When change takes place within a dynamic system such as the developmental niche, change inevitably generates more change. This assumption by no means implies deterministic pathways or preordained outcomes of change processes. Rather, development and thus change are regarded as probabilistic processes in the sense that many different pathways and outcomes are possible. Which pathways of change are followed and which outcomes are achieved ultimately seems to depend on the way the specific characteristics of the nature and nurture aspects that constitute the dynamic context of ontogenetic development come together as organism and context interact. As Bronfenbrenner and Ceci put it, “If proximal processes are the engines of development, it is the characteristics of person and context that provide the needed fuel and do most of the steering. However, in the end, what matters most is the destination reached.” (Bronfenbrenner & Ceci, 1994; p. 584).
Cognitive Co-construction in Mother-Child Interaction
This study addresses the concept of cognitive co-construction as an alternative to the social influence model that still predominates in research seeking to explain the social and cultural nature of cognitive development. Cognitive co-construction was defined as the combined operation of intersubjective cooperation of mother and child, and their cognitive distancing behavior in joint activity. Video recordings were made in the home environment of 41 mother-child pairs solving a practical and a symbolic task. Overall, a very high degree of intersubjective cooperation was found between mothers and children, that appeared to be quickly and easily established upon confrontation with a new task. Within this intersubjective cooperation, mothers’ cognitive distancing behavior moderately to strongly predicted children’s cognitive distancing behavior. The study further explored the effects of children’s cognitive developmental level and task differences.

### 2.1 Introduction

Although alternative family structures and a wide variety of childcare facilities have taken a prominent position in the childrearing practices of western societies, the nuclear family can still be considered the primary representative of culture and society for preschool children in general. Research shows that the development of representational competence and cognition in general (Leseman & van den Boom, 1999; Sigel, Stinson, & Kim, 1993), language skills (e.g. Bornstein, Haynes, & Painter, 1998; Hoff-Ginsberg, 1991), narrative skills (Haden, Haine, & Fivush, 1997), emergent literacy (Leseman & de Jong, 1998; Whitehurst & Lonigan, 1998), and problem-solving skills (Fagot & Gauvain, 1997; Landry, Smith, Swank, & Miller-Loncar, 2000) is related to specific characteristics of parent-child interactions, such as conversational style, instruction style, and use of cognitive distancing strategies (cf. Sigel et al., 1993).
Cognitive Co-construction in Mother-Child Interaction

Although these studies show the importance of parent-child interactions (and its specific characteristics) for children's development of knowledge and skills, their scope is limited by the methodologies used. The studies examined the influence of family interactions by correlating measures of parents' behavior in interactions with their children (e.g. the use of cognitive distancing strategies, the use of decontextualized language) with measures of children's development, or by determining the additional variance explained by parents' behavior controlling for the autoregressive effects of previous developmental measures (cf. Landry et al., 2000; Leseman & van den Boom, 1999). This approach can be questioned. From a theoretical point of view, Rogoff (1998) argues that correlating parents' behavior with children's developmental outcomes, usually assessed with a standard test, amounts to determining the 'additional - 'social influence' on children's development after accounting for internally driven development, failing to recognize that personal development and social interaction are inseparable and obscuring how external social influences do get 'inside' the individual's brain or mind. From an empirical point of view, correlational evidence is not a strong proof of the cultural nature of skills, nor of the essential role of the social context in skill development (Scarr, 1997). Furthermore, when initial individual differences in cognitive skills are statistically controlled to determine the net social influence, the additionally explained variance usually is small, as if cognitive development in the end is still largely endogenous (cf. Collins, Maccoby, Steinberg, Hetherington & Bornstein, 2000; Leseman & van den Boom, 1999).

In this present study we use the concept of cognitive co-construction as an alternative approach to conceptualize and empirically examine the role of parents (and others) in children's cognitive development. The statistical analyses used in this study are traditional, in the sense that they provide results based on correlation analyses. However, the correlations concern the interrelated actions (i.e. actions that evoke, expand, and extend each other) of mother and child during episodes of intersubjective collaboration, through which we believe mother and child co-construct knowledge and skills. By recognizing what Rogoff calls the 'active and dynamic contributions from both individuals', we intend to explore 'the mutually defining roles of each' (1993, p.124).

The concept of co-construction is rooted in the works of Piaget and Vygotsky, and elaborated by Rogoff (1990, 1998), Trevarthen and Aitken (2001), Valsiner (2000) and Wertsch (1985; Wertsch & Bivens, 1993) and several others, working
in the tradition of the sociocultural theory of cognitive development. The concept of cognitive co-construction, though differently termed by some authors (e.g., as collaboration or co-operation), captures in a direct (non-metaphorical) way how new knowledge structures emerge as a result of coordinated acting and dialoguing in situations of collaboratively solving a problem or obtaining a shared goal.

From the sociocultural perspective, cognitive skills should not be considered autonomously developing structures located somewhere ‘inside’ the individual, nor as ready products or mental objects that are somehow transmitted through instruction and implanted into the individual. Instead, cognitive skills are to be seen as dynamic situated structures that are constructed purposefully in and through goal directed activity in particular situations related to particular tasks, problems or objectives (Fischer & Bidell, 1998). Cognitive co-construction reflects the culturally guided construction of higher psychological functions (Lightfoot & Valsiner, 1992). Extending this view to social situations, co-construction refers to the collaborative construction of skills by the child and other persons, in particular more skilled representatives of the child’s cultural community, such as parents, in and through situated goal directed activity (cf. Rogoff, 1990; 1998; Wertsch, 1985; Wertsch & Bivens, 1993). Co-construction in social interaction with more experienced others is viewed as a basic human cultural learning mechanism, through which children gradually appropriate the cultural tools of their communities and their uses in concrete situations (Tomasello, 2000).

Essential to co-construction of knowledge is the process in which shared thinking, mutual understanding, a common frame of reference, or, shortly, intersubjectivity is established. Intersubjectivity is never finalized nor static. Instead, it is an ongoing process of defining and redefining the ‘common ground’ of a joint activity that resides in that activity and gives it coherence and systematicity (Rogoff, 1998). The establishing, maintenance, and elaboration of such a common ground between partners implies a willingness of the partners to cooperate in the joint activity, that is, to respond meaningfully to initiatives, and to expand and extend each other’s actions coherently within the shared understanding.

The ongoing process of establishing and elaborating intersubjectivity provides the space to construct and appropriate more comprehensive cognitive structures that really are joint products and that change each individual’s actual skill. To evaluate this process from a cognitive developmental point of view the concept of psychological distancing is followed in this study. Psychological distancing refers
Cognitive Co-construction in Mother-Child Interaction

to the cognitive separation of the child from the immediate behavioral environment by symbolical representation (Cocking & Renninger, 1993; Sigel et al., 1993; Wertsch & Bivens, 1993). Although psychological distancing implies mental processes, it is assumed that manifest, situated behaviors can be evaluated to the degree of cognitive distance they represent. The concept of psychological distancing can also be used to evaluate adult behavior towards children (cf. Sigel, 1982; Sigel et al., 1993). For instance, by discussing or evaluating an ongoing activity of the child on a more abstract level or by asking explanations or reasons, parents can trigger a higher level of distancing by the child.

Although to date only a few qualitative and quantitative empirical studies have addressed the subject of co-construction explicitly (cf. Kumpulainen & Mutanen, 2000; Leseman, Rollenberg, & Rispens, 2001; Rogoff, 1990; Verba, 1993; Wertsch, 1985), these studies do confirm the two basic dimensions of co-construction: the social-cooperative or intersubjective dimension on the one hand, and the symbolic-informational or cognitive distancing dimension on the other hand. The present study was designed to contribute to this still small and largely qualitative body of evidence by examining in quantitative way the combined operation of intersubjective-cooperative and cognitive-constructive mechanisms in mother-child interactions in a family setting. In addition, the present study also explored how individual and task characteristics influence cognitive co-construction, focusing on children’s established cognitive skill and age.

Two different task situations were introduced that provided mothers and their 4-year-old children with the opportunity to engage in a cooperative task session. The (symbolic) picture task with a presumed scholastic cultural appearance and the (practical) block task with a presumed playful cultural appearance in this study provide the opportunity to further clarify the process of co-construction between mother and child, and to explore the role of child and task characteristics. The study sets out to provide answers to the following research questions:

1. To what extent do 4-year-old children and their mothers cooperate intersubjectively in practical and symbolic task sessions?
2. To what extent can the participation of mothers and children be considered to be cognitively stimulating, as measured by the distancing level of their activities?
3. Are their differences between symbolic problem-solving tasks and practical problem-solving tasks in all the above respects?
4 How do mother-child behaviors correlate in shared episodes when the age of the child and the child's already established cognitive abilities (as measured with standardized tests) are controlled for?

2.2 Method

2.2.1 Subjects and Procedures
The study involved 41 mother-child dyads from different socioeconomic backgrounds, living in a medium sized city in the Netherlands. On average, the children were 52 months old (min. = 47 months, max. = 56 months, SD = 2.6) at the time of measurement. Video recordings of mother and child involved in a symbolic problem-solving task and a practical problem-solving task were made in the home settings of the dyads. The symbolic problem-solving task consisted of 21 cards with concrete and familiar objects that had to be grouped in threesomes (picture task). Three cards, for instance, formed the group of ‘fruits’: ‘apple’, ‘cherry’s’ and ‘pear’. The object of the practical problem-solving task was to construct a marble slide out of twelve wooden blocks, using a picture of the completed slide as a model (block task). Mothers were shown in advance how to solve the block task. The children were not present at this time. Mothers further received standard instructions on the tasks in general, explaining that the children were supposed to perform the task and that the mothers were allowed to assist and instruct the child when they thought this necessary. Additionally, mothers were present as a norm-referenced test was administered to the children to assess their cognitive developmental level.

2.2.2 Measures
Video recordings were made during the entire time mothers and children were involved in a task. Detailed transcripts were made of all the verbal and nonverbal behaviors expressed by mother and child from the onset of the task until the completion, with a maximum of eight minutes. Verbal behaviors - speech units - were identified by turns, interruptions and long pauses. Non-verbal behaviors could be labeled by simple action verbs and action predicates (e.g., ‘child looks at mother’). On average the transcripts consist of 318 acts. The mean duration of the picture tasks was 5.28 minutes (range 2.12 to 8.00) and 6.21 minutes (range 3.05 to 8.00) for the block task.
Cognitive Co-construction in Mother-Child Interaction

The multidimensional coding scheme that is presented in Figure 1 was developed to operationalize the basic concept of cognitive co-construction. The dimension \textit{function for intersubjective cooperation} was used to distinguish behaviors that contributed to the process of establishing and maintaining intersubjectivity, from behaviors that interfered (e.g., solitary or disruptive) or preceded (e.g., initiative) this process. The \textit{cognitive content} dimension distinguished between relational, procedural and task directed behaviors. The task directed behaviors were further subdivided to identify different levels of psychological distancing.

\textit{Figure 1} Overview of the Multi-dimensional Coding Scheme

<table>
<thead>
<tr>
<th>Agent, i.e. performer of the verbal or nonverbal act.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Child</td>
</tr>
<tr>
<td>2 Mother</td>
</tr>
<tr>
<td>3 Mother and child, i.e. act performed simultaneously by mother and child.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Behavioral mode, i.e. type of behavior exhibited by the agent.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Verbal, i.e. language utterances, speech act.</td>
</tr>
<tr>
<td>2 Para verbal, i.e. paralinguistic utterances such as exclamations and onomatopoeia.</td>
</tr>
<tr>
<td>3 Nonverbal, i.e. picking up a card, pointing at the picture, placing a block, etcetera.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Intersubjective cooperation</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Solitary, i.e. actions that are not part of the interaction between mother and child.</td>
</tr>
<tr>
<td>2 Interactive, i.e. actions that are part of the interaction between mother and child.</td>
</tr>
<tr>
<td>- Initiative, i.e. verbal or nonverbal act that starts a new episode or resumes a forgoing episode.</td>
</tr>
<tr>
<td>- Cooperation, i.e. meaningful response to a question, request or forgoing action.</td>
</tr>
<tr>
<td>- Expansion, i.e. a response that coherently continues the forgoing actions.</td>
</tr>
<tr>
<td>- Extension, i.e. addition of a new element, enrichment of the interaction, explanation of principles or rules, elaboration of the subject, if...then-reasoning.</td>
</tr>
<tr>
<td>- Clarifying Instruction, i.e. instructional elements (for example repetition, tutoring, scaffolding), feedback, meaningful mirroring of partners actions.</td>
</tr>
<tr>
<td>- Disruptive, i.e. disruptions of the ongoing activities.</td>
</tr>
<tr>
<td>3 Rest category, i.e. indistinct or unintelligible behaviors.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Cognitive content function</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Relational behavior</td>
</tr>
<tr>
<td>- Relational negative, i.e. expressions of negative affect or feedback, physical correction without further instructing, sarcasm, mock, etc.</td>
</tr>
</tbody>
</table>
| - Relational positive / neutral, i.e. expressing pleasure, positive affect, or positive feedback and motivating remarks without instructional content, signaling attention, looking at or
following the movements of the partner.

2 Procedural behavior
- Procedural low, i.e. procedural and disciplining remarks with a negative affective load, negative ground rules.
- Procedural high, i.e. actions that start the interaction or an episode, ground rules and meta-communication, role definition, interaction management, creating a shared frame of reference, negotiating and defining shared overall goals.

3 Task related behavior
- Low distancing, i.e. pointing to and looking at objects or places, labeling, simple descriptions of task aspects without further analysis, concrete directives to execute simple single actions, functional manipulation and non-verbal task performance intended as instructions, isolated performance actions that are not part of a planned sequence of actions, observing partners actions.
- Intermediate distancing, i.e. sequence of actions that is based on a (not necessarily correct) plan or concept, utterances after the task but within the expanded discourse, that connect the task to personal, previous experiences and the personal world.
- High distancing, i.e. task performance that is part of a planned extended series of successive actions relating to the assignment, high complex conceptual instructions, utterances that concern representation, planning, monitoring, evaluation of the activity, statements about rules, utterances that are part of analytical-explanatory reasoning and disputing about more or less abstract principles in relation to the task, utterances within the extended discourse, that connect the task to general abstract topics after the actual performance of the task.

4 Rest category, i.e. non-task directed behaviors such as involuntary movements, thumb sucking, looking astray, staring without apparent meaning or intention, eating, going to the bathroom, single words such as well or now.

After an intensive period of training two coders independently rated 5% of the acts of the picture task and of the block task to compute Cohen's $\kappa$ for the main categories. Inter-coders reliability was satisfactory, ranging from .65 for cognitive content on the block task to 1.00 for agent and behavioral mode on both tasks. Figure 2 presents small fragments of transcripts from both tasks with the codes that were given to the verbal and nonverbal actions on the dimensions function for intersubjective cooperation and cognitive content.

As all actions were coded on all dimensions, several cross-dimensional combinations could be computed. Combining subcategories of Participant, Mode, Function for Intersubjective Cooperation, and Cognitive Content using logical
Cognitive Co-construction in Mother-Child Interaction

statements in SPSS to define the combination variables, for instance, yielded the number of verbal high distancing expansions by the child (IF Participant = child AND Behavioral Mode = verbal AND Intersubjective Cooperation = expansion AND Cognitive Content = task-directed high distancing). For the analyses to be reported later, the obtained scores were aggregated to the level of mother-child pairs.

Figure 2 Fragments from Two Transcripts and Coding Examples

<table>
<thead>
<tr>
<th>Picture task:</th>
<th>Interaction</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>M: there are more things that you can eat</td>
<td>Instruction</td>
<td>High distancing</td>
</tr>
<tr>
<td>&amp; (C: puts the picture of the apple next to the pear)</td>
<td>Expansion</td>
<td>Intermediate distancing</td>
</tr>
<tr>
<td>&amp; (M: looks at the cards that are left over)</td>
<td>Expansion</td>
<td>Low distancing</td>
</tr>
<tr>
<td>M: what’s this?</td>
<td>Instruction</td>
<td>Low distancing</td>
</tr>
<tr>
<td>&amp; (M: looks at the picture with the cheese)</td>
<td>Expansion</td>
<td>Low distancing</td>
</tr>
<tr>
<td>&amp; (M: looks at C)</td>
<td>Expansion</td>
<td>Relational neutral</td>
</tr>
<tr>
<td>&amp; (C: looks at M pointing)</td>
<td>Expansion</td>
<td>Low distancing</td>
</tr>
<tr>
<td>C: cheese</td>
<td>Expansion</td>
<td>Low distancing</td>
</tr>
<tr>
<td>M: you can eat that too</td>
<td>Instruction</td>
<td>High distancing</td>
</tr>
<tr>
<td>C: that’s for the mice</td>
<td>Extension</td>
<td>Intermediate distancing</td>
</tr>
<tr>
<td>&amp; (M: looks at picture with cheese)</td>
<td>Expansion</td>
<td>Low distancing</td>
</tr>
<tr>
<td>&amp; (M: laughs)</td>
<td>Expansion</td>
<td>Relational positive</td>
</tr>
<tr>
<td>M: but why doesn’t cheese go with those?</td>
<td>Extension</td>
<td>High distancing</td>
</tr>
</tbody>
</table>

Block building task:

<table>
<thead>
<tr>
<th></th>
<th>Interaction</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>C: you must help me</td>
<td>Initiative</td>
<td>Procedural high</td>
</tr>
<tr>
<td>&amp; (C &amp; M are looking at the pile of blocks)</td>
<td>Expansion</td>
<td>Low distancing</td>
</tr>
<tr>
<td>(M points to a small block)</td>
<td>Instruction</td>
<td>Low distancing</td>
</tr>
<tr>
<td>&amp; (C looks at M pointing)</td>
<td>Expansion</td>
<td>Low distancing</td>
</tr>
<tr>
<td>K: this one</td>
<td>Expansion</td>
<td>Intermediate distancing</td>
</tr>
<tr>
<td>&amp; (C puts small block under a sliding block)</td>
<td>Expansion</td>
<td>Intermediate distancing</td>
</tr>
<tr>
<td>&amp; (M looks at C act)</td>
<td>Expansion</td>
<td>Low distancing</td>
</tr>
<tr>
<td>M: and then one so the marble can role through</td>
<td>Expansion</td>
<td>High distancing</td>
</tr>
<tr>
<td>(C picks up a corner block)</td>
<td>Expansion</td>
<td>High distancing</td>
</tr>
<tr>
<td>&amp; (M looks at the picture model)</td>
<td>Expansion</td>
<td>Low distancing</td>
</tr>
<tr>
<td>(C puts corner block on sliding block)</td>
<td>Expansion</td>
<td>High distancing</td>
</tr>
</tbody>
</table>

m = mother; c = child; ( ) = nonverbal; & = at same time.
As a further operationalization of the co-construction concept, composite variables were constructed representing, respectively, the cognitive distancing level and proportion of high-level procedural behaviors according to their function for establishing and maintaining intersubjective cooperation. Solitary and disruptive behaviors were not included due to their very low observed frequencies. Distancing scale scores were computed, based on theoretical considerations, by weighted integration of the former distinct distancing levels into a new variable (with weights $-1$ for low, $0$ for intermediate and $+1$ for high distancing). Slightly differently, procedural scale scores were obtained by computing the proportion of high procedural behavior of all procedural behaviors. The obtained composite scores were also aggregated to the level of mother-child pairs.

The child’s age was inquired in an interview with the mother. Widely used norm-referenced test were used to assess children’s active and receptive vocabulary, and semantic-taxonomic and logo-mathematical concept knowledge. The subtests had sufficient internal consistency. To reduce the number of variables and to strengthen measurement quality, a composite score cognitive developmental level was computed as the sum of the subtests and the child’s age after $z$-transformation.

2.3 Results

2.3.1 Descriptives

Table 1 presents an overview of the basic descriptive results of the observations of mother and child during the picture task and the block task. To test the statistical significance of the differences between the two tasks $t$-tests for paired samples were applied for each agent on each coding category with the two separate tasks.

2.3.1.1 Behavioral mode

Table 1 shows how mothers took responsibility for the general proceedings of both tasks as indicated by their share in task (60%) and by the fact that mothers contributions were evenly verbal and non-verbal, while children were mainly responsible for the actual task execution, illustrated by the high percentage of non-verbal behaviors (76% on average). However, Table 1 also shows wide score ranges, indicating considerable differences in role division between mother-child pairs.
Cognitive Co-construction in Mother-Child Interaction

Table 1  Observed behaviors by situation and agent, for behavioral mode, intersubjective cooperation and cognitive content.

