THE FIRST HOUR OF LIFE

- Description of the early reciprocal interaction
- Mother–infant behaviour and development of their mutual relationship

Britt Wiberg

Umeå 1990
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DOCTORAL DISSERTATION

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by

Britt Wiberg
Abstract


The immediate postpartum period may be particularly important for the developing relationship between mother and infant. This report consists of two studies: the first study (paper I) gives descriptions of the interaction between infants and their parents during the first hour post partum and the second study (papers II–IV) in this report examines the effect of extra contact during the first hour following delivery.

In the first, descriptive study, the study group consisted of 12 families, who were videotaped immediately after the birth of their infant. The aims of this study were to examine the absolute first contact between the newborn and its parents and to test Mahler's theory (1975) of the normal autistic phase. The videotapes were analysed by independent observers, who have examined the activities of the infants, the mothers, and the fathers with special emphasis on interaction. The typical process of activity development is presented and commented on and one case study is described in detail as an example (in Swedish in Appendix IV of paper I). The newborn's own capacity of intentionality and interaction through movements and sounds gives the mother a feeling of being the person who is sought by the infant during the first post partum hour. As this typical process is one of activity and of non-verbal interaction, it seems more appropriate to call this period a turning point phase or a phase of reciprocal adjustment immediately after delivery rather than a normal autistic phase as it was termed by Mahler.

In the second, longitudinal, prospective study, an extra naked skin–to–skin contact and suckling contact, during 15–20 minutes during the first hour post partum, was given to 22 primiparous mothers and their infants (P+ group). A control group of 20 primiparous mothers and their infants received routine care immediately after delivery (P group). The aim of the study was to examine what possible influence extra contact, in contrast to routine care, might have on the behaviour of mother and infant and on the development of their mutual relationship, also taking the sex of the infant into account. Follow-up studies were made at 36 hours, 3 months, 1 year, and 3 years after the birth of each infant. In this thesis the results of the 1–year and 3–year follow-up studies are included, both presenting main effects between the experimental group and the control group and effects in relation to boys and girls. The results of this study are discussed to some extent in relation to Mahler's theory of symbiosis and individuation.

Key words: First hour post partum, mother–infant behaviour, early interaction between mother and infant, observations, development, follow–up, Mahler's theory of symbiosis and individuation.
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**Doctoral thesis**

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Britt Wiberg

Department of Applied Psychology
University of Umeå
Umeå 1990
To the memory of my parents BERTHA and RAGNAR, who taught me about parenthood;

and to the love of my children MIKAEL and MARIE, who taught me about childbirth.
"Imagine sitting in a room alone listening to a recording of the ocean rhythmically pounding against the shore. The sounds from outside are vague and muted. The room is dark with no more than a pink haze penetrating the drawn curtain. Suddenly, the lights go on overhead, people are shouting, and someone lifts you out of your chair. Not a pleasant thought. Yet, this is the beginning of life for many human infants."

(Spezzano & Waterman, 1977, p. 110.)
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It must also be recognized that without the willingness of many families to share special life events with the research team, the present doctoral thesis would never have come into existence.
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Thanks to all of you!

Holmsund, August 1990.

Britt Wiberg
PREFACE

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The present thesis begins with an extensive introduction (p. 7–40) of this complex and fascinating field. Then follows a summary of the present studies, a discussion, and the reports below, which will be referred to in the text by their Roman numerals:

I  Wiberg, B. (1990): The first post partum hour – A descriptive study of the activities of the newborn, the mother, the father, and their interaction. DAPS, 33, Department of Applied Psychology, University of Umeå.


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The activities of the fathers

The parents' verbal communication

The interaction between the newborn and its parents
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P+ group: Extra contact immediately following delivery

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P and P+ groups: Routine care in the maternity ward

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P group: Comparison between boys and girls

Boys: Comparison between mothers in P and P+ groups
INTRODUCTION

Fundamentally human life is about survival, and about development as an individual and as a species. In critical situations survival of the individual always takes priority; there is however no clear boundary-line between the individual's need for self-protection and social or altruistic needs, which are a prerequisite for the survival of the species – the one presupposes the other.

If one is to understand the psychological significance of various ways of caring for mother and baby in connection with delivery – the birth of the infant – it is necessary to place this event in a historical context, and it is also important to place this event in a context of development – a turning point, a critical period of increased vulnerability and increased possibilities.

Delivery in a historical context

Obstetrical assistance was an act of love between women in olden times in Sweden. When a woman was about to deliver, wives and widows gathered from the neighbourhood. The delivery normally took place in the living room and no one else was let in, including the husband. Single women were not allowed to be present. In time obstetrical assistance developed into a profession of its own, not subject to any kind of control; there were no requirements as to education, medical qualifications, ethical or moral qualities. Even in the middle of the 15th century these women were called earth-ladies or earth-wives. Generally it was persons of low social status who could or were allowed to help the woman during the delivery. The woman in childbed was regarded as unclean. The risks involved in the delivery were great at this time both for mother and infant, especially for those who were physically exhausted, undernourished or unmarried, who ran the further risk of being threatened by the church with the pillory, or threatened with social disgrace (Höjeberg, 1981).

Collegii Medici, later Medicinalstyrelsen and now Socialstyrelsen, was founded in 1663 and was assigned the task of supervising midwives seeing that they had the required knowledge and experience to deal with deliveries. Doctor Johan von Hoorn was the man who introduced scientific obstetrics and was also the founder of midwifery with his book "Den svenska väl-öfwade Jordgumman" in the year 1697. The plight of poor women in confinement and the need for educational institutions necessitated the setting up of the lying-in hospitals. One of the first obstetrical institutions in Sweden, Stockholm's Allmänna Barnbördshus, was opened in 1775. The mortality rate was terrifyingly high among the infants of poor, unmarried women, and the objective was to reduce the mortality rate among infants. As a result, expectant mothers were accepted without demanding money or explanations. During the 19th century maternity care attracted the attention of the authorities. The various lying-in hospitals had a bad reputation because of the high mortality rates among the newborn infants. However, the women with the highest
status, socially and economically, preferred to be delivered in their homes well into
the 20th century (Höjeberg, 1981).

In the 1870's, as the questions of infant mortality and infectious diseases began to
be solved, the mortality rate among mothers and infants was drastically reduced. In
the early 20th century, when many infants often contracted fatal, infectious
diseases, strict hygienic regulations were adopted in handling the newborn infants.
Touching and handling the infant was reduced to a minimum. The care of the
newborn became much stricter. Mother and infant were divided in separate wards,
and in addition infants born prematurely were placed in incubators in isolation
rooms. Routines used in the care of premature infants were carried over to the care
of healthy, full term infants, with the consequent separation of mother and infant.
There was a general attempt to keep contact with the infant to a minimum, not
even the doctor should touch the infant more than necessary because of the risk of
infection.

Eventually a gradual change took place from delivery in the home to the lying-in
hospitals. In 1938, free delivery care was introduced in Sweden, which heavily
reduced the private midwives' chances of earning their living, thus contributing to
the transition to institutional deliveries. A 1941 report on midwives revealed that,
apart from the increased feeling of security institutional medicare was said to give,
other social conditions such as poor housing conditions and difficulties in
obtaining domestic help during confinement, also contributed to the rapid
transition from home treatment to hospital care. It was also discovered that living
far away from where the midwife was stationed caused anxiety, and the fear that
the midwife might be occupied elsewhere and this increased the tendency to seek
admission to the maternity hospital. Institutional deliveries increased gradually and
today practically all deliveries take place at hospitals.

Manuals from 1945 and 20 years onwards continued to recommend minimal
handling, strict isolation, and the exclusion of all visitors from the wards. Right up
to the 1970's the hospitals in Sweden had strict rules concerning both full term and
premature infants. The parents' opportunities for contact with their infant were
limited. The mother could meet the infant at feeding time for half an hour every
fourth hour throughout the day. The father could look at his infant through a
nursery window, while a nurse held it up.

Until recently the care of newly delivered mothers and their infants has been
governed entirely by medical concern. Lately, however, there has been a
reevaluation of the psychological consequences of strict isolation and hygienic
procedures, and interest in the emotional aspects of early contact between mother
and infant has increased. For full term, healthy infants, the rooming-in system has
been reintroduced. The importance for the mother of taking care of her infant
herself has been taken fully into account.
Procreation and parenthood: a human crisis

The period of childbearing and new parenthood can be seen as a *crisis or turning point – a critical phase in human life, in the sense that women in particular go through a time of great change and adjustment. The parents in general and the mother specifically are faced with enormous bodily (physiological), psychological and social changes, which make heavy demands on physical and psychological resources. This period provides opportunities for positive development but also entails increased vulnerability and susceptibility to emotional disturbance.

On the changed social situation for the new family

Having a child also entails a radically altered social situation. The first pregnancy often occurs when the parents are in the process of establishing themselves in the labour market and before they have found a stable position in society (Lagercrantz, 1979). There are thus a combination of forces of a social, cultural and economic character, which are highly interactive, and cause differing reactions to the prospect of becoming a parent. Quite obviously such factors as the parents' own social contacts, their working and living conditions, and their financial circumstances, play an important part in enabling them to enter upon parenthood with some security.

There are factors on several different levels – within the individual, in his/her relations with those close to him/her, and his/her social circumstances – which play a part in how this whole crisis is experienced. These factors are both closely connected and complicated in their interaction. They also influence how this life crisis will develop and how the parents will find their solutions.

On this period as a developmental crisis

This life crisis has the characteristics of a turning point or an existential changing point in life (Cullberg, 1975), which is determined by how the individual has earlier worked through and solved his or her own psycho-sexual development. Benedek (1959; 1970) sees the parenthood, especially with the first child, as a step toward the maturation of the personality. She has done a theoretical analysis of parenthood as a possible outcome of the processes of introjection and identification, which were active in earlier development phases to build up the intra-psychic structures. Erikson (1971; 1977; 1985) has divided up a person's life cycle into eight psycho-social stages, where each step to another stage is a potential crisis since it has the potential to bring about radical changes. The way in which a person organizes the course of his/her life, determines that person's individual and specific personality and psychological functioning.

* Crisis = from the Greek word krisis = limit. In Romany meaning judgement, deliberation. The Chinese word for crisis means a turning point and implies both risk and possibility.
In dividing the human life cycle into these different ages, Erikson has created the concept of the human life cycle as a set of developmental crises, and believes that each stage of development presents different problems that must be solved. During the process of development these problems can be solved well or badly, wholly or partially. Under favourable circumstances, a crisis always represents possibilities for increased maturity. Erikson (1971) has named one of these so-called normative developmental crises the generativity crisis—the step from youth to parenthood. Becoming a parent presents particular problems to be solved (generativity versus stagnation, where generativity is a lasting result) and care is the fundamental virtue of this psycho-social stage. Erikson describes how, in successful cases, the pregnancy crisis becomes a significant turning point that can lead to clearer awareness of identity, increased ego-strength, maturity and integration.

On the point of no return: from youth to motherhood

Bibring (1959; Bibring et al; 1961; Bibring and Valenstein, 1976) states that pregnancy is a crisis period which differs clearly from the other crises in a person's life. The powerful physical changes mentioned earlier as well as the specific physical conditions that are characteristic of pregnancy imply a psychological crisis. Bibring calls the step from youth to motherhood "a point of no return" (Bibring et al, 1961). The woman's situation is radically changed will never be the same after her child's birth. "The development crisis is in its nature irrevocable" (Kihlbom et al, 1981, p. 10).

Bibring and her co-workers (1961) discussed three adaptive functions or developmental tasks, which are important for the pregnant woman; firstly to be able to accept the conception and the foetus and to form the basis of an emotional symbiosis, then to dissolve infantile bonds with her own mother, and lastly to transform the partner relationship from dyadic to triadic.

On accepting conception and the foetus, and forming the basis of an emotional symbiosis

Development during pregnancy can, according to Lagercrantz (1979), be seen as a number of stages in maturity, building one on the other. During this period the woman is going through a deep emotional process. The first such stage in pregnancy is when the woman learns that she is pregnant and accepts this fact emotionally. This means accepting that the foetus is also a part of the man, and thereby becomes a part of her. This can give rise to serious conflicts if the infant is unwanted or if the woman harbours feelings of enmity towards the man. The next stage towards maturity is when the woman feels the quickening of the foetus, whereby she should be able to imagine and accept the foetus as an independent individual. Now her thoughts and desires consciously concern the expected baby. At this stage the pregnant woman and the foetus are living in a symbiotic relationship—a close biological dependency relationship. The presence of the baby awakes strong positive and negative emotions and the woman has fantasies about...
the developing baby. The woman's own *regression will help her to get in contact with her own emotions and memories. This vulnerability – which has been called "regression in the service of reproduction" (Brudal, 1985) – helps her to identify herself with the baby in her womb and to be susceptible to the subtle signals of her baby while at the same time helping her to be open to her inner mind and prepare her for her task of caring. Towards the end of pregnancy the woman begins to prepare herself – through fantasies about what the baby will need and what she can provide – for the break-up of the biological symbiosis by the birth process. In this way she prepares herself for her two roles in the new relationship – giver and receiver. Raphael–Leff (1982, in Berg Brodén, 1989) writes that the aim of the pregnancy is both to produce a baby and to create a mother. Raphael–Leff discusses that this process serves as a training for motherhood and she identifies three phases of the pregnancy, which are parallel to the tripartition of the pregnancy: fusion, gradual differentiation and successive psychic separation. These phases are, according to Raphael–Leff, in concordance with Mahler's phases: normal symbiotic phase, differentiation and separation-individuation process during the postnatal period.

**On dissolving infantile bonds**

During this crisis period in their lives, parents, and especially mothers, are faced with powerful physical, psychological and social changes. It is a time of great upheaval, and considerable physical and emotional resources are needed to cope with it. The changes that take place during pregnancy mean that more or less repressed psychological conflicts can easily surface again. They may be conflicts that arose when the woman was a child, relating perhaps to how she herself was treated and what sort of parental models she had and still has. The surfacing of these conflicts gives the woman a chance of finding other more mature solutions – if she is able and strong enough to deal with them (Lagercrantz, 1979). The mother's general psychic functioning and her ability to cope with the conflicts, and the way in which she has solved earlier conflicts in previous developmental phases, play a very great part in whether or not she is able to solve intrapsychic, emotional and social problems that arise in pregnancy. Thus, a pregnancy crisis can be a positive turning point for the woman through which she can achieve a clearer sense of identity, of who she is and what she wants in life. Olin–Lauritzen (1979) consider that, if new and old conflicts prove to be so difficult that the woman is incapable of solving them, the pregnancy crisis can give rise to severe anxiety and her emotional balance can be seriously disturbed. The pregnancy offers the woman a chance of coming to terms with her own mother–daughter relationship – of perhaps liberating herself or achieving reconciliation or understanding. Uddenberg (1976) has pointed to the importance of the woman's relationship with her own mother. In his three-generation study, he examines the connection between the new mother and her own mother. He found that now this

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* One definition of regression is given by Killingmo (1971, p. 112): "An accentuation of a developmentally lower level of functions and a parallel of higher or later developed levels – the result of increased differentiation and hierarchical integration – which becomes less dominant".
connection affects the new mother's adjustment to her reproductive functions, i.e. women that have had lengthy and difficult labours may have had negative experiences in their relationship with their own mothers and expressed these conflicts when faced with the prospect of themselves becoming mothers.

The pregnancy crisis also means that a woman, is to a unique degree, open to emotional influence. The expectant and the new mother often seek new models of good motherhood; the staff at the antenatal clinic, the delivery ward, maternity ward, and the child health centre may well be seen as such new parent models.

**On transforming the partner relationship from dyadic to triadic**

The relationship between the woman and her partner is naturally of the greatest importance during this whole period. This relationship influences how pregnancy and birth are experienced (Lagercrantz, 1979). The relationship between a man and a woman changes particularly with the birth of their first child (Benedek, 1959). The development of the couple into mature parents implies the growing out of a two party relationship (dyad) and the growing into a mutual give and take between three parties (triad) (Bibring et al, 1961). This process may create great and severe strains on the new parents if they have not thought about and prepared themselves for it. Benedek (1970) states that motherhood and fatherhood are complementary processes in their aim to take care of their offspring. Kihlbom et al (1981) have, in their investigation of pending and new parents, described the psychological processes experienced during pregnancy and recent parenthood. They found that to become a parent represents a putting forth of a set of new tasks which one must, in some way, cope with. Carlberg (1989) has discussed the inner and outer readiness for parenthood.

**A natural process which can trigger traumatic experiences**

A critical period can in one way be expressed as a natural life-changing process which can be provoked into a traumatic crisis. Deutsch (1945) described pregnancy and birth as an event in life which entails major physical and emotional changes. In her opinion, all women are ambivalent about both pregnancy and birth, and the whole pregnancy is accompanied by conflicting impulses. Lagercrantz (1973; Lagercrantz & Hammarström, 1975; Lagercrantz, 1979) described pregnancy and newly attained motherhood as a crisis period, which provides the possibility for development of a positive nature but can also give rise to increased vulnerability and sensitivity to emotional disturbance. In her study of thirty-three somatic, healthy first-time mothers, one-fourth of her mothers felt strong anxiety and worry, and they also had emotional disturbances. Nilsson & Almgren (1970) found in their prospective investigation of paranatal emotional adjustment that one-third of their 165 women showed emotional disturbances. They concluded that these emotional disturbances were connected to the mother's self identification and previous mental health, the relationship to the child's father, whether or not the pregnancy was desired or undesired, as well as other social circumstances. Liljeström (SOU 1975:31) found in her investigation that one-third of all the women surveyed still had unresolved or repressed conflicts. In this study, 40% of
the women developed increased mental resources as a result of the crisis of giving birth; they had stronger relationships with their mates, and with their own mothers and were able to communicate with their children.

On the man's situation – fatherhood

Both Jarvis (1962) and Gurwitt (1976) have described the psychological development process of the man in relation to his wife's pregnancy and delivery. They conclude that this period of pending and recent fatherhood constitutes a crucial psychological development phase and represents many different types of adjustment for the man. The relationship between the man and woman is understandably of great importance for this development during the whole period of pregnancy and also influences how pregnancy and delivery are experienced. The pregnant woman's symbiotic relationship to the foetus can mean that the man feels himself as an outsider and the foetus as a rival which has unrestricted dominance.

An investigation of the father's situation during this period (Alm et al, 1977; Strandberg, 1978) has shown that the men also experience a psychological crisis shown in "pregnancy symptoms". Anthropologists have studied this ritual in connection with fatherhood and have found that in some ways it is a form of identification called *couvade–rituals (Brudal, 1979a) in which the man expresses his identification with his wife to the extent that he experiences the symptoms of giving birth to the child. The man experiences the so-called prenatal or pseudo-maternal forms of labour pains and cries, while the woman gives birth to the child in silence. This phenomenon is also known as "Zeus–jealousy" because in mythology, there is a story of how Zeus swallowed his pregnant wife so that he would be able to give birth to her child. A parallel situation with different types of triangle situations may also be imagined, in which the man instead of identifying with his wife, identifies with the foetus (this is called the postnatal form or the lesser (diet) form of couvade).

Brudal (1984) studied sixty first-time Norwegian fathers during the first days after the birth of their children. The results of the semi-structured interviews and the twenty-four item questionnaires were compared with a study made by Stein (reported in Brockington and Kumar, 1982) and she concluded: "The data strongly suggest that new mothers and new fathers have a number of reactions in common, such as forgetfulness and poor concentration, depersonalization, depression, and tension, lending further support to the idea that these reactions in mothers are based on emotional rather than hormonal factors. Although the evidence does not indicate that these reactions in men and women are identical, nevertheless the presence in new fathers of a clear-cut postpartum syndrome seems to justify the use of the term paternity blues comparable to maternity blues. Since the study of the psychological reactions in connection with the birth of a child may be fruitfully considered a separate field, it is here proposed that it be called tocology, derived from the Greek tokos, meaning to give birth or to be born" (Ibid, p. 383–384).

* Couvade = from the French word couver = by lying down, sit (on eggs) (Brudal, 1979a, p. 25).
On the delivery as the peak of this life crisis

Ekselius et al (1978) see the whole pregnancy as a critical period with three peaks—the first when pregnancy is officially confirmed, the second when the woman feels the quickening of the foetus, and the third when she actually gives birth.

The delivery—the birth of the infant—can be seen as the peak of this crisis, when the biological symbiosis is abruptly destroyed. During a short space of time, previous conflicts, fears and anxieties are brought to a head (Lagercrantz, 1979). In successful cases the delivery can be an extremely positive experience for the woman—a peak—experience according to Brudal (1979b). In other cases it may be so painful and anxiety—charged—a pain—experience according to Brudal (1979b), so that the crisis is exacerbated. The course of the delivery, and her own experience of it, depend on how well the woman has been psychologically prepared; i.e. how successfully she has passed through the above—mentioned maturity stages, according to Lagercrantz (1979) and also her capacity of emotional regression and psychological openness.

