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The Temporal Relation between Regression and Transition Periods in Early Infancy

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According to the literature about developmental changes, periods of instability and disorganization in the social and emotional behavior in both human and non-human primate, infancy precedes major developmental achievements or transitions (Heimann, 2003; Sparrow & Brazelton, 2006). Developmental investigators have observed a more frequent and prolonged crying, clinging and bids for physical contact with mother during these periods of instability and disorganization. Some authors, according to Horwich (1974), called these periods regression periods. Rijt-Plooij and Plooij (1992) claimed that 10 regression periods could be identified during the first 20 months of human life. In an early study, Sadurní and Rostan (2002) confirmed the presence of 8 such regression periods during the first year of life of 18 Catalan babies. Their 8 regression periods were comparable to the first 8 of the 10 regression periods found by Van de Rijt Plooij and Plooij. The aim of the present study is to see whether the regression periods that we found are temporally related to some transition. We define a transition as the occurrence of a new developmental change in a child. In the present study we have used non-analyzed data from the same 18 Catalan babies (10 boys and 8 girls) as mentioned in our earlier published study on regression periods. The age of these babies was between 3 weeks and 14 months. Using a microgenetic methodology we have found 8 transitions periods in the first year of life. We have also observed a temporal relation between the regressions periods found earlier and the transition periods reported here.
Keywords: regression periods, transitions periods, mother-infant interaction, infant development.

La literatura científica acerca de los cambios en el desarrollo, sostiene que existen períodos de desorganización e inestabilidad en el comportamiento emocional y social de las crías de primate tanto humanas como no humanas que preceden a los cambios evolutivos o transiciones (Heimann, 2003; Sparrow & Brazelton, 2006). Las investigaciones revelan un llanto más prolongado y un aumento de la necesidad de aferramiento y contacto físico con la madre durante estos períodos de inestabilidad. Algunos autores, siguiendo a Horwich (1974) han denominado a esos períodos, periodos de regresión. Van de Rijt-Plooij & Plooij (1992) afirman que 10 períodos de regresión pueden ser identificados durante los primeros 20 meses de vida humana. En un estudio anterior, Sadurní and Rostan (2002) confirmaron la presencia de 8 de estos períodos durante el primer año de vida en 18 bebés pertenecientes a la Comunidad Autónoma de Cataluña, que coincidieron con los 8 primeros encontrados por Van de Rijt Plooij and Plooij. El objetivo del presente estudio es comprobar si estos períodos de regresión hallados están temporalmente relacionados con alguna transición. Definimos una transición como la emergencia de un nuevo cambio en el desarrollo de un niño/a. En el presente estudio hemos utilizado datos no analizados de los mismos 18 bebés (10 niños y 8 niñas) que formaron parte del estudio anterior. Los bebés tenían entre 3 semanas y 14 meses. Utilizando un análisis microgenético hemos hallado 8 períodos de transición en el primer año de vida. Asimismo hemos observado una relación temporal entre los períodos de regresión hallados previamente y los períodos de transición presentados en este estudio.
Palabras clave: períodos de regresión, períodos de transición, interacción madre-niño, desarrollo infantil.

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Levels and transitions

During the last few decades, the process of child development has been seen as an alternation between periods of gradual, continuous, quantitative change that sustains a determined form of organization in the child's system, and a series of sudden, abrupt, qualitative changes or "leaps" resulting from a deep, discontinuous modification in the structure and function of the components of the child's system. It is assumed that, as a result of these underlying changes, a new pattern of child behavior emerges. These discontinuous, qualitative leaps in the organization and manifestation of a child's abilities and competencies have been conceptualized in different ways. Traditionally, according to Piaget (1950), psychological development has been divided in a series of stages. However, some aspects of the concept of stage have been proven to be problematic. One of them has been the hypothesis that when children enter a new stage, most or all of their behaviors are supposed to shift to that stage within a short time. This aspect of the concept of stage is known as 'developmental synchrony'. Fisher (Fischer, 1983; Fischer & Pipp, 1984) has argued that empirical research has failed to support this aspect of the concept of stage. For this reason a number of investigators have been looking for alternative descriptions of developmental discontinuities. The most commonly accepted substitute for stage has been the term level[1] in combination with the term *transition.* The term 'developmental level' uses a simpler, empirical criterion than the term stage, and assumes a general reorganization or sudden change underlying behavior. The term 'transition' is used, generally, to indicate when a child moves from one level of organization to another (Fischer, 1983). According to Werner (1948) the concept of transition period has to incorporate the notion of 'developmental leap' in the sense that it may show a lack of intermediary points of developmental change during a leap. In the present study we adopted this concept of transition period. Nevertheless, it is necessary to say that after Fischer (1983) had formulated his criticism on the concept of 'stage', 'developmental synchrony' in task acquisitions has been reported by several authors for some discontinuous or spurt-like changes in development (Lewis & Ash, 1992).

