Fostering Independence in Mother-Child Interactions: Longitudinal Changes in Contingency Patterns as Children Grow Competent in Developmental Tasks

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Fostering Independence in Mother-Child Interactions: Longitudinal Changes in Contingency Patterns as Children Grow Competent in Developmental Tasks

Thomas A. Kindermann

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The study attempted to reconstruct changes in naturalistic interactions between mother and child while children gained competence in three basic developmental tasks, namely, while they were learning to walk, eat, and dress themselves alone. Cross-sequentially organised observations focused on independent and dependent child behaviours and corresponding supportive mother reactions. At four measurement points across a period of 100 days, six children, two each at the age of 9, 12, and 21 months, were videotaped at home interacting with their mothers; at each point, mothers were interviewed about children’s competencies. Changes in behaviour frequencies and interaction patterns were consistent with hypotheses that mothers adjust their socialising interactions to children’s growing competencies in developmental tasks. Before tasks were begun, interactions could be characterised as nurturant (contingent maternal support for dependent behaviour only); when children were actively learning in a task, interactions evolved into complementary patterns (maternal support for both dependent and independent behaviours); and when competence was firmly established,

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mothers rarely showed contingent support for either dependent or independent task-related behaviours. The discussion contrasts processes of developmental change in socialising contexts with assumptions about the stability of childrearing practices.

INTRODUCTION

Although research on parental socialisation has continued to occupy a prominent place in the study of children’s development, conceptualisations of how parents contribute to children’s development have shown marked historical change (Maccoby & Martin, 1983). Early studies typically focused on maternal childrearing styles, assessed through questionnaire measures or observational ratings of mothers’ global characteristics. Building on these now classic studies, new conceptualisations of the process of transmission from caregivers to children have emerged.

First, as researchers began to focus on the actual experiences of the child as proximal forces in shaping children’s development, studies used observations of parent-child interactions in natural settings. Secondly, as investigators attempted to identify the processes of transmission, new targets of study were behavioural interactions, and the antecedent-consequence relations between adult’s and children’s behaviours. Methodological advances were also instrumental in rendering these processes accessible to empirical study (e.g. Bakeman & Gottman, 1986). Thirdly, both parents and children were accorded a more active role in the socialisation process. The impact of parents’ goals, expectations, and beliefs in guiding their behaviour was investigated (Sigel, 1986); and children’s participation in instigating and guiding interactions with parents was recognised (Bell, 1979).

The current study builds on new perspectives in socialisation research in its focus on the processes by which parents encourage independence in young children (cf. Gewirtz, 1972; Maccoby, 1984). Micro-analyses of naturalistic in vivo mother-child interactions were used to identify antecedent-consequence relations. Emphasising the active role of the child, maternal reactions to children’s independent and dependent behaviours were the targets of study. The active role of the mother was likewise central. Of primary concern was the connection between mothers’ beliefs about their children’s competence and their behaviour to encourage or discourage independence.

The study also attempted to add to ongoing dialogue about the conceptualisation of parent-child interactions by adding a focus on development. Up to now, development has typically been seen as an individual process which is the outcome of socialising interactions. In this study, the development of mother-child interactions themselves was examined. The overarching issue was whether, as many authors have suggested but few studies
have documented, socialising interaction patterns change with children’s development.

The development of mother-child interactions was examined in two ways, both based on the model of developmental tasks (Havighurst, 1972). The first question was simply: Do mothers’ socialising reactions (to children’s independent and dependent behaviours) show any change when children make progress in developmental tasks? (cf. Green, Gustavson, & West, 1980). The sound question is more complex, and centred on the issue of how changes in interaction patterns were organised. Do mothers adjust their reactions to children’s independent attempts according to the child’s chronological age only, or is change organised according to the child’s progress in specific developmental tasks?

The focus of the study was on observable dependent and independent behaviour and the identification of maternal support contingencies for these behaviours in natural social interactions (cf. Baltes, 1988). Changes in mother child interactions were analysed across time, both across children’s developing competence within a developmental task and between tasks which are differentially central to different ages.

To examine interactional changes as a function of growing competence, it is essential that the definitions of independent and dependent behaviour be conceptually and operationally distinct from those of competence. Competence refers to a child’s capacity; dependent or independent behaviour refers to his or her observable engagement in a given situation. Hence, although intuitively, it may seem unlikely that incompetent children will behave independently or that competent children will show dependent behaviour, the emergence of developmental tasks can also be seen as a period during which independent children may increasingly attempt task behaviours through independent behaviour. For example, children who are not yet competent in feeding themselves can nevertheless exert much effort in attempting to get food in their mouths using their hands; following task accomplishment, competent children may nevertheless show dependent behaviours again, such as “playing baby” or requesting help from mothers. In other words, a child of any level of competence can behave independently as well as dependently. Only by conceptually distinguishing competence and independence is it possible to examine empirically, whether maternal reactions change as a function of children’s changing competence.

Based on the model of developmental tasks, points in development were identified during which particular sets of competencies were expected to emerge. Three tasks were selected: learning to walk; learning to eat; and learning to dress/wash oneself. These three tasks, taken together, are central topics of a substantial portion of parent-child socialising interactions between 9 and 24 months. Three points in a child’s progress through a
developmental task are considered: (1) "noncompetent off-task", before a developmental task is set up; (2) "central", the point in the process when the task is a central topic of interactions; and (3) "competent off-task", after the task is solved.