In the opinion of Deutsch (1945), the severing of the umbilical cord destroys the unity that exists between mother and infant while the infant is in the womb. The mother's reaction to this physical separation at birth is compensated for by a kind of rediscovery of the infant. In the period immediately following delivery, there is in every mother regressive tendencies which work towards a restoration of the previous prenatal unity between mother and infant. According to Deutsch (1945), the emotional bonding which begins here can be described as a mental umbilical cord. Reactions to the separation are transferred from the physical to the mental sphere, so that bonding to the infant is maintained even when the purely physical connections are destroyed. This may well correspond to what we call "maternal instinct" in animals.

Furman (in Klaus & Kennell, 1976, p. 52) comments that during pregnancy the mother feels the infant to be primarily a part of herself, and invests self—love in it. Birth means then for the mother a partial loss of her self, both physical and mental. If she is allowed to hold and care for her baby, right from the start and uninterruptedly, she will re—establish physical unity with the infant and will be able to transfer her self—love from "the baby inside" to "the baby outside" her womb. At the same time the infant's unique behaviour helps the mother to begin a relationship with it as a separate individual. According to Lagercrantz (1979), the mother establishes a psychological symbiosis with her baby through caring for it, learning to know it, looking after and breast—feeding it.

The competence of the unborn child

Historical background

In China and Japan the child is considered to be one year old at birth; individual's existence throughout the period of foetal development is thereby recognized from
the moment of conception. The philosopher-physician, Sir Thomas Browne, drew attention to this period, and in 1642 he wrote: "Every man is some months older than he bethinks him, for we live, move, have being, and are subject to the actions of the elements and the malice of diseases, in that other world, the truest Microcosm, the womb of our mother" (Macfarlane, 1977, p. 11). In 1802 the poet Samuel Taylor Coleridge wrote in the margin of Browne's book: "Yes – the history of man for the nine months preceding his birth would probably be far more interesting, and contain events of greater moment, than all the three score and ten years that follow it" (Macfarlane, 1977, p. 11).

The belief that various events can affect the unborn child – and that they can be connected with such factors as magic, the gods and the planets, the child's own actions, or occurrences that influence the pregnant woman, has existed in all cultures and epochs during recorded history. In the 4th century B.C., for instance, the physician Hippocrates believed that the pregnant woman could influence her unborn child, and his views were shared by Serenus in the 1st century A.D. The Chinese had antenatal clinics a thousand years ago, not primarily to check on the mother's physical health, but rather to establish that she was calm and relaxed so that the unborn baby would be likewise. During the Middle Ages, however, people believed in the power of magic and devils, and midwives were most often regarded as witches or enchantresses. But ideas varied, and in the 15th century Leonardo da Vinci considered that there was a direct connection between a pregnant woman and her unborn child: "The things desired by the mother are often found impressed on parts of the child whom the mother carried at the time of the desire. So it is concluded that one and the same soul governs the two bodies, and the same body nourishes both" (Macfarlane, 1977, p. 12). At this time there was also a general belief that the imagings of the mother and father at conception affected the result of the pregnancy (Ibid, 1977).

Leonardo da Vinci (1452–1519) made a drawing of a foetus in the womb some time between 1510–1512. He wrote in a commentary on this famous drawing that the foetus had neither breath nor heartbeat. "At this time the foetus was not considered to be alive until it had been delivered and started breathing. Life was synonymous with breath – spirit – pneuma in Greek and spiritus in Latin" (Lagercrantz, 1989, p. 9).

The predominant opinion of scientists during the previous century, and earlier in this century, was that the womb was a fortress which nothing but sperm could penetrate. The womb was imagined as some sort of mausoleum in which the foetus lay buried. There was no stimulation of any sort, either internal or external, until life after nine months finally broke through. In 1889 Hirsch listed a number of substances such as opiates, tobacco and ether, which could pass through the placenta and be transferred from the mother's blood to the child's. In 1935 Sontag & Wallace demonstrated how cigarette smoking and loud noises could affect the frequency of the child's heartbeat. In the 1960's it was finally realized how vitally important was the interaction between mother and child in connection with the Thalidomide tragedy, brought about by a sedative prescribed for pregnant women.
Today we know over 1500 substances that can have an adverse effect on foetal development (Macfarlane, 1977).

In biological sense the foetus is an endoparasite that exploits the body of the mother. The effect of the foetus on the mother's physiology is summed up by Hyttten (1976; in Macfarlane, 1977, p. 13): "The foetus is an egoist, and by no means an endearing and helpless little dependant as his mother may fondly think. As soon as he has plugged himself into the uterine wall he sets out to make certain that his needs are served, regardless of any inconvenience he may cause. He does this by almost completely altering the mother's physiology, usually by fiddling with her control mechanisms."

"Up until the 1960's and 1970's the foetus was seen as something highly undeveloped, unable to do anything. It was 1970 before scientists could establish that the foetus actually breathes. It is also only recently that the foetus has been shown to perform a number of movements that the infant after birth later performs" (Lagercrantz, 1989, p. 9).

**How research has progressed**

Research into the development and environment of the foetus has intensified during the last ten years. Previously, knowledge of the unborn child's abilities was obtained mainly through the mother's descriptions, through studies at the abdominal wall by directly palpating the mother's abdomen or by using a stethoscope. These days it is possible to study very premature babies that now survive, and since the beginning of the 1970's it has been possible to use ultrasound techniques to obtain new information about the unborn child (de Château, 1989). Today there is an obvious change in the view of the unborn child. "From the standpoint of research today, we can see that the earlier view of the foetus as a poorly-functioning adult is being increasingly replaced by one of an admirably well-adapted, functioning "baby" (Liley, 1972)" (Carlberg, 1989, p. 45). In the same way as we now speak of "the competent infant" (Chamberlain, 1988), we can speak of "the competent foetus" (Graves, 1980), which actively seeks stimulation and practices various functions (Carlberg, 1989).

**On the life of the foetus and its surroundings**

Our development begins in salt water – our origin lies in the amniotic fluid; we spend nine months of our life in water, the rest on land. "The baby in the uterus lives in a warm, noisy and maybe pink-tinted world cushioned by surrounding fluid" (Macfarlane, 1977, p. 19). "The foetus floats in a weightless state in warm amniotic fluid. It knows neither up nor down. It does not seem to become seasick.

* "Ultrasound techniques developed originally from sonic-depth finding of the sea bed. The method uses high frequency sound waves which are inaudible to the human ear. These sound waves penetrate water with ease, and are reflected by stationary objects. The technique is thus particularly suitable for studying the foetus in its fluid environment" (Lagercrantz, 1989, p. 65).
if its mother swings, spins round or does gymnastics. Dutch ultrasound researchers have found that the foetus lacks reflexes of position. The organ of equilibrium in the inner ear develops very early however, but apparently does not function until after birth. The foetus' temperature (c. 37.5°C) is somewhat higher than its mother's, which in turn is somewhat higher than that of a non-pregnant woman. Presumably it remains constant, even if the mother takes a sauna or becomes severely chilled. The foetus, like the newborn, cannot shiver, and it is largely unable to sweat" (Lagercrantz, 1989, p. 70).

On the foetal movements

Prechtl (1985) has recorded in great detail when various movements could first be observed in twelve foetuses. The foetuses were observed, using ultrasound techniques, for one hour every week from the 8th to the 20th week of pregnancy. All the foetuses showed fourteen different movements by the 15th week. The repertoire of movements occurred in a specific order, and resembled that which can be seen in infants; the unborn child kicks, flings out its arms, twists its head, bends its neck, puts its hand to its mouth, opens its mouth wide, sucks and swallows. The foetus can also make walking movements, and its kicks are presumably needed to help it turn in the right direction with its head down. Perhaps the amniotic fluid makes it easier for the foetus to move. The sucking and eating repertoire is also well-developed, and sometimes sucking marks can even be seen on the thumb or hand of a newborn.

Concerning the grasping function of the hands (Graves, 1980), no continuous development towards higher functions has been found, but rather a cyclic process in which the capacity develops in a certain sequence, then disappears to return at a higher consciously determined level, between the eighth and 44th week of life. The same applies to certain muscular functions (Liley, 1972) which the child makes use of when it turns round in the womb. These disappear and then return in the 14th to 20th week of life. The motor development shows progression and regression rather than harmony and continuity. "It seems as if certain ego functions such as motor and sensory functions reach a relatively high level of development already in the womb, and that the womb environment offers adequate stimulation for the various functions to develop forcefully after birth" (Carlberg, 1989, p. 46).

"Studies also show a connection between the degree of motor activity in the foetal stage and the level of activity in the 6-month-old baby (Graves, 1980)" (Carlberg, 1989, p. 46). "An Italian psychoanalyst has made a close study of foetal behaviour using ultrasound techniques, and then followed up the children after birth. She saw a foetus that seemed to move its mouth and suck the whole time. Also after its birth the child wanted to suck its mother's breast continually, and seemed to be always hungry. Another foetus moved little, and seemed to withdraw to the wall of the womb. It became a very passive child. Sigmund Freud anticipated modern research when he postulated a connection between behaviour before and after birth – which it has now been possible to establish" (Lagercrantz, 1989, p. 76).
On the foetus' state of consciousness

It is only fairly brief periods that the foetus spends in so-called calm sleep, i.e. the predominant sleep-type of adults. There is no dreaming during this sleep phase, neither are there eye movements or grimaces. During calm sleep, breathing seems inhibited – the foetus often holds its breath. After birth, the human being breathes very regularly during this phase. However, the foetus usually does not sleep absolutely calmly, but spends most of its time in so-called active sleep, when it moves, grimaces and breathes. This sleep-type is also often called REM-sleep – Rapid Eye Movement Sleep – when the eyes can be seen to move rapidly. The foetus breathes only during this dreaming sleep. We know that the child and the adult both dream during this type of sleep, and it is very likely that the brain cells are active. We do not know whether the foetus dreams. It is believed that this dreaming phase is important for cerebral development, e.g. for connecting the nerve-paths. Prechtl has studied foetal behaviour with the help of ultrasound techniques and has noted that at times the foetus opens its eyes and is then probably awake. Loud noises can arouse it. Gensner, who has studied human foetal breathing, found inter alia that when the mother smokes a cigarette the foetus stops breathing. When the cigarette is finished the foetus breathing more than usual (Lagercrantz, 1989).

Via the placenta, signal substances, hormones and other elements of the mother's blood can be transferred to the infant and affect its nervous system and vice versa. Through this chemical "dialogue" the foetus learns to know its mother's habits and moods; this dialogue builds up the foetus' self-awareness. Several studies have been reported which clearly indicate that the foetus is affected by its mother's emotional state.

On the sensory organs during the foetal stage

How much can the foetus experience of the surrounding world? Does it feel pain? Can it apprehend music? Sensory organs begin to function during the foetal stage: the ability to feel touch develops first, then follows the development of the senses of taste, smell, hearing and sight in that order (Chamberlain, 1988).

Graves (1980) found that right from about the eighth week of pregnancy *foetal movements can be provoked by means of external stimulus – the child contracts its muscles in response to touch. From about the tenth week of pregnancy various reflex activities become more differentiated.

"The foetus feels pain. It reacts to surgery with grimaces, and retracts the affected limb. One should assume that it can suffer pain in connection with an operation, and that it therefore should be anaesthetised" (Lagercrantz, 1989, p. 75).

* The first foetal movements are usually experienced by the mother around the 16th week of pregnancy.
Regarding the sense of taste, it is assumed that, as in animals (Kolata, 1984), it develops early in the foetal stage. The foetus is able to taste, and reacts to the injection of sweet, sour, salt or bitter substances into the amniotic fluid. As the sense of taste is functional at birth, it is therefore likely that it is important at the start of life.

The sense of smell probably also develops early before birth, but may not be able to function properly in the amniotic fluid. It is therefore assumed that this sense is not functional until the nasal cavity is filled with air.

Hearing also develops early in the foetus' life. Many pregnant women will certainly have been made aware that the foetus reacts to loud noises. Ultrasound techniques have also revealed that it眨s when subjected to sudden noise – a reflex that is observable after birth as well.

Anders and Zeanah (1984) have found that the foetus can also distinguish between sounds and recognize language. The foetus has an apprehension of human speech. Naturally it hears its mother best, as sounds are transferred via her body. It can also hear sounds from outside. The foetus, like the newborn, seems to have hearing that is adjusted for reception of those wavelengths typical of human speech, especially female voices. Some studies have attempted to find out whether children have any memory of what they heard in the womb, and they have shown that newborns recognize what they have previously heard in their foetal life. DeCasper & Fifer (1980) conducted a study where they began by recording the voices of sixteen pregnant women reading the story "The Cat in the Hat" and the poem "The King, the Mice and the Cheese". Each woman was then asked to read aloud, to her unborn child, only one of these during the final six and a half weeks of her pregnancy, twice a day. Each foetus listened over and over again for a total of about five hours to the same story or poem, right up to its birth. When the children were three days old, the recordings were played to them through headphones – one if they sucked quickly and the other if they sucked slowly. Fifteen newborns reacted by sucking quickly so as to be able to hear the story/poem they had heard earlier. One interpretation of this study is that foetuses recognize human speech and language, and "behave almost like toddlers asking again and again for their favourite stories!" (Klaus & Klaus, 1987, p. 63).

There have also been studies showing that foetuses react differently to different sorts of music. An unborn child who has often heard certain pieces of music will seem to remember just those sounds after birth. Lagercrantz (1989) tells of a pregnant cellist who noticed that her foetus seemed to be calm and peaceful when she played her cello and reacted in the same way after birth. He also reports on children who have heard aircraft noise while in the womb. The children of mothers living near an airport in Japan during their pregnancy grew accustomed to the noise, while newly-arrived children were clearly disturbed.

The womb is by no means a quiet place. The noise-level from a mother's "turbulent" body is about 72 decibels (Graves, 1980), "about the level of a busy
street. Normally it is about 40 decibels, rather like an ordinary home. It is above all its mother's intestinal movements, the sound of blood-flow from blood vessels, and heartbeats which the foetus hears, but noises can also penetrate from outside" (Lagercrantz, 1989, p. 73).

Sight is developed early in the foetus' life. It has been found that the unborn child reacts to light directed at the abdominal wall. The muscles for moving and controlling the eye movements and the actual visual apparatus develop very early in the pregnancy. The infant in the womb moves its eyes both as reaction to changes in position and in the way that it will do throughout life when it sleeps and dreams. "Not surprisingly, very little is actually known about what or how much the foetus sees. There is some evidence that towards the end of pregnancy the uterus and the mother's tummy wall get so stretched that some light does get through to become diffused in the amniotic fluid; it would look like the glow we see through a hand held over the end of a flashlight. If this is so, then the baby may go through periods of light and dark corresponding to the degree of light the mother is exposed to" (Macfarlane, 1977, p. 19).

In Macfarlane's (1977) opinion, even while still a foetus, the infant develops and "trains" its perception apparatus – it reacts to and distinguishes between different sounds, light and pain. It learns to recognize typical maternal sounds such as voice, heartbeat and movements. The infant has this equipment with it at birth, or as Sandström (1964) puts it: "In the beginning was perception" (Ibid, p. 111).

The capacity of the newborn

Historical background

"The healthy newborn child, after a normal delivery, draws its first breath an average of ten seconds after birth. This happens in the space of a moment, as the Greek physician Hippocrates observed in the 4th century B.C. It may be hours or days before other necessary functions are set in motion in the newborn. Breathing is something it does not know how to do. It was believed earlier that the child did not begin life until it had drawn its first breath" (Lagercrantz, 1989, p. 98).

During the Age of Enlightenment, the English philosopher John Locke (1632-1704) wrote that the newborn child's brain was empty, to be compared to a blank page which must be filled with knowledge. In the opinion of the German philosopher Immanuel Kant (1724-1804), the child already had in its brain a certain basis for a conception of the world. The psychologist William James...
(1842–1910) considered that the newborn child saw everything in a mist and heard the sounds around it as a "booming" or "buzzing confusion", which until the 1960's was the predominant view of textbooks on child psychology.

For a long time infancy was the most obscure period of life, in that research into it began so late. "The humanities researcher can enter into communication and dialogue with the object of research, but in the sciences this is not possible" (Lesche, 1971, p. 11). The difficulties in dealing with the earliest years are obvious, not the least of them being that it is not possible to ask the infant what it feels; everything must be based on direct observation. With the help of increasingly advanced facilities and great creativity, infancy researchers have developed methods of offering various investigatory stimuli, as well as ways of recording how the newborn reacts to them – for instance, video-filming facial expressions, measuring breathing and pulse rates, and using a dummy for the child to suck which is connected to a machine that registers the frequency and intensity with which it sucks. When the child recognizes something, it sucks more intensely and regularly, and this can be utilized for the objective registration of most sensory experiences.

"Infant research based on behavioural observation has steadily intensified in the last 25 years, and our knowledge concerning infant competence has increased dramatically. Our view of the infant has also changed – from a passive, asocial being to a well-equipped individual able from the beginning to interact with other individuals" (Berg Brodén, 1989, p. 70).

On the motor ability

While still in the womb, the infant begins to exercise the muscles in its arms, legs, body and head. At birth the newborn shows early and pronounced movements, which are often said to be congenital reflexes (e.g. the crawling reflex), as they gradually disappear as the infant grows older. These sensorimotor and motor systems have been inherited in a co-ordinated state and correspond to instinctive aims, such as to satisfy the need for food. According to Piaget (1978) these reflexes have the character of independent activity – not of mechanical passivity – which demonstrates the existence of an early developed sensorimotor assimilation.

Babkin (1956, in Duve, 1974) has shown that the grasping reflex can easily be produced by directly touching or tickling the infant's palm, whereupon the hand closes itself around the irritant. In Babkin's view the grasping reflex and orality are closely connected as the infant also opens its mouth and turns its head to the medial position. Humphrey (1969) has described the hand-mouth movement as a reflex. Hand and mouth interact and seek each other, and the hand always ends up within a circle extending from the centre of the mouth to the bridge of the nose. According to Duve (1974), this co-ordination is very important for the infant's seeking behaviour, while the degree of bodily contact is crucial for future hand and eye co-ordination. Call (1965) found that newborns demonstrate this hand-mouth reflex, which is seen as a congenital, active movement that helps mother and infant in the breast-feeding situation. Call has judged the hand-mouth reflex as the core
of the ego formation. Brackbill & Thompson (1967) have concluded that it is necessary for the infant to hold on to skin while feeding at the breast, as this has a vitalizing effect and increases oral activity. While sucking, a boy's penis will become erect and a girl will experience vaginal contractions. Gunther (1966) found that the movements of the infant's hands on the mother's breast also have a stimulating effect on the mother and her system.

The oral seeking reflex – the rooting-reflex – can appear both as a pure reflex and as directed behaviour governed by internal or external stimuli. It is our first active seeking reflex, and it contains a complex behavioural pattern involving all the sensory organs – primarily the skin senses and in particular the aspects of touch and skin sensation. Blauvelt & McKenna (1966) maintain that this seeking and reaching is the infant's signal system to the mother and that it plays an important part in facilitating interplay between them. It is the mother's active caring for her infant – how she touches, strokes and caresses it and how she gives it emotional care – that the infant responds to with this active reaching, seeking behaviour.

Blanc & Blanc (1981, p. 36) write: "Even in the first weeks of life one can observe signs of organized processes – "rooting", increased cerebral-wave activity, following with the eyes". In their opinion, after birth the physical processes of development go through a kind of organization which leads to the rooting-reflex at the age of one week. However, the rooting-reflex has been observed by Odent (1979) directly after birth, appearing 20–30 minutes after the delivery. It requires in this case a special co-ordination between mother and infant, where close contact is necessary and also the newborn's hands must be free to reach the mother's breast. According to Odent, the sense of smell probably also plays a great part in orienting the infant towards the mother's nipple. If the infant is not suckled immediately after birth there follows a latency period of many hours when it will not show this rooting-reflex. Thus the newborn can in response to definite stimuli twist its head, open its mouth and suck – and the sucking in its turn stimulates swallowing. These movements are very closely co-ordinated – for instance, as soon as the infant releases the nipple the milk that it has been unable to swallow will run out. Duve (1974) considers that nature has seen to it that all energy at this stage is concentrated in the mouth as our first reaching organ with built-in vital mechanisms.

On rhythm and states of consciousness

The newborn is, according to Mahler et al (1975), for the greater part of its earliest life, usually in a half-waking or half-sleeping state reminiscent of its existence as a foetus. Thus, it does not experience the cyclic swings between sleeping and waking that develop later. The baby wakes when a need, e.g. hunger, makes itself felt, and then it cries. When the need is satisfied, it goes to sleep again. Physiological rather than psychological processes are predominant.