Many researchers have focused on the study of the developmental reorganizations and have been looking for age-linked 'quantum leaps'. Piaget's traditional cognitive stage theory is well know, as well as the pioneering work of Spitz (1958), that makes reference to three transition periods during the first year and a half of life. Later, McCall, Eichorn, and Hogarty (1977) proposed the existence of four transition periods which they specified as emerging at 2, 7, 13 and 14 months. A more specific example is offered by Kagan (1984) who proposes the emergence of self-awareness at around 18 months as a qualitative change. This has profound consequences for the child's understanding of social customs and the awareness of the child's own emotions, intentions and competencies. The age of one and a half years of life is also seen by developmental psycholinguists as a transition in language acquisition after which children show an explosive increase in their vocabulary and start using sentences of two or more words. The period between 18 and 24 months is likewise seen as a period of profound changes in abilities and attention control (Ruff & Rothbart, 1996), and in the ability to remember past experiences and to predict future events (Meltzoff & Gopnik, 1989). Colwyn Trevarthen (1982) has proposed two important transitions in the development of human intersubjectivity: the emergence of primary intersubjectivity around 2 months of life, and a new reorganization between 9 and 12 months giving rise to secondary intersubjectivity. Fisher is another author that proposes major reorganizations during infant development and defends eight developmental levels supported by evidence of discontinuities (Fischer, 1983). Pretend play or theory of mind studies (Perner, Leekam, & Wimmer, 1987; Perinat & Sadurní, 1999; Camioni, Aureli, Bellagamba, & Fogel, 2003) also describe discontinuities or sharp alterations in the form of the curve portraying developmental change.

Without trying to be exhaustive, it is fair to conclude that there is considerable agreement in the scientific community to accept that the duration of these transitions is short. This issue is not new. Since Vygotsky (Veer, 1986) and Werner (1948) many other developmental theorists have assumed that the transition to a new level produces a relatively sudden transformation in a child's behavior. Recently, Trevarthen and Aitken (2003) have proposed to name these transitions *Periods of Rapid Change (PRCs)*

Regressions

Transitions have been linked in some studies to the loss of competencies or abilities that are shown by a child on the threshold of a developmental change. This phenomenon is known as a "regression". For example, Maratos (1982) observed that the capacity of a one month old baby to imitate the movements of the tongue and the mouth seems to disappear after the age of two months only to return at around nine months in a more frequent and elaborate way. Karmiloff-Smith's (1994) representational re-description model shows how children go through different cyclical phases in the developmental process, which imply temporary losses or retraction of acquired behavioral mastery. Other cognitive psychologists have also observed patterns of "U-shaped development" (Strauss & Stavey, 1982; Strauss, 1982). Brazelton and Sparrow (2006) notes that a burst in one development thread often is linked with a backslide, or "regression" in another area. Also, according to Mounoud (1982) at around two months, the baby's capacity of putting their hand in their mouth or to suckle and look at the same time is lost. In the same line, Bever (1982) showed how the variety of vocal productions developed by the child up to the age of four months stops as far as both increase and differentiation are concerned. Another example showing regressions is that of Zelazzo (1982) who found that at nine and a half months, there was a reduction in the production of vocalizations and visual fixation with stimuli, both in a physical as well as a social sense. As we can see, the concept of regression encompasses the notion of a return to previous structures or forms of behavior and has been applied to several domains in development.

Regression Periods in the emotional domain

Although there is a great deal of scientific evidence about both regressions and transitions, there are not many studies that relate both phenomena. Additionally, as regards both transitions and regressions, findings often originate in diverse fields of study, making it difficult to draw general conclusions concerning the nature of these phenomena. One of the studies that focus on this issue was carried out by Plooij and van de Rijt-Plooij (Plooij & Rijt-Plooij, 1989b; Rijt-Plooij & Plooij, 1992; Rijt-Plooij & Plooij, 1993). These authors have found regression periods in the emotional domain. In their work the term *regression periods* is used in a restricted sense: it refers to the return to a high frequency of mother-infant contact, characteristic of an earlier period. During these periods the baby's behavior becomes "difficult" for the mother. Not only is the baby more demanding of contact with the mother, but in addition his behavior is characterized by the three c's: crying, clinging and crumpy. The authors have suggested that these regression periods shortly precede transition periods in development. Although regression periods do give the mother-infant dyad a difficult time, there is also a positive side to this phenomenon: the regression periods announce progress in the baby's development. A brief resumé of Plooij and van de Rijt-Plooij's research is presented in the following few paragraphs.