<table>
<thead>
<tr>
<th></th>
<th>Child</th>
<th>Picture Task</th>
<th>Block Task</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Min</td>
<td>Max</td>
<td>Mean</td>
</tr>
<tr>
<td>Total number of acts (F)</td>
<td>39</td>
<td>254</td>
<td>120</td>
</tr>
<tr>
<td>Proportion in task</td>
<td>34</td>
<td>52</td>
<td>43</td>
</tr>
<tr>
<td>Behavioral Mode</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Verbal</td>
<td>11</td>
<td>45</td>
<td>27&lt;sup&gt;a&lt;/sup&gt;</td>
</tr>
<tr>
<td>Para verbal</td>
<td>1</td>
<td>8</td>
<td>2</td>
</tr>
<tr>
<td>Nonverbal</td>
<td>49</td>
<td>100</td>
<td>71&lt;sup&gt;b&lt;/sup&gt;</td>
</tr>
<tr>
<td>Intersubjective Cooperation</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Solitaire</td>
<td>0</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>Initiative</td>
<td>0</td>
<td>10</td>
<td>3&lt;sup&gt;bb&lt;/sup&gt;</td>
</tr>
<tr>
<td>Expansion</td>
<td>77</td>
<td>97</td>
<td>90&lt;sup&gt;a&lt;/sup&gt;</td>
</tr>
<tr>
<td>Extension</td>
<td>0</td>
<td>8</td>
<td>2</td>
</tr>
<tr>
<td>Clarifying instruction</td>
<td>0</td>
<td>10</td>
<td>2</td>
</tr>
<tr>
<td>Disruptive</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Not codable</td>
<td>2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cognitive Content</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Relational negative</td>
<td>0</td>
<td>27</td>
<td>11</td>
</tr>
<tr>
<td>Relational</td>
<td>0</td>
<td>15</td>
<td>6&lt;sup&gt;bb&lt;/sup&gt;</td>
</tr>
<tr>
<td>Procedural low</td>
<td>1</td>
<td>10</td>
<td>3</td>
</tr>
<tr>
<td>Procedural high</td>
<td>15</td>
<td>70</td>
<td>45</td>
</tr>
<tr>
<td>Low distancing level</td>
<td>0</td>
<td>39</td>
<td>19</td>
</tr>
<tr>
<td>High distancing level</td>
<td>0</td>
<td>74</td>
<td>13</td>
</tr>
<tr>
<td>Not codable</td>
<td>2</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>Mother</th>
<th>Picture Task</th>
<th>Block Task</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Min</td>
<td>Max</td>
<td>Mean</td>
</tr>
<tr>
<td>Total number of acts (F)</td>
<td>37</td>
<td>305</td>
<td>160</td>
</tr>
<tr>
<td>Proportion in task</td>
<td>48</td>
<td>66</td>
<td>57</td>
</tr>
<tr>
<td>Behavioral Mode</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Verbal</td>
<td>28</td>
<td>61</td>
<td>51&lt;sup&gt;aa&lt;/sup&gt;</td>
</tr>
<tr>
<td>Para verbal</td>
<td>4</td>
<td>2&lt;sup&gt;bb&lt;/sup&gt;</td>
<td>(1.1)</td>
</tr>
</tbody>
</table>
## Mother-Child Problem-Solving as Cognitive Co-Construction

<table>
<thead>
<tr>
<th></th>
<th>Nonverbal</th>
<th>38</th>
<th>70</th>
<th>47&lt;sup&gt;bb&lt;/sup&gt;</th>
<th>(5.9)</th>
<th>44</th>
<th>69</th>
<th>53</th>
<th>(5.1)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Intersubjective Cooperation</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Solitaire</td>
<td></td>
<td>1</td>
<td>2</td>
<td>1&lt;sup&gt;aa&lt;/sup&gt;</td>
<td>(0.6)</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>(0.1)</td>
</tr>
<tr>
<td>Initiative</td>
<td></td>
<td>2</td>
<td>22</td>
<td>6</td>
<td>(3.1)</td>
<td>2</td>
<td>11</td>
<td>6</td>
<td>(2.4)</td>
</tr>
<tr>
<td>Expansion</td>
<td></td>
<td>60</td>
<td>90</td>
<td>77&lt;sup&gt;aa&lt;/sup&gt;</td>
<td>(7.4)</td>
<td>45</td>
<td>84</td>
<td>62</td>
<td>(8.9)</td>
</tr>
<tr>
<td>Extension</td>
<td></td>
<td>0</td>
<td>12</td>
<td>4&lt;sup&gt;aa&lt;/sup&gt;</td>
<td>(3.4)</td>
<td>0</td>
<td>5</td>
<td>1</td>
<td>(1.3)</td>
</tr>
<tr>
<td>Clarifying instruction</td>
<td></td>
<td>3</td>
<td>29</td>
<td>11&lt;sup&gt;bb&lt;/sup&gt;</td>
<td>(7.4)</td>
<td>1</td>
<td>47</td>
<td>29</td>
<td>(9.6)</td>
</tr>
<tr>
<td>Disruptive</td>
<td></td>
<td>1</td>
<td>1</td>
<td>(0.1)</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>(0.0)</td>
</tr>
<tr>
<td>Not codable</td>
<td></td>
<td>0</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>2</td>
</tr>
<tr>
<td><strong>Cognitive Content</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Relational negative</td>
<td></td>
<td>0</td>
<td>4</td>
<td>1</td>
<td>(0.7)</td>
<td>0</td>
<td>5</td>
<td>1</td>
<td>(1.0)</td>
</tr>
<tr>
<td>Relational</td>
<td></td>
<td>8</td>
<td>35</td>
<td>23&lt;sup&gt;aa&lt;/sup&gt;</td>
<td>(6.9)</td>
<td>3</td>
<td>22</td>
<td>13</td>
<td>(5.5)</td>
</tr>
<tr>
<td>Procedural low</td>
<td></td>
<td>1</td>
<td>14</td>
<td>7&lt;sup&gt;bb&lt;/sup&gt;</td>
<td>(3.5)</td>
<td>0</td>
<td>18</td>
<td>5</td>
<td>(3.5)</td>
</tr>
<tr>
<td>Procedural high</td>
<td></td>
<td>0</td>
<td>12</td>
<td>4</td>
<td>(3.5)</td>
<td>0</td>
<td>12</td>
<td>5</td>
<td>(3.6)</td>
</tr>
<tr>
<td>Low distancing level</td>
<td></td>
<td>25</td>
<td>70</td>
<td>42&lt;sup&gt;bb&lt;/sup&gt;</td>
<td>(8.9)</td>
<td>39</td>
<td>70</td>
<td>53</td>
<td>(7.6)</td>
</tr>
<tr>
<td>Interm. Distancing level</td>
<td></td>
<td>1</td>
<td>21</td>
<td>8</td>
<td>(4.9)</td>
<td>0</td>
<td>18</td>
<td>8</td>
<td>(4.0)</td>
</tr>
<tr>
<td>High distancing level</td>
<td></td>
<td>0</td>
<td>22</td>
<td>10</td>
<td>(6.4)</td>
<td>1</td>
<td>20</td>
<td>11</td>
<td>(4.7)</td>
</tr>
<tr>
<td>Not codable</td>
<td></td>
<td>5</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>4</td>
</tr>
</tbody>
</table>

* picture > block at p < .05; <sup>aa</sup> picture > block at p < .01; <sup>b</sup> picture < block at p < .05; <sup>bb</sup> picture < block at p < .01

### 2.3.1.2 Intersubjective cooperation

Table 1 further shows that mother and child were involved in intersubjective cooperative behaviors most of the time (92% on average). Both solitary and disruptive behaviors were very rarely observed during the task performances. As to the function for intersubjective cooperation the observed behaviors were most frequently expansions (respectively 90% and 88% for the children and 77% and 62% for the mothers), indicating that a great deal of the behaviors followed the foregoing actions coherently, without disturbing the ongoing process but also without enriching the discourse by adding new thoughts and topics. Children behaved in a rather similar manner on both tasks, although they showed significantly more expansions in the picture task and more initiatives in the block task. Mothers’ behaviors differed more strongly on the two tasks. They made significantly less expanding behaviors during the block task (respectively 77% and 62%), and instead gave more clarifying instructions (29%). Mothers showed significantly more extending behaviors during the picture task.
Cognitive Co-construction in Mother-Child Interaction

2.3.1.3 Cognitive content and cognitive distancing
Overall, behaviors were mostly task directed (respectively 66% and 78% on average). Low distancing behaviors were most common for both mother and child. Mothers performed significantly more low level distancing acts during the block task. This indicates that mothers took a more active part in the task execution but that this participation consisted mainly of concrete instructions (e.g. “pick up that block”) or demonstrations without further verbal explanations. Table 1 shows that mothers displayed significantly more relational behaviors in the picture task (respectively 23% versus 13%). Together these findings indicate that mothers’ involvement differed between the two tasks.

2.3.1.4 Summary
As to the first two research questions, the results first of all show a high prevalence of intersubjective-cooperative behaviors. Second, task directed behaviors (i.e. distancing behaviors) are the most common behaviors observed in both task situations. Although the majority of these behaviors are of a low distancing level, children on average perform 30.5% of their behaviors on an intermediate or high distancing level. Eighteen and a half percent of the behaviors of the mothers concern the use of cognitively stimulating intermediate or high distancing strategies. So nearly half of all behaviors regarding the actual execution of the task were performed on distancing levels that implied the use of symbolic representation. The third research question, whether differences in behaviors during the two specific tasks were observed, can be answered affirmatively. Mothers and children talked more during the picture task and acted more during the block task. With regard to the dimension for intersubjective cooperation children’s behaviors only differed with initiatives and expansions, while mothers showed differences in initiatives, expansions, extensions and instructions. The cognitive content dimension showed that children’s distancing levels do not differ from one task to the other, but the percentage of low-level procedural behaviors does. Mothers do differ with regard to the low-level procedural behaviors and furthermore display more low level distancing behaviors during the block task.

2.3.2 Exploring influences on children’s cognitive distancing behaviors
In this section, the relationships between children’s cognitive distancing behavior on the one hand, and mothers’ verbal distancing behavior and children’s
developmental level on the other hand, are examined. Table 2 presents the bivariate correlations, the standardized regression weights $\beta$, the total predicted variance $R^2$ and the adjusted $R^2$. The focus lies on the cognitive distancing level of children’s expansions and extensions, and on possible differences between the two tasks and between the verbal and nonverbal behavioral mode. The child behaviors ‘initiatives’ and ‘instructions’ were excluded from the present analyses due to low observed frequencies. To further reduce the number of predictors, mothers’ verbal expansions, extensions and clarifying instructions were pooled into a single category named ‘expansions’.

Table 2  Predicting the cognitive distancing level of children’s intersubjective-cooperative behavior; Pearson correlations, standardized regression weights and $R^2$'s ($N = 41$).

<table>
<thead>
<tr>
<th>Distancing level of child’s verbal</th>
<th>expansions</th>
<th>extensions</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Picture task</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Distancing level of mother’s verbal</td>
<td></td>
<td></td>
</tr>
<tr>
<td>- task directed initiatives</td>
<td>-.33 *</td>
<td>-.33 *</td>
</tr>
<tr>
<td>- task directed expansions, extensions etc.</td>
<td>.31 *</td>
<td>.34 *</td>
</tr>
<tr>
<td>- procedural initiatives</td>
<td>.38 *</td>
<td>.31 *</td>
</tr>
<tr>
<td>- procedural expansions etc.</td>
<td>.14</td>
<td>-.20</td>
</tr>
<tr>
<td>Child’s developmental level</td>
<td>.19</td>
<td>.06</td>
</tr>
<tr>
<td>$R^2$ (adjusted)</td>
<td>.31 * (.22)</td>
<td>.22 (.12)</td>
</tr>
<tr>
<td><strong>Block task</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Distancing level of mother’s verbal</td>
<td></td>
<td></td>
</tr>
<tr>
<td>- task directed initiatives</td>
<td>.21</td>
<td>.06</td>
</tr>
<tr>
<td>- task directed expansions, extensions etc.</td>
<td>.68 **</td>
<td>.67 **</td>
</tr>
<tr>
<td>- procedural initiatives</td>
<td>.18</td>
<td>.19</td>
</tr>
<tr>
<td>- procedural expansions etc.</td>
<td>.21</td>
<td>-.04</td>
</tr>
<tr>
<td>Child’s developmental level</td>
<td>39 *</td>
<td>-.01</td>
</tr>
<tr>
<td>$R^2$ (adjusted)</td>
<td>.49 ** (.42)</td>
<td>.34 * (.25)</td>
</tr>
</tbody>
</table>

Distancing level of child’s nonverbal

| **Picture task**                  | expansions | extensions |
| Distancing level of mother’s verbal |            |            |
| - task directed initiatives      | .15        | .18        |

35
Cognitive Co-construction in Mother-Child Interaction

<table>
<thead>
<tr>
<th></th>
<th>r</th>
<th>β</th>
</tr>
</thead>
<tbody>
<tr>
<td>Block task</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Distancing level of mother’s verbal</td>
<td></td>
<td></td>
</tr>
<tr>
<td>- task directed initiatives</td>
<td>.20</td>
<td>.10</td>
</tr>
<tr>
<td>- procedural initiatives</td>
<td>-.36*</td>
<td>.22</td>
</tr>
<tr>
<td>- task directed expansions, extensions etc.</td>
<td>-.11</td>
<td>-.12</td>
</tr>
<tr>
<td>- procedural expansions etc.</td>
<td>-.02</td>
<td>-.01</td>
</tr>
<tr>
<td>Child’s developmental level</td>
<td>.35*</td>
<td>.23</td>
</tr>
<tr>
<td>R^2 (adjusted)</td>
<td>.19</td>
<td>(.08)</td>
</tr>
</tbody>
</table>

2.3.2.1 Verbal expansions

The results show that the distancing level of children’s verbal expansions, indicating intersubjective cooperation with the mother, was reasonably well predicted. Note that in the present study task directed (lower, intermediate and higher distancing) verbal expansions of the child accounted for about 75% of all verbal behavior of the child and for about 18% of all verbal and nonverbal behavior. Some remarkable differences between the two tasks appeared. The distancing level of mothers’ verbal initiatives during the picture task correlated negatively with the distancing level of the child’s verbal expansions. This may point to a negative influence on the child’s participation of a too strong task directed lead of the mother in the task execution. As for the block task, the distancing level of mother’s verbal initiatives was weakly positively correlated with the distancing level of the child’s verbal expansions, yet the β-weight was near zero. For both tasks, but particularly for the block task, the distancing level of mother’s verbal expansions, extensions and clarifying instructions (pooled into one category), indicating intersubjective cooperation with the child, was an important predictor of the distancing level of the child’s verbal expansions. Furthermore, for the picture task, but not for the block task, the degree of higher-level procedural initiatives of the mother was an additional important predictor.
2.3.2.2 Verbal extensions
The distancing level of the child’s verbal extensions – indicating intersubjective cooperation of the child with the mother as well but with the additional introduction of new ideas or steps in the task execution – was somewhat less well predicted. Note that task-directed verbal extensions of the child accounted for only about 1% of all verbal child behavior. Again, the distancing level of mother’s verbal task directed initiatives apparently was not an important predictor of the distancing level of the child’s verbal extensions, but the distancing level of her verbal task directed expansions was. For the picture task, the degree of higher-level procedural initiatives predicted additional variance as well. A remarkable difference with the results for the child’s expansions concerns the role of the child’s developmental level. The child’s developmental level appeared the most important single predictor of the distancing level of the child’s verbal extensions for both tasks. A possible explanation is that verbal actions were coded as extensions if two conditions were fulfilled: they should be coherent continuations of the preceding joint actions and they should contain a new conceptual element, an enrichment of the interaction, an elaboration of the subject, et cetera. In particular this second condition may have depended strongly on previously established skill and developmental maturity reflected in the developmental level composite.

2.3.2.3 Nonverbal distancing
The results shown in the lower part of Table 2 reveal that the correlations concerning the nonverbal distancing behaviors were overall weak and inconsistent. The predicted variances were much lower and mostly not statistically significant. A possible explanation is that nonverbal behavior actually is subordinated to verbal behavior in co-construction processes, given the requirement to constantly explicate and discuss the common plan of work. Another possible explanation is that nonverbal behavior is less transparent and therefore less reliably to code in terms of cognitive distancing.

2.3.2.4 Summary
As for the fourth research question, it became apparent from the analyses that the child’s cognitive abilities and child’s age correlated moderately to strongly with the distancing level of his or her verbal task directed behavior (specifically
Cognitive Co-construction in Mother-Child Interaction

extensions) and with the nonverbal expansions. As for the mothers, it appeared that specifically their verbal task directed contribution to the interaction effected the distancing levels displayed by their child: higher distancing levels used by mothers correlated with higher distancing levels used by children. This correlation however was less apparent for the nonverbal behaviors.

2.4 Discussion

2.4.1 Limitations
Before discussing the main findings of this study a number of limitations should be addressed. The small sample (N = 41) of this study seriously limits the generalization of the results. Furthermore, the use of pre specified, ‘organized’ task situations instead of situations that occur in the daily grinds of mother-child interaction further limits the generalizability of the results. As was mentioned in the introduction, correlation evidence has several limitations. Although these limitations remain valid, we believe that data were provided that offered the opportunity to determine more than the additional social influence of parent-child interaction. Despite the limitations mentioned, we believe this study serves it’s purpose in contributing to the further clarification of the process of co-construction of knowledge and skills between mother and child in the family setting.

2.4.2 Main Findings
The results of this study support the notion that in addition to the child’s cognitive skills, the kind of behaviors that mothers display in interaction with their child and the distancing level of these behaviors influence the actions of children when trying to solve a (symbolic or practical) problem, but only when verbal behavior is concerned. Mothers who used task directed verbal intermediate or high distancing acts during the intersubjective episodes, had children who used high levels of verbal distancing in the general discourse of the interaction. This was especially apparent when they faced the rather difficult block task in this study. With respect to extensions, constituting a particular form of intersubjective cooperation, it appeared that the child factor explored in this research (cognitive developmental level) was of significant influence as well. Although no causal
conclusions in a traditional sense can be inferred from this study, the fact that these strong relationships between mothers’ and children’s cognitive distancing concerned behaviors that were qualified as *intertuitive-cooperative*, that is, as coherently continuing the ongoing interaction sequence, building on the ‘common ground’ of the shared endeavor (Rogoff, 1998), favors an interpretation in terms of co-construction, thus implying in this specific sense a causal role of the mother.

A further important finding of this study was that behaviors demonstrated by mother and child were almost all of an intersubjective-cooperative nature as defined here, that is, qualified as clarifications, expansions or extensions that coherently continued the ongoing collaborative interaction sequence. It appeared that little negotiation had to take place for mother and child to set shared goals and to interact in a cooperative manner in the new situations that were introduced in this study. The negotiation process seemed to play a far less prominent role than Wertsch (1985) reserves for it. A possible explanation is that the mother-child pairs in this study obviously shared an extended and elaborate history together, in cognitive, linguistic and social-emotional respect, as is usually the case in normally functioning families.

The results of this study indicate that the picture task and the block task differ from each other on a number of aspects, i.e. providing two situations that ask for different knowledge, skills and behaviors of the two partners involved in the interaction. The difficulty of the symbolic picture task appeared to be well within the scope of the classification skills of most children in the study. These children were capable to perform at least a part of the symbolic task independently. Children’s need for instructions on the content of the task was limited. Most mothers appeared very well aware of this fact, leaving the actual task performance to the child and instead organizing the proceedings, essential pre-conditions and making stimulating and complementing remarks on the performance of the child, stimulating cognitive distancing by the child through these high level procedural support. When the children did encounter a problem the mothers gave clues that very often referred to situations in their daily lives (”What did grandpa use to build your dollhouse?”), coded as an intermediate level distancing strategy. However, if the task proceeded without many difficulties this comparatively often led to extended discourse.
The block task on the other hand, often presented a bit of a challenge. Faced with the apparent complexity of the task, mothers were much more involved with the actual task performance and children had more need for instructions. The instructions given by mothers often were of a low distancing level. However, sometimes mothers gave instructions on an intermediate or high distancing level, triggering general problem-solving strategies (“If you want to know that what you did is correct, you can look at the example”), asking for reasoning (“Why do you think that side has to be higher?”) or referring to abstract principles like gravity (“See how the marble can roll downwards”). If they did this in intersubjective cooperation with the child, children tended to follow in the intermediate and higher distancing behavior of the mother as was reflected in the moderate to strong correlations found between mother’s verbal distancing and the child’s verbal distancing.

In summary, the results confirmed that the two tasks represented different ecological settings (cf. Kontos & Keyes, 1999), making it necessary as well as possible for the agents to put different skills and knowledge to practice.

2.5 Conclusion

This study addressed the concept of cognitive co-construction as an alternative to the social influence model that still predominates in research seeking to explain the social and cultural nature of cognitive development. Following the work of Rogoff, cognitive co-construction was defined as the combined operation of intersubjective cooperation and cognitive distancing in collaborative activities. The concept proved useful to describe and analyze mother-child problem solving activities in the family setting. When the presence of intersubjectivity characterizes the interactions of partners, the use of psychological distancing strategies by the more-experienced participant, can become an important mechanism for development of the less-experienced participant in the process of cognitive co-construction.
Expressions of Individualistic and Collectivistic Beliefs in Surinamese-Dutch, Dutch Middle-Class, and Dutch Working-Class Mother-Child Interactions

Mayo, A.Y. & Leseman, P.P.M
(submitted for publication)

In the present study Dutch mothers, regardless of their SES, held predominantly individualistic parental beliefs. Surinamese-Dutch immigrant mothers on the other hand showed a specific system of beliefs, in which both collectivistic (as in the original Surinamese culture) and individualistic values were incorporated. Mother-child interactions during symbolic and practical problem-solving situations were analyzed on the dimensions for intersubjective cooperation and cognitive distancing. The analyses showed how cultural beliefs in general are reflected in mother-child interactions, and how tasks characteristics make apparent the effects of a bicultural belief system on interaction styles. All mothers used a didactic interaction mode (which reflects individualistic parental beliefs) during the school like picture task. However, while Dutch middleclass mothers used this same mode during the block task, Surinamese-Dutch mothers used a mixture of this didactic mode and an efficient mode. They focused on completion of the task rather than on the process, leaving the child little room to take responsibility for the process (reflecting more collectivistic beliefs). Although Surinamese-Dutch mothers negotiated task procedures with their child, they firmly controlled the actual task performance and their communications were of a relatively low distancing level.