The infant's states of consciousness have been studied and classified by Wolff (1959), who describes six separate states of arousal in the newborn: the fussy/cry
state, active wakefulness, alert inactivity state, the drowsy state, the REM state, and the NREM deep sleep state. The alert inactivity state means that the infant is quietly alert; calm, wide awake, with its eyes open, and the infant is able to respond to his environment. During its first week of life the infant spends about 11% of its time in this quiet alert state – but unfortunately the infant may be in this state for periods as short as a few seconds. In Wolff's study some infants were awake for 1.5 hours after birth, and subsequently were not awake for such a long period of time until the end of the first month. Others were awake for 15 minutes after birth, then fell asleep and did not wake again until the second or third day. Desmond et al (1966) found that the newborn was in this calm wakeful state for a period of 45–60 minutes after birth.

McLaughlin et al (1981) examined characteristics of infant state and behaviour during the first hour after birth and again during the second day of life. Nine newborn infants were observed in the following classes of behaviour: states of consciousness, arm and hand movements, and smiles. The results showed that the newborn infants were significantly more alert during the first post partum hour than during a comparison period on the second day after birth. No differences were found in the other behaviours observed.

On the capacities of the sense organs
Since most of the sensory organs are actually skin receptors of various kinds, the infant feels with its ears, its nose and its mouth – rather than hearing, smelling or tasting (Montagu, 1978). One of the most important sensory organ during the first weeks of life is therefore the skin, as it receives signals or sensory stimuli which the infant can experience, and the skin can to a large degree compensate for other sensory organs if they are missing. It can thus be considered as a means of communication, and the quality of skin stimulation which the infant receives during for example breast-feeding, transfers a message which is important for its ability to apprehend its surroundings. A hard blow communicates quite a different message from a gentle, tender caress. It is through bodily contact that the infant exchanges signals with others, and thus acquaints itself with the world of experience belonging to others. Touch thus confirms presence and also reality – there is someone outside of the infant. "It is clear that the decisive form of our intercourse with things is in fact touch. And if this is so, touch and contact are necessarily the most conclusive factor in determining the structure of our world" (Montagu, 1978, p. 101; c.f. Ortega y Gasset, 1957). "From the tangible evidence of the mother's body, the clinging of the lips, of hands and fingers to the breast, with the world at his fingertips in a very real sense, the infant will develop an awareness of his own and his mother's body which will constitute his first object relations. And what cannot be too often emphasized here is that, while much else is involved, it is through the primacy of the skin in his experience that the infant gropes his way to this establishment of object relations" (Ibid, p. 101).

Rocking and cradling are also a part of touching; it exerts gentle stimulation over almost every part of the infant's skin. A baby being cradled knows that it is not
alone. Apart from this, cradling is important for circulation and it encourages breathing (Montagu, 1978).

The so-called skin senses comprise sense of temperature, of pain and of touch. Regarding sense of temperature, it is known that newborns react strongly to stimuli that are cooler than body surface temperature, but the reaction is less noticeable to warmer stimuli. The sense of pain is less developed at birth, and it is assumed that this delay in development serves some biological purpose. The sense of touch develops earliest and has great significance for the newborn baby. The sense of touch – skin sensitivity – undergoes intense stimulation during pregnancy and especially during the birth itself. According to Montagu (1978), the pressure exerted on the baby's skin by the birth contractions plays an important part in enabling the internal organs to start functioning. There is a close interplay between the skin and the central nervous system, both of which have developed from the same foetal tissue.

According to Scheu (1979), a baby receiving tactile stimulation during the neonatal period has a better chance of early cognitive and social development. The infant's tactile experiences are thus critical for its continued development. In Montagu's opinion (1978), there is reason to believe that the brain and the nervous system develop more fully with external stimulation. The skin grows and develops throughout the whole of life, and the development of the skin's sensitivity depends greatly on the kind of external stimulation it receives.

The sense of taste is capable of functioning before birth and newborns have a well-developed sense of taste. The newborn baby may discriminate between different tastes and may also react different to the same ingredient of varying degrees of concentration. The infant reacts to different tastes with different expressions of its face, and its reactions to sweet, sour, salt, and bitter look like the expressions of adults at the same ingredient. The newborn infant is sensitive to sweet things, and as a result, researchers use sweet ingredients in motivating and gratifying the infants in their experiments (Macfarlane, 1977).

The sense of smell also develops before birth, but is assumed not to function normally until air fills up the nasal cavity. The newborn's sense of smell is well developed and the infant may discriminate between different odours and also between different concentrations of the same smell and may also find the direction of the odour. Macfarlane (1975) found that the odour of the mother may affect the newborn infant. In an experiment he observed that the breast-feeding infants by the fifth day of life have the ability to distinguish by scent the breast-pad of its own mother from an unused breast-pad. Macfarlane also found that mostly breast-feeding infants 6–9 days after the birth can discriminate their own mother's breast-pad from the breast-pads of other women.

The newborn can hear immediately after birth, and can also distinguish between and react to various sounds. It hears only muffled sounds, as the middle ear behind the eardrum is still filled with amniotic fluid, and the outer ear is still sealed
The infant provokes stronger reactions to complex sounds than to mere pure tones and when an infant reacts to sounds it will come in a delay of some seconds. Wertheimer (1962) let newborn infants hear clicking sounds – alternatively by the one and the other ear of the infant – and he noticed that the infant turned its gaze in the direction of the sound. Salk (1960) has shown that the acoustic stimuli that have a soothing effect on the infant are normal heart rhythm and the human voice. The infant notices if the heartbeats are too fast or slow and reacts with signs of anxiety. The infant reacts to the human voice, especially voices with high intensity and pitch as well as low sounds. Brazelton (1983) has found that newborns notice and react to female rather than male voices because of the higher tone; and that the high–pitched female's voice has a favourable effect on infants. Lang (1972) observed that most mothers of newborns talk to their babies with lighter voices than they use for addressing adults. Using a high–pitched voice suits the baby's auditive perception and its attraction to speech in a higher frequency range. Newborns (2–12 hours old) have the ability to interact non–verbally with the voice of the person taking care of them, and this response tendency encourages parents' verbal interaction with the infant (Condon & Sander, 1974). DeCasper & Fifer (1980) found that the infants may discriminate the voice of their mothers from other women already at the first day of life. In a new experiment (DeCasper & Prescott, 1984), but now with the father's voice and an other man's voice taped, they could not find a corresponding preference for the voice of their fathers. However, Hwang (1984) found that the infant may discriminate the voice of the father if he, during one week, is active in the care of his baby.

Although sight is the least developed of the sense organs at birth, the newborn baby will react strongly to a directed bright light by screwing up its eyes, wrinkling its forehead and tensing its muscles (Macfarlane, 1977). Brazelton and co–workers (1966) reported that the infant can see at birth and at the same time the infant born of an unmedicated mother has a special ability to follow movement with its eyes during its first hour of life, e.g. will easily follow a moving hand at 12 to 15–inch distance. It has also been found that the clarity of vision is set at about eight to ten inches (Fantz, 1966), at which point the infant can best focus on an object. This is the same distance as the distance between the eyes of the mother and her baby during breast–feeding (Spitz, 1965) and this is also the optimal distance when the mother holds or cradles the baby in her arms (Stern, 1977). Goren et al (1975) showed that the infant five minutes after birth would follow an ungarbled representation of a face for 180 degrees, but significantly less (60 degrees) and for less time if it is garbled, and concluded that the infant is programmed for the human face at birth.

Robson (1967) studied the role of eye–to–eye contact between mother and infant, and concluded that it triggers a powerful feeling of intimacy and a desire to care in the mother. Klaus and co–workers (1970) found that the mothers, during the first contact with their newborns, expressed strong interest in eye–to–eye contact. Spitz (1965) studied the infant's route from reception to perception. He distinguished between the newborn's apprehension of its body and the separative perception
which the infant later develops. Spitz believed that certain zones serve as bridges between the two ways of apprehending the surroundings. The mouth is the primary zone, where the inner and outer worlds meet in a special way. At the same time as the infant makes direct contact with the external world through its mouth, it apprehends rhythm, position, tension, temperature, smell, taste and so on. Spitz called this "contact perception"; it is most intense during breast-feeding when something else is also established that he called "distance perception". During nursing the breast-fed baby fastens its gaze uninterruptedly on and stares unwaveringly at its mother's face, not on her breast.

**Combination and integration of the abilities**

Earlier it was thought that the senses developed one after each other but later research of infants has shown that the infant from the very beginning may combine its sense of impression. According to Bower (1981) the world of perception constitutes, an undividable general picture or impression. Hofsten (1982) has studied the eye-hand coordination in the newborn. He concluded that "when the neonate looks at an object and reaches out for it, both the reaching and the looking are parts of the same orienting response toward the object. The infant prepares himself or herself for the encounter with the external event by pointing his or her feelers toward it. This conclusion implies that the coordination of exploratory systems of the infant are in certain respects preadapted" (Ibid, p. 460). Hofsten & Fazel-Zandy (1984) studied the development of infants' ability to use vision in adjusting its hand and fingers to an object, which was to be grasped. The results showed that visual information about object orientation was accessible to the manual system when the infant started grasping objects, and that the adjustments of its hand to the orientation of the object became more precise with age.

In several experiments researchers have reported that infants get anxious, begin to cry and withdraw if something in the experience of entirety is missing. Infants have also an inborn ability to transform information from one modal sense to another. Meltzoff & Borton (1979) did an experiment to find out if the infant could translate from tactile to visual experiences. They found that the infants who had sucked a granulated rubber-teat with blindfolded eyes could recognize it with their sight. Another example that infants may transform information from one sense function to another is the experiment of imitation. Imitation is a complex action which demands that information is translated from the sense of sight to the proprioceptive sense.

**On the social ability**

The newborn infant reacts different to faces and nonfigurative pictures (Fantz, 1961; 1963). From the very beginning the baby is visually adjusted to the human face and prefers it among other forms (Goren et al, 1975). The baby may already at birth recognize and discriminate the voice and smell of its mother from another woman's voice and smell. Infants like to imitate, and imitations come into existence in presence of an adult. Meltzoff & Moore (1977) found that newborns imitated facial and manual gestures, and also (1983) that newborn infants imitated
adult facial gestures. Heimann & Schaller (1985) found in their study, when the infant's mother protuded her tongue, opened her mouth, or interacted spontaneously, that the infants showed imitative responses with individual differences between the infants. They concluded that there may exist two subgroups of infants: high and low imitators.

The inborn ability of habituation has also been studied, and today researchers know that the infants have memory functions. The newborns have presumably the intention to come in contact with human beings. Infant's ability to recognize and discriminate its own parents from other adults has been discussed by parents, researchers, and theorists. Brazelton (1983) found that infants react differently to human beings and things very soon after birth. The infant has a characteristic mode of salutation when meeting a person. In this address of welcome the infant gives eye-to-eye contact, begins moving arms and legs up and down, opens and closes its hands, forms its mouth and tongue and finally tries to evoke sounds. This behaviour does not exist when infants are coming in contact with things. From the very beginning infants may comprehend that human beings are different from things (Trevathan, 1980).

Condon & Sander (1974) described the newborn's ability to interact synchronically with its mother. The mother and infant moved in time each other's sounds and emotions, and Brazelton commented (in Klaus & Kennell, 1976, p. 74) that "their communications became a sort of "mating dance" (similar to that of swans) when they were analyzed on film by frame-by-frame analysis".

The birth process as a period of change for the infant

Evidence that life in the womb is not quite paradise has been presented by measuring the amount of oxygen in the blood, which drops considerably during the last weeks of pregnancy. At the time of its birth the infant seems to be very close to lacking oxygen while at the same time its freedom of movement is minimal. The infant's hormone world makes an active contribution to the process and environmental change that birth entails.

While in the womb the infant has grown accustomed to certain sounds, rhythms and movements. The signal that triggers the birth process is set off by, among other things, the infant's hormone system. Birth contractions stimulate the foetus' skin, breathing, circulation and nervous system. "The actual birth can be seen as a transition period between life inside and life outside the womb" (Wiberg, 1988b, p. 19). At birth, the infant leaves its fluid-cushioned foetal life behind and enters a whole new world of experience and adaptation – an atmospheric and social environment. Greenacre (1960, in Mahler et al, 1975, p. 52) says: "I have had the idea that the process of birth itself is the first great agent in preparing for awareness of separation; that this occurs through the considerable pressure impact on and stimulation of the infant's body surface during birth and especially by the marked changes in pressure and thermal conditions surrounding the infant in his
transfer from intramural to extramural life." Erikson (1971, p. 83) writes: "Every stage is thus in turn a potential crisis in that the perspective is radically altered. The word crisis is used here in connection with development and does not represent a threatening catastrophe; on the contrary, it represents a turning point, a critical period of increased vulnerability and increased possibilities – and therefore the ontogenetic source of productive strength and of maladjustment. The most radical of all changes, the transition from intrauterine to extrauterine life, occurs at the start of life."

"In the history of psychoanalytical theory there are examples of authors who place great stress on the so-called birth trauma (Greenacre, 1945). Birth is seen as a major switch over from the water, darkness, warmth and silence of the womb to the air, light, chill and noise of the outer world. Today we have partly revised our view of life in the womb as silent and dark, but naturally the fact remains that birth brings with it a dramatic change" (Carlberg, 1989, p. 47). Leboyer (1974) maintains that birth is extremely painful for the child; he writes: "Hell exists. It is not a fairy-tale. You really burn there. This hell is not at the end of life. Nor is it somewhere else. It is here. In the beginning." In the introduction to "Birth without violence" Leboyer also quotes Gautama, who says that "Birth is suffering" (Ibid, p. 34).

"Psychologically one can assume that the moment of birth is in many respects associated with its opposite, the moment of death (Brudal, 1985). For many people therefore, birth will also give rise to thoughts of death and non-being – that is to say an existential anxiety present in everyone to a greater or lesser degree" (Carlberg, 1989, p. 48).

According to Duve (1974, p. 35), "Birth is both an end and a beginning. The child is moved from the womb to an external coexistence – a new form of intimacy with the mother object." She continues: "Our long childhood generally begins with a cry. Breathing is started. As on the first day of Creation the darkness becomes a sea of light. Air takes the place of water. The long silence becomes noise. And the umbilical cord linking us to our source of life is severed" (Ibid, p. 36). "Birth is a violent upheaval – from life in water to life in air" (Ibid, p. 62). The teamwork continues, but now under other conditions and in other forms.

The postnatal period from an interpersonal view – the sensitive phase in mother–infant adjustment

"During the birth process mother and infant have had a somewhat trying time. At birth each clearly requires the reassurance of the other's presence. The reassurance for the mother lies in the sight of her baby, its first cry, and in its closeness to her body. For the baby it consists of the contact with and warmth of the mother's body, the support in her cradled arms, the caressing, the cutaneous stimulation it receives, and the suckling at her breast; the welcome into "the bosom of the family" (Montagu, 1978, p. 63)."
According to Montagu (1978), the human infant enters the world in a very immature state. He poses the question why human babies should be so much more immature at birth than animal young – the time spent in the womb is only a fraction of the total development into an adult. It is of course true that birth would be impossible for a human baby if it were considerably larger, but there may be other reasons why humans need to spend the greater part of their developmental period outside the womb. The human being is to a very great degree a psychological and social creature, governed to only a slight degree by inherited instincts. What takes place in the womb is largely a biological development. The biological pregnancy is terminated by the biological birth, at which point the infant is sufficiently developed to survive physiologically outside the womb without the umbilical cord. Montagu draws the conclusion that human pregnancy does not end with birth, but that for purely anatomical reasons the human infant must be born before pregnancy can be completed.

Birth marks the beginning of the "breast–oral stage" (Laing, 1976) and a psychological development for the infant which would be impossible inside the womb as it requires external stimulation and opportunities for a different interaction from that in the womb. According to Montagu (1978), despite all the changes, the infant continues with the pregnancy, which moves from internal to external. It is therefore of the utmost importance that parents understand the full implications of their newborn baby's immaturity. Instead of calling the period a crisis, van Orshoven (1979) suggests it be called "the period of mother–infant adjustment", for example when her baby cries, the mother gets upset and then tries to handle the situation in the right way together with her infant.

As a foetus the infant lived in and on the mother's system – a sort of parasitic existence. After birth the question is one of mutual dependence – a new form of intimacy and kinship. In Ribble's (1946, in Duve, 1974) opinion, the infant was previously a part of the mother's organism and after the birth they enter into a symbiotic relationship, one in which two individuals adjust themselves to one another both physically and emotionally. Even after the birth, mother and infant form one whole – a closed system – as they continue to be dependent on each other. According to Mahler et al (1975), this dependency is relative for the mother but absolute for the infant.

When the mother–infant relationship is presented as something unique right from the start, the explanation lies partly in that the infant chooses or becomes fixated on a person to whom it bonds during its earliest days and hours (Duve, 1974). The newborn is both a part of its parents and a completely new, unknown individual who will express needs and eventually make demands on its parents.

Duve (1974) calls the first nine months of life outside the womb the emotional pregnancy, as the infant is not yet mature enough to be separated from its mother. Mahler et al (1975, p. 3) writes: "The biological birth of the human infant and the psychological birth of the individual are not coincident in time. The former is a
dramatic, observable, and well-circumscribed event; the latter a slowly unfolding intrapsychic process".

Theoretical background about the ability of the newborn to interact with its parents

There is a great deal of controversy about the ability of the newborn to interact with its parents (Freud, 1911; Mahler et al., 1975; Klein, 1957; Fairbairn, 1963). Most theories do not question the importance for the infant of satisfying contact with some person. There are, however, differing opinions concerning attachment, and the development of object relationships – whether an infant attaches to one person (Bowlby, 1951; Spitz, 1965) or to several (Rutter, 1972), at what point the process begins, and the significance of object relations for further development. "The psychoanalysts have always considered that mother–infant contact during the first year of life is of vital importance for the child's emotional, social and cognitive development. Psychoanalytic theories concerning early human development can be divided into two main schools of thought, both of which have Sigmund Freud as their starting-point" (Wiberg, 1988b, p. 21).

According to the one direction, there is a primary object relation from the very beginning: Fairbairn (1963) writes that from the start the ego is fundamentally object-seeking, and Klein (1932) believes that the process of relating begins at birth and possibly even in the womb. The other direction of psychoanalytic theory maintains that the very first stage of life is primarily narcissistic; here Freud (1911) compares the newborn's situation to that of the unhatched baby bird, which has all its nourishment within the eggshell and needs only warmth and protection from its surroundings to be able to survive.

Spitz (1965) called the period 0 to 2–3 months the objectless stage. He claimed that the infant during the first few weeks seemed to be protected from stimulus impressions by a high stimulus threshold. According to Spitz, the infant mainly reacts to stimulations which come from within and to external stimulations which directly touch the body. The messages the infant receives through the other senses (sight, hearing, tasting etc.) do not convey anything in a psychological sense. The infant can only react by means of reflexes to handle internal stimulation (cry, vomit, empty the bowels etc.) The infant is otherwise dependent on help from the outer world for comfort (food, warmth, temperature regulation, change of position etc.) The mother can enter into some sort of communication with her infant by being sensitive to this kind of needs. Normally the infant is in a state of calm, interrupted at times by states of emotion which usually take the form of agitation of a negative character. This does not, however, tell us anything about what it experiences. Several such experiences eventually give rise to memories, later to be differentiated into experiences of pleasure or displeasure.

Hartmann (1958) claimed that the ego is defined by its functions, i.e. if the ego is not functioning it does not exist, since it has to be regarded as a construction. He
stressed that the ego develops the functions of the object relations at the same time as the ego structure is being built up through the object relations. He formulated that each infant is born into an average survival environment.

Blanck and Blanck (1976) argued that the concept of organisation has to be extended since it is not only the functions of the ego that need organisation. They came to the conclusion that the ego needs to be defined not only through its functions, but also through its function as an organizing factor. This theory about the ego as an organizing process clearly indicates that there is no division between "before ego" and "the beginning of the ego".

Freud (1911) compared the situation of the infant during its early days of life with that of the young bird in the egg. it has everything within its shell and is only depending on the outside for warmth and protection.