The objectives of the study were two-fold. First, the study aimed at identifying characteristic patterns of mother-child interactions involving dependent and independent behaviours, and to map changes in interaction patterns according to the progress of children's growing competencies in developmental tasks. Secondly, it evaluated the regularity of these changes in interaction patterns with growing competence of the child across the different developmental tasks. Although changes in behaviour frequencies were also examined, these were considered only a prelude to (and were expected to be different from) changes in antecedent-consequence relations.

The hypotheses were as follows. In terms of observed behaviour frequencies in the developmental tasks: (1) initially infrequent child independent behaviour was expected to increase, whereas initially frequent dependent behaviour should decrease as children became competent in the tasks; (2) initially infrequent mother behaviours supporting independent child behaviours should increase, whereas initially frequent dependence-supportive mother behaviour should decrease with children's growing competence.

Predictions for the behavioural interaction patterns were based on the expectation that a mother's efforts to support dependent or independent behaviour of her child within a developmental task are related to the child's competence and progress in the task. (1) During noncompetent off-task times, caretakers fulfil a predominantly nurturant (dependence-supportive) role. As long as a task had not yet commenced as a central topic of interactions, it was expected that mothers would not respond consistently to children's independent behaviour. At the same time, however, mothers were expected to support children's dependent behaviour, for example, by responding contingently to children's requests for task help. (2) When a developmental task is central, the primary goal of caretakers' interactions shifts to support learning processes towards independent achievement (cf. didactic interactions; Bornstein, 1989). When children are starting to acquire competencies in a developmental task, it was expected that their independent behaviours would, for the first time, be followed by mothers' independence-supportive contingencies. At the same time, mothers' dependence-supportive contingencies following dependent child behaviours were expected to decrease. (3) Later, after a developmental task is mastered, maintenance of learned behaviours (or accomplishment in a new developmental task) might be the only concern of caretakers. At this point, mother's task-related independence-supportive
contingencies following independent behaviours were expected to phase out, indicating that mother’s contingencies are no longer needed to support children’s independent task behaviour.

METHOD

Sample and Design
Participating in the study were 6 infants, two each of the ages of 9 (male only child; female with a brother 4 years of age), 12 (male, female; both only children), and 21 months (both male; with siblings 5 and 10 years of age) and their mothers. The age groups were selected to represent times in development when the specific developmental tasks emerged as central topics in daily mother-child interactions: for the 9 months children, the tasks of learning to walk and learning to eat; for the 12 months group, the task of learning to eat; for the 21 months children, the task of learning to dress and wash oneself.

Instruments and Procedures

Questionnaires and Interview. At every measurement point, the following instruments were used to interview mothers: (1) The Kent Infant Development Scale, examining mother's estimate of children’s status of development at 9 and 12 months of age (Katoff, Reuter, & Dunn, 1978); (2) the Minnesota Child Development Inventory (Ireton & Thwing, 1974) tapping mothers’ estimations of children’s status of development at 21 months (see Table 1); (3) direct questions about whether in each of the developmental tasks mothers thought the children were currently (a) not yet learning, or just starting to learn, but mothers did not expect rapid progress; (b) learning, but mothers did not expect the task to be completed soon, or learning in the task, showing quite competent behaviour, and mothers expected them to reach competence soon; and (c) fully competent in the task already.

Videotaping Procedure. Interactions were videotaped using a battery-powered handcarried videorecorder with the explicit goal not to change the normal routines and family constellations, but to capture the normal family life of the dyads. Observation times were based on diaries that mothers previously kept on what they normally did with their children throughout the day. Thus, a high likelihood for observing dressing, feeding, and/or mobility interactions was secured without interfering with normal daily routines.
<table>
<thead>
<tr>
<th>Age Groups:</th>
<th>9-13 months</th>
<th>12-16 months</th>
<th>21-35 months</th>
</tr>
</thead>
<tbody>
<tr>
<td>Scale</td>
<td>Points of measurement:</td>
<td>Child</td>
<td>t1</td>
</tr>
<tr>
<td>KID Motor</td>
<td>9 A</td>
<td>10.8 13.0 14.0</td>
<td>10.1 11.0 12.6 13.0</td>
</tr>
<tr>
<td>KID Self-help</td>
<td>9 A</td>
<td>8.9 9.6 12.1 12.4</td>
<td>8.9 9.1 12.4 13.0</td>
</tr>
<tr>
<td>KID Motor</td>
<td>12 A</td>
<td>14.0 4.0 4.0 4.0</td>
<td>14.0 3.0 3.0 3.0</td>
</tr>
<tr>
<td>KID Self-help</td>
<td>12 A</td>
<td>4.0 4.0 4.0 4.0</td>
<td>4.0 4.0 4.0 4.0</td>
</tr>
<tr>
<td>MCDI Gross Motor</td>
<td>21 A</td>
<td>4.0 4.0 4.0 4.0</td>
<td>4.0 4.0 4.0 4.0</td>
</tr>
<tr>
<td>MCDI Self-help</td>
<td>21 B</td>
<td>4.0 4.0 4.0 4.0</td>
<td>4.0 4.0 4.0 4.0</td>
</tr>
</tbody>
</table>

Note: Underlined scores refer to the ceiling of the KID scale. The MCDI should not be used with children younger than 12 months of age.
The duration of a session of continuous videotaping averaged 45 minutes. Each of the 6 dyads was videotaped 8 times according to a predetermined schedule over a total period of about 100 days. Two days of videotaping were treated as one point of measurement. Thus, there were four points of measurement, in which the first two and the last two were each separated by about 1 to 2 weeks, whereas in the middle there was a time gap of 2 months.