Van de Rijt-Plooij and Plooij started their observations of babies amongst the free-living chimpanzees in the Gombe National Park, Tanzania, East Africa. They observed that infant chimpanzees show five transitional leaps in the first 2 years of life in their growing independence from their mother. They suggested that these changes were the result of age-linked reorganizations of the central nervous system. With each reorganization, a new type of perception would emerge in the young chimpanzee. Consequently, a new type of learning of new skills followed, while at the same time the mother-infant system evolved towards a new relationship. Rijt-Plooij and Plooij (1987) observed that each transitional leap was preceded by a regression period in the emotional domain that ultimately provoked mother-infant conflict. In other words, before the chimpanzee infants progressed towards a new level of development, they first regressed to stay in closer proximity to the mother. The infant chimpanzees were seen to be temporarily more dependent, while the mother tried to promote independence or the use of new skills in the exploration of the physical surroundings. Finally, the learning of new skills and patterns of behavior emerged (Plooij & Rijt-Plooij, 1989b). One of the hypotheses suggested by the authors is that the maternal role in a regression period is first to provide security in a phase of developmental reorganization, soon to be followed by her promoting her infant's independence.

In later studies on human infants, van de Rijt-Plooij and Plooij (1992, 1993) observed 10 regression periods in the first 20 months of human life at 5, 8, 12, 17, 26, 36, 44, 53, 61-62, and 72-73 weeks. The human babies showed some common characteristics during the regression periods: they cried and became irritated easily, sleep patterns were more fragile, among some of them there was a reduction in appetite and there was an appearance of rejection of familiar people with the exception of the mother or another attachment figure. There was also a decrease or increase in activity which made daily routines like getting dressed, bathing or playing with the mother more difficult. One of the most notable characteristics, the same as in the infant chimpanzees, was the increase in body contact with the mother.

Mikael Heimann (2003) argues that, evolutionarily speaking, the regression periods are a very old phenomenon. Before van de Rijt-Plooij and Plooij, other researchers had observed these peaks in mother-infant contact among monkeys and also in one non-primate mammal. For example, Horwich (1974) reported peaks in nipple contact for 12 monkey species and suggests that these peaks occur at similar times in development, if one takes the developmental speed of the species into account, and become less pronounced as the monkey infants grow older.

Focusing on human infant development and the parent-child relationship, T. Brazelton has been developing his notion of 'Touchpoints' that have strong affinity with the regression periods (Brazelton, 1992; Brazelton & Sparrow, 2006). He proposes that 'Touchpoints' are those predictable times, that occur just before a surge or rapid growth in any line of development when, for a short time, the baby's behavior falls apart. This 'regression' is viewed by the author as a really positive sign of development moving forward, notwithstanding the fact that parents might find themselves worried, or disagreeing with each other, because these bursts can disorganize children's feelings and actions and disrupt care giving routines, such as feeding and sleeping.

In 1995, a European intercultural study of infantile regression periods (ISIRP research group) was started. The first purpose of this study was to replicate the observations of van de Rijt-Plooij and Plooij of age-linked regression periods in three additional countries (Heimann, 2003). The findings were positive (Lindahl, Heimann, & Ullstadius, 2003; Sadurní & Rostan, 2002; Sadurní & Rostan, 2003a; Sadurní & Rostan, 2003b; Woolmore & Richer, 2003) and the evidence presented in all of these studies provides good support for the claim that age-linked regression periods exist. In addition, Plooij and co-workers showed that infants are vulnerable during regression periods and found age-linked peaks in illness and sudden infant death (SID) (Plooij, Rijt-Plooij, Stelt, Es, & Helmers, 2003).

It is assumed that intrinsic changes must be going on at times when infants become so grumpy, difficult in temperament, demanding of parental attention and vulnerable. Plooij sustains that "each regression period signals the start of a period of developmental progress and the emergence of new skills, task performances and behaviors" (2003, p.187). Trevarthen and Aitken (2003) review the findings about regulation of brain development and the developmental function of regressive periods, and show evidence that age-related brain developments are at the core of some intrinsic changes. These authors suggest that periods of rapid change (PRCs) or transition periods are likely to follow the age-linked regression periods. The authors look upon these periods of rapid change as periods where the infants are positively motivated to explore the physical world and communicate with persons. Rapid advances in perception and engagement by all modalities with the physical world and with persons appear to follow troublesome 'regressions' or periods when the baby seems to be more retreated into organismic regulation and self-maintenance and appear to be more "difficult" in temper, more irritating and more demanding of maternal attention.