In a similar way Mahler (1968) and Mahler et al (1975) speak about the newborn infant as being enclosed in an autistic shell – which protects it from sensations. Mahler and her co-workers call the weeks immediately following birth the normal autistic phase, when the infant is screened-off, self-absorbed and not sensitive to external impressions and to its surroundings. During this period the infant is usually in a half-asleep or half-awake state reminiscent of its intrauterine life as a foetus. In this apparently sleep-like stage, "the infant seems to be in a state of primitive hallucinatory disorientation in which need satisfaction seems to belong to his own "unconditional", omnipotent, autistic orbit" (Mahler et al, 1975, p. 42; c.f. Ferenczi, 1913). Mahler here also refers to Freud's (1911) metaphor about the bird egg, and says that it is as if the newborn infant was surrounded by an autistic shell, a kind of stimulus barrier, which protects it from over-powerful sensory impressions. The high stimulus threshold protects the infant from extreme external stimuli in such a way that its psychological development is stimulated. But the screening-off is never complete; the infant can be wakened by tensions arising from within its body, for example hunger, or by external irritations directly involving its body. When the stimulus barrier is penetrated in this way – by loud noise, bright light or changes of position for instance – strong physiological reactions will often be produced, and the infant may scream, spit, vomit, empty its bowels or bladder. The physiological processes are thus predominant, and signs of them can be expressions of discomfort. The newborn's existence revolves around attempts to achieve homeostasis or reduction of tension. The danger in this phase is that the infant's physiological equilibrium can be disturbed if it is overwhelmed by internal or external stimuli, and this can lead to a state of panicky anxiety. The infant has no experience of its surroundings and so cannot distinguish between the external world and its own inner world, which means that there is no polarity between self and object. The infant is thus unable to distinguish between the mother's attempts to alleviate its discomfort and its own efforts to reduce tension. 

The infant is born with certain reflexes – for example the primordial sucking, rooting, grasping, and Moro reflexes – which gradually disappear; as it grows it develops the ability to follow the mother with its eyes and to turn its head to her
breast. Mother and infant begin to form an emotional relationship as the mother cares for her baby, gets to know it, nurtures and suckles it. "As Ribble (1943, in Mahler et al. 1975, p. 42) has pointed out, it is by way of mothering that the young infant is gradually brought out of an inborn tendency toward vegetative, splanchnic regression and into increased sensory awareness of, and contact with, the environment". This caring enables the infant to leave behind its congenital tendency to vegetative regression, and gradually its sensory awareness and contact with its surroundings will increase. In terms of energy and libidinal charging (cathexis), this means that there is a gradual transfer of libido from the body's internal organs (interior) to its periphery (exterior). This first early relation is thus a prerequisite for the cathexis of the infant's body and for the gradual shift in its interest in the direction of the external world. The infant's reactions to external stimuli are at first diffuse and general, reminiscent of foetal reactions. In its waking state it shows a certain impressionability, and is in a state of attentive inactivity. This floating susceptibility to external stimuli, in the form of stroking and caressing for instance, makes a bridge to the next phase of development – the normal symbiotic phase.

The essential characteristics of the normal symbiotic phase are an illusory somatopsychic fusion with the mother figure, and the illusion of a mutual boundary between two physically separate individuals. The term symbiosis is a metaphor for the mutual dependence and mutual satisfaction in the mother–infant relationship, where the infant's needs are absolute while the mother's are relative. The mother satisfies the infant's need of nourishment, warmth and care, while the infant satisfies the mother's need to care. The infant needs the help of its symbiotic partner to maintain its equilibrium; without the mother as its auxiliary self, the infant would be overwhelmed by stimuli. During this phase the most highly-charged object is thus the mother, the infant's first love object, but this "part object" lies within the symbiotic sphere and so the infant's identity fuses with its mother's.

Gradually, memory traces appear which may be seen as diffuse images of the infant's awareness of its own body and its mother–environment, and above all as sensations of pleasure and displeasure rather than as actual perceptions. As a result of the mother's care, the infant begins to distinguish between its own tension-reducing measures and those of the mother; it begins to be able to apprehend the existence of a need-fulfilling someone—something outside itself, and this is the start of a faint differentiation between self and object. According to Mahler, the ability to wait and to delay need-satisfaction originates in this phase, as do both anxiety tolerance and frustration tolerance. Bion (1962) refers here to the mother's containing function, by which he means that by caring, by structuring and by being receptive, the mother helps the infant to develop its inner state and thereby to begin being able to have its own feelings.

Mahler emphasizes much of the mother's behaviour as an auxiliary self and believes that predictability in her holding behaviour (Winnicott, 1965) is very important, as is eye contact. A necessary prerequisite is that the infant now begins

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to be able to see its mother and to know that she exists even if she is not being felt by the infant's skin. This is an important transition from physical contact perception to distant perception by the eyes (Spitz, 1965). The symbiosis is optimal when the mother enjoys breast-feeding, when she holds the infant close to her body, communicates with smiles and murmurs – and also when she lets the infant study her face and establishes eye contact. The infant's nonspecific social smile shows that it has acquainted itself with the mother–part of its symbiotic self. That smile gradually becomes a specific smile response to the mother, and is a sign that a quite special emotional relationship has developed with her. This will in time make the psychological birth of her human infant possible.

If the symbiotic phase follows a normal progress and is neither excessively prolonged nor cut short, by the age of about four to five months the infant will begin to distinguish both itself from its mother and the mother from other adults. This is the beginning of a slow intra-psychic process which will last about thirty months until the child can perceive itself as a separate individual with an identity of its own, and the mother and other adults can be distinguished as separate individuals with definite characteristics. Towards the end of this separation-individuation phase the child is able to be certain that people and things exist regardless of whether or not he/she sees, hears, feels or needs them. At this stage the child has clear images of itself and of significant persons, which gives it a sense of continuity and stability in its life. He/she has also acquired the ability to express expectations, hopes, desires and demands in words. What was previously a state of objectless tension has been transformed into an emotional state of longing.

"In all normal children there is a congenital need to strive for separation and individuation. Separation leads to an intra-psychic perception of particularity – I am separate. This is achieved by means of differentiation, distancing, delimitation (the ego) and liberation from the mother. Individuation, on the other hand, leads to the experiencing of unique individuality – I am somebody special. This is achieved by developing perception, memory, cognition and reality testing. These lines of development are interwoven, and the optimal situation seems to be when consciousness of the physical separation, in the sense of differentiating from the mother, develops parallel to the ego functions that encourage individuation" (Wiberg, 1984, p. 15).

The forerunners of the third phase, the separation-individuation process (Mahler, 1972; Mahler et al, 1975), are the normal autistic phase, and the normal symbiotic phase. There is a great deal of overlap between the separation-individuation process and the normal symbiotic phase. The latter phase is partly over by the time the infant is about ten months old, and reaches its peak when he/she has developed a specific relation to the mother. At this point the infant also starts to enter the separation-individuation process which will last until he/she is approximately three years of age. Mahler divides the separation-individuation process into four subphases: differentiation and the development of the body image; practicing period when the infant's "love affair with the world" (Mahler et al, 1975 p. 70; c.f. Greenacre, 1957) begins; rapprochement period which will
remain until the child has found an individual solution of the rapprochement crisis, optimal distances to important persons (objects), and a beginning of gender identity; and finally consolidation of individuality and the beginnings of emotional object constancy.

With each new phase the child enters there is a reawakened longing to return to a close relation with the mother, while at the same time the desire to be unique and separate from her increases. One sign of this is that the majority of children suffer short periods of increased separation anxiety. There are at least three connected but nevertheless separate developmental processes that contribute to the child's progress towards separation and individuation. These are the rapid physical differentiation from the mother, the development of a specific emotional relationship between mother and child, and the development of the autonomous ego functions in a close relation to the mother.

Animal studies

Existing knowledge of the interaction between mother and child during the first hours of the child's life has been influenced by, among others, animal studies done by zoologists and ethologists and their knowledge of different phenomena associated with the animal world.

Lorenz (1935) made the discovery that the young gosling after hatching follows the first "living" creature, usually the mother goose or possibly others of the species, who are in the vicinity and who are moving. Lorenz called this phenomena "Prägung" or imprinting in English. If the goslings are hatched in an incubator, however, they may just as easily follow a man or some inanimate object that moves, like a pail. After just an hour, a permanent imprinting has taken place and the gosling no longer cares about others of the species. The imprinting promotes the survival of the species and can only take place during a certain receptive period of time. Another characteristic of the imprinting process is that the imprinting is permanent once it has taken place and that it is very difficult to expunge. According to Lorenz, this imprinting to a parent animal diminishes after "infancy" as the animal becomes more and more independent.

Duve (1974) theorizes that a newborn individual must, right from birth, have contact with others of its species in order to "learn", among other things, the characteristics of the species. Imprinting can be seen as a process of learning which should result in the acquisition of the general characteristics of the species. Lorenz (1935) claimed that not only is the young imprinted to the mother, but the mother must also be imprinted to her young if the interplay is to be successful.

"There are certain very particular features in a young creature which bring out the maternal instinct. Some of these may also be found in animals, which is probably the reason we find some young animals prettier than others. We have a kind of instinct for care when it comes to offspring, and this instinct is triggered off by
certain characteristics in a young creature. The key stimuli for the release of this
tenderness, also when it comes to young animals, are, according to Lorenz (1935);
relatively big eyes, round cheeks, a high bulging forehead, helpless movements and
muling sounds of a particular character. These start an emotional reaction in us that
we are very familiar with from confrontation with a litter of puppies or a small
kitten" (Duve, 1974, p. 24).

It is difficult to form a reasonable opinion about the role that imprinting and
related phenomena play in the development of the behaviour of human beings.
There have been reports about infants who at an early age have been exposed to
the elements, but who have been able to survive by being adopted by animals.
Later, when they have been found and returned to a human environment, the
previous imprinting has proved too strong to wipe out, and the readaptation has
been practically impossible to achieve.

In the animal world there are many examples of animals being imprinted to a
different species, with the consequence that their own species is regarded as
strange ever after. The Harlows, an American man-and-wife team of
psychologists, have shown through their research work with monkeys and their
young, that very severe disturbances can be created in the behaviour of the mothers
and their young by means of different artificial manipulations of the development
process. By manipulating the mother-young relationship one can experimentally
produce virtually the entire range of symptoms in child psychiatry – from the most
serious psychological disturbances to varying degrees of maladjustment and
neurotic tendencies.

The experiments carried out by the Harlows on female monkeys and their young
have been come to be regarded as classics of their kind. In a project with rhesus
monkeys the young were separated from their mothers a few hours after birth and
placed in net cages. The mother could see and hear her young, but was prevented
from touching it. After sitting and watching their young for two weeks, the
mothers started to show less interest in them (Harlow et al, 1963). These
experiments with rhesus monkeys showed that touch plays an important role in the
development of the maternal instinct and therefore it is not sufficient for the
mothers just to sit and watch their young.

In another experiment with monkeys, the Harlows (Harlow & Zimmerman, 1959;
Harlow & Harlow, 1965) showed that young monkeys turned to dummy mothers
of soft cloth who offered a good contact surface to grasp and to cling to, in
preference to wire mothers who gave them milk. Once a young monkey had
attached himself to a cloth mother, it used her as a safe base from which to venture
out and investigate new and strange situations.

For the rhesus monkeys, physical contact with the mother is the most important
thing in the development of the young. These severe disturbances in the early
contact between the mother and the young were, furthermore, carried over into the
next generation in that these young later had difficulties in taking care of their own
offspring. In all primates, the young stay constantly in the vicinity of the mother, often with direct physical contact, for example by being carried around, during the first few weeks of life (Bowlby, 1969; van Lawick-Goodall, 1967).

In many species of mammals, the mother isolates herself with her offspring during the early postnatal period, probably to facilitate the necessary contact. In the animal world conformity to standard behaviour patterns is probably more important in lower animals than in human beings.

The first contact between the mother and her young in many mammals takes the form of the mother licking the young. This licking has two important functions: it gives the mother the opportunity to develop the first bonding to her offspring, and it stimulates the skin of the young. Montagu (1978) claims that there is an evolutionary link between the licking of animals and the stroking and caressing with the hands in humans, and that this form of experience for the human young is as important as the licking is for the animal young.

A number of studies have been made concerning the consequences of manipulating the relationship between mother and offspring in mammals. Klaus and Kennell (1976) have studied the postnatal period in a number of animals and have found that different animals have different patterns of behaviour, but that there is a general pattern which can be found in all mammals. The prime objects of their studies have been cows, sheep and goats, and they have noticed that the very first postnatal hours are crucially important for the way in which the mother will take care of her offspring in the future. Hersher et al (1963, in Klaus and Kennell, 1976) found in one of their studies that five minutes contact directly after birth was enough to ensure that most nanny-goats accepted their kids. The nanny-goat must at the birth be given the opportunity to "imprint" her offspring through smelling it, licking it, suckling it, perceiving it with all her senses, and must do so immediately after the birth, lest a complete and permanent alienation should arise between mother and offspring. The conditions required for the nanny-goat to function as the mother to a particular kid are thus absolute, and if they are not fulfilled it may mean the death of the offspring.

Klaus and Kennell (1976) argue that the importance of the very first contact between the mother and her infant has been shown through these various animal studies. The first post partum period is of immense importance for the later development of the relationship between mother and infant. The slightest disturbance in the normal interaction can prove fatal for the young, who can either be rejected or even bitten to death. Their conclusions from the animal studies concerning the first contact between the mother and her young can be summarized as follows: the earlier the separation – the greater the effect. For each species there seems to be a certain limit to the length of time the separation can be maintained without seriously disturbing the behaviour of the mother towards her young. These disturbances are often permanent.
"To remove the newborn baby from its mother and place it on its back or its front on a flat surface, often uncovered, is to fail to understand the newborn's great need for enfolding, to be supported, rocked, and covered from all sides, and that the infant may only gradually be introduced to the world of more open spaces. From the supporting, continuous, tangible presence of his mother, the infant will gradually come to move some distance toward the outside world. One sees this particularly vividly in older infant mammals, and especially in juvenile monkeys and apes, who from tentative proximate separation from the mother, gradually increase the distance until they can achieve an independence more or less complete physically, and to some extent emotionally" (Montagu, 1978, p. 233).

Increasing knowledge about the animal world has stimulated research into the fundamental mechanisms of human life including the search for a more intimate understanding of the mother–infant relationship.

**Human studies of the early contact between the infant and its parents**

**Studies of the mothers' first contact with their newborns**

Rubin (1963) noted that mothers showed a definite progression of behaviour after birth while they became acquainted with their their babies. The touch contact the mothers made with their babies followed an orderly sequence: from small areas of contact the mother gradually moved to more extensive ones, at first using only her fingertips, then her hands including palms, and then much later her arms as an extension of her whole body. In Rubin's study, the infants were dressed and it was not until the third or even as long as the fifth day that the mothers would advance from fingertips to the whole cupped hand (palm contact) to stroke her baby's head. Rubin pointed out, that fingertip exploration was tenuous as the mother was not sure how she would be received, and later she used the whole hand for maximal contact with the infant's body in developing close contact with it.

Klaus and his colleagues (Klaus et al, 1970) observed a similar pattern as Rubin (1963) but at a much faster rate. In their study the first postnatal contact between twelve mothers and their healthy, full term newborn infants was filmed. The undressed infants were placed next to their mothers a few minutes or hours after birth. Most of the mothers touched theirs infants in a pattern of behaviour, which can be defined as an orderly progression of tactile contact in maternal relation to their normal newborns. The mothers started with fingertip touching of the infants' extremities, and proceeded in four to eight minutes to massaging, stroking palm contact of the trunk, and encompassing of the infant. Finally an intense interest in eye-to-eye contact was observed. In the first three minutes (0–3 min.) fingertip contact was 52%, and palm contact was 28% of the time. In the last three minutes (6–9 min.) of observation fingertip contact decreased to 26% and palm contact increased to 62% of the total scored time. Klaus et al (1970) also studied nine other mothers during their first three tactile contacts with their normal premature infants the first three to five days of life. They found that these mothers also followed a
similar sequence of behaviour, but at a much slower rate; these mothers did not use their palms even at their third visit to their infants. Much more progress in tactile contact occurred in nine minutes in the previous mentioned mothers of full term infants than by the latter mothers. Klaus et al (1975) have suggested that there exists a species-specific behaviour in human mothers at their first contact with their newborn infants.

Trevathan (1981) presented a study, which was designed to test the following hypothesis: "mothers exhibit an orderly progression of tactile interaction upon first contact with their newborn infants beginning with fingertip stroking of the infants' extremities and moving to palmar massaging of the trunks" (Ibid, p. 550). The results from the statistical analysis revealed that maternal tactile behaviour in the first ten minutes of active interaction was more variable than previously reported by Rubin (1963), and by Klaus et al (1970).

Trevathan (1988) recorded the conversations of mothers together with their newborn infants during the first ten minutes after birth. Analysis of the verbal content revealed that comments about the infant's gender were far more frequent than expected and comments about the infant's resemblance to family members were rare. Trevathan postulated that differences in verbal content of these first conversations may be due to different time intervals for recording or to different socio-cultural backgrounds of the women observed.

Studies of the fathers' first contact with their newborns

McDonald (1978) studied fathers who participated in a normal delivery during observations from videotapes recorded during the first nine minutes following delivery. Seven paternal activities during the first contact with the newborns were observed: hovering, prolonged gazing, visual contact, pointing, face-to-face contact, fingertip contact, and palm contact. McDonald concluded that this paternal behaviour at the first initial contact with their newborn infants may be a species characteristic of fathers and may also function to establish the father-to-newborn affectional bond.

Rödholm & Larsson (1979) studied the first contact between fathers and their newborns delivered by caesarean section. The naked baby was presented to its father approximately 15 minutes after delivery. Photographs of the contact were taken every second during their first seven minutes together. An orderly progression of the fathers' behaviour was observed: the father began touching the extremities, and then he proceeded to touch the trunk, the head, and finally to the face of the infant. In touching, the father first used his fingers and fingertips, then proceeded to touch the infant with his palms, and finally used the dorsal side of his fingers. An increase in eye-to-eye contact over time was observed. Comparisons between these data and data reported by Klaus et al (1970) on the behaviour of mothers in their first contact with their newborns was made. The conclusion of this study was that the fathers in their first contact with their infants displayed a very similar behaviour as was described previously for the mothers.
Studies of short-term and long-term effects of early mother-infant contact

Many routines on our neonatal and maternity wards, such as mother-infant separation (Barnett et al, 1970) were, as mentioned earlier, introduced to prevent infections and to improve treatment of the newborn. In a number of studies (Klaus & Kennell, 1970; Klaus et al, 1972; Kennell et al, 1974; Lozoff et al, 1977; Ringler et al, 1975; 1976; 1978) the importance of early mother-infant interaction for subsequent growth and development have been discussed. The paediatricians Klaus and Kennell have questioned whether or not present hospital care practices may influence maternal behaviour both in the neonatal period and later on. They have given evidence that the immediate post partum period is a particularly sensitive one for mothers in the development of maternal-infant bonding (Kennell et al, 1975; Klaus & Kennell, 1976).

In one of the studies by Klaus and his co-workers (1972), fourteen mothers (control group) were given the usual routine contact with their healthy, full term newborn babies after delivery and fourteen mothers (extended contact group) were given close physical contact with their nude healthy, full term babies. This extended contact was given for one hour within the first three hours after birth and also five extra hours of contact each afternoon in the first three days after delivery (a total of sixteen hours of extra contact). In follow-up studies one month (Klaus et al, 1972), one year (Kennell et al, 1974), two years (Ringler et al, 1975) and five years (Ringler et al, 1976; 1978) after delivery, differences were found between the control group and the extended contact group in maternal attachment behaviour and linguistic behaviour.

Two studies by Hales and his colleagues (Hales et al, 1976; 1977) of Guatemalan mothers revealed significant differences in behaviour with and without early contact. At 36 hours the mothers given skin-to-skin contact with their infants immediately after delivery displayed more affectionate behaviours, particularly in the regard to "en face", than did the mothers in the control group. The researchers argue for the importance of physical contact between the mother and her newborn during the first twelve hours of life.

In Gothenburg, the Carlsson team (Carlsson et al, 1978) investigated 62 mother-infant pairs in order to ascertain the effects of various amounts of body contact between mother and newborn on the mother's later nursing behaviour. They found short-term effects in that mothers who had been allowed five minutes body contact with their newborns immediately after parturition showed an increase in affective components of maternal nursing behaviour on post partum days two and four. In a follow-up study (Carlsson et al, 1979) with 50 mother-infant pairs at six weeks after delivery, the nursing behaviours of the extended contact group and the limited contact group were indistinguishable.

Svedja and her colleagues (Svedja et al, 1980) used a double-blind experimental design, random assignment of 30 mother-and-infant pairs to contact conditions and response indices appropriate to the attachment construct. Fifteen healthy primiparous mothers had their infants for one hour after delivery and 90 minutes at
each feeding. Another 15 kept to the usual hospital routine for newly delivered mothers: brief contact at delivery and 30 minutes at each feeding. In order to minimize a feeling of "specialness" in extra–contact mothers, mothers who were not in the study but who shared a room with these mothers, had their infants longer at each feeding so that this apparent difference in contact time would be eliminated. They tested the hypothesis that early and enhanced mother–infant contact facilitates maternal attachment behaviour with painstaking attention to methodological and procedural controls. No differences in maternal behaviour were obtained on 28 discrete response measures or on pooled sets of individual measures (affection, proximity–maintenance, care and miscellaneous response–types).