Observation Coding System. Behavioural events were coded in the natural sequence of ongoing interactions for type of developmental task and for type of behaviour exhibited. First, each observed behaviour was categorised as to the developmental task in which it occurred. When a behaviour was embedded in more than one developmental task simultaneously (for example, a child was eating while being dressed), the developmentally more difficult task was coded (e.g. learning to dress/wash oneself).

Type of behaviour categories were adapted from gerontological studies on dependent and independence (Baltes & Reisizen, 1986; Baltes et al., 1983, 1987). This coding system differentiates 12 behaviour categories which are mutually exclusive and exhaustive. Due to the present study's focus on the development of the social ecology of task-related behaviours, only interactions occurring in the context of developmental tasks are reported here (see Table 2). For each partner, the four other behaviour

<table>
<thead>
<tr>
<th>TABLE 2 Type of Behaviour Categories Related to Developmental Tasks</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Child dependent behaviour.</strong> Behaviour that is delegated to the mother: Accepting provisions of care without attempting to be actively involved; behaviours such as asking for help, waiting for help, or refusing to carry out task-relevant behaviour alone. Examples: being fed, dressed, carried around; holding up arms in order to be picked up or carried around; refusing to get out of bed, refusing to dress.</td>
</tr>
<tr>
<td><strong>Child independent behaviour.</strong> Behaviour conducted without mother's help: Regardless of success, any efforts to try to exercise task behaviour alone, and resistance to help while trying to engage alone. Examples: eating, dressing, walking/crawling alone; trying to take the spoon away from the mother when she feeds the child.</td>
</tr>
<tr>
<td><strong>Mother dependence-supportive behaviour.</strong> Helping without encouraging child's own engagement: Complying with or encouraging bids for help, positive reactions to waiting for or accepting of help, interrupting child's activity, by making clear that the child is not supposed to try alone or by prohibiting independent attempts. Examples: carrying child around, prohibiting attempts to walk alone; taking spoon away, not letting child take a spoon; dressing child without showing how to do it.</td>
</tr>
<tr>
<td><strong>Mother independence-supportive behaviour.</strong> Encouraging child to engage in task behaviour (even with minimal help): Refraining from help, giving advice about how to try alone, engaging child in task activities while mother is doing most of the job. Examples: encouraging walking, crawling, self-feeding activities; holding sleeves while dressing, handing over soap while washing.</td>
</tr>
</tbody>
</table>
categories referred to social behaviours not related to the tasks (for
children: constructively engaged, destructively engaged, passive be-
behaviour, leaving; for mothers: social engagement-supportive, passivity-
supportive behaviour, no response, leaving the room).

Coding Procedure. The videotapes were coded in random order (at an
average rate of about one behaviour every 4 seconds) by four trained
observers who were uninformed about the developmental status of the
children, their age, and the observational measurement points. Inter-
observer reliabilities, calculated for every coding session using Cohen's
(1960) kappa, averaged 0.83 (range = 0.64–1.00, sd = 0.11); no evidence
was found of systematic shifts across measurement points, times of coding,
or differences across dyads of observers.

RESULTS

The description of results proceeds in three parts. First, the assumptions
will be examined that these three developmental tasks occupy a large
portion of mother-child interactions, and that specific tasks are central
topics of interactions at specific ages. Secondly, behaviour frequencies,
their changes over time, and differences across tasks will be described for
the four behaviour categories of interest. Thirdly, and of primary interest,
the interaction patterns of the dyads and the changes therein will be
described. Statistical analyses, based on the hypotheses, will test trends in
mean level changes and age differences.