3.1 Introduction

Collectivism and individualism are used as terms to describe the cultural belief systems of both societies and individuals. Although non-Western cultures are generally typified as predominantly collectivistic and Western cultures as predominantly individualistic, societies and individuals encompass diverse mixtures of both cultural orientations (Triandis, Chen, & Chan, 1998; cf. Kağıtçibaşi, 1996, 1997; Killen & Wainryb, 2000). Society’s cultural belief systems are reflected in the political, economic, and social structures of a society.
Cognitive Co-construction in Mother-Child Interaction

On the level of the individual, belief systems are for instance reflected in family interactions. Overall, cultural beliefs serve as systems to instantiate the value that society and individuals place on independence and interdependence (Raeff, Greenfield & Quiroz, 2000). Collectivistic cultural beliefs emphasize material and personal interdependence, while individualistic cultural beliefs value independence. Parental beliefs are the specific belief systems that parents hold regarding the nature of children, development, parenting and family. Cultural beliefs in general are shaped during continuing interaction of numerous distal and proximal variables (for an extensive overview see Kağıtçıbaşı, 1997), and research suggests that culture and socio-economic status (SES) influence parental beliefs and goals (Leseman, Sijsling, Jap-A-Joe, & Sahin, 1995; LeVine, Miller, Richman, & LeVine, 1996; Palacios, Gonzalez, & Moreno, 1992; Rosenthal & Roer-Strier, 2001; Willemse & van de Vijver, 1997). Studies further show that parental behaviors and child outcomes are related to these parental beliefs (Sigel, 1992; cf. Harkness & Super, 1999; Harkness, Super, & Van Tijen, 2000; Holden & Edwards, 1989), and to SES (de Jong, Klapwijk, & van der Leij, 1995; Leseman & van den Boom, 1999; LeVine et al., 1996; Palacios et al., 1992; Sigel, 1986). A parallel is seen between parenting practices associated with individualistic parental beliefs and parenting practices in high SES families; practices of parents with collectivistic beliefs show correspondence with parenting practices in low SES families. For instance, while traditional-collectivistic parental beliefs and low SES family interactions are associated with an authoritarian parenting style and a low level of verbal and cognitive stimulation, both modern-individualistic parental beliefs and high SES families are associated with authoritative and intellectually stimulating parenting styles (Laosa, 1982; Leseman et al., 1995; McGillicudy-DeLisi, 1992; Palacios et al., 1992; Sigel, 1992). Studies in the US, that used the collectivistic-individualistic (or a similar) dimension as a frame of reference to relate parental beliefs to cognitive development and school achievement, showed that in general traditional-collectivistic beliefs correlated with cognitive delays, lower IQ, psychosocial problems, lower school achievement and less successful social integration (cf. Palacios et al., 1992; Patterson, Reid, & Dishion, 1992; Okagaki & Sternberg, 1993; Stoolmiller, Patterson, & Snyder, 2000). On the other hand, Okagaki and French (1998) found that for children from Asian-American communities, traditional beliefs and authoritarian parenting were associated with better school achievements. However, the majority of these children’s interactions took place within traditional-collectivistic social-context (see also Lin & Fu, 1990). Research 42
in the Netherlands showed that children from non-Western (Surinamese, Turkish and Moroccan) immigrant families lacked important cognitive skills and were behind in their language development, by the time they started kindergarten at the age of four (de Jong et al., 1995; Leseman & de Jong, 1998; Tesser & Iedema, 2001). On the long-term, differences with indigenous children persevered and resulted in overall lower levels of schooling for children from immigrant families (Tesser & Iedema, 2001). These findings make clear that somehow a considerable discrepancy exists between the skills and knowledge children in minority families develop during their early family interactions, and the skills and knowledge that are valued in the Western school system. This seems to indicate that a good fit between the family’s beliefs and beliefs valued in a broader social world is important for the development of children. Furthermore, it stresses not just the importance of understanding how parental beliefs differ between cultural groups, but (perhaps even more importantly) how these beliefs are effectuated in parent-child interactions.

The present study focuses on the relationship between parent-child interactions and parenting beliefs. The basic premise of this study is that family interactions constitute a context of informal learning that is essential to the early development of a child. We further assume that every parent tries to offer his child the conditions thought to be best for development of knowledge and skills. Parental beliefs can be subject to change due to small and major changes in the cultural, social, and economic life of the beholder. Immigration is a major life-event that brings about many fundamental changes in the life of individuals and calls for adoption of new beliefs. Most modern-individualistic Western societies have substantial sub-cultures, constituted by immigrants from traditional-collectivistic (non-Western) cultures. Immigrants are faced with the challenge of raising their children in a society, which holds value systems that differ substantially from those of their original and personal culture, for instance, on the domain of parental beliefs, with respect to how children learn, what children should learn, and what role parents play in this process. So, although it may be true that all people simultaneously hold multiple and often conflicting concerns with independence/individualism and interdependence/collectivism (Killen & Wainryb, 2000), this seems especially relevant for immigrants from non-Western cultures. Parke and Buriel (1998) use the term ‘biculturalism’ to describe the simultaneous adoption of two cultural orientations that is often seen among immigrants. Kağıtçıbaşı (1996; 1997) suggests an addition to the model of independence/interdependence (i.e.
individualism/collectivism) that, instead of separating the two dimensions integrates them. She describes a model of emotional interdependence that is found with (collectivistic) societies, families or individuals in transition, in which certain aspects of the collectivistic culture weaken (i.e. material intergenerational interdependence) while others remain (i.e. emotional interdependence). This new family model “allows for the introduction of an autonomy orientation in child rearing, as complete intergenerational interdependence is no longer required, rendering dysfunctional total obedience and dependence of the growing child” (Kağıtçıbaşı, 1997, p. 21). The issue we intend to address in the present study is whether these possible bicultural/transitional (parental) belief systems are reflected in the parenting practices of non-Western immigrants in a Western culture.

### 3.2 Development Through Interactions

Although correlations between different value systems and child developmental outcomes have been determined, the effectuation of cultural beliefs in actual behavior (e.g. parenting) still remains underexposed (cf. Blunt Bugental & Johnston, 2000; Holden & Edwards, 1989; Sigel, 1992). To study the relationship between parental beliefs and maternal teaching styles in co-constructive interactions we used the sociocultural theory as a frame of reference. The following section shortly addresses the sociocultural perspective on co-construction of knowledge. A distinction is made between social and cognitive dimensions of co-constructive processes. Although these two dimensions are intertwined during interactions, they are analytically distinguishable. Both are considered pivotal to the process of co-construction of knowledge.

On the social dimension of interaction, parent and child are involved in a constant process of redefining their interactions. This redefining takes place through negotiation of their respective roles and goals, and (re-)setting boundaries by either disrupting, cooperating with, or elaborating joint activities. Through this redefining-process partners actively bring coherence and structure to their interactions. In other words, they create and redesign mutual understanding, or intersubjectivity (see for instance Rogoff, 1998). The presence of intersubjectivity in interaction paves the way for psychological distancing, seen as a general way to stimulate cognitive development (Fischer & Bidell, 1998; Leseman, Rollenberg & Rispens, 2001; Mascolo & Fischer, 1999; Sigel, Stinson, & Kim, 1993). Psychological distancing
Expressions of Individualistic and Collectivistic Beliefs in Surinamese-Dutch, Dutch Middle-Class, and Dutch Working-Class Mother-Child Interactions

represents the cognitive dimension of interaction. It refers to the process in which a person (in this case the child) psychologically separates himself from what is immediately present, i.e. shifting his thought process from concrete to abstract (Sigel, 1992). This process, of symbolizing and constructing mental representations, provides the child with opportunities to develop more mature and comprehensive cognitive skills. Parents can initiate and stimulate this process by applying specific teaching strategies. For instance, parents who frequently use questioning in their interactions will be challenging their children to play a more active role in the interaction, thereby stimulating their representational development (Sigel, 1992). Studies find that parents’ teaching behaviors are expressions of parent’s cultural beliefs (Sigel & Kim, 1996; cf. McGillicuddy-DeLisi, 1992) and that the way parents assign their children to different kinds of physical and social settings is based on their cultural beliefs as well (Harkness & Super, 1992). Research further indicates that teaching strategies are context and task dependent (Sigel & Kim, 1996) and that beliefs about how children learn are particular to specific knowledge domains (Sigel & Kim, 1996).

The present study aims to contribute to our understanding of how cultural beliefs influence children’s developmental outcomes, by exploring whether different cultural beliefs are reflected in observable differences of co-constructive interactions between mothers and their young children. To explore mother-child interactions a coding model was applied that operationalized two main aspects of co-construction processes, intersubjectivity and cognitive distancing.

We acknowledge that the polarization of individualism and collectivism is rather crude and will be less clear-cut in the reality of day-to-day living. However, we do believe that these concepts can serve to position (immigrant and indigenous) individuals and their beliefs. Not by identifying them or their beliefs as either individualistic or collectivistic, but by showing individual’s measure of agreement with both concepts.

A comparison is made between Dutch middle- and working-class mother-child dyads and Surinamese-Dutch dyads, living in the Netherlands. These three groups represent the variation seen within the (indigenous) cultural community in the Netherlands (working-class vs. middle-class) as well as the variation between cultural/ethnic communities (collectivistic/non-Western vs. individualistic/ Western). Immigrants from Surinam constitute the second largest ethnic minority group in the Netherlands. Surinam is one of the former Dutch colonies, and has a traditional-
Cognitive Co-construction in Mother-Child Interaction

collectivistic culture (see for instance Distelbrink, 1998; Eldering & Born, 1996). Traditionally, parent-child interactions in Surinam reflect the collectivistic belief system (for instance, valuing interdependence and authority), while parenting in Dutch families, especially in the middle-class families, corresponds with the more individualistic value orientations in the Netherlands (for instance, valuing autonomy and equality).
Following the aforementioned studies, we hypothesize that differences in parental beliefs of indigenous and immigrant mothers will lead to differences in the way parents and children co-construct knowledge and skills, because these beliefs effectuate different interaction styles and value different developmental goals. Therefore, we mainly focus on whether differences in cultural beliefs (rooted in culture and SES) become manifest in co-constructive mother-child interactions, and not so much on how these (differences in) beliefs came about.

3.3 Method
3.3.1 Sample and Procedures
Sixty mother-child dyads from two major cities in the Netherlands participated in the present study. Thirty-six mother-child pairs were Dutch; 24 pairs were Surinamese-Dutch (further referred to as Surinamese). On average, the children were 45 months old (minimum age was 40 months, maximum age was 49 months, standard deviation was 2.2). None of the children were enrolled in daycare for more than three full days a week (the mean daycare attendance for the whole country lies between two and three days). Only 3 of the 24 Surinamese mothers were born in the Netherlands. On average the mothers born in Surinam had been in Holland for more than 15 years (minimum was 5 years, maximum was 31 years, standard deviation was 6.1).
Trained research assistants of the same ethnic-cultural group as the mothers held structured interviews with the mothers, during which parental beliefs, parental educational level, and family SES were addressed. In order to observe co-constructive interactions, video recordings were made of mother-child interactions during two task sessions in the homes of the dyads. These video recordings were transcribed and coded.
Expressions of Individualistic and Collectivistic Beliefs in Surinamese-Dutch, Dutch Middle-Class, and Dutch Working-Class Mother-Child Interactions

3.3.2 Measures

3.3.2.1 Parental beliefs

By asking mothers after their agreement with statements on a five point Likert scale (Strongly disagree; Disagree; Neither disagree nor agree; Agree; Strongly agree) parental beliefs were determined. The statements were adapted from Schaefer and Edgerton’s ‘Parental Modernity Inventory’ (1985). The statements, such as ‘Children are eager to learn by nature’ or ‘Children must always obey their parents’, were categorized either on the dimension ‘Individualism’ or on the dimension ‘Collectivism’. The first dimension represented a modern (Western) cultural orientation; the second reflected the values of traditional (non-Western) cultures. Reliability analyses of the two dimensions were satisfactory with the 11 items on the individualism dimension resulting in an alpha of .74, and the 12 items of the collectivism dimension resulting in an alpha of .82.

3.3.2.2 Socioeconomic status

The family’s socioeconomic status (SES) was measured on a nine-point ordinal scale and computed as the mean of both parents’ completed educational level. The educational levels on the scale ranged from 1 (incomplete elementary school) to 9 (graduation from university). Families with a SES between 1 and 6.5 (maximally lower vocational training) were categorized as ‘working-class’; families with an SES higher than 6.5 were categorized as ‘middle-class’. This cut-off point (between 6.5. and 7) is a common dichotomy related to the system of secondary education in the Netherlands. A SES up to 6.5 indicates lower vocational training as the highest form of completed education, while 7 or above indicates general levels of education. These educational levels are highly selective in the Dutch society regarding for example school-dropout, and (later) job content. Because of the relatively low number of Surinamese participants with SES scores higher than 6.5 (N=8), all Surinamese participants were pooled into one group. However, the socioeconomic status of the Surinamese families was representative for that of Surinamese population in the Netherlands. So, three groups were construed, based on ethnic background or SES. Group 1 consisted of 19 Dutch mother-child dyads with a high SES. The second group was composed 17 Dutch mother-child dyads with a low SES. Finally, the third group consisted of 24 Dutch-Surinamese mother-child pairs who varied in their socioeconomic status.
3.3.2.3 Co-constructive interactions

Video recordings were made of mother-child interactions during two task sessions. The two tasks were selected because they represent two distinctive interaction situations. The picture task represents a school-like task (although still informal) interaction, while the block task is more playful and practical. Mothers were asked to assist and instruct their child if and when they felt this necessary. The first task concerned a symbolic problem-solving situation (picture task). The objective of the task was to assemble six threesomes of cards according to their super-ordinate, depicting objects from daily life; for instance ‘milk’, ‘butter’ and ‘cheese’. The second task concerned a practical problem-solving situation (block task), in which a marble slide was to be constructed. The task consisted of eight wooden blocks and a picture of the completed slide was used as a model. On average, the tasks took five and a half minutes to be completed. From the onset of the task until completion (with a maximum of eight minutes), verbatim transcripts were made of the interactions, supplemented by detailed descriptions of the non-verbal behaviors. Verbal speech units were identified by turns, interruptions and long pauses. Non-verbal behaviors were labeled by simple action verbs or predicates (e.g. ‘child picks up apple’).

Figure 1 presents the multidimensional coding scheme that was developed to operationalize the basic concepts of cognitive co-construction. The dimension ‘Intersubjective Cooperation’ distinguishes behaviors that contribute to the process of establishing and maintaining intersubjectivity from behaviors that interfere with this process or precede the process. The dimension ‘Cognitive Content’ makes a distinction between relational, procedural and task-directed behaviors. Task directed behaviors are further subdivided to identify different levels of psychological distancing. In addition, the type of behavior (verbal/ non-verbal) and the agent who performed the act were coded. Inter-coder reliability analyses on 5% of the data showed satisfactory results, with Cohen’s Kappa ranging from .65 for cognitive content on the block task and 1.00 for agent on both tasks.
Expressions of Individualistic and Collectivistic Beliefs in Surinamese-Dutch, Dutch Middle-Class, and Dutch Working-Class Mother-Child Interactions

Figure 1  Overview of the Multi-dimensional Coding Scheme

Agent, i.e. performer of the verbal or nonverbal act.
1  Child
2  Mother
3  Mother and child, i.e. act performed simultaneously by mother and child.

Behavioral mode, i.e. type of behavior exhibited by the agent.
1  Verbal, i.e. language utterances, speech act.
2  Nonverbal, i.e. picking up a card, pointing at the picture, placing a block, et cetera.

Intersubjective cooperation
1  Initiative, i.e. verbal or nonverbal act that starts a new episode or resumes a forgoing episode.
2  Expansion, i.e. a response that coherently continues the forgoing actions.
3  Extension, i.e. addition of a new element, enrichment of the interaction, explanation of principles or rules, elaboration of the subject, if... then-reasoning.
4  Instruction, i.e. instructional elements (for example repetition, tutoring, scaffolding), feedback, meaningful mirroring of partners actions.
5  Negotiation, i.e. negotiation of role division, task arrangements etc.

Rest category, i.e. indistinct or unintelligible behaviors.

Cognitive content function
1  Relational behavior, i.e. expressing pleasure, positive affect, or positive feedback and motivating remarks without instructional content, signaling attention, looking at or following the movements of the partner or expressions of negative affect or feedback, physical correction without further instructing, sarcasm, mock, etc.
2  Procedural behavior
   -  Procedural low, i.e. procedural and disciplining remarks with a negative affective load, negative ground rules.
   -  Procedural high, i.e. actions that start the interaction or an episode, ground rules and meta-communication, role definition, interaction management, creating a shared frame of reference, negotiating and defining shared overall goals.
3  Task related behavior
   -  Low distancing, i.e. pointing to and looking at objects or places, labeling, simple descriptions of task aspects without further analysis, concrete directives to execute single actions, functional manipulation and non-verbal task performance intended as instructions, isolated performance actions that are not part of a planned sequence of actions, observing partners actions.
   -  Intermediate distancing, i.e. sequence of actions that is based on a (not necessarily correct) plan or concept, utterances after the task but within the expanded discourse, that connect
Cognitive Co-construction in Mother-Child Interaction

the task to personal, previous experiences and the personal world.
- High distancing, i.e. task performance that is part of a planned extended series of successive actions relating to the assignment, high complex conceptual instructions, utterances that concern representation, planning, monitoring, evaluation of the activity, statements about rules, utterances that are part of analytical-explanatory reasoning and disputing about more or less abstract principles in relation to the task, utterances within the extended discourse, that connect the task to general abstract topics after the actual performance of the task.

4 Rest category, i.e. non-task directed behaviors such as involuntary movements, thumb sucking, looking astray, staring without apparent meaning or intention, eating, going to the bathroom, single words such as well or now.

1.4 Results

Means and standard deviations were computed for the data collected with the questionnaires and the multi-dimensional coding scheme. Analyses of variance (ANOVA’s) were performed to distinguish possible statistically significant differences between the data of the three groups (Dutch middle-class; Dutch working-class; Surinamese). Post Hoc Tukey tests were applied to determine between which of the three groups possible differences were statistically significant. Discriminant function analyses were used to explore patterns of behavior that could classify the groups. Finally, regression analyses were performed to determine how the background variables (ethnicity and SES) and the intermediating cultural beliefs would relate to cooperative distancing behaviors of the mothers.

3.4.1 Descriptive Results
3.4.1.1 Cultural beliefs and socioeconomic status
Table 1 shows that although mothers from all three groups related positively to individualistic statements (such as ‘Children are entitled to have and express their own opinion’), Surinamese mothers had the highest scores ($p<.01$). While Dutch mothers generally disagreed with collectivistic statements (such as ‘Children are not allowed to question their parents’ authority’), Surinamese mothers on average neither agreed nor disagreed with these statements. Surinamese mothers scored significantly higher on the ‘Collectivism’ dimension than Dutch middle-class
Expressions of Individualistic and Collectivistic Beliefs in Surinamese-Dutch, Dutch Middle-Class, and Dutch Working-Class Mother-Child Interactions

mothers \( (p < .05) \). The minimum and maximum scores on the collectivism dimension reveal that while Dutch mothers at most very meagerly ‘agreed’, some Surinamese mothers ‘strongly agreed’ with collectivistic statements. To control for a possible response set the data were standardized by culture (means per group divided by the obtained respective standard deviations of the groups). Again ANOVA’s and post hoc Tukey tests were performed and they confirmed and even exulted the results of Table 1 (individualistic beliefs: group 3>group 1 and group 2 \( (p < .000) \); collectivistic beliefs: group 3> group1 and group 2 \( (p < .000) \).

As the group division was (partly) based on the socioeconomic status of the family (and SES is partly constructed by the educational level of the mother) Table 1 (not surprisingly) shows that the first group differs significantly \( (p < .00) \) from the other two groups with regard to both family SES and mother’s educational level. On average mothers in the Dutch middle-class group had either completed pre-university education or a completed higher vocational education (level 8). Mothers from the Dutch working-class group had the lowest average educational level of the research population (mean = 5.2). Level 5 education corresponds with uncompleted lower general secondary education. The average education level of the Surinamese mothers was between level 5 and level 6 (completed lower general secondary education).
Table 1  Measures of Parental Beliefs, SES and Mothers’ Level of Education by Group

<table>
<thead>
<tr>
<th></th>
<th>Group 1</th>
<th>Group 2</th>
<th>Group 3</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Dutch middle-class</td>
<td>Dutch working-class</td>
<td>Surinamese</td>
</tr>
<tr>
<td></td>
<td>(N=19)</td>
<td>(N=17)</td>
<td>(N=24)</td>
</tr>
<tr>
<td></td>
<td>Mean</td>
<td>(SD)</td>
<td>Min</td>
</tr>
<tr>
<td>Individualistic beliefs (1)</td>
<td>4.2</td>
<td>(0.4)</td>
<td>3.3</td>
</tr>
<tr>
<td>Collectivistic beliefs (2)</td>
<td>2.4</td>
<td>(0.5)</td>
<td>1.3</td>
</tr>
<tr>
<td>SES (3)</td>
<td>8.1&lt;sup&gt;aabb&lt;/sup&gt;</td>
<td>(0.6)</td>
<td>7.0</td>
</tr>
<tr>
<td>Mothers’ level of education (4)</td>
<td>7.9&lt;sup&gt;aabb&lt;/sup&gt;</td>
<td>(0.7)</td>
<td>7.0</td>
</tr>
</tbody>
</table>

aaa: group1>group2, p< .00; bbb: group1>group3, p< .00; c: group 3> group 1, p< .05; ce: group 3>group 1, p< .01; ff: group 3>group 2, p< .01.