In a very large prospective study, O'Connor et al (1980) have investigated low–income primiparous mothers, randomly assigned to either a hospital routine care group or an extra contact group. Over 300 families have been followed for a period of 1–2 years and abuse, neglect, abandonment and failure to thrive have more commonly been observed in routine care families. Kennell (in de Château & Wiberg, 1984, p. 315) comments: "If early and extended contact makes a difference in the incidence of abuse, failure to thrive, abandonment, and neglect, as is suggested by the study of O'Connor and colleagues (1980), but not confirmed by the study of Siegel and colleagues (1980), more striking differences in parent–infant interaction and in the behaviour and development of some children can be anticipated" .
The immediate post partum period may be particularly important for the developing relationship between mother and infant. This report consists of two parts; part one: the descriptive study and part two: the longitudinal study. The first study (paper I) gives descriptions of the activities of the infants, the mothers, and the fathers with special emphasis on the interaction during the first hour post partum and the second study (papers II–IV) examines the effect of extra contact during the first hour following delivery.

PART I: DESCRIPTIVE STUDY (Paper I)

Aims

The main aim of the descriptive study was to examine the absolute first contact between the newborn and its parents during the time that the infant was lying on its mother's chest and abdomen immediately after the birth. This examination was done in two ways:

a) by seeing (observing) the first contact between the newborn and its parents. The activities of the infants, the mothers, and the fathers and their interaction were observed, described and analysed; and

b) by hearing (listening to) how the parents verbalized the process of giving birth to and having a child.

Another aim was to test the theory of the normal autistic phase, which Margaret S. Mahler et al (1975) theorized.

METHOD

Selection criteria

There were three basic requirements for the selection of participants for this study:

1. The mother had to be healthy with a normal pregnancy – a pregnancy without any serious complications, and duration of $40 \pm 2$ weeks. She should also have had a normal delivery, and with an upper limit of 24 hours for the duration of labour.
beginning with the release of the amniotic fluid or the onset of labour pains and ending with the delivery of the infant.

2. The infant had to be of a single childbirth i.e. not a twin, triplet etc, healthy, full term, and of normal weight. It had to be born in vertex presentation and have an *Apgar score of > 7, one minute post partum.

3. The father had to be healthy and present at the delivery as well as during the infant's first hour of life.

Selection procedure

The selection of the mothers were made on two different occasions. A first selection was made by the midwife on duty and the researchers at the delivery ward. A second selection was made by the midwife on duty, when the expectant mother made her last visit to the antenatal clinic about one month prior to estimated day of delivery. About one week after the women had received this information they were contacted by telephone by one of the researchers. Then a letter was sent to the women, who were interested in participating, which they were to take with them to the delivery ward. They then handed over this letter to the midwife on duty when they were admitted to the hospital.

Subjects

The first selection resulted in nine families being chosen and the second in seven families, who were later videotaped at their child's birth. Of these remaining sixteen families, four were not used. Three films have not been used due to photographical and technical difficulties or failures, and the fourth because the mother, by mistake, was given her infant dressed after routine care, making extra contact care impossible.

Thus, there were a total of twelve (six from each selection group) usable videofilms, in which the mothers had their naked infant with them directly after the delivery. The material consists of twelve mothers; six primiparous women and six multiparous women, and six boys and six girls.

* The Apgar score is a medical measure of the state of the newborn child. It is assessed from the child's breathing, heartbeat/pulse, skin colour, reflexes, and reaction to stimulus. Each function is scored from 0, 1 to 2 and the Apgar score is the sum of the points for the 5 variables with 10 as the maximum. The infant is considered as normal if it gets 7 points or more. The American doctor Virginia Apgar constructed this score in 1954. (See further in Lagercrantz, 1989, p. 95.)
Description of the delivery room and the apparatus for videotape recording

The investigation room was equipped exactly like other rooms in the delivery ward with the exception of the apparatus for videotape recording (a microphone and a small video-camera), and an infrared lamp on a wheeled stand to keep the newborn warm. The researchers conducted the videotape recordings from an adjoining room.

Videotape recordings

Immediately after delivery, the midwife placed the infant on its mother's chest and abdomen, the infrared lamp was turned on and the videotape recording started. A skin electrode was taped onto the infant's back or bottom to check its body temperature. Then the midwife helped the mother to expel the placenta and put in any necessary stitches. After this the midwife left the room and the family was left alone for about an hour. After the recordings were completed, the usual routine care of mother and infant continued. The videotape recordings did not interfere with the standard care of mother and infant.

The length of the recordings varied between the families due to which selection group the family belonged. In the first group, the midwife on duty made her own decision about when it was time to stop the recordings. These six films are shorter (22–48 minutes) than the six films of the second group (52–90 minutes), where the family and the researchers together decided when it was time to stop the recordings.

Methods of analysing the videotape recordings

Analysis of the activities of the infants, the mothers, and the fathers. Two different groups consisting of two observers have separately analysed the twelve videotape recordings. The observers made their evaluations independently of each other.

In order to obtain a coherent and unequivocal evaluation, the observers had lists of variables. There were separate lists of variables for each family member. The following variables were studied: the infant's activities: cries, whimpering, eye-to-eye contact, movements, etc., the mother's activities: touching, parts of the infant touched/examined, the pitch of the mother's voice in addressing the infant, helping the infant etc., the father's activities: touching, parts of the infant touched/examined, the pitch of the father's voice in addressing the infant, helping the infant etc.

The video films have been analysed from the birth of the infant and then either during the whole length of the videotape recording or during the first hour of life,
depending on to which selection group the family belonged. On the videotapes there was a clock, showing the time continuously. The observers made their observations during each 1-minute period and then noted the activities for each family member. This interval was chosen as a suitable time, since it was possible to remember what recently had happened. The observers had to observe each interval at least three times (infant/mother/father) in this analysis, and even more often if necessary.

**Analysis of the parents' verbal communication and description of the interaction between the infant, the mother, and the father.** The observers have also documented the verbal communication: what the mother and father talked about and discussed, to whom the mother and father talked, etc.

Every family has been documented in a series of short case studies. Long detailed descriptions of each family and their interaction, during the infant's first hour of life, have also been made from the videotapes, and these descriptions were later analysed. An example of one of these long descriptions and the additional analysis of their process is given in Swedish (See Appendix IV in paper I).

**RESULTS**

**The activities of the infants**

The activity of the newborn may be described as a developing and intentional process, in which the different kinds of activities overlap each other. The most important step and the culmination of this process is the so-called *rooting-reflex.*

All twelve infants cried loudly and vigorously, the so-called *birth cry*, at least for a short period directly after the birth before they were placed on the mother. Seven infants also cried when they were placed on the mother's chest and abdomen, and five infants stopped crying instantly. After a couple of minutes after birth six infants had stopped crying, and at three minutes after birth eight infants had stopped crying. One infant continued to cry almost the whole first hour of life. Now and then some infants cried during the first hour of life. When the babies cried the mothers often embraced their babies.

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* The *rooting-reflex* usually denotes the turning and seeking movement the infant makes with the head when one of the cheeks is touched. The infant turns its head towards the side that is touched to seek the breast (Alin-Åkerman, 1980). Here, as in Odent (1979), the term is used to describe a more complex behaviour in which the whole body participates.
After the birth cry, eleven infants entered a period of rest/passivity. During this period the infant was passive, was lying with its arms and legs bent and huddled up as in the foetal position or with arms and legs hanging limp. The twelfth infant, as mentioned earlier, continued to cry or whimper.

During the next phase, awakening, the infant moved its arms and legs, stretched and bent its arms and also eventually clenched its fist under its chin. Eleven infants opened their eyes, and sought eye-to-eye contact at some time during their first hour of life. Two infants opened their eyes prior to being placed on their mother's chest; nine infants did this for the first time during the first twelve minutes of the videotape recordings. As mentioned earlier, one infant continued crying or whimpering.

Thereafter there was a period of great activity, where the newborns at the same time showed mouth movements, crawling movements, and grasping movements.

By mouth movements it is meant that the infant alternately opened and closed its mouth, sometimes smacked its lips and swallowed and sometimes lifted and turned its face upwards to its mother.

Eight infants moved their legs and made clear and distinct crawling movements and they occasionally stretched their legs vigorously, often to the extent that the lower body was lifted. Usually this happened just before the infant started seeking the mouth with the hand.

Eleven infants made grasping movements - alternately opened and closed their hands, usually in front of the mouth. This seeking of the mouth with the hand or vice versa was observed in some form in all twelve infants. This hand–mouth movement initially started between five and thirty minutes after birth and followed this pattern; the infant moved its hand close to its mouth, grasped and spread its fingers, opened its mouth and sometimes moved its head sideways or backwards and forwards. The legs were involved at times in this activity in that the infant made more or less articulate crawling movements. Seven infants at some time sucked their hands.

Whether the infant found its own hand or not, the seeking movements were alternatively directed towards its mother's breast, in that the infant turned and lifted its head very high to reach the nipple. In this search the infant often used its hands. In some infants there was a clear pattern in these seeking movements; the infant first lifted its head, made mouth movements and then whimpered. For the so-called seeking movement as a whole, it was evident that first came the mouth movements and crawling movements, then grasping movements and finally the distinct seeking movement. This seeking behaviour could be frustrated, and accompanied by whimpers and small yells, or also concentrated, and collected. In ten infants a marked co-ordination of the movements of the hands, arms, legs, and head was observed during the seeking movements.
This active seeking behaviour resulted in six infants sucking the breast and they all continued energetically to seek the mother's breast again when the infant dropped the nipple from its mouth or when the mother interrupted the suckling. The seeking movement was then also directed towards the hand and again towards the mother's breast. When the infant sucked the breast, the midwife often told the mother not to let it suck each breast for more than five minutes in order to avoid skin irritation.

The activities of the mothers

The mother was obliged to hold the infant from the beginning to prevent it from falling, since it was placed on her stomach. The way the mother held the infant was therefore more or less determined from the outset. The mothers held their newborns, either round the bottom or the back. Another dominant pattern in many mothers was that they kept a more or less firm grip with one hand around the infant's back or bottom, leaving the other free to caress or to feel other parts of the infant's body. Otherwise the mothers held the infant in a firm grip with both hands and two mothers had their hands resting lightly on the infants' back for the greater part of the recording period.

The way of touching and holding the infant varied during the recording period and depended on the activities of the baby. About half the mothers gripped the infants rather firmly from the beginning, the other half held the infant carefully from the beginning but adopted a firmer grip after a while. Another typical pattern was that the mother became more active in touching and caressing the infant during the course of the recording. The pattern of touching began with the infant's trunk or head, and all the mothers started to touch or to examine the infant's face and then its bottom. All the mother's touched, caressed, examined and investigated different parts of the infant's body. Mothers' touching of and reactions to boys and girls tended to be different.

The activities of the fathers

The fathers, unlike the mothers, were able to choose whether they wanted to approach the infant and touch it or not. All twelve fathers took the initiative to approach and touch their infants at least on some occasion during the recording period. The fathers touched their infants on the whole much less than the mothers did. The fathers often started to touch carefully or poke at the infant. When the fathers stroked or caressed the infants they often used the dorsal side of their fingers. Their pattern of touching started with the face, trunk and head and then turned to hands and feet and finally ended with the bottom. One father sat for the greater part of the recording holding the infant by the hand, who in turn, gripped the father's finger. There were also tendencies to differences in fathers' touching of boys and girls.
The parents' verbal communication

The parent's conversation during the infant's first post partum hour was about the following topics and followed a circular pattern: firstly the infant's body, and that the infant is well-shaped, the infant's sex and the sex of the expected infant, then follows comparison of the infant with the mother, father, siblings, and relatives, concern about how the infant feels or if it is comfortable, how they feel themselves, the delivery, the pregnancy, the infant's sex and thoughts about a possible name of the infant, the ability of the infant, that the infant is feeling fine or is comfortable, that the infant is theirs, what the infant is doing, and the future.

Parents' conversations about apppellations or names of boys and girls were different, as were their comments about the infant's body and activities.

The interaction between the newborn and its parents

The most common response to the infant's behaviour was that the parents commented verbally. The parents also responded in various ways to sounds made by the infant, for example when the infant cried or whimpered the parents tried to comfort or help it in various ways. The mother rocked and cradled the infant or answered it with baby-talk, other sounds and noises, or words. She often used a high-pitched voice in addressing her infant, and sought eye-to-eye contact with her baby. The father, too, was noted on some occasions to answer the infant in a similar way. The mother and the father sometimes tried to verbalize the infant's cry or whimpering by talking for the infant.

Four parents talked soothingly to the infant when it showed signs of dissatisfaction. Other parents comforted their infants by caressing. The mother embraced her baby, trying to help it to suck its own thumb or to suckle at the mother's breast. One mother let the infant suck her finger after having tried to comfort the infant in different ways, letting it suck the breast for instance, which did not work. After the infant had sucked the finger for a while, the mother made another attempt with the breast, which was successful this time. Certain parents were more concerned about the environment when the infant showed signs of dissatisfaction. It was the temperature above all, that was the cause of worry, and the fathers especially reacted by manipulating the infrared lamp.

The most common and clearest response from the infant to the parent's activities was direct reactions to touch. All infants reacted in some way to touch, either by simple movements or more complex patterns of behaviour.

It was the infants' seeking behaviour which lead to successful suckling attempts. Seven couples commented on and showed that they understood the infant's seeking movements. Eight parents tried to get the infant to suckle at its mother's breast, and six parents succeeded. This interaction between newborn and parents, initiated by
the infant's seeking behaviour and culminating in its sucking the breast, is the most complex pattern of interaction on the videotape recordings.

An example of the process of interaction between the newborn and its parents and the additional analysis is to be found in the case study in Appendix IV in paper I. The process between the parents and infants can be illustrated in four steps or stages. The process is circular rather than linear, which means that an early stage may come back later. The length of each stage varies from family to family, especially the second, rest/passivity. For some parents the second stage did not exist and they went from the first stage almost immediately to the third stage (Table I) (Wiberg, 1988a).

Table I: Interaction and mutuality between the newborns and their parents during the infant's first hour of life.

<table>
<thead>
<tr>
<th>The child's process</th>
<th>The parent's process</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>1. BIRTH CRY</strong></td>
<td>1. ELATION</td>
</tr>
<tr>
<td>The child cries powerfully and loudly directly after birth.</td>
<td>The birth is over and the child is delivered and healthy.</td>
</tr>
<tr>
<td><strong>2. REST - PASSIVITY</strong></td>
<td>2. REST - PASSIVITY</td>
</tr>
<tr>
<td>Fatigue after strong mobilization of energy. Recovery – is half asleep or half awake.</td>
<td>Mother sutured if necessary. Fatigue after a strong mobilization of energy. Recovery.</td>
</tr>
<tr>
<td><strong>3. AWAKENING</strong></td>
<td>3. TOUCHING</td>
</tr>
<tr>
<td>Stretching, opening eyes as well as searching for eye–to–eye contact with mother.</td>
<td>Body and eye–to–eye contact with child.</td>
</tr>
<tr>
<td><strong>4. CONTACT BEHAVIOUR – NON–VERBAL COMMUNICATION</strong></td>
<td>4. PERSONIFICATION AND INVESTIGATION OF THE CHILD WITH THE ESTABLISHMENT OF CONTACT</td>
</tr>
<tr>
<td>Sucking movement with its mouth, crawling movements with its legs, grasping movements with its hands, hand–mouth activities, seeking movements and rooting–reflexes along with suckling at the mother's breast.</td>
<td>Feel, touch, cradle and rocking along with talking to and about the infant. Verbal descriptions of experiences of delivery and new parent roles.</td>
</tr>
</tbody>
</table>
PART II: LONGITUDINAL STUDY (Papers II–IV)

Aims

The aims of the longitudinal study was to examine whether different postnatal care routines for mothers and newborns have different effects on the behaviour of mother and infant, and on the development of their mutual relationship in view of some concepts in Mahler's (Mahler et al, 1975) theory of symbiosis and individuation. The study examined the following considerations:

a) whether changes in postnatal care influenced the development of the mother–child relationship; and

b) whether there were sex-related differences in this relationship.

The main consideration has been to examine how extra naked body contact and suckling contact (limited to 15–20 minutes) immediately following delivery, in contrast to routine care, might influence the development of the mother–child relationship, also taking the sex of the child into account.

MATERIAL

Selection criteria

The basic conditions for participation in this study were that the pregnant women lived in our hospital catchment area and that they were expecting their first child. All mothers had agreed voluntarily to participate. The mothers should be healthy and should have had normal pregnancies and deliveries. The infants should be healthy and the neonatal period should have been free from complications. Many of the important criteria on which the selection was made have been described earlier by Prechtl (1968) as optimal obstetrical conditions and the others have been used by Thoman et al (1972).

The following medical criteria were stipulated for the mothers: maternal age between twenty and twenty-nine years, primi–gravida, no history of previous abortions or miscarriages, no use of drugs except iron medication and vitamins during pregnancy, normal blood pressure and Hb–percentage, and no proteinuria (Pasamanick et al, 1956). The mother should have a normal weight gain during pregnancy (10 to 15 kilograms) (Pitkin et al, 1972), and the length of pregnancy thirty-eight to forty-two weeks. Labour had to have started spontaneously at full term (with birth–throes or "water–loss"), and lasted less than twenty–four hours. The mothers should not have received more than 200 mg pethidin (or equivalent) one to six hours before parturition.
The medical criteria that all infants had to meet were: they had to have been born in vertex presentation, the babies had to be singles (no twins) and the infant's birth weight had to be between 3000 and 4000 grams, the babies had to be free from any signs of intra- and/or extrauterine asphyxia with an *Apgar score of more than 7 at one minute post partum, and they had also to be free of any signs or symptoms of congenital malformation or disease and be healthy when physically examined one day and six days post partum.

The very strict selection criteria used give us an optimal sample of subjects, thus minimizing possible effects of irrelevant variables.

Selection procedure

The prospective, longitudinal study started in December 1974 and was carried out in a university hospital. When the mothers arrived at the delivery unit, the midwife made a preliminary selection of the mothers, 1–15 hours before partus. This preliminary selection was based on existing data concerning previous obstetric history, present pregnancy, and place of residence. The records of these mothers were marked "study" with a red tape and numbered in order of arrival. General care, observation, and preparation for delivery were carried out according to standard routine procedures.

The mothers were delivered by the midwife on duty, because of the duration of labour, this was very often not the same midwife who was present at admission. Immediately after the delivery, the midwife or nursing-aid helping her (during delivery) compared the number on the mother's record with a coincidence table. According to this coincidence table – placed in a locker in an office outside the delivery room – the mothers and their infants were randomly assigned to either a routine care (P) group or an extra contact (P+) group.

Subjects

According to the selection criteria and using this preliminary selection procedure; a total of fifty mothers were initially selected for the study and randomly, before delivery, assigned to either the routine care group (n=24) or the extra contact group (n=26).

* The Apgar score is a medical measure of the state of the newborn child. It is assessed from the child's breathing, heartbeat/pulse, skin colour, reflexes, and reaction to stimulus. Each function is scored from 0, 1 to 2 and the Apgar score is the sum of the points for the 5 variables with 10 as the maximum. The infant is considered as normal if it gets 7 points or more. The American doctor Virginia Apgar constructed this score in 1954. (See further in Lagercrantz, 1989, p. 95.)
Eight mother–infant dyads – four dyads from each observation group – were excluded afterwards as they did not fulfil the established criteria concerning delivery (1P and 1P+), infant condition (1P and 1P+), neonatal period (1P and 1P+), or place of residence (1P and 1P+).

**Observation groups**

The final study thus comprised the remaining forty-two mother–infant pairs with the following numbers included in the two observation groups:

**Control group, P group** (n=20): Primiparous women, given the usual routine care together with their newborn infants after delivery.

**Experiment group, P+ group** (n=22): Primiparous women, allowed extra naked contact – an extra skin-to-skin and suckling contact – together with their newborn infants immediately after delivery. Afterwards the usual routine procedure continued in the same way as in the routine care group.

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**DELIVERY WARD**

Preliminary selection of mothers before delivery  
\[ n = 50 \]

- Routine care  
  \[ n = 24 \]
  - Drop-outs  
    \[ n = 4 \]
  - P group  
    \[ n = 20 \]
- Extra contact  
  \[ n = 26 \]
  - Drop-outs  
    \[ n = 4 \]
  - P+ group  
    \[ n = 22 \]

**MATERNITY WARD**

**HOME**

**Figur 1.** Selection procedure and final observation groups.
Background data

Both groups (P and P+) were comparable as to mean maternal age, civil status, socioeconomic status, mean number of visits to the antenatal clinic, mean maternal weight gain during pregnancy, and mean gestational age. The mean duration of labour and amount of analgesia used were comparable in the two observation groups. The fathers were present at the delivery in equal proportions.