Centrality of Developmental Tasks

In total, 24,011 behaviours were coded, about evenly distributed across the
age groups and their management points. Of these, 17,132 observations
(70% of the total) were related to the developmental tasks, as can be seen
in Table 3. Only these will be considered further. Between 12 and 20% of
the observations refer to each of the dyads and about 33% of each of the
developmental tasks. The large proportion of interactions organised
around the developmental tasks gives credence to the assertion that these
are in fact central topics of socialising interactions from ages 9 to 24
months. Chi-square comparisons showed that the expected centrality of
the developmental tasks was confirmed by mothers' estimates of children's
competence in the tasks. When, according to age norms, children should
not yet be entering a developmental task, mothers were more likely to
describe them as "not yet learning", \( X^2 = 66.7, \text{ df } = 1, P < 0.001. \) When
children should have been in the central acquisition phase, mothers tended
to described them as "learning" or "almost competent", \( X^2 = 14.77, \text{ and} \)
<table>
<thead>
<tr>
<th>Age</th>
<th>Developmental Tasks</th>
<th>Child</th>
<th>Learning to Dress/Wash</th>
<th>Learning to Eat</th>
<th>Learning to Walk</th>
<th>Totals</th>
</tr>
</thead>
<tbody>
<tr>
<td>9 months</td>
<td></td>
<td>9 A</td>
<td>862 (29%)</td>
<td>1012 (19%)</td>
<td>1196 (41%)</td>
<td>2070 (17%)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>9 B</td>
<td>648 (32%)</td>
<td>1072 (20%)</td>
<td>1657 (49%)</td>
<td>3377 (20%)</td>
</tr>
<tr>
<td>12 months</td>
<td></td>
<td>12 A</td>
<td>827 (30%)</td>
<td>1134 (37%)</td>
<td>998 (36%)</td>
<td>2959 (16%)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>12 B</td>
<td>436 (14%)</td>
<td>545 (19%)</td>
<td>1513 (49%)</td>
<td>2594 (18%)</td>
</tr>
<tr>
<td>21 months</td>
<td></td>
<td>21 A</td>
<td>1611 (55%)</td>
<td>751 (26%)</td>
<td>5116 (26%)</td>
<td>7028 (12%)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>21 B</td>
<td>1146 (56%)</td>
<td>618 (30%)</td>
<td>646 (38%)</td>
<td>1800 (10%)</td>
</tr>
<tr>
<td>Totals per task</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>17132 (100%)</td>
</tr>
</tbody>
</table>

Note: Boxes indicate developmental tasks that are central for the respective age group.
$X^2 = 21.39$, both df = 1, $P < 0.001$; and in the supposedly competent groups, mothers were more likely to describe their children as "competent", $X^2 = 72.24$, df = 1, $P < 0.001$.

Overview of Frequency Analyses

Due to the small sample size, results will centre on the description of behaviour distributions and their changes. For statistical examination, analyses of variance were performed with the factors age of child (3), measurement point (4), and day of observation (2, nested in measurement point). Analyses were conducted using behaviour percentages, separately for each child and mother behaviour, and for each developmental task. A multivariate procedure was applied to the repeated measurements.

Problems of linear dependence in the dependent variables when using percentages were minimised in the study. For either partner, only two out of six behaviour categories were examined in the analyses. Furthermore, individual dependence and independence related behaviours only rarely summed up to more than 75% of the observations. Thus, a buffer-zone of at least 25% can usually be assumed to allow for independent variation of behaviour categories. Because of the small sample sizes, the results of the analyses of variance need to be regarded with caution; most importantly, due to lack of power, the results are rather conservative.

Intra-individual change was examined longitudinally across progress in the central developmental tasks. To test the hypotheses, two planned comparisons were performed for each behaviour category. The first tested the convergence of the cross-sectional findings of the behaviour profiles along the boundaries of adjacent age groups, which is a prerequisite for pseudo-longitudinal interpretations (Bell, 1953). The second examined cross-sectional effects of task centrality for the three age groups. Because the study aims at testing specific hypotheses about interactional development, only the results of the planned comparisons were inspected.

*Intra-individual Stability and Change.* First, as predicted for dyads of both noncompetent off-task groups, children's dependent behaviour (range: 40–74% for individual dyads; see Table 4 for cross-dyad averages) was more frequent than independent behaviour (2–25%). Regarding mother behaviours, the corresponding schema applied as predicted: In both noncompetent off-task groups, mother dependence-supportive behaviours (43–85%) were more frequent than independence-supportive behaviours (1–19%).

Secondly, as predicted for the central groups, initially frequent dependent behaviour (13–56%) generally decreased (to 1–31%), whereas initially low independent behaviour (16–45%) increased (to 32–85%).
### TABLE 4
Percentages of Children’s (C) and Mothers’ (M) Behaviours Observed in the Developmental Tasks

<table>
<thead>
<tr>
<th>Points of measurements:</th>
<th>Developmental Tasks</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Learning to Dress/Wash</td>
</tr>
<tr>
<td>Age</td>
<td>t1</td>
</tr>
<tr>
<td>9 months</td>
<td></td>
</tr>
<tr>
<td>C-independent</td>
<td>13.8</td>
</tr>
<tr>
<td>C-dependent</td>
<td>57.3</td>
</tr>
<tr>
<td>M-ind-supp.</td>
<td>2.9</td>
</tr>
<tr>
<td>M-dep-supp.</td>
<td>69.6</td>
</tr>
<tr>
<td>12 months</td>
<td></td>
</tr>
<tr>
<td>C-independent</td>
<td>10.4</td>
</tr>
<tr>
<td>C-dependent</td>
<td>68.9</td>
</tr>
<tr>
<td>M-ind-supp.</td>
<td>5.7</td>
</tr>
<tr>
<td>M-dep-supp.</td>
<td>75.5</td>
</tr>
<tr>
<td>21 months</td>
<td></td>
</tr>
<tr>
<td>C-independent</td>
<td>25.5</td>
</tr>
<tr>
<td>C-dependent</td>
<td>44.4</td>
</tr>
<tr>
<td>M-ind-supp.</td>
<td>21.3</td>
</tr>
<tr>
<td>M-dep-supp.</td>
<td>58.7</td>
</tr>
</tbody>
</table>

*Note: ind-supp. = independence-supportive; dep-supp. = dependence-supportive; boxes indicate developmental tasks that are central for the respective age-group. Percentages are averages of two dyads, separately for child and mother behaviours.*
Regarding mother behaviours, the corresponding schema applied for all tasks as predicted: Initially frequent dependence-supportive behaviour (25–74%) decreased (to 11–54%), whereas initially rare independence-supportive behaviour (8–30%) increased (to 11–54%) with children’s growing competence.