(1) Agreement with individualistic child rearing beliefs; scale 1 (= strongly disagree) to 5 (= strongly agree).
(2) Agreement with collectivistic child rearing beliefs; scale 1 (= strongly disagree) to 5 (= strongly agree).
(3) Socioeconomic status: the sum of both parents’ educational level; range 1 to 9 (working-class SES = 1 to 6.5; middle-class SES = 7 to 9).
(4) Highest completed level of education by mother; range 1 (= primary education) to 9 (= academic degree).
### 3.4.1.2 Co-constructive Interactions

Table 2 shows the verbal behaviors of the mothers during the picture task and the block task as coded with the multi dimensional coding scheme (see Figure 1). Almost 55% of the observed behaviors of the mothers were verbal. Most of the significant differences between the three groups were found on the block task.

**Table 2  Observed Verbal Behaviors of the Mothers by Situation and Group, for Behavioral Mode, Intersubjective Cooperation, and Cognitive Content.**

<table>
<thead>
<tr>
<th>Behavioral mode</th>
<th>Picture task</th>
<th>Block task</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Group 1</td>
<td>Group 2</td>
</tr>
<tr>
<td>Verbal</td>
<td>54 (6.8)</td>
<td>55 (5.8)</td>
</tr>
<tr>
<td>Para verbal</td>
<td>2 (1.4)</td>
<td>2 (1.7)</td>
</tr>
<tr>
<td>Non verbal</td>
<td>44 (6.3)</td>
<td>43 (5.8)</td>
</tr>
</tbody>
</table>

**Intersubjective cooperation**

| Initiative            | 8 (3.9)  | 7 (2.5)  | 9 (3.5)  | 7 (3.4)  | 9 (3.8)  | 8 (4.8)  |
| Expansion             | 46 (13.9)| 48 (20.6)| 53 (17.7)| 38 (12.3)| 37 (12.1)| 36 (10.9)|
| Extension             | 8 (4.5)  | 7 (3.6)  | 5 (4.4)  | 4 (4.0)  | 3 (3.0)  | 1 (2.6)  |
| Instruction           | 36 (16.6)| 35 (20.0)| 30 (15.9)| 44 (7.8) | 42 (14.8)| 39 (13.4)|
| Negotiation           | 2 (3.3)  | 3 (3.5)  | 3 (3.6)  | 7 (9.9)  | 9 (7.3)  | 16 (12.8)|

**Cognitive content**

| Relational            | 18 (9.3) | 22 (9.7) | 21 (8.9) | 17 (8.5) | 18 (7.1) | 15 (6.9)|
| Procedural low        | 4 (3.1)  | 4 (2.2)  | 4 (2.5)  | 6 (3.4)  | 6 (3.9)  | 8 (4.9)|
| Procedural high       | 10 (6.1) | 5 (6.1)  | 7 (5.8)  | 13 (11.3)| 12 (8.4) | 19 (12.6)|
| Low distancing        | 24 (4.4) | 26 (7.8) | 27 (10.5)| 12 (3.7) | 19 (7.9) | 18 (8.1)|
| Interm                | 17 (8.6) | 15 (6.6) | 13 (7.8) | 16 (6.3) | 19 (7.9) | 12 (7.2)|
| High distancing       | 21 (8.8) | 24 (13.2)| 21 (11.7)| 34 (10.9)| 23 (8.8) | 25 (12.1)|
| Not codable           | 6 (4)    | 4 (7)    | 2 (4)    | 4 (3)    | 53

*a* group 1 > group 2 at *p*<.05; *b* group 1 > group 3 at *p*< .1; *bb* group 1 > group 3 at *p*< .05; *cc* group 2 > group 1 at *p*<.01; *dd* group 2 > group 3 at *p*< .05; *ee* group 3 > group 1 at *p*< .05.
Cognitive Co-construction in Mother-Child Interaction

3.4.1.3 Intersubjective cooperation
On the dimension for ‘intersubjective cooperation’ the majority of behaviors were qualified either as ‘expansions’ or as ‘instructions’ attuned to the child. However, with these behaviors no significant differences were found between the groups. Statistically significant differences between the three groups on this dimension were limited to ‘extending’ behaviors and ‘negotiation’. During both tasks Dutch middle-class mothers showed significantly more extending behaviors than Surinamese mothers. These extending behaviors continued forgoing actions coherently (i.e. semantically contingently) without disturbing ongoing processes, and in addition enriched the discourse by adding new thoughts or topics. Compared to Dutch middle-class mothers, Surinamese mothers showed significantly more negotiating behaviors during the block task. These negotiations for instance concerned the way the task should be executed, or how the role division between mother and child should take place.

3.4.1.4 Cognitive content
On the ‘cognitive content’ dimension an average of nearly 61% of the behaviors was coded as task directed (‘low, intermediate, or high distancing behaviors’). Differences in task directed distancing behaviors between the groups were especially apparent on the block task. Mothers from both the Dutch working-class and the Surinamese group showed significantly more low-level distancing behaviors, then Dutch middle-class mothers. These ‘low distancing’ behaviors were concrete demands or statements, that neither challenged nor stimulated the child to develop more complex thought processes on the subjects involved; i.e. ‘Put this block here’ or ‘Now pick up the apple’. Dutch working-class mothers showed significantly more distancing behaviors of an intermediate level, than Surinamese mothers ($p<.05$). These intermediate level distancing behaviors mostly consisted of cues that referred to a certain theme; i.e. ‘Which blocks have holes?’. Finally, high-level distancing behaviors were mostly observed during the interactions of the Dutch middle-class mothers. These mothers asked questions that challenged the children to for instance reason why they were building the marble slide in a certain way (‘How come the marble doesn’t make the bell ring?’).

3.4.1.5 Comparing the picture task and the block task
When the behaviors of the mothers on the two tasks are compared (by ANOVA’s), results show that Dutch middle-class mothers use significantly fewer
Expressions of Individualistic and Collectivistic Beliefs in Surinamese-Dutch, Dutch Middle-Class, and Dutch Working-Class Mother-Child Interactions

...extensions (p = .011), more instructions (p = .016) and negotiations (p = .023), and more low-procedural (p = .029), less low distancing (p < .000) and more high distancing behaviors (p < .000) during the block task. Dutch working class mothers show less difference in their behaviors during the two tasks. Although they show more extensions during the picture task (p = .002), they show more negotiation (p = .002), more procedural high (p = .003), and more low-level distancing behavior (p = .031) during the block task. Surinamese mothers show less expansions (p < .000), extensions (p = .002), relational (p = .010), and low-level distancing behaviors (p = .001) during the block task, but more low (p < .000) and high (p < .000) procedural behaviors.

3.4.2 Discriminant Function Analyses

Differences among the three groups were further explored by use of discriminant function analyses. Table 3 shows how eleven predictors (i.e. the variables that constituted the dimensions ‘intersubjective cooperation’ and ‘cognitive content’ in Table 2) were used in the analyses of the picture task and the block task. For the picture task the two discriminant functions accounted for respectively 56.7% (p = .07) and 43.3% (p = .16), of the between-group variability in discriminating among groups. With the block task this was 55.6% (p < .00) and 44.4% (p = .03) for the two discriminant functions.

3.4.2.1 Picture task

For the picture task the first predictor maximally separated the Dutch working-class and the Surinamese groups from the Dutch middle-class group. As is shown in Table 3, the best indicators (loading .25 and above) for this discriminant function were ‘extensions’, ‘high-level procedural behaviors’, ‘intermediate’-‘and ‘low level distancing behaviors’, and ‘relational behaviors’. During the picture task Dutch middle-class mothers typically used extensions, high-level procedural behaviors and intermediate level distancing behaviors; their behaviors can be characterized as ‘cooperatively challenging’. These mothers explained the procedures and objective of the task to their child by creating a shared frame of reference e.g. by explaining the objects involved or setting positive ground rules for communication. They extended the conversations by adding new elements or explaining principles. During the task these mothers typically used distancing strategies of an intermediate level. In their questions and suggestions they for
Cognitive Co-construction in Mother-Child Interaction

instance referred to familiar situations (e.g. ‘What did you use when you helped grandpa build your doll house?’). The behaviors of the Surinamese and Dutch working-class mothers on the other hand characteristically were ‘concrete directives’. Their feedback and instructions were restricted and concrete (e.g. ‘That’s wrong’, or ‘Pick up that card’), without for instance explaining why something was wrong or correct.

Table 3 Discriminant Function Analyses of Verbal Behaviors of the Mothers during the Picture Task and the Block Task.

| Predictor variables | Picture task | | | Block task | | |
|---------------------|--------------|-----------------|-----------------|-----------------|-----------------|
|                     | 1 | 2 Univariate F | P | 1 | 2 Univariate F | P |
| Initiative          | .07 | .47 | 2.0 | .15 | .25 | 1.2 |
| Expansion           | .24 | .19 | 1.0 | -.13 | .01 | 0.3 |
| Extension           | -.39 | -.29 | 2.5 | .089 | -.41 | -.04 | 2.8 | .067 |
| Instruction         | -.19 | -.23 | 0.9 | -.25 | .04 | 1.0 |
| Negotiation         | .17 | .09 | 0.4 | .47 | -.12 | 4.0 | .024 |
| Relational          | .25 | -.08 | 0.8 | -.17 | .18 | 1.0 |
| Procedural low      | -.02 | -.04 | 0.0 | .35 | -.17 | 2.4 | .098 |
| Procedural high     | -.39 | .33 | 2.8 | .071 | .34 | -.19 | 2.4 | .100 |
| Low distancing      | .27 | .10 | 1.0 | .44 | .42 | 5.7 | .006 |
| Intermediate        | -.33 | -.14 | 1.5 | -.31 | .47 | 4.5 | .015 |
| High distancing     | .04 | -.24 | 0.6 | -.41 | -.40 | 5.0 | .010 |

The second discriminant function of the picture task separated the Surinamese group and the Dutch working-class group, with the Dutch middle-class group falling between these groups. However, since this dimension was non-significant it is not further discussed.

With the use of both discriminant functions 68.4% of the members of the Dutch middle-class group, 64.7% of the Dutch working-class group and 50% of the Surinamese group were correctly classified (compared to 33.3% by chance). From the Surinamese group 6 mothers (25%) were incorrectly classified as Dutch middle-class and 6 as Dutch working-class.
3.4.2.2 Block task

The right half of the loading matrix (Table 3) shows the two discriminant functions for the block task. The first function separated the mothers from the Surinamese group from the Dutch middle-class, while the Dutch working-class group held a position in the middle. The best predictors were ‘negotiation’, ‘low distancing’, ‘extension’, ‘high distancing’, ‘procedural low- and high’, ‘intermediate distancing’ and ‘instruction’. While the behaviors of Surinamese mothers could be characterized as ‘negotiating procedures’, behaviors of Dutch middle-class mothers were typically characterized as ‘challenging instructions’. It appeared that Surinamese mothers and children had to make a greater effort to create intersubjectivity with regard to the block task. A shared frame of reference had to be established by means of negotiating and explaining what had to be done and who was to do so. Task-directed instructions and explanations were directive and concrete (e.g. ‘Give me that block’). The instructions and remarks of Dutch middle-class mothers on the other hand challenged their children to think about strategies and principles that would help them solve the task (e.g. ‘Why do you think the marble won’t roll any further?’).

The second discriminant function separated the Dutch working-class group from both the Dutch middle-class group and the Surinamese group. Behaviors of the first group were typically ‘task directed leading’. Mothers held a firm hand on proceedings by initiating simple operations and dividing the task into many sub-steps. Their distancing strategies either were very concrete and directive (‘Pick up that block’) or referred to observable characteristics (e.g. ‘Now look for all the blocks with holes.’). Their use of high distancing strategies was limited in comparison with the other groups.

With the use of these two discriminant functions in the block task 73.7% of the members of the Dutch middle-class group, 70.6% of the Dutch working-class group and 70.8 % of the Surinamese group were correctly classified. Seventeen Surinamese mothers were correctly classified, while 4 mothers were classified as Dutch middle-class and 3 as Dutch working-class group members.

3.4.3 Regression Analyses

To explore expected relationships between the teaching strategies used by mothers during the two tasks and their ethnic background, SES, and parental beliefs, regression analyses were performed. The behaviors of the mothers that
were identified as 'cooperative' (i.e. initiatives, expansions, extensions, and instructions on the dimension for 'intersubjective cooperation') were used for these analyses since they are indicators of intersubjective understanding between partners that is essential for the co-constructive process (cf. Fischer & Bidell, 1998; Leseman et al., 2001; Mascolo & Fischer, 1999; Sigel et al., 1993). Because a multidimensional coding system was applied, simple compute statements could be used to construct a new variable that incorporated the verbal, task related (i.e. low, intermediate, and high distancing), and cooperative behaviors of the mothers. Cooperative low distancing behaviors were weighted −1, while cooperative intermediate behaviors were weighted 0, and cooperative high distancing behaviors +1. This way a variable was constructed for each mother that represented the overall distancing level of her verbal cooperative behaviors. This variable was used as the dependent variable in the regression analyses. The independent variables used were ethnic background, SES and parental beliefs (individualistic and collectivistic). Table 4 represents the outcomes of the regression analyses for the two tasks.

3.4.3.1 Picture task
The total $R^2$ (i.e. the correlation of the dependent variable with all the independent variables together) and the adjusted $R^2$ (i.e. total $R^2$ corrected for number of cases and number of independent variables) are not very strong for the picture task. It is however interesting to see the separate $R^2$ (representing the square of the bivariate correlation coefficient) shows that cultural beliefs constitute the single variable that significantly predicts mother behaviors during this task. Twelve percent of the variance in behaviors displayed by mothers during the picture task can be explained by their parental beliefs. Examination of the standardized coefficients Beta ($\beta$) shows that collectivistic beliefs constitute the only significant predictor in this regression model ($\beta = -.35, p< .007$).
Expressions of Individualistic and Collectivistic Beliefs in Surinamese-Dutch, Dutch Middle-Class, and Dutch Working-Class Mother-Child Interactions

Table 4  Predictive Values of Mothers' Parental Individualistic and Collectivistic Beliefs, Family Socioeconomic Status and Ethnic Background for the Distancing Levels of Mother's Verbal Cooperative Behaviors During the Picture Task and the Block Task.

<table>
<thead>
<tr>
<th>Picture task</th>
<th>Separating level of mothers verbal cooperative behaviors</th>
<th>Unique</th>
<th>Total R²</th>
<th>Adjusted R²</th>
</tr>
</thead>
<tbody>
<tr>
<td>Parental beliefs</td>
<td>.12 *</td>
<td>.10 *</td>
<td>.12 .06</td>
<td>.06</td>
</tr>
<tr>
<td>Family SES</td>
<td>.02</td>
<td>.00</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ethnic background</td>
<td>.02</td>
<td>.00</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Block task</th>
<th>Separating level of mothers verbal cooperative behaviors</th>
<th>Unique</th>
<th>Total R²</th>
<th>Adjusted R²</th>
</tr>
</thead>
<tbody>
<tr>
<td>Parental beliefs</td>
<td>.16 **</td>
<td>.09 *</td>
<td>.31 ****</td>
<td>.26</td>
</tr>
<tr>
<td>Family SES</td>
<td>.22 ****</td>
<td>.15 ****</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ethnic background</td>
<td>.02</td>
<td>.01</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*p<.1;  * p<.05; * * p<.01; ** * p<.001; **** * p<.000

3.4.3.2 Block task.
The regression analyses of the block task shows that together the independent variables explain 31% of the observed variance in mother behavior (26% when adjusted for number of cases and number of independent variables). This time SES is the strongest predictor, followed by parental beliefs, and again ethnic background does not add significantly to the model. Examination of the standardized coefficients $Beta(\beta)$ shows that high scores on the collectivistic beliefs dimension lead to a decrease of the distancing level of mothers verbal cooperative behaviors ($\beta = -.28, p = .023$), while a high family SES leads to an increase of this distancing level ($\beta = .40, p<.001$).

3.5 Discussion

3.5.1 Main Findings
This study showed that Dutch mothers regardless of their SES have primarily individualistically orientated parental beliefs. Surinamese mothers, despite being raised in the tradition of collectivism showed these individualistic beliefs as well. Although expressed agreement to traditional-collectivistic beliefs among Surinamese mothers was stronger than among Dutch mothers, Surinamese
Cognitive Co-construction in Mother-Child Interaction

mothers expressed less agreement to these beliefs than to individualistic beliefs. These findings suggest that Surinamese mothers and Dutch mothers (regardless of their SES) have distinctive parenting beliefs: Dutch mothers show a predominantly individualistic orientation, while Surinamese mothers express what could be interpreted as a bicultural value system.

Analyses of mother-child interactions showed that differences in parental beliefs correspond with characteristic parenting practices. However, the type of interaction seems to play an important role in whether cultural and/or economic characteristics are reflected in the parenting style that is set to use (cf. Leeseman & Sijsling, 1996; Sigel & Kim, 1996). While the school-like picture task seemed to diminish differences between mothers, the practical block task presented an interaction situation in which differences in parenting style (related to cultural beliefs and SES) became obvious.

The school-like quality of the picture task and the practical, more playful quality of the block task seem to trigger mothers to use different ‘modes of interaction’ (Hoogsteder, Maier, & Elbers, 1996, cf. Leeseman & Sijsling, 1996). All mothers, regardless of their background, seemed to have used a mode that to some extent resembled what Hoogsteder et. al. called a ‘didactic mode’ during the picture task. Typically for this mode of interaction children were given ample opportunity to perform the task themselves. The objects depicted in the picture task are familiar to all mothers and children, and the classification of these objects is rather straightforward. The relatively low percentage of negotiation and discussion of the task proceedings after or during the actual task performance of the picture task, suggested that the symbolic problem solving interactions fitted well within the boundaries of the common ground previously established through mother-child interactions. Mothers closely monitored their child’s actions, and used errors as opportunities to explain rules or facts. Most children encountered little difficulties during the performances of the picture task.

Although all mothers showed significantly different patterns of behaviors during the two tasks, differences between the groups were most obvious for the Surinamese and the Dutch middle-class mothers during the block task. This indicated that differences in behaviors of Dutch and Surinamese mothers were at least partly based on socioeconomic differences (this was confirmed through the regression analysis). During the block task Dutch middle-class mothers showed a didactic parenting style that is in accordance with high SES and individualistic parenting
Expressions of Individualistic and Collectivistic Beliefs in Surinamese-Dutch, Dutch Middle-Class, and Dutch Working-Class Mother-Child Interactions

styles: informative regarding goals, procedures, and roles and challenging the child to actively participate and extend his understanding of the task. The Dutch working-class group showed a pattern of behaviors that in earlier studies was found to be typical for Western parents from low socioeconomic background families and traditional-collectivistic beliefs. Mother and child showed a clear and mutual understanding of how interactions would proceed; namely with mother firmly leading her child in the desired direction. Mothers’ approach of task and child was controlling and directive. They used low or intermediate distancing strategies in communication with the child, referring to what was concrete and visible or known from daily life (for instance see Laos, 1982; McGillicuddy-DeLisi, 1992; Palacios et al., 1992; Sigel, 1992). Surinamese mothers used a mixture of an ‘efficient mode’ (e.g. pursuing correct and rapid completion of the task) and a ‘didactic mode’. Although these mothers offered the child room to participate, negotiate, and explore during procedural behaviors, they controlled and dominated the actual task performance (i.e. often performing the task themselves) and left the child little room to be involved as a full-fledged partner. Dutch mothers from the middle-class group used significantly more extensions, while Surinamese mothers were more often involved in negotiations with their child. Negotiation and extension are both examples of intersubjectivity at work (Wertsch, 1985), albeit in a different stage of the process. Negotiation of role division, task division, and goals, mostly serves to create a basic shared understanding or a ‘common ground’ of interaction (Rogoff, 1998). A basis of shared understanding is a necessary condition for extensions to become a successful part of an interaction. Extensions not only offer partners an opportunity to extend earlier established boundaries, but also to extend their understanding of the ongoing processes. Mothers from the Dutch middle-class group showed significantly more distancing behaviors of a high level, and less of a low level then both the Dutch working-class group and the Surinamese group. Compared to the Surinamese group the Dutch working-class group used more distancing behaviors of an intermediate level.