P group: Routine care immediately following delivery

After birth the baby was lying on the delivery table, between the legs of its mother. Mouth and upper airways were rinsed and the stomach emptied. Face, trunk, and legs were wiped dry with a towel. The mother was then given a brief view of her infant but usually she did not touch her baby. A numbered bracelet was put around one wrist of both the mother and infant. After cord clamping, two to six minutes post partum, the baby was taken away to another part of the delivery room for weighing, measuring, bathing, physical examination, Credé prophylaxis, and dressing. This took approximately thirty minutes. In the meantime the mother was helped to deliver the placenta, was washed, and cleaned. Thereafter the baby — with clothes on — was put in a crib and covered with a blanket. The crib was placed beside the mother's bed so that she could watch her baby and touch its face. In some instances the baby, fully dressed and wrapped in a blanket, was placed in the mother's bed. The mother, the infant and the father, who had often attended his baby's birth, stayed together in the delivery room for approximately two hours after the actual time of birth. Then the mother and the baby were transferred to the maternity ward.

P+ group: Extra contact immediately following delivery

After birth the infant's mouth and upper airways were rinsed, its stomach was emptied, and its body was dried with a towel. The midwife fastened a numbered bracelet around one wrist of both the mother and infant as in the routine care group. Then, after clamping the cord — two to six minutes following delivery — the midwife put the naked baby onto the mother's abdomen, and the infant's back was covered with a blanket. This skin-to-skin contact began approximately ten minutes post partum. Some five minutes later the midwife moved the baby upwards onto the mother's chest and attempts were made to let the baby suckle at its mother's breast. It was now approximately fifteen minutes post partum. This extra naked contact — skin-to-skin and suckling contact — lasted for about fifteen to twenty minutes during the first hour following delivery. After this period, when the baby was about twenty-five to thirty minutes old, the usual routine procedure, as described for the routine care group, was continued.
P and P+ groups: In the delivery ward

Apart from this the two observation groups were treated in the same way in the delivery ward. Before leaving the delivery ward all the selected mothers were asked to participate with their newborn infants in an ongoing study on breast-feeding and child development. They were told that they were to be observed later on in the maternity ward. All mothers agreed voluntarily to participate, probably because the approach was made via the midwives who, by that time, were known and trusted by the mothers. Approximately two hours after delivery mothers and infants were transferred to the maternity ward.

P and P+ groups: Routine care in the maternity ward

During the rest of their stay in the maternity ward all subjects in both groups received the same care. For the first three days after delivery, the mothers in both groups saw and nursed their infants every four hours during the day. During the night, and for most of the day, the infants stayed in a separate nursery. During the second half of the post partum week, the infant was placed in the mother's room during the daytime. The mother then took a more active part in the care of her baby, bathing it, changing nappies and clothes, and so on. During the night, most infants remained in the nursery. Most of the rooms in the maternity ward have accommodation for four mothers and their infants.

Drop-outs

The mothers and infants in both the control and the study groups have been investigated on four different occasions: 36 hours (de Château & Wiberg, 1977a), 3 months (de Château & Wiberg 1977b), 1 year, and 3 years after delivery. The number of mother–infant pairs participating in the most recent parts of the longitudinal investigation is given below.

1 year after delivery: This follow-up investigation included 33 mother–infant pairs (P group: n=15; 11 boys and 4 girls, and P+ group: n=18; 9 boys and 9 girls). Nine mother–infant pairs; five P (2 boys and 3 girls) and four P+ (3 boys and 1 girl) did not come to this follow-up. They were lost for the following reasons: unwillingness to come (4 P and 2 P+), employer did not allow a day–off (1 P), did not keep the appointment (1 P+), and living abroad (1 P+).

3 years after delivery: At this follow-up study in total 38 families (P group: n=18; 11 boys and 7 girls, and P+ group: n=20; 11 boys and 9 girls) were studied. In both control group and study group two mother–child pairs were lost due to: unwillingness to come (1 P boy and 1 P+ girl), and failure to keep the appointment (1 P boy and 1 P+ boy). Some of the mother–child pairs, who were missing at the one–year follow–up study did agree to come this time.
Socio-economic status

At allocation, both observation groups were comparable as to socio-economic status. At the follow-up study one year after delivery, seven (4 P and 3 P+) of the nine mothers dropping out, and at the three-year follow-up study, all four drop-outs (2 P and 2 P+), belonged to the lowest socio-economic category.

STUDY DESIGN AND METHODS

In the longitudinal study the mothers and infants in both the control and the study groups have been investigated on four different occasions: thirty-six hours (de Château & Wiberg, 1977a), three months (de Château & Wiberg, 1977b), one year, and three years after delivery. Various methods, such as direct observation of behaviour, personal interviews, estimations of infant development, mother's diaries, videotape recordings, and so on, have been used in an attempt to mirror the relationship between mothers and infants in several aspects. Several different experimenters and observers have been working in the various follow-up studies.

Figur 2. Study design and methods used at the different follow-up studies.

Since the design and the methods have been reported in detail in a special paper on study design and methods (paper II) and have also been given in the present papers (III and IV) they will be only briefly sketched below.
Short description of the methods employed at the one-year follow-up study

When the infants had reached the age of one year they were invited together with their mothers to participate in a new follow-up study, which was carried out at the Paediatric outpatient clinic.

Three new experimenters (two psychologists and one doctor) were engaged. This procedure was chosen in order to circumvent any kind of bias arising from the fact that the previous observers knew the group (P or P+) to which some of the subjects belonged. The subjects were randomly assigned to one of the observers (psychologists). Only one of the two observers was present with each mother-infant pair. The same experimenters made all the examinations for each mother-infant pair during one day. Only one mother-infant dyad came to the clinic each day.

Firstly, the mother and infant behaviour was observed by a psychologist. All observations took place in the same examination room and were made during a physical routine examination of the infant by the paediatrician. The same doctor examined all the infants in the study. The observer was present when the mother, infant, and doctor entered the examination room. The observations started after an initial talk and after the mother had undressed her infant.

The direct observations were made by means of a time-sampling technique and the observation time was divided into two parts: a first part while the mother was seated with the infant on her lap and a second part while the infant was lying on the examination table. Part one contained twenty-six different behavioural items – 19 maternal and 7 infant – and part two contained twenty-five items – 18 maternal and 7 infant – which were scored and noted according to two separate checklists. The observations included items in the following areas: body contact, eye contact, smiling contact, playing contact, and verbal contact (Appendix I).

After the direct observation the same doctor conducted a short semi-structured interview with all the mothers. This personal interview contained questions covering socio-economic and occupational circumstances, health, some child-rearing practices, and the father's participation in the daily care of the infant (Appendix II). Data about the breast-feeding was also collected from the mothers during this personal interview and afterwards also checked through scrutiny of the Child Health Centre records.

Then, in the presence of the mother, the infant was examined, and the infant's level of maturity was tested using the Gesell Developmental Schedules (Gesell & Armatruda, 1947; 1949). This test consists of five major parts: gross motor, fine motor, adaptive, linguistic, and personal-social development. Next the mother was interviewed about the social ability of her infant in a standardized and structured way using the Vineland Social Maturity Scale (Doll, 1936; Magne & Wahlberg, 1961). This scale measures social development and maturity in children, indirectly
through-the-mother. The mother was thereafter asked to complete a personality inventory, the Cesaree Marke Personality Scheme. This CMPS (Cesarec & Marke, 1968) is based upon Murray's (1959) theory of personality concerning psychogenic needs (Appendix III).

During the week before the appointment day at the hospital, all the mothers also had kept a diary of their infant's feeding (two days) and sleeping (seven days) habits, which they handed over. The follow-up day ended with a closing discussion.

**Short description of the methods employed at the three-year follow-up study**

A new follow-up study was conducted when the children reached the age of three. This time more effort was made to assemble and motivate the families to participate. We invited the mother, the father, the child, and also the siblings of each child to spend a day at the outpatient clinic of the Department of Child and Youth Psychiatry. One family came to the clinic each day, and met three experimenters (two psychologists and one doctor). The follow-up day for each family was divided into two parts, a morning session and an afternoon session.

The family was given a short introduction and description by the researchers of what would happen during the day. After this introduction the parents and the child were separated. Both parents were independently given a questionnaire. The questionnaire included questions about general child development, attitudes towards child-rearing practices, the current social, economic, and family structure, health, family planning, and parental experiences of the first hour after delivery. When the parents had completed the questionnaires, they were given the opportunity in the interview to freely discuss their individual answers, to raise any personal questions of concern, and also to talk about the ongoing study. The doctor interviewed the parents.

Meanwhile one of the two psychologists took the child to a separate room for the first of three separate observations using the Erica Method. The Erica Method is a structured, standard observation of play (Andersson & Wiberg, 1982; Danielson, 1962; 1976; 1986) – a special play-diagnostic method and a form of projective technique used for psychodiagnosis of children (Harding, 1965; Kessler, 1966). After this observation session the child was taken on to the next activity, a Denver Developmental Screening Test (Frankenberg & Dodds, 1967). This DDST is a structured, standardized observational screening for child psychomotor development and is divided into four major sectors: gross motor, fine motor-adaptive, linguistic, and personal-social development. The same psychologist, who was unaware of the groups to which the children belonged, examined all the children.
At noon the family gathered again to have lunch in a private room at the clinic and stayed together for a scheduled rest period. After lunch, at around 1 p.m., mother and child were invited to play together for half an hour with dolls in a doll's house. A videotape recording of this play session was made. To facilitate the video recordings the doll's house was constructed without a roof and it contained four furnished rooms: kitchen, bathroom, bedroom, and living-room. The dolls were intended to represent the members of the child's own family and were chosen individually to suit each mother-child dyad: normally mother, father, child (male or female – representing the three-year-old) and a baby if there was a sibling in the family. During this session the father and any siblings were asked to wait outside the study room.

At the end of the follow-up day child play was for the second time observed using the Erica Method (Danielson, 1962; 1976; 1986), while the parents had a final discussion with the doctor about what had been studied during the day. The whole family was then asked to watch their videotape together with the experimenters. This was done in order to give the members of the family an opportunity to see what was actually recorded and also to give their opinion about the recording. The follow-up day ended at approximately 3.30 p.m. One week later the child came back for a third play observation using the Erica Method. During this follow-up study we also observed and noted separation reactions, when the child and its parents were separated.

We also carried out hormonal studies. Urine samples for measurements of adrenaline, noradrenaline, and cortisol from each family member (from the mothers, the fathers, and the children) were collected at four different times during the follow-up day at the hospital. The periods chosen for urine sampling, reflected variations in stress and rest, creating different conditions appropriate for measurement of the hormones. In order to obtain baselines after night rest and day-time activities at home, urine samples were collected at four different times on a separate day (Saturday) under minimal activity conditions (Lundberg et al, 1981).

**Statistical methods**

**At follow-up study at 1 year:** For each method used, the mean frequency and standard deviation of the results were calculated. The t-test (two-tailed) was used in analysing these results and in evaluating the level of significance. The p-values calculated were analysed by this method; p-values of 0.05 or less were regarded as significant. The p-values of 0.10 or less were also given in tables and in the text as we used two-tailed t-test (Guilford, 1965; Hays, 1977).

**At follow-up study at 3 years:** Chi-square test (Guilford, 1965) was used in the analysis of the questionnaires, in the quantitative analysis of mother and child behaviour, and in the qualitative analysis of mother and child interaction during the videotape recording, as the data were in the form of frequencies. In the
hormonal studies, the means of adrenaline and noradrenaline excretion during the different conditions in the groups were calculated, and paired t-tests were used in analysing these results; p-values <0.05 were regarded as significant (Guilford, 1965; Hays, 1977).

RESULTS

The results of the most recent follow-up studies (1 year and 3 years respectively after delivery) are presented below and the reports will be referred to in the text with reference to their Roman numerals.

Firstly, an overall comparison between the two observation groups with different post partum care (P and P+ groups) is made. The results of the longitudinal study indicate that mothers with boys behave differently from mothers with girls, although they have had the same immediate post partum care. As a consequence of that, comparisons of behaviour with regard to sex of infant within the extra contact group and the routine care group respectively are given. Differences related to type of neonatal care are more pronounced for boy–mother pairs than for girl–mother pairs. Therefore the results for the child–mother pairs in extra contact and routine care groups are compared according to sex of child as well as group in the following ways:

a) Comparison with all subjects of P and P+ groups;
b) P+ group: Comparison between boys and girls;
c) P group: Comparison between boys and girls;
d) Boys: Comparison between mothers in P and P+ groups; and
e) Girls: Comparison between mothers in P and P+ groups.

Comparison with all subjects of P and P+ groups

Paper III. During a physical examination at one year, the baby was examined both on the mother's lap (Obs. 1) and on the examination table (Obs. 2). The results of observation 1: mothers with extra contact significantly more often held their infants with an expression of positive feelings as shown by body posture; they also exhibited significantly more affectionate touching, and talked more frequently to the doctor than did P mothers. In contrast, mothers with routine care significantly more often held their infants with an expression of negative feelings as demonstrated by body posture than did P+ mothers. The results of observation 2: P+ mothers more often talked positively to their infants by giving them support, encouragement, and comfort in their manner of speaking; they less frequently held their infants with negative empathy than did mothers with routine care.
The answers to the eight questions in the interview at one year revealed a number of differences between the two groups. No statistically significant differences between P mothers and P+ mothers were found. However, the following tendencies were noted; fewer mothers with extra contact immediately following delivery had returned to their employment outside the home than had routine care mothers. A greater proportion of extra contact infants were reported by their mothers to sleep in a room of their own. Both groups lived in comparable housing. Ten P mothers as opposed to six P+ mothers had started bladder-training of their infants at one year. According to the mothers, fathers in the P+ group participated to a lesser extent in the daily care, e.g. feeding, changing nappies, playing, putting to bed, of their infants than did fathers in the routine care group.

At the one-year follow-up study psychomotor development was measured by the Gesell Developmental Schedules. A comparison of all subjects in the routine care group with all subjects in the extra contact group revealed no significant differences in any of the five parts of the test. However, in four out of the five parts of the test (exception: adaptive factor), infants with extra contact immediately after delivery were ahead of infants in the routine care group.

The social maturity of the infants in both groups was measured on the Vineland Social Maturity Scale. Both routine care mothers and extra contact mothers rated their infants somewhat higher than was to be expected from their actual biological age. No significant differences between the two observation groups as a whole were found. The mean frequency of the social quotient was somewhat higher in the P+ group than in the P group. There were very obvious sex-linked differences in both groups studied. The mothers rated girls' social maturity higher than they rated that of boys. A comparison of all boys with all girls revealed that mothers of girls rated them higher than did mothers of boys.

The measurements obtained with the Vineland Social Maturity Scale were somewhat higher than but consistent with the measurements of psychomotor development obtained from the Gesell Developmental Schedules – especially for boys.

The mean duration of breast-feeding for the mothers in the routine care group was 103 days (range: 10–240 days), compared with 175 days (range: 14–365 days) for the mothers in the extra contact group. Three P+ mothers were still partly breast-feeding at one year, as opposed to none in the P group. There was a sex-difference in the duration of breast-feeding, boys being fed longer than girls in both the P group and in the P+ group.

**Paper IV.** At three years the quantitative analysis of videotapes of mother and child behaviour during play showed following: there were no longer any clear-cut, statistically significant differences in maternal and child behaviour between the two groups as a whole, but the following tendencies could be noticed: mothers in the extra contact group smiled/laughed at and showed more active touching with their children than did mothers in the routine care group. Children in the extra
contact group smiled/laughed more at their mothers and were also sitting further away than children in the routine care group.

The qualitative analysis of mother and child interaction during the videotape recorded play situation showed the following: two significant differences were found between the mothers in the routine care group and extra contact group. The extra contact mothers were more encouraging and more instructing in relation to their children than the routine care mothers. Small tendencies were noticed in that the extra contact mothers were somewhat more often authoritarian and demanding than the routine care mothers, the opposite was true for supporting and laissez-faire. The child's manner of conduct was comparable in both groups. The type of verbal communication was divided into four subgroups. Monologue by the child, parallel monologue and maternal one-way communication were observed with the same frequency in the two groups, the latter being more common in mothers with boys. A dialogue between mother and child was somewhat more common in the extra contact group. In all mother–child dyads, except for one mother–daughter in the extra contact group, conflicts arose. Articulated conflicts were more common in the extra contact group. Regardless of the type of conflict, significantly more conflicts in the extra contact group were solved.

At three years some differences were still found during an interview with the mothers. Asked in retrospect, eleven mothers in the routine care group felt that the time they had together with their infants immediately after delivery had been insufficient. In contrast only five mothers in the extra contact group shared this opinion. This was the only significant difference between the mothers in the two groups. Weak trends were found in the following matters: although actual facilities for the care of the children and time spent outside the home were practically identical in both groups, more mothers in the routine care group wished to have more time together with their three-year old children. Two significant differences between children in the two groups were found: nine mothers in the extra contact group and two mothers in the routine care group judged their children to have been stubborn at the age of 24 months. The extra contact mothers reported that six children as opposed to one child in the routine care group were continent during the day at 18 months. One weak tendency was found. The language development, measured as success in mastering two-word sentences at the age of 18 months, seemed to have been faster for children, especially boys, with extra contact.

At three years the Denver Developmental Screening Test was used. The results were expressed in three categories: normal, questionable and abnormal, and showed a normal age distribution. No major differences between the two groups as a whole, or depending on the sex of the child, were found. One extra contact girl was tested twice and her result was judged to be normal. The four children with questionable results were all boys, two from each group. None of the children showed severe delay of psychomotor development. Twice as many boys as girls requested to be accompanied by a parent, similar proportions were found in both the routine care group and in the extra contact group.
In the hormonal studies at three years of age, adrenaline, noradrenaline, and cortisol excretion during different conditions have been investigated. Adrenaline and noradrenaline excretions were somewhat higher in mother–child pairs with early extra skin-to-skin and suckling contact. The differences between the two groups were more pronounced for mother–boy dyads than for mother–girl dyads in almost all measurements at all four occasions of follow-up. Analyses of variance for repeated measurements were performed and showed that the difference in noradrenaline excretion between routine care and extra contact mothers reached significance. No significant difference between the groups in cortisol excretion were noted.

**P+ group: Comparison between boys and girls**

**Paper III.** At the physical examination of infants at the Paediatric clinic, during observation 1, mothers with boys held their infants on her right-hand side of the body significantly more often than did mothers with girls. No significant differences were found during observation 2.

Psychomotor development as measured by the Gesell Developmental Schedules showed that, within the P+ group, boys had reached a higher level of adaptive capacity than girls.

**Paper IV.** Extra contact girls touched their mothers more than extra contact boys did.

In the hormonal studies at three years of age, a tendency for extra contact mothers and for extra contact boys to excrete both more adrenaline and noradrenaline was found.

**P group: Comparison between boys and girls**

**Paper III.** Observation 1: mothers of girls talked positively to them significantly more often and played actively with them (with or without toy) more often than did mothers of boys. Boys were significantly more quiet, making no sounds than were girls. Observation 2: mothers of girls played actively with them significantly more often than did mothers of boys.

Using the Gesell Developmental Schedules, within the P group, girls were significantly ahead of boys in linguistic development, fine-motor skills, and also in personal–social development. The girls also showed a more advanced overall development than the boys, this being a summation of the five separate factors.

**Paper IV.** Routine care girls looked significantly more often at their mothers and they also smiled and laughed more often than boys did. Mothers in the routine care group looked more at their daughters than at their sons.
Boys: Comparison between mothers in P and P+ groups

Paper III. At the one-year follow-up study, during the physical examination of the infant, the following two behaviours were found during observation 1: P+ mothers held their boys with positive empathy significantly more often and held their boys with negative empathy expressed by body posture less frequently than did P mothers. Observation 2 revealed no significant inter-group differences.

Paper IV. Mothers of boys with extra contact smiled/laughed significantly more often only during the second interval than mothers with boys in the routine care group.

During the play session, out of the eleven extra contact mother–boy dyads, six solved their conflicts in contrast to two out of eleven routine care mother–boy pairs.

Girls: Comparison between mothers in P and P+ groups

Paper III. During the physical examination at one year; observation 1: girl babies in the P+ group were more often sitting on the mother's lap without major body movements and were more often quiet and made no sounds than were girls in the P group. No differences were found during observation 2.

MAIN RESULTS AND CONCLUSIONS

1. All the newborns were very active and in a quiet alert state with opened eyes, and they sought eye–to–eye contact with their mothers. The infant expressed sounds, small yells, whimpered, cried, and reacted to touching (study I).

Conclusion: The newborn infant's potential for interaction at birth was observed in their ocular (visual), tactile, and vocal activities. The newborn's ability to interact disproves the occurrence of a normal autistic phase, which Mahler et al have theorized, during the infant's absolute first hour of life.

2. The infants' activities followed a kind of developing process, in which one activity followed another and also that certain activities came back at a higher level – a kind of circle. This process culminated in infants' sucking the breast (study I).