The only exception was for independent child behaviour in the task of learning to walk. Instead of the predicted increase in the central age group (9 months), stability was found. Because the operationalisation of task accomplishment appears most straightforward (mothers called in when children took their first steps), poor timing of observations cannot account for this unexpected finding. Whether this finding is due to an error of coding (i.e. crawling should have been excluded from the task of learning to walk), or to inadequacy of this specific hypothesis (i.e. the crossover effect should be expected long before actual competence is reached), cannot be decided here. A 6 to 9 months comparison group would have been necessary in order to decide between both alternatives.

Thirdly, for the competent groups, the crossover effect found in the central task groups, which lead to a higher level of independent than dependent behaviour, was maintained across all dyads. Likewise, in the competent groups, independence-supportive mother behaviour was generally higher than dependence-supportive behaviour.

**Planned Comparisons for Convergence of Adjacent Age Groups.** In the comparisons across adjacent measurement points of the 9 and 12 months age groups, no significant differences emerged for any of the four behaviour categories. Thus, a longitudinal interpretation across these measurement points seems warranted.

**Planned Comparisons for Age Differences.** Regarding children’s dependent behaviours, significant (linear) cross-sectional decreases were found with increasing age in the task of learning to dress/wash oneself, \( F(1,3) = 21.32, P < 0.05 \); and the task of learning to walk, \( F(1,3) = 11.11, P < 0.05 \). For the task of learning to eat, the differences did not reach conventional levels of statistical significance, \( F(1,3) = 6.7, P < 0.08 \). For independent behaviours, cross-sectional age differences indicated a significant linear increase in the task of learning to dress and wash oneself, \( F(1,3) = 200.06, P < 0.01 \).

Regarding mothers’ behaviours, the predicted linear decreases of dependence-supportive behaviours were found for all three tasks: learning to dress/wash, \( F(1,3) = 18.22, P < 0.05 \); learning to eat, \( F(1,3) = 13.1, P < 0.05 \); and learning to walk, \( F(1,3) = 24.67, P < 0.05 \). For the predicted increase in independence-supportive mother behaviour, a linear cross-
sectional age trend was found in the task of learning to dress/wash only, $F(1,3) = 33.38$, $P < 0.01$.

**Summary of Frequency Results.** In combination with the results on intra-individual change, convergence of adjacent age groups, and inter-individual cross-age trends, the results largely were consistent with the hypotheses. Initially frequent dependent behaviours declined and rare independent behaviours increased with children's growing competence in the developmental tasks. Parallel to this, a decline of initially frequent dependence-supportive mother behaviours was accompanied by an increase of initially rare independence-supportive behaviours.

**Overview of the Sequential Analyses**

The core of the study were analyses of interaction patterns and their changes over time. LAG-sequential analyses were performed separately for each dyad, measurement point, and task (Sackett, Holm, Crowley, & Henkins, 1979). In these analyses, the conditional probabilities (CPs) for behaviour events, given that a specific antecedent event had occurred previously, are compared with their base probabilities (BPs, i.e. overall relative frequencies). Deviations of conditional probabilities are tested with binomial $z$-tests. Positively significant deviations indicate that a particular event is more likely to occur as a consequence of a specific antecedent than would be expected by chance. The test procedure was adjusted according to suggestions by Allison and Liker (1982).

In addition to the description of the results on interaction patterns, statistical analyses tested the hypotheses about changes in interaction patterns within dyads, as well as about differences in contingencies across age groups and tasks. Analyses of variance were performed on the z-score probabilities of the LAG-analyses (cf. Bakeman & Gottman, 1986), with the factors age of the child (3), type of contingency (2), and point of measurement (4). Again, a multivariate procedure was employed.

For testing the hypotheses, two sets of planned comparisons were performed, separately for each developmental task. It should be noted that these are concerned with *complementary* mother responses only (e.g. *dependence-supportive* behaviours following child *dependent* behaviour). Hypotheses and results regarding noncomplementary contingencies are not reported; because of low conditional frequencies, reliable interaction patterns were too rare to allow for comparisons across tasks.