The different interaction styles during the two tasks may reflect a cultural difference in interpretation of the two tasks (cf. McGillicuddy-DeLisi, 1992; Sigel & Kim, 1996). All mothers clearly interpreted the picture task with its school like quality (i.e. labeling, matching, etc.) as a learning event. The block task on the other hand seemed to be perceived more as a practical small job than as a learning
event by Surinamese mothers. They regarded the completed marble slide as relevant and fun for the child and not the construction process itself. The task division between mother and child that was nearly automatically assumed during the picture task had to be extensively negotiated during the block task. Mother and child negotiated not only who was to do what, but also at what point certain things had to be done, how they were to be done, and sometimes why things had to be done a certain way. This extensive negotiation of the task proceedings was very specific for the Surinamese mother-child pairs. These kinds of interaction, in which mother and child communicated more or less as equals, are in contrast with traditional Surinamese patterns of communication studies (for instance see Distelbrink, 1998; Eldering & Born, 1996). Perhaps these negotiations are the embodiment of individualistic beliefs in Surinamese mother-child interactions. However, like their own Surinamese parents, Surinamese mothers were mostly directive and very concrete in their instructions to the child. Compared to the Dutch working-class mothers their instructions were less leading and more steering (i.e. ‘Does this small block go on top of this big block or on top of that other small block?’, instead of ‘Put that block on top of this one’). Nonetheless, these interactions were not only less cognitively stimulating than those of Dutch middle-class mother-child pairs, but also compared to their own interactions revolving around task procedures.

3.5.2 Conclusions
The similarity in teaching strategies of all mothers during the picture task indicated that the strong agreement expressed by Surinamese mothers with regard to modern-individualistic beliefs was reflected in parenting behaviors, at least with regard to a task perceived as school-like. However, the distinct parenting behaviors of Surinamese mothers during the block task showed that interaction patterns associated with traditional collectivistic beliefs were used in a situation perceived as more practical. It seemed that in this situation the correct and efficient completion of the task was what mattered, and that learning opportunities were lost out of sight.
This study addressed how differences in co-constructive mother-child interactions in the year preceding kindergarten entrance (age 4 in the Netherlands), contributed to cognitive differences between children from different socioeconomic and ethnic-cultural backgrounds. Within that year 58 mother-child dyads were observed three times during two problem-solving situations. Share in task, intersubjective cooperation, and cognitive skill-level together operationalized the concept of cognitive co-construction. Results revealed a general developmental trend of changing roles; while children’s task responsibility and skill-levels gradually increased, mothers’ task-share and skill-level gradually decreased. This trend was most evident in Dutch middle-class families, and least in Turkish-Dutch families. A combined measure of children’s co-constructive behaviors related reasonably well to (norm-referenced) cognitive test-scores, and predicted significant additional variance in age-4 test-scores.

4.1 Introduction

The process of co-construction of knowledge in social interaction with more experienced representatives of the cultural community constitutes a basic human cultural learning mechanism (Tomasello, 2000). It is through this process that children gradually appropriate the cultural tools (such as language) of their communities and their use in concrete situations. Parents constitute a significant cultural knowledge source for young children, especially during the pre-school years when the span of children’s interactions with the social world is relatively limited. During family interactions parents and children actively and collaboratively co-construct knowledge and skills (cf. Gauvain, 2001; Rogoff, 1998). A broad range of child-skills is related to specific characteristics of parent-child interactions (see for an overview Arnold & Doctoroff, 2003).
Cognitive Co-construction in Mother-Child Interaction

In several Western countries significant differences are found already at school entrance age in cognitive and language development between children from higher and lower social classes and between children from indigenous and (non-Western) immigrant families (cf. OECD, 2001). These differences at school entrance persevere over time and result in overall lower levels of schooling for children from low income and immigrant families (Stipek, 2001). These findings not just point to the importance of skill-development in the preschool period, but also suggest that skills and knowledge children develop during their preschool years in family interactions, differ considerably: between cultures (between Western and non-Western cultural communities), as well as within cultures (between middle-class and working-class communities).

To address this issue, the present study focuses on the process of co-construction of cognitive skills and knowledge during mother-child interaction in Dutch middle- and working-class families, and in Surinamese-Dutch and Turkish-Dutch immigrant families in the year prior to the child’s entrance in the kindergarten department of primary school (at the age of four). We hypothesize that developmental differences found in children’s cognitive skills at kindergarten entrance are rooted in these mother-child interactions. Mothers and children co-construct cognition in and through goal directed activity in particular situations related to particular tasks, problems or objectives (Fischer & Bidell, 1998; Gauvain, 2001). The concept of cognitive co-construction captures in a direct way how new knowledge structures emerge as a result of coordinated acting and dialoguing in situations of collaboratively solving a problem or obtaining a shared goal. In the following section we first outline the social aspects of co-construction, which we refer to as ‘intersubjective cooperation’, and second discuss the cognitive aspect of co-construction processes, which we refer to as the ‘microdevelopment of cognitive skill’.

On the social dimension, parent and child are involved in a constant process of creating, maintaining, and if necessary restoring shared understanding, or intersubjectivity, of their interactions (see for instance Gauvain, 2001; Rogoff, 1998; Wertsch, 1985). By negotiating roles and goals, by (re-)setting boundaries either by interrupting or disrupting, or by cooperating with the joint activity, partners are thought to establish and maintain (or disrupt) intersubjectivity. Once cooperation between partners and a certain basis of intersubjectivity are established, boundaries of the shared frame of reference may be expanded through introduction of new topics, rules, goals et cetera by either one of the
Developmental Changes in Cognitive Co-Construction in Dutch, Surinamese-Dutch and Turkish-Dutch Mother-Child Problem-Solving Interactions

Partners. On the cognitive dimension, as boundaries of shared understanding are stretched out, knowledge and skills of the actors in that particular situation may grow. As young children interact with more skilled partners in particular situations of problem solving they are helped to apply more complex and abstract ways of thinking. When a mother for instance helps her child to become aware that a marble can roll down but not up a slide, she helps her child to construct and use skills that go beyond his functional developmental level (i.e. what he or she can do without support) towards his optimal level of development (i.e. the highest performance level with high support conditions; Fischer & Bidell, 1998), that is, as Vygotsky called it, she instructs in the child's zone of proximal development (Fischer & Bidell, 1998; Wertsch, 1985). During this type of interactions microdevelopment of skill occurs. Microdevelopment of skill refers to situated and socially supported construction of higher-level cognitive structures during specific interactions, by integrating and hierarchically coordinating previously established lower-level skills (Fischer, 1980). We presuppose that parents can initiate and stimulate microdevelopment of skills by applying so called cognitive distancing behaviors in task-focused interactions with the child, that is, all questions, suggestions, instructions, and modeling of strategies that stimulate the child to adopt higher level cognitive behavior, in particular more abstract representations, in performing a task (Sigel, Stinson, & Kim, 1993). We further assume that cognitive skills developed on microlevel within a specific situation are related to the general cognitive skill development children show on macrolevel by processes of consolidation and cross-task generalization (see for an extensive discussion: Fischer & Bidell, 1998; see also Chen & Siegler, 2000; Siegler & Svetina, 2002).

Turkish immigrants constitute the largest non-Western ethnic minority group in the Netherlands. The first Turkish men arrived in the Netherlands at the second half of the 1970's as unschooled (temporary) laborers. Later their families followed. Most Turkish immigrants originated from poor rural areas and had low levels of schooling, especially the women. In general, cultural beliefs and parenting practices of these immigrants are traditional and collectivistic. Respect, obedience and sense of responsibility for the family are highly valued (see for instance Leseman, Sijsling, Jap-A-Joe, & Şahin, 1995). Immigrants from Surinam are the descendants from African slaves and Indian and Indonesian contract-laborers. They constitute the second largest ethnic minority group in the
Cognitive Co-construction in Mother-Child Interaction

Netherlands. Although Surinam is one of the former Dutch colonies, and almost all Surinamese immigrants are familiar with the Dutch culture, went to schools modeled on the Dutch school system, and speak the Dutch language, the Surinamese culture and associated parenting beliefs are still distinct from the Dutch (see for instance Leseman et al., 1995; Riksen-Walraven, Meij, Hubbard, & Zevalkink, 1996).

The aforementioned has resulted in a number of research questions to be addressed in the present study. First we want to determine what kind of interaction patterns and styles can be observed during two different co-constructive mother-child interactions. Do these interaction patterns differ between the four groups in this study (i.e. Dutch working- and middleclass, Surinamese-Dutch and Turkish-Dutch)? And do these patterns change during the year prior to kindergarten entrance (3 to 4 years of age)? Furthermore we want to address whether these possible differences in interaction style can be related to the family’s SES and the cultural beliefs mothers express regarding children, development, and parenting. Finally we intend to explore if differences in co-constructive interactions can explain (part of) the variance in children’s cognitive development as determined with norm-referenced tests at the entrance into kindergarten, while mediating the effects of SES and cultural beliefs.

4.2 Method

4.2.1 Subjects and Procedures
Fifty-eight mother-child dyads from two major cities in the Netherlands participated in the study. All Dutch participants and most of the Surinamese participants were recruited in the first city by a mailed request sent by the city council to a random sample of Dutch and Surinamese families with a 3-year-old child. The positive response rate was 32%; because of privacy regulations in that city no reminders could be sent to the non-responders. The Turkish families and remainder of the Surinamese families were recruited in the second city. As it was expected that response to a mailed request would be too low, the municipality provided names and addresses of possible subjects. The families were contacted personally and 46% agreed to participate. The participating dyads were divided into four subgroups based on ethnic background or SES. The first group consisted of 15 Dutch mother-child dyads with a high socioeconomic status (referred to as

66
Developmental Changes in Cognitive Co-Construction in Dutch, Surinamese-Dutch and Turkish-Dutch Mother-Child Problem-Solving Interactions

‘Dutch middle-class’). The second group was composed of 15 Dutch mother-child dyads with a low socioeconomic status (‘Dutch working-class’). The third group consisted of 15 Surinamese mother-child pairs with varying socioeconomic status. Thirteen Turkish immigrant mother-child pairs, again with a diverse yet on average low socioeconomic status, formed the last group. The Turkish and Surinamese mothers were all first generation immigrants. In general the Surinamese mothers had been living in the Netherlands longer than the Turkish mothers; respectively 19 years (range = 11 to 31 years, SD = 5.6) and 10 years (range = 4 to 21 years, SD = 5.6). All Surinamese mothers used the Dutch language in their communications. All Turkish mothers preferred the Turkish language. Three types of data were collected on three moments in the course of one year in the homes of the dyads. At the first measurement occasion children’s average age was 39 months (min. = 36 months, max. = 44 months, SD = 2.2). At the second occasion the average age of the children was 45 months (min. = 40, max. = 50, SD = 2.5). At the third observation period the children’s average age was 51 months (min. = 48, max. = 58, SD = 2.6). There was a slight over representation of boys in the sample: 53% in the Dutch middle-class group (8 out of 15), 60% in the Dutch working-class group (9 out of 15), 67% in the Surinamese group (10 out of 15), and 62% in the Turkish group (8 out of 13).

4.2.2 Co-constructive Interactions

The first set of data consisted of video recordings of mother-child interactions during two task sessions. Mother-child interactions were observed during a school-like (although still playful) picture sorting task and a more playful and practical block construction task on three observation periods in the course of a year. The tasks were explained to the mothers in advance. Mothers were told to instruct and assist their child when they thought this necessary.

The picture task concerned a symbolic problem-solving situation. The objective of the task was to assemble threesomes according to their super-ordinate (for instance dairy products, fruits or boats). All cards depicted familiar objects; for instance ‘milk’, ‘train’ or ‘apple’. An exemplary threesome (three musical instruments) was put in front of mother and child. At the first measurement occasion five sets of cards had to be assembled. An extra set of three cards was added at each of the following measurement occasions to enhance task-difficulty.

The second task concerned a practical problem-solving situation (block task), in
Cognitive Co-construction in Mother-Child Interaction

which a marble slide was constructed. A picture of the completed slide was used as a model. During the first observation the task consisted of eight wooden blocks. At each of the next measurement occasions two blocks were added. On average, the two tasks took about six minutes to be completed. From the onset of the task until completion (with a maximum of eight minutes), verbatim transcripts were made of the interactions, supplemented by detailed descriptions of the non-verbal behaviors. Verbal speech units were identified by turns, interruptions and long pauses. Non-verbal behaviors were labeled by simple action verbs (e.g. ‘child picks up apple’). This resulted in a total of 130,143 units. A single task during either of the three measurements had a mean of 358 units per transcript (min. = 76, max. = 1084, SD=172.7). As all Turkish dyads spoke Turkish during their interactions, Turkish native speakers transcribed the interactions of the Turkish dyads and translated them into Dutch.

4.2.2.1 Multi-dimensional coding scheme

A multidimensional coding scheme was applied to every unit in the transcripts, i.e. verbal utterances and non-verbal acts. First, type of behavior (verbal/non-verbal) was coded, followed by the agent (mother/child) who performed the act. Then all acts were coded on the dimension intersubjective cooperation. This dimension distinguished behaviors that indicated maintained intersubjectivity (i.e. initiatives and cooperation) from behaviors that established or disrupted intersubjectivity (i.e. negotiating or disruptive acts). Initiatives were defined as verbal or nonverbal acts directed towards the partner that either started a new episode, or resumed a previously interrupted episode of collaboration. Cooperative behaviors included responses that coherently continued the forgoing actions or extended them by adding new steps or ideas to the interaction, but also instructive behaviors such as repetition, feedback, or explanation of principles and rules, and reasoning. Negotiations referred to discussions concerning goals, role division, and task arrangements that served to (re)establish intersubjective cooperation. Finally disruptions were behaviors that disrupted or ended task interactions. Additionally all behaviors were coded on the cognitive skill dimension, with a coding scheme adapted from Mascolo and Fischer (1999, Table 11.1). Given the age range of the children in this present study, the highest skill-level defined was the level of representational systems, which is thought to emerge as a more or less stable structure between 6 and 7 years of age. In the following section, the skill-levels as used in the coding scheme, will be briefly described.
Developmental Changes in Cognitive Co-Construction in Dutch, Surinamese-Dutch and Turkish-Dutch Mother-Child Problem-Solving Interactions

Single sensorimotor actions were acts such as looking at a partner or grasping a block. When an actor coordinated two sensorimotor actions, such as searching for an object in order to grab the object, these actions were coded as sensorimotor mappings. The highest level of sensorimotor skills, sensorimotor systems, involved the coordination of two or more sensorimotor mappings into one system of intentional and goal directed acts, such as looking at a card and grabbing it and than looking at the rows of cards and placing the card next to some other cards. Single representations involved actions in which one sensorimotor system was used to represent an object looked at or grasped, or to evoke the performance of an action. Included in this category were giving (or asking for) brief verbal descriptions and labels to objects, and giving (or following) concrete instructions to act upon an object (‘pick up this picture’). We further distinguished an extra skill-level (not defined by Mascolo & Fischer [1999], but apparent in their Table 11.1), referred to as the level of compounded single representations. This was done to account for the goal-oriented coordination of multiple sensorimotor systems that was frequently observed in longer connected sequences of apparently planned nonverbal task performance, assuming that these behaviors were connected by a certain plan of action. Representational mappings involved (exclusively verbal) actions that related two or more representations, such as discussing or evaluating plans of action, strategies or approaches, and negotiating about each participant’s role in the collaborative work. Included were also verbal behaviors that stimulated the use of mental representations (such as conceptual instructions: ‘Look for pictures of things you can eat.’) or that related present task performance to previous personal experiences (‘What did Daddy use when he was fixing your dollhouse?’). Finally, task related instructions, formal definitions, and reasoning or theorizing involving conventional superordinates (‘fruits’, ‘means of transport’) and abstract cognitive concepts and principles (‘causation’, ‘gravity’), or connecting what happened in the task to general topics or theories that were not directly based in personal experience, were coded as representational systems.

Inter-coder reliability analyses on 5% of the data showed satisfactory results, with Cohen’s kappa ranging from .65 for cognitive skill on the block task to 1.00 for agent on both tasks.
Cognitive Co-construction in Mother-Child Interaction

4.2.2.2 Composite measures
For each interaction situation (picture task and block task) and for each measurement occasion two composite measures were computed for further analyses. The first, referred to as cognitive skill-level, was computed separately for mother and child as a weighted sum of all mother or child actions on each distinguished skill-level if initiating or cooperative, divided by the mother’s or the child’s total number of initiating and cooperative actions respectively. Preliminary analyses (separately for mother and child), correlating for each skill-level the proportion of actions on that level with family’s SES and children’s cognitive test scores, showed an almost linear relationship: the proportion of actions on the lowest skill-level correlated strong and negatively, while the proportion of actions on the highest skill-level correlated strong and positively with these criterion variables, with correlations for intermediate skill-levels falling neatly in-between. Because simple sensorimotor actions were infrequent, the first two sensorimotor levels were pooled and given the weight 1. Sensorimotor systems were assigned weight 2, single representations weight 3. To emphasize the higher complexity of the following levels of representational skills, the levels were set further apart by giving compounded representations with 5, representational mappings weight 6, and representational systems weight 7. This way a score was obtained for participants representing their mean skill-level, on a scale of 1 to 7.

The second composite measure, referred to as contribution to cognitive co-construction, combined information on each of the participants’ share in task, their intersubjective cooperation, and their mean cognitive skill-level, thus providing on theoretical grounds a quantitative operationalization of the construct of cognitive co-construction. For this composite measure the weighted sum of the skill-levels of initiating and cooperative behaviors of either mother or child was divided by the total number of all acts of mother and child together, including also non-cooperative actions. The theoretical range of this composite was from 0, indicating no contribution to co-construction at all by this particular participant (which did not occur in the present study), to 7, indicating that all actions observed in that particular situation were performed by this one participant (the other not contributing), and that they were all initiating or cooperative, and on the highest skill-level.

4.2.3 Interviews
The second type of collected data consisted of structured interviews with the mothers, conducted by trained female research assistants from the same cultural
community. The interviews were held at the time of the first observation period. During these interviews family SES, and mother’s idea’s regarding parenting, child development, and developmental goals were addressed.

4.2.3.1 Socioeconomic status
The family’s socioeconomic status (SES) was measured on a nine-point scale and computed as the mean of both parents’ completed educational level. The educational levels on the scale ranged from 1 (incomplete elementary school) to 9 (university degree). Families with a SES between 1 and 6.5 were categorized as ‘working-class’; families with a SES higher than 6.5 were categorized as ‘middle-class’. This cut-off point represents a basic track division in the secondary education system in the Netherlands. A SES up to 6.5 indicates intermediate (secondary) vocational education as the highest form of completed education, while 7 or above indicates levels of general (secondary) education and higher. The sample accurately reflected the socioeconomic positions of the Surinamese and Turkish families with young children in the Netherlands at the time of data collection according to national statistics (Tesser & Iedema, 2001). An analysis of variance (ANOVA) and an additional post-hoc Tukey test showed that the Dutch middle-class mean SES of 8.1 (SD=.6) was significantly higher than the mean SES of the other three groups (Dutch working-class mean= 5.0, SD=1.2; Surinamese-Dutch mean = 6.0, SD= 1.7; Turkish-Dutch mean= 3.7, SD=1.6), but that differences between the other three groups were not significant (F(3, 54)=26.4, p< .000).

4.2.3.2 Parenting beliefs
Parenting beliefs were determined with a structured questionnaire adapted from Schaefer and Edgerton’s ‘Parental Modernity Inventory’ (1985). Mothers were asked to indicate their agreement with 43 statements on a five point Likert scale (strongly disagree; disagree; neither disagree nor agree; agree; strongly agree). The statements, such as ‘Children are eager to learn by nature’ or ‘Children must always obey their parents’, were pooled. As a result a high score on the parental beliefs scale indicated that parents held modern individualistic parenting beliefs. Reliability of the scale was satisfactory with the 43 items resulting in a Cronbachs’ alpha of .92.
Cognitive Co-construction in Mother-Child Interaction

An ANOVA and a post-hoc Tukey test showed that Turkish mothers' parenting beliefs were significantly less modern than the beliefs of the mothers from the other groups ($F(3, 54) = 22.9, p<.000$).

4.3.3 Cognitive Developmental Level
Finally, norm-referenced tests were used to assess children’s receptive vocabulary in their first language, semantic-taxonomic (i.e. super ordinates) and logomathematical concept knowledge (i.e. size and amount). All subtests had satisfactory internal consistency. The receptive vocabulary test and the concept knowledge tests are frequently used for student monitoring in preschools and the lower grades of primary school. The receptive vocabulary test was specifically developed for bilingual development studies (Narain & Verhoeven, 1992); the Dutch and Turkish tests were equivalent parallel tests. To reduce the number of variables and to strengthen measurement quality, a composite test score was computed as the sum of the subtests after standardization of the subtest scores. Intercorrelations of the sub-tests varied between $r = .46$ and $r = .76$.