Conclusion: This result may give rise to the question regarding the newborn infant's capacity of intentionality. The infant's seeking is intentional in that the baby knows the direction, and in that it finds its mother's breast and sucks it. The newborns give evidence of being primarily object–seeking, and the mother is the one who is sought by her baby.
3. The activities (fingertip touching, palm contact, eye-to-eye contact, verbal communication) of the mothers were diverse and varied depending on the activities of her baby, and also the father and the midwife (study I).

Conclusion: There is an early reciprocal interaction between the newborn baby and its mother, where both are giving and receiving signals to confirm each other's presence, a kind of emotional imprinting. This non-verbal interaction could be called an early reciprocal coining or impression, in which both the infant and the mother confirm each others' presence. The results contradict the earlier reported species-specific pattern of maternal contact when a mother first meets her baby.

4. All fathers caressed and touched their babies. The fathers touched their babies on the whole much less than the mothers. They touched very carefully both with fingertips and cupped hands, and they often used the dorsal side of their fingers. The fathers were a sort of a reference point for both mother and child (study I).

Conclusion: The touching activities varied among the fathers. No species-specific pattern of touching was found in this study. Certain fathers were also occupied with photographing mother and infant, and with the environment when the infant showed signs of dissatisfaction, e.g. the infrared lamp which was intended to control the infant's body temperature. The function of the fathers was different than that of the mothers.

5. The parents verbalized the process of giving birth to and having a child – the loss of the belly and gaining of the infant. The topics of their conversation concerned that their baby was well-shaped, the gender of the infant and it's activities, and abilities. They also integrated the infant in the family and talked about the future (study I).

Conclusion: In giving the parents and their babies time together they get an opportunity to feel, react, and verbalize having a child, and also to be born as mothers and fathers. The parents also give their baby a real identity or personification. The physical openness also corresponds to an emotional openness and regression, particularly among the mothers. The process of getting through this life-changing crisis and its peak – their child's birth – is very obvious in several videotapes, where one can anticipate an adaptation and growth of parenthood at the end of the videotapes.

6. Some tendencies of sex-related differences in mothers' and fathers' touching of and verbal communication with their sons and daughters respectively were found. Boys were more touched than girls. A tendency was found that mothers/fathers of boys were one time period before their sons and that mothers/fathers of girls were one time period after their daughters. The verbal communication about boys and girls was different (study I).
Conclusion: The parents of boys activated their sons, while parents of girls left their daughters in calm and waited until the girls would give signals of contact. The verbal communication mirrored the gender of the infant; for example the parents of girls commented on their daughter's temperament in contrast to the parents of boys, who often talked about "actions" of boys and they made no mention of their son's temperament.

7. The differences between the extra contact group and routine care group were most pronounced at the earlier follow-up studies at 36 hours at 3 months. During the follow-up studies at 1-year and 3-years the differences were reduced (study II).

Conclusion: According to the very strict selection criteria used, and using the above-mentioned selection procedure, an optimal sample of subjects with two comparable observation groups was obtained; thus minimizing possible effects of irrelevant variables. The short extra contact - limited to 15-20 minutes body contact and suckling contact - during the first hour of life, influenced the mother-infant interaction right from the beginning of their relationship. The differences are later minimized over time, but both significant differences and tendencies still existed at the 1-year and 3-year follow-up studies. The mothers and their infants in the routine care group may later have compensated for the time they earlier did not get. This means that now the routine care mother and infants have had time to catch up with the advantage of the extra contact mothers and infants.

8. Tendencies of sex-related differences were found in that the influence of extra contact care seemed more pronounced in mother-son pairs than in mother-daughter pairs (study II).

Conclusion: There were differences in the process of attachment and in the process of separation-individuation according the gender of the infant. Mother-daughter pairs attach more easily to each other than mother-son pairs. Mother-son pairs have more difficulties in the attachment process, and it seemed as if the extra contact care made it easier for them. Mother-daughter pairs have difficulties with regard to stubbornness, conflicts, and solving conflicts in the separation-individuation process, while mother-son pairs go more easily through the separation-individuation process.

At the Department of Child and Youth Psychiatry, where I have been working as a child psychologist, we often treat children whose problems began in infancy and could sometimes be traced to difficulties in the first days of life. Among children with early emotional disturbances there is an over-representation of boys.

9. During observation of a physical examination of the infant at the one-year follow-up study, extra contact mothers held and touched their infants more frequently and more often talked positively to their infants than did mothers given routine care (study II).
Conclusion: One year after delivery, different type of postnatal care does influence the maternal behaviour in relation to their infants. To be supporting and encouraging and talking positively may mirror the relationship. Emotions are reciprocal and the atmosphere between the mother-infant pair, says something about their relationship. I would claim that if "good circles" starts in the early mother-infant interaction; they will get a possibility to develop a good relationship.

10. Two separate analyses of videotapes of free play at the three-year follow-up study showed that mothers and children in the extra contact group were smiling/laughing more than routine care mothers and children. The P+ mothers were more encouraging and instructing towards their children than the P mothers. Articulated conflicts were more common in the extra contact group, and regardless of the type of conflict, more conflicts in the P+ group were solved (study II).

Conclusion: At the three-year follow-up study most children are considered to be in the separation-individuation process, according to Mahler. During the rapprochement crisis the children usually have articulated conflicts, rapprochement crisis. More P+ children are here supposed to be in that phase, and they also proved that they could handle the situation in the way they solved their conflicts.

11. Asked in retrospect a greater proportion of mothers in the routine care group described that the time they had had together with their infants immediately after delivery had been insufficient, while the mothers in the extra contact group shared this opinion to a significant lesser extent. More mothers in the routine care group than in the extra contact group also wished to have more time together with their three-year old children (study II).

Conclusion: The extra contact mothers stated that their time together with their babies after delivery had been sufficient. In remembrance of their child's birth, the quality of the time in addition to delivery was gratifying, and a good mother-child relationship was begun. This is in contrast to the routine care mothers who wished to have more contact with their three year olds. The time wanted may be considered as an opportunity to compensate for lack of earlier contact. Unconsciously, they perhaps wished to make up for the loss of extra contact, which they had not received during their infant's first hour of life.

DISCUSSION

There are several studies which emphasize the great importance of the first contact between mother and infant. They point out the importance of the first few hours immediately after delivery – an especially sensitive period for the mothers which is of optimal importance in establishing a maternal-infant bonding (Klaus et al, 1970). From the results of the descriptive study, it is important to note that the
newborn infant has an active part in this co-operation and is alert and attentive to its surroundings.

All twelve infants in the descriptive study were very active and also remarkably bright and lively immediately after birth. Most of the newborns became relatively calm when they were placed on their mother's chest and abdomen, and it seemed as if they were carefully trying to adapt themselves to their new surroundings. The infants varied as to degree of activity, but all infants followed a strict process of development during their first hour of life, which consisted of the following stages: birth cry, rest/passivity, awakening/eye-to-eye contact, mouth movements, crawling movements, grasping movements, seeking movements and finally sucking its mother's breast. During this process, when the baby began to be more and more active, it looked as if the baby drew its parents into its circle – in Fairbairns (1963) terminology the babies were "fundamentally object-seeking" – and the parents, specifically the mother, were the objects who were sought. Wolff (1959) and Desmond et al (1966), as mentioned earlier, talked about the quiet alert state, when the infants' eyes were wide-open and the newborns responded to their environment. Their observations are confirmed in this study. Robson (1967) suggested that eye-to-eye contact is one of the innate releasers in maternal-infant attachment and Brazelton commented (in Klaus & Kennell, 1976 p. 70) that "eye-to-eye contact serves the purpose of giving a real identity or personification of the baby, as well as getting a rewarding feedback for the mother".

A comparison between the infants who displayed the most and the least intensive seeking movements indicated that the touching by the mother played an important role in the complexity of this behaviour and how advanced the infant was in its seeking movements; if the baby stopped with the hand-mouth activity, or continued to seek with its head for its mother's breast. Other possible reasons for the variation in the infants' recorded seeking movements could be insufficient time, external disturbances; for example sounds, and excessively bright lights in the delivery room, and some of the infants might have been affected by the anaesthetics. These observations confirm Odent's (1979) conclusions that oral seeking behaviour is more than a reflex; it is a complex pattern of behaviour, which expresses a special co-ordination between mother and infant, and which involves all senses.

In all families it was the mother who was responsible for most of the contact with the infant. This was natural since the infant was placed on the mother's chest and abdomen after delivery. The mothers touched/caressed/examined – both in a feeling and a controlling way – their infants much more than the fathers and the way the parents touched their newborns was also determined by the activities of their babies. The mothers also tried to get eye-to-eye contact with their newborns. Eye-to-eye contact is important in the development of attachment between mother and infant (Robson, 1967). Rubin (1963) found that the mothers showed a definite progression of behaviour in relation to their dressed babies after birth; firstly fingertip touching and then palm contact. In a study of mothers with undressed babies by Klaus et al (1970), they reported a similar tactile behaviour but at a
much faster rate. Klaus et al (1975) suggested that human mothers exhibit a characteristic species-specific pattern of contact at first contact with their newborn infants, which begins with fingertip touch of the extremities and progresses to palmar massaging of the trunk of the infant. In the present study, the reported species-characteristic pattern of touching among the mothers was not found. The results found in this study are similar to those of Trevathan (1981) who found no evidence of a pattern of touch progression in her study. The present study concurs with her conclusion: "that tactile contact with the infant, including encompassing and finger exploration of the face, is a typical response of human mothers to their newborn infants but that the tactile contact does not follow a strict, species-specific pattern" (Ibid, p. 558).

The fathers' body-contact with their newborns were very careful compared to the mothers. In addition the fathers had to take the initiative themselves in approaching and touching their infants. The fathers touched or caressed the infants carefully, usually with the dorsal side of their fingers. This father-child contact occurred only occasionally during their infants' first hour of life. An increase in the activity of the fathers was observed once the staff had left the delivery room and the infants were still lying on its mothers' chest. Then, the father approached his wife and baby in a more direct manner, later to withdraw when the staff returned. Both McDonald (1978) and Rödholm & Larsson (1979) reported that the fathers exhibit a similar behaviour as the mothers in the study by Klaus et al (1970). In the present study the suggested progression of species-specific behaviour not found. On the contrary, the fathers in this study were more careful, and they waited to see how the mother brought the baby closer to her and the fathers often let their wives help them to touch the baby. In most of the studied families, the father was "in the background" or "to one side". The father usually took on a passive and a structuring role, and was the one who supported, caressed and talked to the mother, discussed and talked to the staff, and to relatives via the telephone and took photographs. He was in many ways a reference point for both the mother and infant in the triad – the oral triangle. In some families the mother helped the father to make contact with their baby by taking the father's hand for instance and putting it on the baby or verbally telling the baby where the father was: "It is your father sitting there!"

The delivery may be seen as the culmination of the pregnancy or a life-changing crisis. The parents, especially the mother, are during this transition phase extremely psychologically open and emotionally regressed. This means that the mother speaks more and it is as if she has had now boundary-line between her inner world and the outer reality, she has, so to say, "no vestibule". As one mother put it when she saw herself afterwards on the film: "How tiny I look. I don't recognize myself, I look drunk and under the influence of something".

The parents' topics of conversation concerning "the loss of the belly and gaining of the infant". It is quite obvious that the first hour of the infant's life constitute an initial processing of the experiences around delivery, and a processing of the adaptation, or possible crisis, that the role of being a parent signifies. Despite post-
delivery labour, the mother's attention was still most concentrated on the baby. The best example of this was a mother who went through very difficult post-delivery labour with great pains, but in spite of this she talked to the infant in a soft and tender voice. She told the infant of her pains. The contact with the baby was more important than her own pain.

Having a baby is one of the greatest experiences in one's life. Even if a woman has prepared herself for nine months for something that is growing within her, it is still a surprise, something incredible, that it actually becomes an infant, one's own baby. As one mother said after eagerly waiting to have the baby with her: "Oh, it is the most beautiful baby I have ever seen". As soon as the first breathtaking moment was over each mother started to examine her infant, gropingly at first. As another mother expressed it: "You have numb hands in the beginning, haven't you?", then with more confidence and certainty the various parts of the infant's body, and finally the whole body was examined. All fingers and toes were checked and the mother was astonished that everything was so little, yet so alive. In the descriptive study the parents often talked about the gender of the infant, both in relation to the expected sex of the infant and while trying to find a name for the infant. In this study there was also some talk about the infant's resemblance to the mother, the father and relatives. Much of the time the parents spent in talking about the pregnancy, the delivery, the infant's ability and the future. Trevathan (1988) found in her study that comments about the infant's gender were far more frequent than expected and that comments about the infant's resemblance to family members were rare.

The ability of the infants to experience and feel is a much debated subject. The behaviour of the newborn infant gives rise to a number of interesting questions about the infant's consciousness and ability to feel and experience. What does the newborn infant feel and experience? Are the movements of the infant complicated reflex behaviour, or a sequence of reflexes, which are triggered off by temporarily suitable stimuli? Or are they conscious movements, expressions of a purposeful, partially internally governed, behaviour? It is probably not possible to obtain a complete understanding of this complex process. Perhaps the truth lies somewhere in between, or in a combination of both. One can only make conjectures about what the newborns really experience on the basis of observations. However, even if infants cannot tell us about their experiences, we can observe their reactions. Furthermore, infants are less complicated and without conflicts which makes them easier to observe than adults.

One aim of the descriptive study was to test a thesis about the normal autism of the newborn infant which Mahler et al (1975) have presented. Freud (1911) compared the situation of the infant during its early days of life with that of the young bird in the egg. It has everything within its shell and is dependent only on the outside for warmth and protection. In a similar way Mahler et al (1975) spoke about the newborn infant as being enclosed in a stimulus barrier – an autistic shell – which keeps it relatively protected from body sensations (Spitz, 1965) and from the outer world. It is mainly hunger and other internal discomforts which upset the
equilibrium (Mahler, 1968). The first period in the infant's life is mainly devoted to maintaining physiological equilibrium. The infant's experiences thus consist chiefly of experiences of states of tension and freedom from tension. Psychoanalytical development psychology appears to be a simple object relation theory in its stress on the dyad relation, in the sense that it describes the newborn as highly dependent on its surroundings. Mahler and her colleagues (1975) carried Hartmann's (1958) thesis further with their observations that the majority of the adaptation is carried out by the infant, which has an innate apparatus for just this purpose. This changes the simple picture of the object relations as totally dependent on the contribution of the mother in the dyad. Mahler even came to the conclusion that weakness in the ability to absorb from the surroundings could prevent the infant from engaging in interplay within the dyad.

It is apparent from the present descriptive study that no autistic phase can be found during the first post partum hour under the delivery conditions used. The processes of the newborn and their parents were mutual and parallel. This early non-verbal interaction between the newborn infant and its parents could in psychological terms be named an early "coining" or mutual imprinting, where both the infant and the parents confirm each other. The newborns' own capacity of intentionality and early interaction through movements and sounds disproves the occurrence of a normal autistic phase in Mahler's full sense of the word during the infants' first hour of life. Stern (1985) noted that Mahler, in a personal communication, revised her theory about the normal autistic face and she considered that it could be named: "awakening".

It is possible that the special delivery routines with a more pleasurable course of events for the infant, with a higher degree of body contact, more time and other general steps to alleviate the transition from the protection of the womb to the clinical reality of the outer world, may mean that the newborn infant does not have to be autistic. The symbiotic desires of the infant may continue as far as possible and the stimulation is not so great as to necessitate the creation of a protective shell to alleviate the frustration. Here it should be mentioned, that the videotape recording of the one mother–infant pair with routine care, in which the baby, by mistake, was dressed; did not express the same intensity in their interaction as did the mother–infant dyads who received the extra contact and in addition, time for each other.

In the introduction, both psychoanalytic theories of the capacity of the newborn infant to interact with its parents and studies of the capacities of the newborn infant – the competent infant – are given. With help of developmental psychoanalytic theory about the clinical infant, it is possible to infuse fresh life into the observed infants' abilities. Infant researchers have been concerned about these abilities, but have been lacking a theory of the internal workings of the living or real child. Perhaps the truth lies somewhere in between these two directions of infant development, or in a combination of both.
From the present descriptive study it seems obvious that there is some form of intentionality in the directed activities and signals of the infant. Here the main reference is to the oral seeking process, the so-called rooting-reflex. All infants displayed some form of seeking movements, which seem well-adapted. But it may also been seen in the infants' responses to external events, for example changes in the position of the body, comforting talk, caressing, cradling, mothers' pain, photo flashes, etc. If this line of reasoning is taken further, we may assume that right from birth an infant is capable of differentiating between pleasure and displeasure. In that case the newborn infant – at least during the first hour of life – is at a level that psychologists concerned with the ego (like Mahler) claim that it does not reach until much later when it begins to be aware of another person (object). Therefore, it is even more important that the infant is allowed to obtain optimal closeness to its mother and as high a level of pleasure as possible at the time of birth. Stern (1985) has formulated a theory about self-psychology both from the view of psychoanalysis and development psychology. He describes how the self develops in circular, firstly as an emergent self, then a sense of a core self, an experience of a subjective self and finally an experience of a verbal self. He postulates that new dimensions add to the earlier ones and that all aspects of the self exist at the same moment. The first emergent self means that the infant starts to be someone who has the capacity to experience, organize impressions and to transform these impressions into different reactions, or behavioural responses. From this vantage, the activities of the newborns in the descriptive study may be seen as a sign of organizing processes.

With the delivery, the physiological pregnancy and the biological symbiosis is broken and mother and infant enter a state of psychological pregnancy. Duve (1974) writes about this psychological pregnancy, that the contact between mother and infant is established via the breast functions which act as a new umbilical cord. The connection which has just been broken when the infant left the womb and the umbilical cord was cut, is reformed during the first breast-feeding. According to Duve (1974), a new placenta and a new umbilical cord are formed at the mother's breast. Even if this first attempt at breast-feeding fails, or never takes place, it may be of great importance that the infant has been able to express its need during the open and active period (Wolff, 1959; Desmond et al, 1966) that occurs immediately after delivery. During this time the mother is drawn to her infant through eye-to-eye contact, body contact, and suckling contact.

During the pregnancy the mother has already felt the movements of the foetus and felt it growing. To her it is much more of a concrete being than to the father. Therefore it is partially a question of two different events in the parents' first contact with their infant. Initially, the importance of continuity in the mother's experience of the infant in and out of the womb was discussed. For the mother, the first contact with her newborn should then signify some sort of reunion, while for the father it really is a question of an absolute first contact, and that he has to start getting to know his child.
Regarding the sex role, the father is a relatively new phenomenon in the delivery ward. Contact with infants presupposes a closeness and tenderness that does not fit in with the traditional male role. It is also a question of recognizing one's own emotions and being able to express them. The first meeting with one's newly born infant is a very emotional event, which can prove to be too much for someone who has difficulties in expressing emotions. In the case of one of the recorded fathers it was very obvious that on several occasions he had to withdraw as he did not know how to control his facial expression.

Our experiences tell us that one human being must be closer to the infant than anybody else, and that during the infant's first year of life the development passes through a stable "one-to-one" contact. As a species we belong to the mammals. All mammals have to go through the first phase of development through the mother object. The woman's basic biological function is to suckle her offspring and to be its first object of attachment. There is a lot to be said for the idea that the one who feeds the infant should be the most important object of attachment. The woman, therefore, plays a unique role for the infant after birth. Duve (1974) speaks about the woman as the first organizer of the human mind.

The father plays a part too, of course. He has also a sex role in relation to the offspring. It is a different function from that of the mother, but just as important. His main function is to be the person, who is turned to by both the mother and the infant, and the person who attracts them both; some sort of reference point outside the symbiotic sfär. From a traditional viewpoint, the role of the father starts at a later stage. There is some theoretical foundation for the idea that the mother alone is the most important object for the infant during the first few months of life, and even for the first year (Mahler et al, 1975; Duve, 1974). This does not prevent the father from having an important role right from the very beginning in supporting his wife – the mother of his child – and also important for he himself and for his future relationship to his child (Klaus & Kennell, 1976). One must bear in mind that mothers and fathers right from the beginning have different functions in relation to their children.

The question about the possible long-term effects of early postnatal mother–infant interaction has been a controversial one during the last two decades. Several studies of postnatal care–giving procedures have indicated the period around birth to be of special importance for the development of the parent–child relationship. Some studies have shown correlations between early extra or extended contact and later measurements of different aspects of maternal behaviour and infant development (Klaus et al, 1972; Kennell et al, 1974; Hales et al, 1976; 1977; Lozoff et al, 1977; Ringler et al, 1975; 1976; 1978; O'Connor et al, 1980). Other studies have failed to find such a connection (Carlsson et al, 1978; 1979 and Svedja et al, 1980).