The first set of hypotheses examined *intra-dyad changes* across progress in the developmental tasks, namely, (a) the trends of mothers' independence-supportive contingencies for child independent behaviour,
FIG. 1. Interaction patterns in the developmental tasks of learning to walk, learning to eat, and learning to dress/wash, as a function of mother's estimations of children's competence. --- mother dependence-supportive contingencies following child dependent behaviour; —- mother independence-supportive contingencies following child dependent behaviour. Points indicate that significant elevations of mother contingencies above baseline ($P < 0.05$) were replicated across dyads.
(b) dependence-supportive contingencies as consequences of dependent behaviours, and (c) the expected interaction of these trends. The second set of comparisons examined cross-sectional effects of centrality of the tasks across the dyads with children of different ages for both kinds of contingencies and their interaction. In order to allow for longitudinal interpretations of results, an additional set of comparisons tested the convergence of interaction patterns in adjacent age groups (9 and 12 months) regarding both contingency patterns, and yielded no evidence of significant differences. Therefore, longitudinal interpretations were allowable.

Developmental Task: Learning to Dress/Wash. As was predicted for the central age group (21 months), child dependent behaviour was significantly followed by mothers’ dependence-supportive behaviours at all measurement points (CPs ranged from 0.26 to 0.67 for individual dyads; BPs 0.05 to 0.20) (see Fig. 1). Similarly, child independent behaviour was found to be consistently followed by mothers’ independence-supportive behaviour (CPs 0.22 to 0.64; BPs 0.07 to 0.24). Moreover, as predicted, these latter conditional probabilities increased steadily.

For both noncompetent age groups (9 and 12 months), child dependent behaviour was quite consistently followed by dependence-supportive mother behaviours (CPs 0.46 to 0.76; BPs 0.18 to 0.35). For child independent behaviour, the conditional frequencies of mothers’ independence-supportive behaviours were often too low to be interpreted. However, at some points, they were found to be significant consequences of independent behaviour (CPs 0.08 to 0.57; BPs 0.01 to 0.07).

Developmental Task: Learning to Eat. As can be seen in Fig. 1, this task is central for both the 9 and 12 months age groups. Following child dependent behaviours, mothers’ dependence-supportive behaviours were significantly elevated consequences at the first three measurement points for both dyads of the first central age group (CPs ranging from 0.17 to 0.80 for individual dyads; BPs 0.03 to 0.34). The predicted decrease resulted in lack of significance for one child in measurement point 4. For the second central age group (12 months), mothers’ dependence-supportive behaviours were again found to be significant consequences (CPs 0.33 to 0.67; BPs 0.05 to 0.25). Similarly, as predicted for both central age groups, child independent behaviour was significantly followed by mothers’ independence-supportive behaviours (CPs 0.08 to 0.40; BPs 0.02 to 0.21).

In the competent group (21 months), interaction patterns appeared to fluctuate. Mothers’ dependence-supportive behaviours were likely consequences of children’s dependent behaviours in the rare cases when dependent behaviour still occurred; again, due to low frequencies of child dependent behaviour, the findings could not always be interpreted.
Following independent behaviour of this age group, mothers' independence-supportive behaviour was only occasionally a significant consequence (about 60% of the cases; CPs 0.08 to 0.27; BPs 0.06 to 0.17).

*Developmental Task: Learning to Walk.* Regarding consequences of child dependent behaviour, in the central age group (9 months), conditional probabilities of mothers' dependence-supportive behaviours were usually significantly elevated for both children (see Fig. 1). Furthermore, as predicted, these contingencies showed a steady decrease for both dyads across the first three measurement points (CPs dropped from 0.70 and 0.75 for individual dyads to 0.38 and 0.05; BPs between 0.18 and 0.02). At the last measurement point, an increase was found (CPs 0.50 and 0.37; BPs 0.08 and 0.10). Regarding child independent behaviour, mothers' independence-supportive behaviours were significantly enhanced consequences throughout all measurement points and in both dyads (CPs 0.05 to 0.25; BPs 0.03 to 0.16).

For the two competent groups (12 and 21 months), different patterns of results were found. Following dependent behaviours (recall their rare occurrence for both groups), mother dependence-supportive behaviour was a significantly elevated consequence in the 12 months group (range of CPs 0.25 to 0.64; BPs 0.01 to 0.13). For the 21 months group, due to low frequencies, the findings were often not reliable. For child independent behaviour in the 12 months group, mother independence-supportive behaviour was a less frequent consequence, but was elevated significantly at one-half of the measurement points (CPs 0.05 to 0.12; BPs 0.03 to 0.06). However, as predicted, for the 21 months group this contingency was rarely significant (CPs 0.06 to 0.24; BPs 0.02 to 0.15).

*Planned Comparisons for Intra-individual Change.* For the central age groups, the statistical analyses largely supported the hypotheses. Regarding the dependent-dependence supportive contingency, as predicted, linear decreases were found for the central age group (21 months) of the task of learning to dress/wash ($F(1,3) = 29.97, P < 0.05$), and in the first central age group (9 months) for the task of learning to eat ($F(1,3) = 33.48, P < 0.01$). Also consistent with the hypotheses, a quadratic trend was found for the central age group (9 months) of the task of learning to walk, with a decrease up to measurement point 3 ($F(1,3) = 15.86, P < 0.05$), and a subsequent increase. These trends denoted a decrease of maternal dependence-supportiveness following children's dependent behaviour, at least up to the point when competence was reached in a developmental task. No significant trends were found for the independent-independence supportive contingencies.
However, as predicted, in all three tasks, there were indications that, across measurement points, the patterns of change for independent-independence supportive contingencies differed those for dependent-dependence supportive contingencies. Differences in linear trends of both contingencies in the central group (21 months) of the task of learning to dress/wash did not reach conventional levels of statistical significance \((F(1,3) = 9.08, P < 0.06)\); there was a significant difference between linear trends for the first central group (9 months) of learning to eat \((F(1,3) = 94.82, P < 0.01)\), and a significant difference between the quadratic trends for the central group (9 months) in learning to walk \((F(1,3) = 10.79, P < 0.05)\). In line with the hypotheses, these results confirm that with increasing competence in the tasks, complementary contingencies changed in opposite directions for child dependent versus independent behaviours.