4.4 Results

4.4.1 Share in Task
Overall, children had a smaller share in task execution (i.e. 40% on average) than their mothers (see Table 1). Children’s share in task generally increased over time with about 3% to 7%; this increase was not always significant. Dutch middle-class children increased their share in task significantly during the picture task ($F(2, 42) = 4.3, p<.02$), however, during the block task the increase was only borderline significant ($F(2, 42) = 3.0, p<.06$). On the other hand, share in task of Dutch working-class and Surinamese children only increased significantly during the block task (respectively $F(2, 42) = 3.8, p<.03$, and $F(2, 42) = 5.0, p<.02$). Turkish children’s share in task did not show an increase during the picture task. The small increase found for the block task was not significant.
### Table 1  Children’s Share in Task as Percentage of Total Number of Acts in Task

<table>
<thead>
<tr>
<th>Picture task</th>
<th>Measurement 1</th>
<th>Measurement 2</th>
<th>Measurement 3</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Group</strong></td>
<td><strong>Mean</strong></td>
<td><strong>(SD)</strong></td>
<td><strong>Mean</strong></td>
</tr>
<tr>
<td>1</td>
<td>40</td>
<td>(3.9)</td>
<td>42</td>
</tr>
<tr>
<td>2</td>
<td>37</td>
<td>(4.1)</td>
<td>39</td>
</tr>
<tr>
<td>3</td>
<td>41</td>
<td>(3.9)</td>
<td>40</td>
</tr>
<tr>
<td>4</td>
<td>39</td>
<td>(4.6)</td>
<td>40</td>
</tr>
</tbody>
</table>

| Block task | **Mean** | **(SD)** | **Mean** | **(SD)** | **Mean** | **(SD)** |
| 1 | 37 | (5.0) | 40 | (6.1) | 42 | (4.4) |
| 2 | 34 | (5.7) | 38 | (4.2) | 38 | (4.6) |
| 3 | 35 | (8.5) | 42 | (9.1) | 42 | (4.7) |
| 4 | 41 | (6.3) | 41 | (6.2) | 45 | (5.7) |

N.B. mothers’ share in task can be acquired by subtracting children’s share in task from 100.

*Group 1 = Dutch middle-class; Group 2 = Dutch working-class; Group 3 = Surinamese-Dutch; Group 4 = Turkish-Dutch.

#### 4.4.2 Intersubjective Cooperation

Exploration of the behaviors on the intersubjective cooperation dimension showed that the vast majority of behaviors was cooperative with respect to the evolving common plan of action, and far less often initiating, negotiating, or disrupting, thus indicating a high degree of intersubjective collaboration. Although initiatives were not particularly frequent they were regarded as intersubjective behaviors as well, since initiating requires children to take turns and identify and express their needs and interests to their social partner (see Landry et al., 2000). On average, 89% of all mother and child behaviors observed were evaluated as intersubjective (children: mean = 88%, SD= 10, min.= 42%, max.= 100%; mothers: mean = 90%, SD = 8.4, min.= 54%, max. = 100%).

ANOVA’s revealed that Turkish dyads showed significantly less intersubjective behaviors during both tasks than dyads from the other groups (children: $F(3, 54)= 32.1, p< .000$; mothers: $F(3, 54)= 37.4, p< .000$). However, like all other dyads they showed significantly more intersubjective behaviors during the picture task than during the block task (mothers: $F (1, 346)= 55.0, p< .000$; children: $F (1, 346)= 29.1, p< .000$). No clear developmental trends with regard to intersubjective cooperation were observed during either of the tasks.

73
### Cognitive Co-construction in Mother-Child Interaction

#### Table 2 Cognitive Skill-Levels of Children and Mothers, by Group, Task, and Measurement Time

<table>
<thead>
<tr>
<th></th>
<th>Picture task</th>
<th>Block task</th>
</tr>
</thead>
<tbody>
<tr>
<td>Children</td>
<td></td>
<td>Mean (SD)</td>
</tr>
<tr>
<td>Period 1</td>
<td></td>
<td>2.6 (0.44)</td>
</tr>
<tr>
<td>Group 1</td>
<td></td>
<td>2.3 (0.30)</td>
</tr>
<tr>
<td>Group 2</td>
<td></td>
<td>2.3 (0.53)</td>
</tr>
<tr>
<td>Group 3</td>
<td></td>
<td>2.0 (0.30)</td>
</tr>
<tr>
<td>Group 4</td>
<td></td>
<td>2.9 (0.41)</td>
</tr>
<tr>
<td>Period 2</td>
<td></td>
<td>2.7 (0.53)</td>
</tr>
<tr>
<td>Group 1</td>
<td></td>
<td>2.6 (0.39)</td>
</tr>
<tr>
<td>Group 2</td>
<td></td>
<td>2.1 (0.44)</td>
</tr>
<tr>
<td>Group 3</td>
<td></td>
<td>2.9 (0.81)</td>
</tr>
<tr>
<td>Group 4</td>
<td></td>
<td>2.7 (0.32)</td>
</tr>
<tr>
<td>Group 3</td>
<td></td>
<td>2.6 (0.72)</td>
</tr>
<tr>
<td>Group 4</td>
<td></td>
<td>2.2 (0.43)</td>
</tr>
<tr>
<td>Period 3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Group 1</td>
<td></td>
<td>2.4 (0.38)</td>
</tr>
<tr>
<td>Group 2</td>
<td></td>
<td>2.3 (0.34)</td>
</tr>
<tr>
<td>Group 3</td>
<td></td>
<td>2.3 (0.29)</td>
</tr>
<tr>
<td>Group 4</td>
<td></td>
<td>2.3 (0.40)</td>
</tr>
<tr>
<td>Period 2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Group 1</td>
<td></td>
<td>2.4 (0.35)</td>
</tr>
<tr>
<td>Group 2</td>
<td></td>
<td>2.4 (0.37)</td>
</tr>
<tr>
<td>Group 3</td>
<td></td>
<td>2.3 (0.47)</td>
</tr>
<tr>
<td>Group 4</td>
<td></td>
<td>2.3 (0.42)</td>
</tr>
<tr>
<td>Period 3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Group 1</td>
<td></td>
<td>2.1 (0.35)</td>
</tr>
<tr>
<td>Group 2</td>
<td></td>
<td>2.3 (0.30)</td>
</tr>
<tr>
<td>Group 3</td>
<td></td>
<td>2.1 (0.41)</td>
</tr>
<tr>
<td>Group 4</td>
<td></td>
<td>2.4 (0.39)</td>
</tr>
</tbody>
</table>

*Group 1 = Dutch middle-class; Group 2 = Dutch working-class; Group 3 = Surinamese-Dutch; Group 4 = Turkish-Dutch.
4.4.3 Cognitive Skill-Level

Table 2 shows how mean cognitive skill-levels differed considerably between children from the different groups. ANOVA’s showed that these differences in skill-levels were significant at all measurement times for both tasks (from $F(3, 54)=3.6$, $p<.02$ to $F(3, 54)=15.1$, $p<.000$). A post-hoc Tukey test confirmed that Turkish children showed significantly lower skill-levels, especially when compared to Dutch middle-class children. At the last observation of the block task Surinamese children also had a significantly lower mean skill-level than Dutch middle-class children ($p<.043$). Table 2 further presents effect sizes of observed developmental changes in skill-levels from first to second and from first to third measurement time. Effect size was computed by dividing the difference between measurement times by the pooled standard deviation. Over the period of about one year Dutch working-class children showed the strongest increase in skill-level with respect to the picture task. Dutch middle-class children showed a strong increase in skill-level from the first to the second measurement time for the block task, but a decrease from the second to third measurement time, which may reflect decreased interest in the task at that time. A similar pattern was found for the Surinamese children. Turkish children showed steadily increasing skill-levels over time on both tasks. Their growth was strongest with respect to the block task. Overall, mothers’ mean cognitive skill-level was lower than children’s cognitive skill-level, with the exception of the Turkish group, reflecting especially the mothers’ role in practically organizing the task situation (coded on lower cognitive skill-level). Group differences in mean skill-levels were found significant on two measurement occasions only: during the last observation of the picture task ($F(3, 54)=2.9$, $p<.042$) and during the first observation of the block task ($F(3, 54)=3.2$, $p<.029$, post-hoc Tukey: group1> group 4, $p<.016$). There were no clear developmental changes in mothers’ mean skill-levels for the picture task (see effect-size in Table 2). However, a rather dramatic decrease in skill-levels was found for Dutch mothers during the block task (i.e. over one-and-a-third standard deviation). Although skill-levels of Surinamese and Turkish immigrant mothers decreased as well, the decrease was much less dramatic.

4.4.4 Changes in Contribution to Co-Construction

The composite measure contribution to co-construction combined information about the participants’ share in task, intersubjective cooperation, and skill-level.
Cognitive Co-construction in Mother-Child Interaction

Changes in the participants’ contribution to the co-construction process and differences between groups were tested for statistical significance by trial trend analyses in a repeated measures analysis, with one between-subjects factor (group), and one within-subjects factor (time). Post-hoc Tukey tests were applied to test if groups differed significantly. Mean scores of the composite measures are represented graphically in Figure 1, showing over-time development of children’s and mothers’ contribution to co-constructive processes by group and task. The statistical test results are summarized below.

**Figure 1  Developmental Changes in Children’s and Mothers’ Contribution to Cognitive Co-construction in Children’s Fourth Year of Life**

<table>
<thead>
<tr>
<th>Children</th>
<th>Mothers</th>
</tr>
</thead>
<tbody>
<tr>
<td>Picture task</td>
<td>Picture task</td>
</tr>
<tr>
<td>Block task</td>
<td>Block task</td>
</tr>
</tbody>
</table>

**Measurement Times**

---

- - - Dutch middle-class  Surinamese
- - - Dutch working-class Turkish
Regarding children’s contribution during both tasks only main effects for time and group were found. The first main effect indicated that interaction-levels differed significantly over time (picture task: $F(2, 108)= 17.3, p< .000$; block task: $F(2, 108)= 18.1, p< .006$). A test of between-subjects effects indicated that changes in contribution differed significantly between groups (picture task: $F(3, 54)= 11.9, p< .000$; block task: $F(3, 54)= 11.8, p< .000$). Post-hoc Tukey tests showed that during both tasks children from both Dutch groups as well as Surinamese children contributed significantly more to the co-constitution process than Turkish children. Dutch middle-class children also had a significantly higher contribution than Dutch working-class children.

Significant main effects of time and group were also found for the mothers for both tasks. During the picture task a significant interaction effect between time and group was found. The main effects indicated that over time changes in mothers’ contribution were significant (picture task: $F(2, 108)= 3.0, p< .056$; block task: $F(2, 108)= 23.7, p< .000$). The interaction effect indicated that these changes over time differed between the four groups (for the picture task only: $F(6, 108)= 4.5, p< .000$). Figure 1 shows that for instance Dutch middle-class mothers’ contribution to the picture task decreased strongly, whereas Turkish mothers’ contribution increased over time. In all groups an overall decrease of mothers’ contribution to the block task was found (linear: $F(1, 54)= 49.8, p< .000$); the decrease was slightest for Turkish mothers (see Figure 1). Finally, between-subjects tests and post-hoc Tukey test showed that Turkish mothers contributed significantly less to the co-constitution process during both tasks than mothers from the other three groups ($F(3, 54)= 9.9; p< .000$).

4.4.5 Stability of Between-Subjects Differences

Pearson correlations between the scores on consecutive measurement times were computed to examine the stability of between-subjects differences in cognitive skill-level and contribution to co-constitution. Differences between children’s cognitive skill-level appeared fairly stable over time, with correlations of $r = .54$ (time 1-2), $r = .52$ (time 2-3) and $r = .47$ (time 1-3) for the picture task, and $r = .67$, $r = .62$, and $r = .56$ for the block task respectively (all correlation coefficients were significant at $p < .000$). Similarly, children’s contribution to the co-constitution process appeared fairly stable as well, with cross-lag correlations of $r = .61$, $r = .58$, and $r = .58$ for the picture task and $r = .65$, $r = .55$, and $r = .53$ for
Cognitive Co-construction in Mother-Child Interaction

the block task (all $p < .000$). Regarding the mothers, moderate to high stability of between-subjects differences in cognitive skill-level was found between time 1 and 2 ($r = .59$ and $r = .64$ for the picture task and the block task respectively; $p < .000$), but lower stability between time 2 and 3 ($r = .43$ and $r = .37$ for the picture task and the block task respectively; $p < .01$). Correspondingly, moderate stability in mothers’ contribution to the co-construction process was found between time 1 and 2 for both tasks ($r = .57$ and $r = .52$ respectively; $p < .000$), but low stability between time 2 and 3 ($r = .40$ and $r = .39$ respectively; $p < .01$). The latter results are in accordance with the developmental changes in mothers’ cognitive skill-level and contribution to co-construction reported in the previous section.

A further analysis concerned cross-task correlations on each measurement occasion. With regard to cognitive skill-level, moderately strong correlations were found for the children ranging from $r = .48$ to $r = .61$ ($p < .001$), but weaker correlations for the mothers, ranging from $r = .27$ ($p < .05$) to $r = .42$ ($p < .01$). A similar pattern was found for contribution to co-construction with cross-task correlations ranging from $r = .47$ to $r = .65$ ($p < .001$) for children and from $r = .25$ (n.s.) to $r = .41$ ($p < .01$) for the mothers.

4.4.6 Relationships with Children’s Cognitive Test Scores, SES, and Parenting Beliefs

Finally, relationships were examined between observed co-constructive task interactions and children’s cognitive test scores (based on a composite of norm-referenced language and cognition tests), family SES and modernity of parenting beliefs. Before presenting results of the correlation- and regression analyses, an overview of the development of each group’s cognitive test scores is given in Table 3. Overall, with only small differences between the groups, children’s cognitive test scores increased strongly within the year of the research (effect size $d$ for growth was on average about 1.6). Repeated measurements ANOVA revealed a significant main effect of measurement time ($F(2, 108) = 113.1; p < .000$) and group ($F(3, 54) = 5.3; p < .002$), but no significant interaction-effects of time and group.

Overall, correlations of children’s cognitive skill-level and contribution to cognitive co-construction at each measurement occasion with children’s cognitive test scores were moderate, ranging from $r = .26$ ($p < .05$) to $r = .54$ ($p < .000$) for cognitive skill-level and from $r = .27$ ($p < .05$) to $r = .60$ ($p < .000$) for contribution to co-construction. The pattern of correlations of mothers’ cognitive skill-level and contribution to co-construction reported in the previous section.
Developmental Changes in Cognitive Co-Construction in Dutch, Surinamese-Dutch and Turkish-Dutch Mother-Child Problem-Solving Interactions

skill-level and contribution to co-construction with children’s cognitive test scores was similar to the pattern found with the children.

Table 3  Children’s Cognitive Test Scores at the Three Measurement Times.

<table>
<thead>
<tr>
<th>Group</th>
<th>Measurement 1</th>
<th>Measurement 2</th>
<th>Measurement 3</th>
<th>Effect Size</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean (SD)</td>
<td>Mean (SD)</td>
<td>Mean (SD)</td>
<td>Time 1-3</td>
</tr>
<tr>
<td>Dutch middle-class</td>
<td>9.68 (0.77)</td>
<td>10.10 (0.53)</td>
<td>10.59 (0.34)</td>
<td>1.66</td>
</tr>
<tr>
<td>Dutch working-class</td>
<td>9.28 (0.66)</td>
<td>9.74 (0.50)</td>
<td>10.11 (0.53)</td>
<td>1.47</td>
</tr>
<tr>
<td>Surinamese</td>
<td>9.18 (0.45)</td>
<td>9.53 (0.61)</td>
<td>10.08 (0.55)</td>
<td>1.68</td>
</tr>
<tr>
<td>Turkish</td>
<td>8.99 (0.46)</td>
<td>9.25 (0.66)</td>
<td>9.90 (0.50)</td>
<td>1.69</td>
</tr>
</tbody>
</table>

The correlations of children’s cognitive skill-levels and their contribution to co-construction with family SES and modernity of parenting beliefs, were moderately strong and positive (ranging from \( r = .34, p<.01 \) to \( r = .59, p<.000 \)), indicating that a relatively high family SES and modernity of parenting beliefs were associated with higher cognitive skill-levels and greater contribution to co-construction by children. The correlations between mother’s cognitive skill-levels and contribution to co-construction were less univocal.

In order to explore whether differences in co-constructive interactions could serve to explain part of the variance in the cognitive development of the children by entrance into kindergarten - i.e. as mediating processes between cognitive development and socioeconomic status and cultural background- two regression analyses were performed with children’s cognitive test scores at the last measurement occasion as the dependent variable. In the first analysis only variables relating to the observed family processes and family socioeconomic and cultural background were included. Entry order was determined on the basis of the presumed proximity of the variables to the developmental process of the child.

At the first step, measures of children’s contribution to the co-construction process in both problem-solving tasks were entered, which were seen as the most proximal determinants of children’s cognitive development. Given the moderate stability of these variables over time, the measures obtained at each measurement time were pooled for each task, yielding two predictors. At the second step, measures of mothers’ contribution to the co-construction process were entered. Again, the measures obtained at the three measurement times were pooled. At the third step, cultural parenting beliefs, and at the final step socioeconomic status
Cognitive Co-construction in Mother-Child Interaction

and two dummy variables representing Surinamese and Turkish ethnicity were entered, which were seen as the most distal determinants of children’s cognitive development. The second regression analysis was conducted in a similar way maintaining the entry order of the family process and background variables, but now entering at the first step children’s cognitive tests scores of the first measurement occasion in order to determine the additionally explained variance by family processes and background characteristics controlling for the child’s cognitive ability at the start.

Table 4 Predicting Children’s Cognitive Test Scores at Kindergarten Entrance at Age 4.

<table>
<thead>
<tr>
<th>Predictors</th>
<th>Model 1</th>
<th></th>
<th>Model 2</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>R² Change</td>
<td>.51 ***</td>
<td>R² Change</td>
<td>.66 ** (.59)</td>
</tr>
<tr>
<td>Cognitive Test Scores 1</td>
<td>-</td>
<td>.28 **</td>
<td>.07 *</td>
<td></td>
</tr>
<tr>
<td>Children’s Contribution</td>
<td>.12 *</td>
<td>.04</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mothers’ Contribution</td>
<td>.01</td>
<td>.01</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Modern Parenting Beliefs</td>
<td>.09 *</td>
<td>.03</td>
<td></td>
<td></td>
</tr>
<tr>
<td>SES and Ethnicity</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

| Total R² (Adjusted R²)            | .49 ** (.40) | .66 ** (.59) |

*p < .05; ** p < .01; *** p < .000

Table 4 shows that, in the first analysis, a total of 49% variance in children’s cognitive developmental level was explained. Children’s contribution to co-construction processes, seen as a proximal determinant of their cognitive test scores, predicted 28% of the variance (F(3, 54) = 6.8, p < .001). An additional significant amount of variance was explained by mothers’ contribution to co-construction processes and family background, indicating that not all home influences were mediated by children’s behavior. In the second analysis, children’s time one cognitive test scores, as expected, predicted the largest part of the variance, 51% (F(1, 56) = 58.4, p < .000), but the children’s contribution to co-construction explained an additional significant amount of 7% (F(3, 53) = 2.9, p < .045). The other family variables did not add significantly to the explained variance.
4.5 Discussion

4.5.1 Main Results
The first set of research questions addressed whether interaction-patterns and developmental changes in these patterns differed by group, and whether these interaction patterns were related to differences in parenting beliefs, SES or ethnic background. Although results showed a general trend of dyads working closely together on both tasks without many problems and disturbances, considerable group differences were found regarding share in task, cognitive skill-levels, and participant’s contribution to the co-construction process. Although all dyads showed significant developmental changes in co-construction processes, change-patterns differed between the groups. These change-patterns were related to parenting beliefs and to family SES.

Overall, the results showed two distinctive patterns. The first pattern indicated good cooperation between mother and child. At the first observation mothers controlled and directed the interaction, while simultaneously providing the child with extensive verbal and non-verbal support regarding their performance and task objectives. Over time these mothers became less directive and left more of the actual task performance to their child. Although skill-levels of these dyads were relatively high, these mothers decreased their skill-levels over time, as they more and more confined themselves to practical support and simple actions of arranging the task situation. Combining the decreasing share in task and the decreasing skill-level, the composite measures of mothers’ contribution to the co-construction process decreased as well. In contrast, children’s skill-level and their share in task increased with time, while they remained highly cooperative with their mothers. Consequently, composite measures of children’s contribution to co-construction processes increased as well, in particular from the first to the second measurement time (with a slight drop from the second to the third regarding the block task, which may have become too easy). In families showing this pattern, mothers seemed well aware of their children’s growing capacity to handle the tasks. They anticipated the changing needs of their child by tailoring their participation to the child’s growing capacity and allowing the child increasing responsibility for the task, in accordance with the sociocultural theory of cognitive development (Gauvain, 2001; Landry, Smith, Swank, & Miller-Loncar, 2000; Rogoff, 1998). Although this parenting strategy was most clearly seen with
Dutch middle-class dyads, it was also common for Dutch working-class and Surinamese dyads. This apparent understanding of children as active participants in their own development is in line with modern, individualistic parenting beliefs (see for instance Harkness & Super, 1999; Leseman et al., 1995). The moderately strong positive correlations of mothers’ parenting beliefs with skill-level and contribution to co-construction confirmed this association.