In the present longitudinal study, a comparison was made between two groups of mother–infant pairs; one with early extra skin-to-skin and suckling contact and the other one with routine care. The findings of this study in the extra contact and
routine care groups are similar to those reported by Klaus et al (1972) in a study of fourteen mother–infant pairs with and fourteen mother–infant pairs without "extended contact". The main difference between the two studies is that Klaus and his colleagues gave their babies one hour of naked contact following birth and an additional five extra hours with their mothers each afternoon of the three days following delivery, while in the present study only 15–20 minutes of nude extra contact separated the two observation groups (P and P+). The fact that this brought about the same tendencies emphasizes the opinion that the very first hours after delivery may be of great importance. The group of mothers and infants, who received early extra contact (P+), however, had an opportunity to exchange signals, which may be of importance for the establishment of mother–infant synchrony later on. Consequently the early development of the mother–infant relationship may proceed more smoothly in the extra contact (experiment) group in contrast to the routine care (control) group of mothers and infants with routine care (P). If this is true, human beings will fit into a pattern similar to that of all other mammals studied (Klopfler, 1971). Mahler et al (1975) speaks in terms of an early attachment process (Bowlby, 1969) and Spitz (1965) called the reciprocity in the interaction between the mother and her infant "the moulding process" during early childhood experiences.

When looking at the results of the longitudinal study at each follow–up occasion, it is obvious that only few of the many observed behavioural items indicate that different kinds of postnatal care immediately after delivery do influence both maternal and infant behaviour. The differences between the extra contact group and routine care group were most pronounced at the earlier follow–up studies at 36 hours (de Château & Wiberg, 1977a) and 3 months (de Château & Wiberg, 1977b). During the present follow–up studies at 1 year and 3 years the differences were reduced. Many of these differences in behaviour observed have an emotional background and a value in the relationship between the mothers and their children. In the separate follow–up studies many t-tests have been used in the statistical analysis of the data. In the analysis of the different variables used both in the one–year and three–year follow–up studies, the 5% level of significance has been used. But as a consequence of the statistical method chosen, two–tailed t–test, also tendencies near this level of significance have been commented on and also in some extent interpreted in relation to Mahler's theory of the separation–individuation process.

The results of the one–year follow–up study indicated that different types of postnatal care do influence maternal and infant behaviour. The differences in maternal and infant behaviour were more pronounced than could be expected by chance alone. During the first part of the observation period, mothers in the extra contact group more often held their infants with positive empathy, and they also exhibited more affectionate touching than did mothers in the routine care group. During the second part of the observation period, mothers with extra contact more often talked positively to their infants than did mothers with routine care. In both parts of the observation period, routine care mothers more often held their infants with negative empathy, as expressed by body posture, than did mothers with extra
The differences observed were both on a non-verbal and a verbal communication level.

The answers to the eight questions in the interview one year after birth revealed no statistically significant differences between P mothers and P+ mothers. However, the following tendencies can be noticed: mothers with routine postnatal care had returned to their gainful employment outside the home to a greater extent than had mothers with extra contact immediately post partum. There were no actual differences between the two groups on any social parameters and an equal proportion of mothers in both groups were in a position to resume work if they wished. This illustrates that mothers in the extra contact group to a higher degree preferred and consciously chose to stay at home with their infants for a longer time than did mothers in the routine care group. This could also be seen as a sign of maternal over-involvement. Yet the fact the mothers in the routine care group reported that their infants more frequently slept in the parents' bedroom would weigh against this interpretation. Around the age of one year the normal process of separation and individuation (Mahler, 1972; Mahler et al, 1975) has started for most infants. The physical presence or absence of the parents during the night and the going-to-sleep pattern which infants gradually develop with their parents play an important role in the development of this process (Gaddini, 1971). The infants in the extra contact group frequently slept in rooms of their own, which might illustrate a further advancement in this respect than in infants in the routine care group. In the light of these results it seems that the development of separation-individuation was further advanced among mothers and infants with extra contact. A relatively large number of mothers had started bladder-training of their infants before the age of one year, twice as many in the routine care group as in the extra contact group. This might possibly indicate greater need for firm rules and training in the routine care mothers.

At the one-year follow-up study mothers with early skin-to-skin and suckling contact breast-fed their infants for an average of 2 1/2 months longer than did routine care mothers. This difference did not reach a statistically significant level. Three out of 21 mothers with extra contact were still partly breast-feeding their infants at one year, as opposed to none of the 19 routine care mothers. At the three-month follow-up study (de Château & Wiberg, 1977b) the extra contact mothers also gave night-feeds for a considerably longer time and experienced less problems with night-feeds than did routine care mothers. This might indicate that the early extra contact had influenced mother-infant co-operation in feeding. Breast-feeding is an act of co-operation between mother and infant and if extra skin-to-skin contact and suckling contact during the early postnatal period does promote mother-infant relations, it should also be associated with more successful breast-feeding.

In four of the five parts of the Gesell Developmental Schedules at the one-year follow-up study, infants with extra contact immediately after birth were ahead of their counterparts in the routine care group, but no significant differences in any parts of the test were found. One may speculate that if the interaction between the
extra contact parents and infants is more synchronous, as suggested by the data from the observational studies, the infants are more likely to develop satisfactorily, i.e. the very early experiences may have been influential. The results reported by Ringler et al (1975; 1976; 1978) are consistent with these findings.

Differences in psychomotor development within observation groups with the same type of postnatal care, depending on the infant's sex, were also found. These differences may be acquired, caused by varied expectations and demands in relation to boys and girls from their mothers, due to deeper lying identification with one's own sex. Every mother in both groups rated her infant's social maturity somewhat higher than was to be expected from its actual biological age. The mean frequency of the social quotient was somewhat higher in the extra contact group than in the routine care group. Tendencies to sex-linked differences were found in both groups. Most mothers rated their girls' social maturity higher than that of their boys. It is possible that the identification with an infant of one's own sex is easier and, moreover, expectations put upon infants differ according to their sex.

In questionnaires addressed to the parents at the three-year follow-up study, extra contact mothers stated that their time together with the infant after delivery had been satisfactory. These opinions were not shared by the routine care mothers. This difference was statistically significant. Mothers in the extra contact group reported tendencies in faster language development and also in earlier bladder control, and statistically significant differences in the occurrence of stubbornness among their children than did routine care mothers. These results are in concordance with Mahler's theory of the separation-individuation process. When the child is ready to speak and uses the terms "I" and "You" it will begin to demonstrate the rapprochement crisis. The results from this study confirms that the children in the extra contact group have a faster development in these aspects. According to parental judgement, the children's language development in the extra contact group should have been faster, which is in concordance with other studies (Ringler et al, 1976; 1978). Söderbergh (1982), using ten of the videotapes of the present study, reported on the possible connection between early extra contact during the first hour post partum and linguistic development three years later.

The results of the present longitudinal study confirm previous findings, showing that adrenaline and noradrenaline excretion are sensitive measures of psychological arousal in children as well as in adults (Lundberg et al, 1981). The only consistent pattern seems to be a somewhat higher catecholamine level in the extra contact mothers as compared with the routine care mothers. A similar but weaker relation was found for boys. The difference in catecholamine excretion between the two groups increased during the day. This co-variated with an increasing stress and was most obvious after the videotape recording of mother and child play.

The stress expressed by the increase in the excretion of catecholamines is obviously correlated with the nature of the conflicts that are observed during the free-play session. In the extra contact group more articulated verbal and therefore
obvious conflicts arose than in the routine care group. The extra contact mothers excreted more catecholamines and at the same time were more instructing and encouraging, thus creating an atmosphere in which their children, especially boys, would perform better. These sex–related differences observed in the children are consistent with other studies of both adults and children (Cederblad & Höök, 1984; Lundberg et al, 1981).

In follow–up studies one month (Klaus et al, 1972), one year (Kennell et al, 1974), two years (Ringler et al, 1975), and five years (Ringler et al, 1976; 1978) after birth differences were found in maternal attachment behaviour and linguistic behaviour between the extended contact group and the control group. Klaus and his colleagues found differences between the treatment groups only when they lumped together several behavioural items into groups (e.g. as they called "maternal attachment behaviour") and could then obtain significant differences between care groups. The present study extended these findings demonstrating significant differences even for separate behavioural items for mothers. In the present longitudinal study, differences in maternal attachment behaviour were also found, which have not been studied by Klaus and his colleagues (Klaus & Kennell, 1970; Kennell et al, 1974; Ringler et al, 1975).

The tendencies to sex–related differences observed in the present longitudinal study show that early contact had more profound effects on boy–mother than on girl–mother pairs. Thus, pre-existing sex–related differences seem to be reinforced by changes in early post partum care. A most interesting and unexpected finding was that a change in care routine influenced boys and their mothers more than girls and their mothers. For example, at the three–month follow–up (de Château & Wiberg, 1977b), infant smiling was seen more frequently in the P+ group for both girls and boys, the influence; however, being greatest on the boys. Smiling is an important mechanism in the development of mother–child relationship and it develops gradually. Not only did the infants behave differently in relation to sex but so also did the mothers, i.e. in kissing, which was seen more frequently in the P+ group for both girls and boys, the influence; however, being greatest on the boys. Whether this was due to acquired difference in attitude, to maternal responsivity (Lewis, 1972) or to a biological mechanism, for example differences in signals given by boys and girls, is not clear. Moss (1967) found differences in behaviour of mothers with boys and girls reared under similar circumstances. The change in post partum care seems to reinforce this already pre–existing difference between the two sexes.

Mothers with boys behave differently from mothers with girls although there has been the same type of immediate postnatal care and the influence of post partum care seemed to be greater on the behaviour of boys and their mothers than on girls and their mothers, for example mothers with boys seem to be particularly sensitive to changes in the early postnatal environment. Such sex–related differences might be acquired, caused by difference in maternal attitudes associated with differences in the mothers' attachment and expectations of boys and girls. The fact that these sex–related differences were already present at the follow–up study 36 hours after
birth (de Château & Wiberg, 1977a) might speak in favour of a biological background or an early moulding process and also a process of identification. In other studies (Carlsson et al, 1979; Kennell et al, 1974; Svedja et al, 1980) the infant's sex has not been taken into account, or at least has not been reported in detail. These results are confirmed by Taylor et al (1985). Differences in behaviour of mothers with boys and girls reared under similar circumstances have been reported in several studies (Lewis, 1972; Moss, 1967; Thoman et al, 1972).

In a review article, Rutter (1980) discussed the theoretical and empirical aspects of long-term effects of early postnatal experience. He concluded that in some circumstances these early experiences can and do have important effects on intellectual and psycho-social development. However, permanent damage after severe maternal deprivation during the first years of life is not inevitably present. These conclusions are in full accordance with the results of this study and one has therefore to bear in mind that a great number of other factors; prenatally, postnatally, and during childhood, adolescence, and adult life may affect and change later psychological functioning. These factors as well as individual differences in adaptation, and capacities to compensate earlier privations play important and varying roles and will also influence the development of family relations.

"The interpretation of studies of early stimulation is still difficult and should be approached with great caution (de Château, 1979). For example, because some mothers and infants may have special needs, they may not benefit from an early intensive interaction. Thus the attitude that hospital staff should apply firm rules and routines may in fact limit adaptability. For this reason we should offer early interaction to parents with an open mind and be sensitive to their individual needs and capacities. Thus parents should be permitted to make their own decision about postnatal extra contact and be prepared for it during pregnancy. This would allow a flexible approach and optimal use of our knowledge. Together with the parents, we would then be able to create the best possible atmosphere for acceptance of the newborn" (de Château & Wiberg, 1984, p. 321).

In order to make the transition from one life to another, from inside the mother's body to outside, as gentle as possible, the infant needs naked body contact with its mother in the form of various kinds of touching – stroking, caressing, cuddling, rocking and so on. It is through this body contact that the infant makes its first acquaintance with the world outside and learns about this new dimension of experience. The infant needs this experience of closeness on which to base its subsequent learning about closeness, openness and varying degrees of distance. At birth, mother and infant also need to assure themselves of each other's presence – the mother by seeing the infant, hearing its first cry and feeling the nearness of its body, the infant through the warmth of the mother's body, the security of being held, rocked and caressed in her arms and, perhaps above all, through being able to suckle at her breast (Montagu, 1978).
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Appendix I

Definitions of behaviour and observation sheets used during the one-year follow-up study

I. During physical examination of the infant sitting in mother's lap

Maternal behaviour

1. **Holds infant positively**: Mother holds infant with positive empathy

2. **Holds infant negatively**: Mother holds infant, no positive empathy expressed by body-posture

3. **Close contact**: At least half of the infant's body touching mother's trunk

4. **No body contact**: Less than half of the infant's body in direct contact with mother's body

5. **Face towards infant**: Mother's face directed towards infant

6. **Face away**: Mother's face away from infant

7. **Holds right**: Mother holds infant in her lap, infant's body at a point to the right side of the mother's body

8. **Holds left**: Mother holds infant in her lap, infant's body at a point to the left side of the mother's body

9. **Holds infant in front**: Mother holds infant in her lap, no clear decision can be made whether the infant is held to the left or the right

10. **Looks at infant**: Mother's open eyes on infant, for a short glance or longer period

11. **Looks at doctor**: Mother's open eyes on doctor, for a short glance or longer period

12. **Looks around**: Mother does not look at infant or doctor

13. **Plays with infant**: Mother plays actively with infant, with or without toy

14. **A.T.L. = Affectionate Touch Love**: Any extra touching of infant or infant's clothes by mother's fingers
Appendix I

15. **Kisses:** Mother kisses infant. Mother's lips touching infant's body

16. **Smiles:** Mother smiles at infant or in response to infant. Definite widening of mouth and heightening of eyebrows by mother directed towards infant. Positive affect shown on mother's face

17. **Talks positively:** Talks directly to infant, giving support, encouragement and comfort with her language

18. **Talks negatively:** Talks directly to infant, giving orders, urgings and prohibitions

19. **Talks to doctor:** Mother talks to doctor during the physical examination of the infant

**Infant behaviour**

20. **Plays:** Infant plays with toys or own body actively

21. **Moves:** Infant moves with any part of body. Any active movements of the infant's arms, legs, trunk and head

22. **Sitting:** Infant sitting in mother's lap without major body movements

23. **Crying:** Infant active bawling, crying hard or fussing continuously, single bouts not included

24. **Smiles/laughs:** Definite smiling or laughing at mother with positive affect shown on infant's face. Definite widening of mouth and heightening of eyebrows by infant directed towards mother

25. **Vocalizes:** Infant makes sounds, mouthing movements, not including crying or laughing

26. **Quiet:** Infant making no sounds, no major movements of arms, legs, trunk or head, eyes usually closed, infant may be suckling
List of variables: Mother and infant behaviour during physical examination of the infant at one-year follow-up study

I. Infant sitting in mother's lap

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Appendix I

Definitions of behaviour and observation sheets used during the one-year follow-up study

II. During physical examination of the infant lying on examination table

Maternal behaviour

1. **Sitting near infant**: Mother is sitting within arm's length of infant during physical examination of infant on examination table

2. **Sitting far from infant**: Infant is on examination table and mother is located farther than arm's length from infant

3. **Standing near infant**: Mother is standing within arm's length of infant during physical examination of infant on examination table

4. **Standing far from infant**: Infant is on examination table and mother is standing farther than arm's length from infant

5. **Walking around**: Mother is not sitting or standing, she walks around in the examination room

6. **Sitting in chair**: Mother is sitting in chair. Self explanatory!

7. **Looks at infant**: Mother's open eyes on infant, for a short glance or longer period

8. **Looks at doctor**: Mother's open eyes on doctor, for a short glance or longer period

9. **Looks around**: Mother does not look at infant or doctor

10. **Holds infant positively**: Mother holds infant with positive empathy

11. **Holds infant negatively**: Mother holds infant, no positive empathy expressed by body—posture

12. **Plays with infant**: Mother plays actively with infant, with or without toy

13. **A.T.L. = Affectionate Touch Love**: Any extra touching of infant or infant's clothes by mother's fingers

14. **Kisses**: Mother kisses infant. Mother's lips touching infant's body
15. **Smiles:** Mother smiles at infant or in response to infant. Definite widening of mouth and heightening of eyebrows by mother directed towards infant. Positive affect shown on mother's face.

16. **Talks positively:** Talks directly to infant, giving support, encouragement and comfort with her language.

17. **Talks negatively:** Talks directly to infant, giving orders, urgings and prohibitions.

18. **Talks to doctor:** Mother talks to doctor during the physical examination of the infant.

**Infant behaviour**

19. **Plays:** Infant plays with toys or own body actively.

20. **Moves:** Infant moves with any part of body. Any active movements of the infant's arms, legs, trunk and head.

21. **Lying:** Infant is lying down on the examination table without gross body movements.

22. **Crying:** Infant active bawling, crying hard or fussing continuously, single bouts not included.

23. **Smiles/laughs:** Definite smiling or laughing at mother with positive affect shown on infant's face. Definite widening of mouth and heightening of eyebrows by infant directed towards mother.

24. **Vocalizes:** Infant makes sounds, mouthing movements, not including crying or laughing.

25. **Quiet:** Infant making no sounds, no major movements of arms, legs, trunk or head, eyes usually closed, infant may be suckling.
List of variables: Mother and infant behaviour during physical examination of the infant at one-year follow-up study

II. Infant lying on examination table

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Appendix II

Personal interview with the mothers at one-year follow-up study

Name: ........................................ Date of birth: ...........................................

Social:
Married – Cohabiting with father of child – Cohabiting with other man – Alone
Mother at home? ..................... Happy/not happy to be at home: ....................
Mother goes out to work? ............. Since............. Full-time/part-time .......... hours
Childminding arrangements ........... Satisfied/uneasy/dissatisfied ..................
Mother's job ................................ Father's job ...........................................
Home – flat/house........................ Number of rooms ..............................

Previous ill-health:
Contacted clinic? ...................... When? ..................... Reason ........................
Admitted? ......................... When? ..................... Reason ........................

Present child:
Feeding:
Breast (how long) ..................... Breast and bottle (how long) ................
Feeding problems .................... When? ........................................
Nature of problem? ...................

Sleep:
Where does the child sleep: Own room .......... With parents ......................
How many hours? ....................
Times of the day ....................
Regular? ......................... How do you get the child to sleep? ..............

Crying: ............................ When? ........................ How long? ............

Father attends to/helps attend to child: often/sometimes/seldom
Do you get any time together? .......... Sufficient/not enough ....................

Development:
Grip ............... Sat ............... Sat down ............... Crawled ............ Pot trained ..............

STATE OF HEALTH:
General ........................................................
Mouth and throat ............................................
Lymph ..........................................................
Pulm ...........................................................
Heart ..........................................................
Abdomen ....................................................
Neurological: Tonus .................................
  Pupillary reflex ......................... Eye movements .........................
  Patellar reflex ..............................
  Pulls self to feet/stands with support ................................
  Walks with support ................................
  Walks ........................................
  Grips with finger and thumb ............... Single words .......................
Appendix III

Cesarec Marke Personality Scale of the mothers at one-year follow-up study

To study psychogenic needs the CMPS (Cesarec and Marke, 1968) has been used. This personality inventory is intended to measure 11 of the psychogenic needs suggested by Murray (1959). This scale is based upon 165 questions to be answered "yes" or "no". For further details about the CMPS, see Cesarec and Marke, 1968. The measured factors of psychogenic needs are:

1. **Achievement**: Need to accomplish something difficult and to rival and surpass others
2. **Affiliation**: Need to please and win affection of cathected objects and to adhere and remain loyal to friends
3. **Aggression**: Need to revenge an injury, impulsive aggression and irritability
4. **Defence of status**: Need to maintain self-esteem by support and approval from others
5. **Guilt feelings**: Guilt feelings and superego conflicts
6. **Dominance**: Need to dominate and lead others
7. **Exhibition**: Need to expose oneself, to be in the center, to be noticed
8. **Autonomy**: Need for autonomy and independence
9. **Nurturance**: Need to help, nurse and take care of others
10. **Order**: Need for order, cleanliness and planning
11. **Succourance**: Need to be helped, nursed, supported and consoled

In addition to the need factors there is also an acquiescence scale (12) measuring a tendency to answer "yes", no matter what the question is.

A five factor index based on factor analysis can also be calculated. The factors are:

I. **Neurotic self assertion**: contains the psychogenic needs; acquiescence, achievement, guilt feelings, defence of status, aggression
II. **Dominance**: a non-neurotic need to dominate, contains the psychogenic needs; dominance exhibition, defence of status, guilt feelings, achievement
III. **Aggressive non-conformity**: contains the psychogenic needs; order, autonomy, aggression, nurturance, exhibition
IV. **Passive dependency**: contains the psychogenic needs; succourance, affiliation, defence of status
V. **Sociability**: contains the psychogenic needs; nurturance, affiliation, aggression, guilt feelings