**Planned Comparisons for Age Differences.** In the cross-sectional comparisons, age decreases for the dependent-dependence supportive contingencies in the task of learning to eat \((F(1,3) = 5.65, P < 0.10)\) and learning to walk \((F(1,3) = 6.01, P < 0.09)\) did not reach conventional levels of statistical significance. However, for the task of learning to eat, the mean level of the first and second central age group combined differed significantly from the competent off-central group \((F(1,3) = 9.9, P < 0.05)\).

Regarding the independent-independence supportive contingencies, age differences showed the expected linear increase with age and increasing competence in the tasks of learning to dress/wash \((F(1,3) = 27.35, P < 0.05)\) and learning to walk \((F(1,3) = 11.64, P < 0.05)\). For the task of learning to eat, the tendency for cross-sectional decrease with age or increasing competence did not reach conventional levels of statistical significance \((F(1,3) = 6.74, P < 0.08)\), but a significant decrease was found when the two central age groups combined were compared to the competent group \((F(1,3) = 13.72, P < 0.05)\).

**DISCUSSION**

The study was designed to reconstruct naturalistic socialisation processes in everyday mother-child interactions as well as changes in these processes while children gained competencies in three basic developmental tasks. Focusing on dependent and independent child behaviours, trajectories of interactional change were identified from cross-sequentially organised short-term longitudinal observations. In general, results were replicated across dyads and developmental tasks and are consistent with the notion of *developmental adjustment in early mother-child socialising interactions*. As
hypothesised, mothers adjust their behavioural contingencies for dependent and independent child behaviours as a function of children’s emerging competencies. These processes of adjustment appear to re-occur across three developmental tasks which are central topics of interactions at different ages in early childhood.

When children were not yet starting to learn in a developmental task, the social ecology appears highly nurturant and protective. High dependence-supportive mother contingencies prevailed for children’s dependent behaviour whereas independent behaviours went largely unnoticed. When children began to engage in learning a developmental task, the change in social interactions can be characterised as a transformation towards a complementary pattern. Mother’s independence-supportive contingencies following independent behaviours increased, thus becoming as salient as the (now decreasing) dependence-supportive reactions to dependent behaviours. This was the only time during which independence-supportive contingencies dominated. After children gained competence in developmental tasks, interactions changed again. In general, maternal contingencies supporting both independent and dependent child behaviours appeared often low and fluctuating; independent-independence supportive contingencies (but not behaviours) declined. Mothers seemed to take their children’s competence for granted, but, at the same time, still provided responsive environments satisfying children’s now rare needs for assistance.

It should be emphasised that the changes found in the antecedent-consequence relations were different from those found for behaviour frequencies. The differences were especially salient after children reached competence. Then, the very frequent independent behaviours went unequivocally unnoticed and the rare dependent behaviours often received high support. Thus, changes in how learning conditions are constructed at different points in development cannot be extrapolated from results about changes in behaviour frequencies. Several theoretical and methodological implications can be derived from the findings; they will be discussed within the constraints imposed by the study’s limitations.

Strengths and Limitations of the Study

The sample sizes employed were small. Extensive information on regularities across changes within individuals were collected at the expense of information on differences between individuals. Hence, the study seems weak regarding generalisability across individuals, but strong with regard to intra-individual development and range of situations. Based on the design’s strengths, the generalisability of the findings for processes of normal development seems quite plausible on three grounds. First, at times
when developmental tasks emerged as central topics of interactions, individual dyads’ results were replicated within age groups in each of the three tasks. Secondly, at these times, findings were replicated across dyads involving children of different ages. Thirdly, the more precisely a mechanism of developmental change is formulated, the smaller the sample size needed to support its acceptance. For normal development, if the trends hypothesised are modelled well enough, one should be able to find them in any dyad.

A further limitation derives from the unidirectional hypotheses that were formulated for interactional influences: Only mothers’ contingent reactions to children’s behaviours were examined. Reciprocal hypotheses need to be formulated about changes in contingent reactions of children that mothers experience as consequences of their behaviour (Bell, 1979).

With regard to the contents of interactions, the findings of the study may appear to be limited to specific socialisation processes only. However, on the one hand, the three tasks selected are probably major developmental milestones of these age periods (along with attachment formation and language acquisition). On the other hand, by examining interactional changes within each task, and using developmental tasks as a frame for organising the timing of changes, regularities in socialisation processes were identified across tasks (and ages).