The second interaction-pattern showed less intersubjective understanding and cooperation between the partners. The interactions were controlled and directed by the mothers. In families showing this pattern, mothers provided many directive instructions, and handled considerable parts of the actual task performance throughout the year. They did not allow children increasing responsibility to handle the task; children’s share in task did not change much over time. This particular developmental pattern was observed with Turkish dyads in the present study. It showed similarities with parenting practices in more traditional and collectivistic oriented cultures, from which many of the Turkish mothers originated (see for instance Kağıtçibaşı, 1997). The cognitive skill-levels at all times were relatively low. Yet, they did rise for both mothers and children regarding the picture task, and for children regarding the block task. Consequently, composite measures of the participants’ contribution to the co-construction processes showed an increase for both mothers and children regarding the picture task, as if both, not just the child, were developing their problem-solving skill in this domain. A possible explanation is that the conventional semantic knowledge involved in this particular task was not readily available to these on average lowly educated mothers.

Children’s skill-level and contribution to the co-construction process correlated moderately strong between tasks and between measurement occasions, indicating coherence between different task situations and developmental continuity over time. Seen as situations of microdevelopment of cognitive skill with decreasing need for social support and increasing executive responsibility, coherence across situations and continuity across time can be seen as essential for consolidation and generalization of children’s cognitive skill, thus for cognitive macrodevelopment (Fischer & Bidell, 1998; Siegler & Svetina, 2002). This, generally, was confirmed in correlation and regression analyses, showing moderately strong relationships with cognitive test scores and substantial prediction of variance in these test scores by pooled measures of children’s co-construction, even when children’s previous levels of cognitive development were 82
controlled for. A relatively big (and over time increasing) contribution to the joint co-construction processes by the child, which was made possible, stimulated, and allowed for in the course of development by the mother, was related to a larger cognitive growth for the child as measured by tests from the first to the final measurement time. Gradually learning to share control and influence provides the child with skills that prepare him for greater independence in social and cognitive functioning (Landry et al, 2000). From the age of three upward children need less parental support for their focus of interest (see for instance Landry at al., 2000). While high support of a relatively low complexity may have been most effective on the earliest observations, withdrawing gradually from actual task performances, while still offering cognitively complex and stimulating support, may have been more effective for micro- and macrodevelopment when the child had further developed his skills. 

Of the distal variables, SES and ethnicity, only SES explained an additional part of the variance, suggesting that the observed proximal family characteristics in the child’s fourth year of life mediate the SES effect only partially. This is not surprisingly, since only two types of task-situations were studied between children’s third and fourth birthday. Interestingly, the remaining direct effect of SES disappeared when children’s cognitive test scores at time one were included in the regression analysis. This may indicate that remaining SES effects refer to experiences before age three. Note that already at the first measurement occasion, at age 3, the differences between children from the four groups in average cognitive skill level were considerable.

4.5.2 Conclusion
Immigrant children who fell behind in their cognitive development by the time they entered kindergarten had experienced less responsibilities for task interactions and less cognitive stimulation during the interactions with their mothers. Their mothers had responded to their growing capabilities by increasing the complexity level of interactions, but not by delegating a greater share of the task performance to them. This specific interaction pattern seemed however not so much to result from the immigrant’s ethnic background, as it did from their SES. As family SES (i.e. the educational levels of parents) increased within an immigrant group, so did the modernity of their parenting beliefs and their parenting style (as seen with the Surinamese group). This suggested that although
Cognitive Co-construction in Mother-Child Interaction

many values of the original culture remained to shape beliefs about children, development, and parenting, so did values of the new culture. Together resulting in a parenting style that contributed significantly to their child’s cognitive development in the year prior to kindergarten.
Human ontogenetic development takes place within a dynamic developmental niche of mutually influencing proximal and distal nature and nurture processes. Within this system, social interactions function as the crucible of biological and cultural aspects of human development. The proximal process interactions through which children are socialized consist of numerous microgenetic episodes. Cognitions develop as an individual gradually accumulates experiences during these moment-to-moment interactions with the physical, social, and cultural environment of his or her particular developmental niche.

The basic goal of this present thesis was to (1) describe and examine the intersubjective and cognitive distancing aspects of cognitive co-construction processes between young children and their mothers during microgenetic episodes of proximal process interactions; (2) to explore the relationship between these aspects of microgenetic episodes of proximal processes and a number of cultural context variables of the developmental niche; (3) and finally, to examine over-time change processes in co-constructive interactions and the possible influence of the cultural context variables on these changes. The data used to tackle these issues were part of a pre-existing data set. The date included video observations, structured interviews, and cognitive developmental assessments, and spanned the year prior to the children’s enrolment in kindergarten at the age of four.

In this final chapter the main findings and conclusions of the theoretical first chapter and the empirical studies presented in chapters 2, 3, and 4 will be discussed. The present chapter concludes with limitations of the presented studies and recommendations for future research.

5.1 Cognitive Co-Construction

The fist empirical study, described in Chapter 2, offered a micro level analysis of co-constructive interactions between mothers and their 4-year-old children. Cognition development was regarded as a co-constructive process brought about through social interaction between organism and environment. Cognitive co-
Cognitive Co-construction in Mother-Child Interaction

construction was defined as the combined operation of intersubjective cooperation of mother and child, and their cognitive distancing behavior in joint activity. In line with findings of previous studies it was hypothesized that presence of intersubjectivity during interactions would increase the use and possibly the complexity of psychological distancing strategies by the more experienced participant. Video-recorded interactions of 41 mother-child pairs solving a practical and a symbolic task were transcribed, coded, and analyzed for this purpose.

Overall, the study showed a very high degree of intersubjective cooperation between mothers and children, which appeared to be quickly and easily established upon confrontation with a new task. Furthermore, during the observed interactions task directed behaviors (i.e. distancing behaviors) were the most common behaviors observed in both task situations. Nearly half of all behaviors regarding the actual execution of the task were performed on distancing levels that implied the use of symbolic representation.

Co-constructive interactions were found to differ by task context. Mothers and children talked more during the picture task and acted more during the block task. With regard to the dimension for intersubjective cooperation children’s behaviors only differed with initiatives and expansions, while mothers showed differences in initiatives, expansions, extensions and instructions. The cognitive content dimension showed that children’s distancing levels did not differ from one task to the other, but the percentage of low-level procedural behaviors did. Furthermore, mothers differed with regard to the low-level procedural behaviors and displayed more low level distancing behaviors during the block task. Within intersubjective cooperation, mothers’ cognitive distancing behavior predicted moderately to strongly children’s cognitive distancing behavior. Children’s cognitive abilities and their age showed a moderate to strong positive correlation with the distancing level of his or her verbal task directed behavior (specifically extensions) and with the nonverbal expansions. As for the mothers, it appeared that specifically their verbal task directed contribution to the interaction effected the distancing levels displayed by their child: higher distancing levels used by mothers correlated with higher distancing levels used by children. This correlation however was less apparent for the nonverbal behaviors.

In summary, this first empirical study deals with one of the three aspects that are associated with the impact-factor of proximal processes on development, the
General Conclusions and Discussion

quality aspect (cf. Bronfenbrenner & Ceci, 1994; Leseman & Van den Boom, 1999). The highly intersubjective cooperative nature of the interactions seemed to indicate both a high degree of reciprocity and of sensitivity. Both mothers and children acted in line with the procedures and goals they set out for the interaction by expanding and extending previous acts, and showing only a scarce number of disruptions or solitary behaviors. Taking into account the fact that mothers were the more knowledgeable partners during these interactions, it was not surprisingly to find that sensitivity was most clearly observable in their behaviors. Mothers seemed to adapt their actual task performance and their instructions, clues, and explanations not just to the general ability of their child, but to the actual ability the child demonstrated during that particular task performance. This was further underlined by the finding that role distribution and distancing level differed from one task to the other. The positive correlation found between higher levels of verbal distancing of mothers and children, seems at least to be an indicator that the type of mother-child interaction-situations studied possibly provide experiences that contribute to the gradual process of cognitive co-construction.

5.2 Co-Construction in Context

The primary goal of the second empirical study presented in Chapter 3, was to explore whether differences in cultural beliefs (rooted in ethnic-cultural background and SES) would coincide with differences in the way mothers interacted with their child during co-constructive interactions, as previous research had shown that differences in parental beliefs were associated with differences in interaction styles and differences in the valuing of developmental goals. A comparison was made between interactions of 45 mother-child dyads living in the Netherlands. Three groups were composed of fifteen dyads each; a Dutch middle-class group, a Dutch working-class group, and a Surinamese-Dutch group respectively. These three groups represented part of the variation seen within the (indigenous) cultural community in the Netherlands (working-class vs. middle-class) as well as part of the variation between cultural/ethnic communities (collectivistic/non-Western vs. individualistic/Western).

The study showed that Dutch mothers regardless of their SES expressed primarily individualistic parenting beliefs. Surinamese mothers, notwithstanding their
upbringing in the tradition of collectivism, expressed these individualistic beliefs as well. In fact, although their agreement with traditional-collectivistic beliefs was stronger than among Dutch mothers, Surinamese mothers expressed less agreement with these beliefs than with individualistic beliefs. As such, these findings suggested a distinction between the parenting beliefs according to ethnic-cultural background: a predominantly individualistic value orientation among Dutch mothers and what might be interpreted as a bicultural orientated value system, incorporating both individualistic and collectivistic values among Surinamese mothers.

The analyses of the intersubjective cooperation and cognitive content dimensions of the co-constructive interactions showed that differences in parental beliefs were reflected in characteristic parenting styles, and that the type of task highlighted differences in interaction styles associated with particular value orientations. While the school-like quality of the picture task seemed to trigger a similar interaction style for all mothers, the more informal and practical nature of the block task presented an interaction situation in which differences in parenting style became apparent.

During the picture task all mothers, regardless of their background, showed a didactic parenting style, which is generally associated with high SES and individualistic parenting styles: informative regarding goals, procedures, and roles and challenging the child to actively participate and extend his understanding of the task. Typically for this mode of interaction, children were given ample opportunity to perform the task themselves. Mothers closely monitored their child’s actions, and used errors as opportunities to explain rules or facts. During the block task Dutch middle-class mothers again showed this didactic parenting style in combination with relatively high distancing levels. During the block task dyads from the Dutch working-class group showed a pattern of behaviors that in earlier studies was regarded as typical for Western parents from low socio-economic background families and traditional-collectivistic beliefs. Mothers approached task and child in a controlling and directive manner, firmly leading proceedings in the desired direction. They used low or intermediate distancing strategies in communication with the child, referring to what was concrete and visible or known from daily life. Surinamese mothers used a mixture of an ‘efficient mode’ (e.g. pursuing correct and rapid completion of the task) and the ‘didactic mode’ (cf Hoogstede et al., 1996). Although these mothers offered the
child room to participate, negotiate, and explore during procedural behaviors, they controlled and dominated the actual task performance (i.e. often performing the task themselves) and left the child little room to be involved as a full-fledged partner. During the block task, mothers and children extensively negotiated the role division, proceedings, and goals. Although Surinamese mothers were mostly directive and very concrete in their instructions to the child, compared to the Dutch working-class mothers their instructions were less leading and more steering (i.e. ‘Does this small block go on top of this big block or on top of that other small block?’ instead of ‘Put that block on top of this one’). Nonetheless, these interactions were not only less cognitively stimulating than those of Dutch middle-class mother-child pairs, but also compared to their own interactions involving task procedures.

If the findings from this study are related to the dynamic approach of development outlined in Chapter 1, it appears that important quality aspects of proximal processes could be met and were met by all mothers involved in the study, given that all mothers regardless of their background used a didactic interaction mode -a parenting style that implies high sensitivity as well as considerable reciprocity-, at least during the school like picture task. This particular parenting style and the content of the interactions seemed to be appropriate given that children of this age are becoming more and more capable of for instance expressing themselves verbally, performing the required sensorimotor and representational skills, and taking responsibility for the task performance (Landry et al., 2003). The particular parenting style furthermore prepares the children for the type of autonomy-stressing interactions they will be encountering during kindergarten, their further school career, as well as in the Dutch society in general. As such, the content of the interaction processes appears to be both culturally and developmentally appropriate, offering the child learning experiences to deal with demands and opportunities of the environment that match his or her needs and abilities. However, the differences in parenting style that became apparent during the block task seemed to indicate that, even though the quality aspects of the interactions were not necessarily met to a lesser extent during the interactions of the Dutch working-class and Surinamese-Dutch dyads, a discrepancy seemed to exist between the abilities and responsibilities mothers attributed to their children during this task and during the picture task, and
Cognitive Co-construction in Mother-Child Interaction

between the cognitions stimulated by the parenting styles used and the cognitions valued in the Dutch (school) culture.

Basically, the second empirical study seemed to show that all mothers provided high quality interactions and appropriate content—at least in accordance with the developmental expectations of the Dutch individualistic oriented culture—at least when these interactions were interpreted as learning events. However the interaction process changed when the interactions became more informal and practical. In this case the type of behaviors mothers displayed, tended to stress, demonstrated, and stimulated during parenting practices were in line with their expressed personal cultural parenting beliefs. For instance, while parenting practices of Dutch middle-class mothers seemed to primarily stimulate autonomy, Dutch working-class mothers’ practices accentuated conformity to rules and authority, while the practices of Surinamese-Dutch mothers showed both these aspects. Although the parenting beliefs were related to the mothers’ ethnic-cultural background, it seemed that differences both in beliefs and in parenting behaviors were at least partly based on socioeconomic differences as well, as differences between the groups were most prominent for the Surinamese and the Dutch middle-class mothers.

5.3 Overtime changes in Co-Constructive Interaction

The last empirical study of this thesis, presented in Chapter 4, addressed changes in co-constructive mother-child interactions in the year prior to kindergarten entrance. The study showed a relationship between overtime changes in interaction patterns during these co-constructive mother-child interactions and the differences found with regard to cognitive developmental levels of children from different socioeconomic and ethnic-cultural backgrounds by school start. Within the year prior to primary school-start 58 mother-child dyads were observed three times during two problem-solving situations. Share in task, intersubjective cooperation, and cognitive skill-level (referred to as cognitive content in the first two studies) together operationalized the concept of cognitive co-construction. Results revealed a general developmental trend of changing roles; while children’s task responsibility and skill-levels gradually increased, mothers’ task-share and skill-level gradually decreased. This trend was most evident in Dutch
General Conclusions and Discussion

middle-class families, and least in Turkish-Dutch families. A combined measure of children's co-constructive behaviors related quite strongly to (norm-referenced) cognitive test-scores, and predicted significant additional variance in age-4 test-scores. The study showed that immigrant children who fell behind in their cognitive development by the time they entered kindergarten had experienced less responsibilities for task interactions and less cognitive stimulation during the interactions with their mothers. Their mothers had responded to their growing capabilities by increasing the complexity level of interactions, but not by delegating a greater share of the task performance to them. This specific interaction pattern seemed however not so much to result from the immigrant's ethnic background, as it did from their SES. As family SES (i.e. the educational levels of parents) increased within an immigrant group, so did the modernity of their parenting beliefs and their parenting style (as seen with the Surinamese group). This suggested that although many values of the original culture remained to shape beliefs about children, development, and parenting, so did values of the new culture. Together resulting in a parenting style that contributed significantly to their child's cognitive development in the year prior to kindergarten.

Basically, the findings of this last empirical study illustrate the dynamic nature of co-constructive developmental processes. Again the importance of highly sensitive and reciprocal practices becomes apparent, as well as the importance of the developmental and cultural appropriateness of the proximal process content. However, the data further show that possible overtime developmental effects of these aspects depend not just on the quality content aspect of these aspects, but also on the flexibility of partners to change their interpretation of these aspects according to changing demands, needs, and abilities. In other words, in order for social interactions to become a mean for cognitive co-construction, interaction-partners need to interpret and apply the quality and content aspects in a dynamic fashion.

5.4 Limitations

There are several limitations regarding the content and methodologies of the present studies that need to be addressed. First of all, one could argue that the
Cognitive Co-construction in Mother-Child Interaction

scope of variables used is too limited. Despite the first chapter’s argumentation that development is a process that takes place in a dynamic niche of mutually constituting biological, social, and cultural factors, the studies all primarily focus on the social component, and no (neuro)biological variables and only a limited number of cultural context variables were included in the studies. The rational for using the limited number of variables is twofold: both pragmatic and theoretic. Although working with a pre-existing data set in many respects places you in a very privileged situation, it can also bring along certain limitations. For one, it is simply impossible to gather additional data from the original sample. So despite the fact that our changing understanding of particular developmental processes since the time of data collection, might call for inclusion of neurobiological variable information, this is not an option. Fortunately however, this same evolved understanding provides us with a theoretical basis to defend this particular procedure. Based on the developmental perspective described in Chapter 1 of the thesis, it can be argued that nature and nurture aspects of the developmental niche are represented by the cognitions of organism and environment during the microgenetic episodes of proximal processes. Although we cannot directly observe for instance neurological activity during a child’s task performance, complexity of the skills and knowledge a child displays does provide information regarding this aspect of the developmental niche. The complexity of the skills and cognitions children show during their task performances for instance reflect the actualization of genetic potential and the present level of sophistication of their neurobiological structures.

Objection can also be made with regard to the limited number of subjects in the samples of the three empirical studies -especially when several groups were distinguished-, the fact that only two structured task situations were observed and no naturally occurring family interactions were included, and that the interaction episodes had a time span of no more than eight minutes. A definite downside of microgenetic studies is that preparing observation data for analyses on the level of single sentences and actions is extremely time consuming, and thus cost worthy. This was even increased by the fact that data from the Turkish sample had to first be transcribed in Turkish by native speakers, before they could be translated into Dutch for coding. However, once transcribed, even short interaction episodes (in this case with a maximum of eight minutes per task) provide a very rich and extensive data set for studying intersubjective and cognitive content aspects of the
interactions. So although the number of subjects was indeed limited, the number of acts that were analyzed was a rather substantial one; for instance the analyses of the last empirical study were done on approximately 140,000 acts. The differences found between the groups, between the measurement periods, and between the tasks, is an indication that differences in co-constructive processes can be distinguished by using this type of procedures and coding system, although generalization of these findings definitely calls for a larger subject sample. Indeed, if it had been possible to involve a larger subject sample, it would have been possible to apply more sophisticated methods of data analyses that could bring the findings beyond the level of correlations.

5.5 Recommendations

Despite the apparent shortcomings in the proceedings, instruments, and analyses of the studies of this thesis these micro level observations and analyses of the microgenetic episodes of proximal process interactions have provided an insight on how mothers and children dynamically build their interactions, adapting their practices to changing needs and abilities. The results of the empirical studies seem to indicate that arrears in cognition development of young children, as expressed through their lower levels of functional cognition, are not just related to limitations in the complexity and frequency of their cognitive experiences, but also by the way they learn to learn through these experiences. Although the teaching strategies the mothers of these children used are not by definition less effective for cognition development, they do seem to be less effective in a cultural environment that highly values assertiveness, independence, and autonomy in children, such as the Dutch school system. Further research incorporating both family and school interactions is necessary to shed a light on the possible discrepancies in beliefs and practices between the home environment and the school environment, and to determine whether these discrepancies contribute to the overall lower levels of schooling for children from (non-Western) immigrant families and from less advantageous socioeconomic backgrounds. Preferably this type of research would at least span the year prior to school entrance and the first two school years, in order to include the developmental
process of early literacy and mathematical skills. Furthermore, the size of the subject samples should be such that pathways of influence among the variables can be determined through statistical analyses. For this it seems necessary to simplify the process of the preparation of the data for statistical analyses. For instance, as speech recognition programs are becoming more and more sophisticated, their use might contribute to a considerable time profit with transcribing (digitalized) observation data, and thus allow for more subjects to be included. Future research could also benefit from a simplified coding system, such as used for the analyses in the third study of the thesis. Over the course of the three empirical studies the number of codes used during analyses was been downsized considerably, by combining certain variables that were originally differentiated, on the basis of theoretical and empirical evidence. A substantial time profit can be gained by directly applying this simplified coding system to the transcribed data.
References


Cognitive Co-construction in Mother-Child Interaction


References


Cognitive Co-construction in Mother-Child Interaction


References


Cognitive Co-construction in Mother-Child Interaction


References


Cognitive Co-construction in Mother-Child Interaction


Cognitive Co-construction in Mother-Child Interaction


Summary

Phylogenetic, ontogenetic, and microgenetic timescales are part of a dynamic system of mutually influencing nature and nurture processes that co-construct human development. Over the course of phylogenetic time the human species have biologically and culturally developed their ability for intersubjective understanding with other human beings, and thereby created a basis for human-unique forms of cultural learning. The accumulated developmental changes of the species are handed down to newborns in the form of genetic and cultural legacies, which form basic building blocks for ontogenetic developmental processes. During an individual’s lifetime biological, behavioral, and cultural changes are gradually constructed as an individual accumulates experiences during moment-to-moment interactions with the physical, social, and cultural environment of his particular developmental niche. These experiences are referred to as microgenetic episodes of proximal processes. Proximal processes are defined as progressively more complex reciprocal interactions between an active, evolving individual and human, symbolic, or material representatives of the surrounding culture. They provide the biological organism with culturally regulated experiences through which his genetic potential becomes actualized and as such function as the crucible of biological and cultural aspects of human development. When a person joins other people, objects, or symbols in co-constructive episodes of proximal processes, series of microgenetic changes are set in motion that ultimately lead to the transformation from genotype into phenotype: protein production is stimulated; neurological connections in the human brain grow, become organized and specialized; social, emotional, and intellectual knowledge and skills are developed, readjusted, extended, and generalized; cultural tools, practices, and beliefs are appropriated, defined, redefined and adapted to new needs and circumstances.