Developmental Adjustment of Interaction Patterns and its Implications for Research on Parenting

The findings of the study have implications for our understanding of how mothers foster independence as well as for the study of socialisation processes in parenting more generally.

Fostering Independence. The findings focus attention on naturally occurring socialisation processes for independence and dependence which take place in the context of everyday mother-child interactions. First, maternal support of children’s independent behaviour does not require “dependency weaning”, that is, does not require mothers to overall react negatively to children’s dependent behaviour. Children’s independent behaviours emerge and are consolidated, while mothers support both independent and dependent child behaviours simultaneously. Fostering independence seems to be a balancing act in which mothers challenge emerging competencies at the same time that they are available to step in when needed. Secondly, patterns of mothers’ changing reactions to children’s independence are not paced according to children’s general development. Instead, they are re-enacted in those competence domains which become central developmental tasks at different ages.
Taken together, the findings provide a sharp contrast to inter-individual approaches to the study of maternal socialisation of independence, but at the same time offer suggestions for new studies within that perspective. The study focused its longitudinal attention on intra-dyadic change over time, producing a picture of appropriate maternal synchrony and adjustment to children's development. Clearly, many researchers are interested in why some mothers are more effective at achieving such adjustments and in continuing to calibrate their behaviours to their children's development. Long-term consequences might be expected for children whose mothers do not adjust; for example, mothers who support independence prior to the development of competencies, or mothers who continue to be supportive after competence is achieved. Of particular interest in future research might be the study of developmental tasks in which parental adjustments to children's independence are differentially easy. Most parents are excited about the emergence of eating, walking, and dressing behaviours; more ambivalence, for example, may be experienced about the emergence of sexual behaviours.

**Studying Processes of Parental Socialisation.** What does the knowledge that mothers adjust their caretaking behaviours to growing competencies of the child contribute to our understanding of socialisation processes? If, in fact, mothers' contingent reactions to children's behaviour do change systematically, then an additional dimension may need to be included in the study of socialisation processes, namely, time. This might mean, for example, that a particular "childrearing style" or pattern of maternal behaviours might be more adaptive at one developmental period than another. Hence, for examining childhood socialisation processes, a frame, as for example, the concept of developmental tasks, is useful for capturing the developmental timing in processes and outcomes of these processes (for similar arguments see also Bee et al., 1982; Bornstein, 1989; Olson, Bates, & Bayles, 1984). Similarly, one aspect of a caregiver's style may turn out to be the extent to which he or she can adjust to the changing demands of his or her child as that child develops. At the very least, studies may wish to more routinely include the assessment of parent-child interactions over time, if for no other reason than to document, rather than to assume, stability.

Clear support for the hypothesis of mothers' behaviour change may not be regarded as unexpected, despite the fact that traditional views on childhood socialisation strongly rely on assumptions of stable modes of childrearing (e.g. Baumrind, 1971). What the study contributes is a demonstration of the extent and regularity of natural change in early mother-child socialising interactions. Perhaps, across processes of mastery in developmental tasks, stability of mother-child interactions ought to be conceptualised as stability of repeated attunement, or as stability of
maternal adjustment and readjustment to a child’s changing developmental level (cf. Heckhausen, 1987; Maccoby, 1984).

The Role of Social Environments in the Construction of Learning Ecologies

The notion of developmental adjustment in socialising agents is not new to research on childhood development (cf. Vygotsky, 1978; Valsiner, 1987). In fact, it has become a common theme in the literature on caretakers’ involvement in children’s cognitive and language development (e.g. Bornstein & Bruner, 1989; Rogoff, Ellis, & Gardner, 1984). However, concepts, such as “readiness to be socialised” (Maccoby & Martin, 1983), or Sears’ (1951) notion that the child’s behaviours grow “changeworthy” with development, suggest that changes and adjustments in mothers’ behaviour may play a more general role. Outside the cognitive domain, the present study seems to be a rare attempt to show that during socialisation processes, maternal behaviour change can be understood as a consequence of children’s accomplishments in developmental tasks, and that this change may not be just a consequence of children’s age and cognitive development. In this regard, a study by Green et al. (1980) on the interactional consequences of children’s ability to locomote seems to be the only other case.

In a broader perspective, concepts such as “family developmental tasks” (Duvall, 1971) can be useful for a contextual framework: When a developmental task emerges as a central topic for a child, it may become a task for caretakers to provide learning conditions that ensure that the child accomplishes the task. The terms “apprenticeship” (Heckhausen, 1987; Kaye, 1982), or “scaffolding” (Bruner, 1978) seem to be appropriate descriptors for interactional changes at those times when task mastery of the novice is a (developmental) task of the competent caretaker. With regard to developmental tasks of early childhood, such as learning to walk, learning to eat, or learning to dress/wash alone, research documents that parents hold subjective “timetables” including beliefs about when competencies in these tasks are necessary accomplishments of childrearing (Goodnow, Cashmore, Cotton, & Knight, 1984). The results of the present study suggest that parental behaviour changes correspond to parent’s perceptions of their children’s accomplishments. In this broader frame, the study of the dynamics of dependence and independence in childhood highlights processes by which caregivers continually readjust the balance between nurturance and stimulation when keeping pace with and guiding the development of the growing child.

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