Development should be regarded as probabilistic process in the sense that many different pathways and outcomes are possible. Especially during the first years of life parents seem to have an substantial impact on their child’s developmental pathways and on developmental outcomes. Parents influence the biological and cultural legacies that together form the basic building blocks of the child’s developmental niche, but also the microgenetic episodes of proximal processes.
Cognitive Co-construction in Mother-Child Interaction

that take place within this developmental context and that are regarded primary generators of developmental change. The impact of any particular proximal process on human development depends on the quantity, quality, and content characteristics of the proximal processes in question. During the first years of life most proximal processes of a child take place during day-to-day family interactions; especially mothers have a large share in these interactions as well as in structuring the child's interactions with others. The empirical studies of the thesis explored the co-constructive processes between mothers and children in the year prior to children's participation in kindergarten. The studies used a data-subset from a larger dataset collected in 1991 and 1992. For the three empirical studies of this thesis, a total of 73 mother-child dyads from the original sample were used. The data consisted of video recordings of mother-child interactions, interviews with mothers, and cognitive development assessment of the children. Video recordings showed the mothers and their child as they interacted during a symbolic problem-solving task and a practical problem-solving task. The symbolic problem-solving task consisted of cards with concrete and familiar objects that had to be grouped in threesomes (picture task). The objective of the practical problem-solving task was to construct a marble slide out of twelve wooden blocks, using a picture of the completed slide as a model (block task). Female research assistants of the same ethnic group collected the data at the homes of the dyads. The data were collected at three measurement periods over the course of a year. The first data were collected when the children were three years old. Measurements were repeated twice, each time with half-a-year interval. The first study addressed the concept of cognitive co-construction as an alternative to the social influence model that still predominates in research seeking to explain the social and cultural nature of cognitive development. Following the work of Rogoff, cognitive co-construction was defined as the combined operation of intersubjective cooperation and cognitive distancing in collaborative activities. The concept proved useful to describe and analyze mother-child problem solving activities in the family setting. Overall, a very high degree of intersubjective cooperation was found between mothers and children, that appeared to be quickly and easily established upon confrontation with a new task. The highly intersubjective cooperative nature of the interactions seemed to indicate both a high degree of reciprocity and of sensitivity, characteristics that concern the quality aspect of proximal process interactions. Both mothers and
children acted in line with the procedures and goals they set out for the interaction by expanding and extending previous acts, and showing only a scarce number of disruptions or solitary behaviors. Taking into account that mothers were the more knowledgeable partners during these interactions, it was not surprisingly to find that sensitivity was most clearly observable in their behaviors. Mothers seemed to adapt their actual task performance and their instructions, clues, and explanations not just to the general ability of their child, but to the actual ability the child demonstrated during that particular task performance. This was further underlined by the finding that role distribution and distancing level differed from one task to the other. The positive correlation found between higher levels of verbal distancing of mothers and children, seems at least to be an indicator that the type of mother-child interaction-situations studied possibly provide experiences that contribute to the gradual process of cognitive co-construction.

The second empirical study focused on the parenting practices that mothers showed during the microgenetic episodes of proximal process interaction. A possible relation between these practices, the parenting beliefs these mothers expressed, and their socioeconomic and ethnic-cultural family background was explored. In the study Dutch mothers, regardless of their SES, held predominantly individualistic parental beliefs. Surinamese-Dutch immigrant mothers on the other hand showed a specific system of beliefs, in which both collectivistic (as in the original Surinamese culture) and individualistic values were incorporated. The analyses of the intersubjective cooperation and cognitive content dimensions of the co-constructive interactions showed that differences in parental beliefs were reflected in characteristic parenting styles, and that the type of task highlighted differences in interaction styles associated with particular value orientations.

While the school-like quality of the picture task seemed to trigger a similar interaction style for all mothers, the more informal and practical nature of the block task presented an interaction situation in which differences in parenting style became apparent. The study seemed to indicate that all mothers provided high quality interactions and appropriate content -at least in accordance with the developmental expectations of the Dutch individualistic oriented culture- at least when these interactions were interpreted as learning events. However the interaction process changed when the interactions became more informal and practical. In this case the type of behaviors mothers displayed, tended to stress, demonstrated, and stimulated during parenting practices were in line with their
expressed personal cultural parenting beliefs. For instance, while parenting practices of Dutch middle-class mothers seemed to primarily stimulate autonomy, Dutch working-class mothers’ practices accentuated conformity to rules and authority, while the practices of Surinamese-Dutch mothers showed both these aspects. Although the parenting beliefs were related to the mothers’ ethnic-cultural background, it seemed that differences both in beliefs and in parenting behaviors were at least partly based on socioeconomic differences as well, as differences between the groups were most prominent for the Surinamese and the Dutch middle-class mothers.

The third and final empirical study addressed how differences in co-constructive mother-child interactions in the year preceding kindergarten entrance (age 4 in the Netherlands), contributed to cognitive differences between children from different socioeconomic and ethnic-cultural backgrounds. Within that year mother-child dyads were observed three times during the two problem-solving situations. Share in task, intersubjective cooperation, and cognitive skill-level together operationalized the concept of cognitive co-construction. Results revealed a general developmental trend of changing roles; while children’s task responsibility and skill-levels gradually increased, mothers’ task-share and skill-level gradually decreased. This trend was most evident in Dutch middle-class families, and least in Turkish-Dutch families. A combined measure of children’s co-constructive behaviors related moderate to strongly to (norm-referenced) cognitive test-scores, and predicted significant additional variance in age-4 test-scores. Immigrant children who fell behind in their cognitive development by the time they entered kindergarten had experienced less responsibilities for task interactions and less cognitive stimulation during the inter-actions with their mothers. Their mothers had responded to their growing capabilities by increasing the complexity level of interactions, but not by delegating a greater share of the task performance to them. This specific interaction pattern seemed however not so much to result from the immigrant’s ethnic back-ground, as it did from their SES. As family SES (i.e. the educational levels of parents) increased within an immigrant group, so did the modernity of their parenting beliefs and their parenting style (as seen with the Surinamese group). This suggested that although many values of the original culture remained to shape beliefs about children, development, and parenting, so did values of the new culture. Together resulting in a parenting style that contributed significantly to their child’s cognitive
development in the year prior to kindergarten. These findings illustrated the
dynamic nature of co-constructive developmental processes. Again the
importance of highly sensitive and reciprocal practices became apparent, as well
as the importance of the developmental and cultural appropriateness of the
proximal process content. However, the data further showed that possible
overtime developmental effects of these aspects depend not just on the quality
content aspect of these aspects, but on the flexibility of partners to change their
interpretation of these aspects according to changing demands, needs, and
abilities. In other words, for social interactions to become a mean for cognitive
co-construction, interaction-partners need to interpret and apply the quality and
content aspects in a dynamic fashion.
Cognitive Co-construction in Mother-Child Interaction
Samenvatting

Fylogenetische, ontogenetische en microgenetische tijdschalen maken deel uit van een systeem van elkaar beïnvloedende processen van biologische en omgevingsprocessen die de menselijke ontwikkeling co-construeren. In de loop van het fylogenetische tijdspad heeft de menselijke soort in biologisch en cultureel opzicht zijn vermogen tot intersubjectiviteit met andere menselijke wezens ontwikkeld en daarmee een basis gecreëerd voor unieke vormen van cultureel leren. De accumulerende ontwikkelingen van de soort worden aan nieuwgeborenen doorgegeven in de vorm van genetische en culturele erfensissen, welke op hun beurt de basale bouwstenen vormen voor ontogenetische ontwikkelingsprocessen. In de loop van het leven van een individu worden biologische, gedragsmatige en culturele veranderingen geleidelijk aan geconstrueerd tijdens de accumulatie van ervaringen die deze persoon opdoet gedurende de moment-tot-moment interacties met de fysieke, sociale en culturele omgevingen van zijn specifieke ontwikkelingscontext. Deze ervaringen worden microgenetische episodes van proximale processen genoemd. Proximale processen worden gedefinieerd als zijnde in complexiteit toenemende wederkerige interacties tussen een actief en veranderend individu en menselijke symbolische of materiële representanten van de hem omringende cultuur. Zij voorzien het biologische organisme van de cultureel geregelde ervaringen waardoor zijn genetische potentieel geactualiseerd wordt. Zodoende functioneren proximale processen als een smeltkroes voor biologische en culturele aspecten van de menselijke ontwikkeling. Wanneer een individu deelneemt aan co-constructieve episodes van proximale processen met andere mensen, objecten of symbolen worden series van microgenetische veranderingen op gang gebracht dat uiteindelijk leiden tot een transformatie van genotype tot fenotype: proteïne productie wordt gestimuleerd; neurologische verbindingen in de hersenen groeien, bekomen georganiseerd en gespecialiseerd; sociale, emotionele en intellectuele kennis en vaardigheden worden ontwikkeld, aangepast, uitgebreid en gegeneraliseerd; culturele gereedschappen, gewoontes en assumpties worden eigengemaakt, gedefinieerd, geherdefinieerd en aangepast aan nieuwe behoeften en omstandigheden.
Cognitive Co-construction in Mother-Child Interaction

Ontwikkeling moet dan ook als een probabilistisch proces worden gezien, in die zin dat vele verschillende paden en uitkomsten mogelijk zijn. In het bijzonder gedurende de eerste jaren van het leven lijken ouders een substantiële invloed te hebben op de ontwikkelingspaden en uitkomsten van hun kind. Ouders beïnvloeden niet alleen de biologische en culturele erfgenissen die de basale bouwstenen van de ontwikkelingscontext van het kind vormen, maar ook de microgenetische episodes van proximale processen die plaatsvinden binnen deze ontwikkelingscontext en beschouwd worden als de primaire generatoren van ontwikkeling. De impact op de ontwikkeling van welk willekeurig proximaal proces dan ook hangt af van de kwantitatieve, kwalitatieve en inhoudelijke kenmerken van het proximale proces in kwestie. Gedurende de eerste jaren van het leven vinden de meeste van deze proximale processen plaats gedurende de dagelijkse familie interacties; vooral moeders hebben een groot aandeel in deze interacties en hebben een aanzienlijk aandeel in het structureren van de interacties die het kind met anderen aangaat. De empirische studies van dit proefschrift vormen een exploratie van de co-construktion processen tussen moeders en kinderen in het jaar voorafgaand aan de basisschool. De data voor de studies vormen een onderdeel van een groter databestand dat tussen 1991 en 1992 bijeen is gebracht. Voor de drie empirische studies van dit proefschrift zijn de gegevens van 73 moeder-kind stellen van de oorspronkelijke groep gebruikt. De gebruikte gegevens bestonden uit video-opnames van moeder-kind interacties, interviews met de moeders en cognitieve ontwikkelingstests van de kinderen. De video opnames toonden de interacties van de moeders en de kinderen tijdens een symbolische probleemoplossingstaak en een praktische probleemoplossingstaak. De symbolische taak bestond uit kaartjes met concrete afbeeldingen van en vertrouwde voorwerpen waarvan er steeds drie bij elkaar gezocht moesten worden (de plaatjestaak). Het doel van de praktische taak was om een knikkerbaan te bouwen met twaalf houten blokken, waarbij een foto van een voltooide baan als voorbeeld diende (blokkentaak). Vrouwelijke onderzoeksassistenten afkomstig uit de zelfde cultureel-etnische groep als de moeders verzamelden de gegevens thuis bij de gezinnen. De data verzameling vond plaats op drie verschillende meetmomenten in de loop van één jaar. Het eerste meetmoment vond plaats toen de kinderen net drie jaar oud waren, de twee volgende meetmomenten vonden steeds een halfjaar later plaats.

112
De eerste studie richt zich op cognitieve co-constructie als een alternatief voor het sociale-beïnvloedingsmodel dat nog altijd de overhand heeft in onderzoek dat tracht de sociale en culturele aard van cognitieve ontwikkeling te verklaren. Het werk van Rogoff volgend werd cognitieve co-constructie gedefinieerd als de gezamenlijke werking van de intersubjectieve samenwerking en het cognitieve afstandsniveau tijdens samenwerkingsactiviteiten. Dit concept bewees nuttig te zijn om de probleemoplossende moeder-kind interacties in de gezinscontext te beschrijven en te analyseren. Over het algemeen werd een zeer hoge mate van intersubjectieve samenwerking waargenomen, die snel en eenvoudig tot stand kwam zodra moeder en kind met de taak werden geconfronteerd. De hoge mate van intersubjectiviteit leek te duiden op een hoge mate van wederkerigheid en sensitiviteit, kenmerken die samenhangen met de kwaliteit van het proximale proces. De gedragingen van moeder en kind sloten aan bij de procedures en doelstellingen die zij vaststelden voor het interactieproces door aan te sluiten bij voorgaande gedragingen, deze gedragingen uit te breiden en een zeer beperkt aantal verstorende of solitaire gedragingen te vertonen. In acht nemende dat de moeders de meer ervaren partners waren gedurende deze interacties, was het niet verassend om vast te stellen dat sensitiviteit het meest in het oog sprong tijdens hun handelingen. Moeders leken hun daadwerkelijke taakuitvoering, hun instructies, aanwijzingen en uitleg niet alleen aan te passen aan het algemene niveau van het kind maar aan het daadwerkelijke niveau dat het kind tijdens de specifieke interactie tentoonspreidde. Dit werd ook zichtbaar in de gevonden taakverschillen met betrekking tot rolverdeling en cognitief afstandsniveau. De gevonden positieve correlaties tussen de hogere afstandsniveaus van verbale handelingen van moeder en kinderen leken op zijn minst een indicatie te zijn dat het bestudeerde soort moeder-kind interactiesituaties de soort ervaringen bood dat bijdraagt aan het geleidelijke proces van cognitieve co-constructie.

De tweede empirische studie richtte zich specifiek op opvoedingsgedrag van de moeders tijdens de microgenetische episodes van de proximale processen. De mogelijke relatie tussen deze gedragingen, de assumpties die de moeders uitten ten opzichte van opvoeding en kinderlijke ontwikkeling en hun sociaal-economische en etnisch-culturele gezinsachtergrond werd onderzocht. De studie vond dat Nederlandse moeders, los van hun sociaal-economische achtergrond vooral individualistisch georiënteerde assumpties uitten. De uit Suriname geëmigreerde moeders daarentegen lieten een specifiek systeem van aannames
Cognitive Co-construction in Mother-Child Interaction

zien waarin zowel collectivistische (zoals in de oorspronkelijke Surinaamse cultuur) als individualistische waarden waren opgenomen. De analyses van de intersubjectieve samenwerking en de cognitieve inhoudsdimensies van de co-constructie interacties lieten zien dat de verschillen in opvoedingsassumpties gespiegeld werden in de karakteristieke opvoederstijlen en dat het soort taak interactieverschillen uitvergrootte die geassocieerd worden met de specifieke waardeoriëntaties. Terwijl de schoolachtige kenmerken van de plaatjes taak bij alle moeders een min of meer zelfde interactiestijl opriepen, bleken het meer informele karakter en de praktische aard van de blokkentaak de verschillen in opvoederstijl juist uit te vergroten. De studie leek uit te wijzen dat alle moeders een hoge kwaliteit van interacties en passende inhoud aanboden – in ieder geval in overeenstemming met het ontwikkelingsperspectief van de Nederlandse individualistisch georiënteerde cultuur- wanneer zij deze interacties aanzagen voor leermomenten. Het interactieproces veranderde echter wanneer de interacties minder formeel en praktischer werden. In deze gevallen vertoond het soort gedrag dat moeders zelf lieten zien, het gedrag dat zij benadrukten, demonstreerden en stimuleerden, overeenkomsten met de geuite persoonlijke culturele opvoederassumpties. Terwijl de opvoedergedragingen van de Nederlandse middenklasse moeders primair gericht leken op het stimuleren van autonomie, benadrukte Nederlandse moeders uit arbeidersgezinnen juist het volgen van regels en autoriteit en waren de gedragingen van de Surinaams-Nederlandse moeders een combinatie van deze twee stijlen. Hoewel de opvoedergedragingen gerelateerd waren aan de etnisch-culturele achtergrond van de moeders, leek het er op dat verschillen in assumpties en gedrag in ieder geval deels gebaseerd waren op sociaal-economische verschillen daar de verschillen tussen de Nederlandse middenklasse moeders en de Surinaams-Nederlandse moeders het meest in het oog sprongen.

Het derde en laatste empirische artikel richtte zich op hoe verschillen in co-constructieve moeder-kind interacties in het jaar voorafgaande aan de basisschool, bijdroegen aan de cognitieve verschillen tussen kinderen van verschillende sociaal-economische en etnisch-culturele achtergronden. Gedurende dat jaar werden de moeder en kinderen drie maal geobserveerd gedurende de twee interactietaken. Aandeel in de taak, intersubjectieve samenwerking en cognitief vaardigheidsniveau operationaliseerde gezamenlijk het concept van cognitieve co-constructie. De uitkomsten lieten een algemene trend van verandering in
rolverdeling zien; terwijl de taakverantwoordelijkheid en het vaardighedsniveau van de kinderen geleidelijk aan toenam, nam de taakverantwoordelijkheid van de moeders en hun vaardighedsniveau juist af. Deze trend was het duidelijkst zichtbaar bij de Nederlandse middenklasse gezinnen, en het minst bij de Turks-Nederlandse gezinnen. Een gecombineerde maat van de co-constructieve gedragingen van de kinderen vertoonde een redelijke samenhang met de genormeerde cognitieve testscores en voorspelde een significant aanvullend deel van de variantie van de testscores op vierjarige leeftijd. Kinderen uit immigranten gezinnen bij wie de cognitieve ontwikkeling achterbleef tegen de tijd dat zij deel gingen nemen aan de basisschool hadden minder ervaring opgedaan met verantwoordelijkheid voor de taak en minder cognitieve stimulering ervaren. Hun moeders reageerden op de toenemende vaardigheden van de kinderen door de complexiteit van de interacties te verhogen, maar niet door een groter deel van de taakuitvoering aan de kinderen over te dragen. Dit specifieke interactiepatroon leek niet zozeer het gevolg te zijn van hun etnisch-culturele achtergrond als wel van hun sociaal-economische achtergrond. Wanneer de sociaal-economische status (d.w.z. opleidingsniveau van de ouders) toenam binnen een immigrantengroep nam ook de moderniteit van hun opvoederideeën en opvoedergedrag toe (zoals zichtbaar in de Surinaamse groep). Dit suggereerde dat hoewel veel van de waarden van de oorspronkelijke cultuur de ideeën over opvoeding en ontwikkeling bleven beïnvloeden, de waarden van de nieuwe cultuur dit ook deden. Gezamenlijk resulteerde dit in een opvoederstijl die een significante bijdrage leverde aan de cognitieve ontwikkeling van het kind in het jaar voorafgaande aan de basisschool. Deze bevindingen illustreren het dynamische karakter van co-constructieve ontwikkelingsprocessen. Wederom werd het belang van zeer sensitieve en wederkerige gedragingen zichtbaar net als het belang van de in ontwikkelingsopzicht en cultureel opzicht passende inhoud van proximale processen. Toch lieten de bevindingen zien dat het effect van deze aspecten in de loop van de tijd niet alleen afhankt van het kwalitatieve inhoudsaspekt, maar ook van de flexibiliteit van de partners om hun interpretaties van deze aspecten aan te passen aan de veranderende behoeften, eisen, en mogelijkheden. In andere woorden, om sociale interacties een middel tot cognitieve co-constructie te laten worden moeten de kwalitatieve en inhoudsaspecten door de interactiepartners op een dynamische wijze toegepast en geïnterpreteerd worden.
Cognitive Co-construction in Mother-Child Interaction
Dankwoord


Daarnaast wil ik graag mijn promotor Aryan van der Leij bedanken voor het vertrouwen dat hij in mij had en de tijd die hij nam om de verschillende hoofdstukken van mijn proefschrift te lezen.

De leden van de promotiecommissie wil ik bij deze danken voor de tijd die zij hebben vrijgemaakt om mijn manuscript kritisch te beoordelen.

Dan zijn er natuurlijk de mensen van de afdeling POW waar ik de afgelopen jaren deel van uitmaakte. Vooral met de AIO’s heb ik een erg leuk tijd gehad. Sanne en Floor, ik vind het ontzettend leuk dat we alle drie vanuit onze gezamenlijke studie in een zelfde traject zijn terecht gekomen. Veel succes met jullie promotieonderzoeken!

En dan mijn paranimfen Hester en Eline. Lieve vriendinnetjes jullie zijn de afgelopen jaren zo belangrijk voor mij geweest! Liene, ik hoop dat je weet hoe ontzettend ik geniet van ons “samen groot worden”. Hester, ik mis onze koffiegesprekken zo!

De afgelopen jaren zijn bijzonder roerig geweest. In een korte periode promoveren is niet altijd even eenvoudig en dat heeft zeker zijn weerslag gehad op mijzelf en de mensen van wie ik zoveel houd. Lief Moesje, dank je wel dat je er bent en vooral ook dat je er was in de moeilijke tijd voor, in en na het ziekenhuis. En Marcel, om met je eigen woorden te spreken: ik vind het stoer dat we samen zover gekomen zijn! Lief jongetje, je was en blijft mijn beste vriendje.
Cognitive Co-construction in Mother-Child Interaction