An important aspect of the phenomenon of regression periods would be the role played by child emotions as basic motivational processes that activate parental care and attention behaviors. In line with what is sustained by the attachment theory (Bowlby, 1969), evolutionarily speaking, the function of the infant's expression of emotions and other attachment behaviors is to provide the baby with the protection of the parental caretakers against life-threatening dangers from outside. The phenomenon of regression periods brings to mind that there may be another function of the infant's expression of emotions and other attachment behaviors. These may act as indicators of internal destabilization processes or, in other words, of an increase in stress (Plooij & Rijt-Plooij, 1989a). Consequently, the second function may be to provide the baby with extra care and attention of the parental caretakers to help fight this danger from inside. We will return to this point in the discussion.

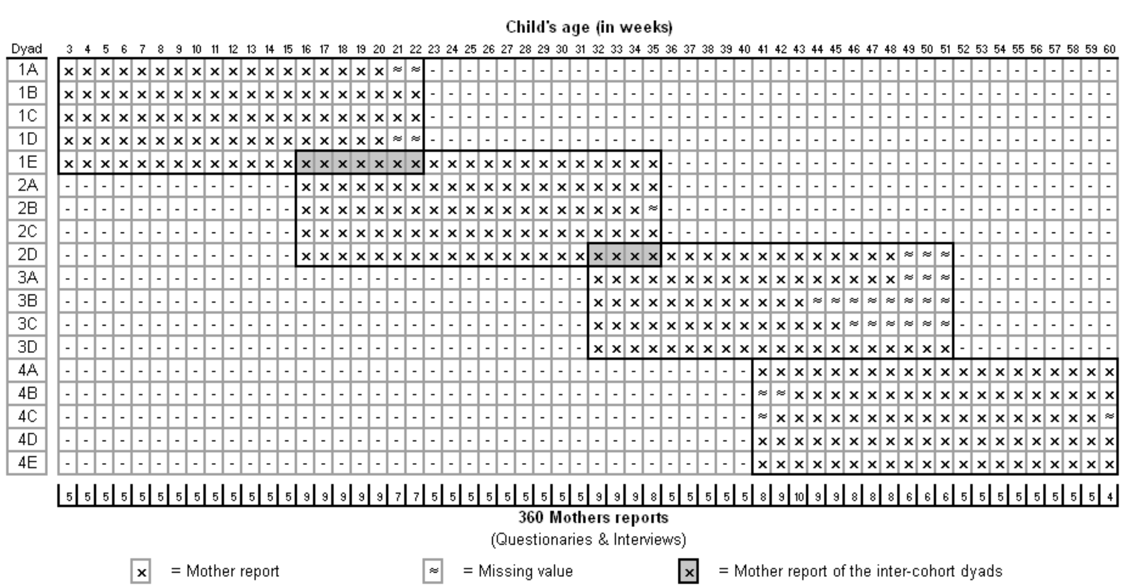

Figure 1. Distribution of the Mother Reports by the Weekly Time Points Studied.

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Research questions

We may conclude that there is evidence for age-linked transitions and regressions. However, to this date, there have been no published studies that have investigated the temporal relationship between regression periods and transitions periods. In the present study, we explore the temporal relation between transition periods and regression periods, if any. We wish to answer the following questions:

1. Can the same mothers that reported regression periods in their infants, observe and report sudden leaps in their infant's development? That is to say: can they observe and report new skills or behavior patterns as *progressive behaviors?* The criterion for such observations to score as 'progressive' is that the skills and behavior patterns reported should be new, and not previously acquired and being improved. If the answer to question 1 is positive, we will consider:
2. whether these progressive behaviors are distributed over age in such a way that clusters can be recognized and whether any such cluster can be defined as a transition period. If the answer to question 2 is positive, we will ask
3. what the frequency and timing of these transition periods is, and 4) what the temporal relation is between the regression periods and the transition periods.

Methods

Participants

A microgenetic design was used to follow the eighteen mother-infant dyads of our previous study on the regression periods (Rostan, 1998; Sadurní & Rostan, 2002). A microgenetic design is a process-oriented approach to understand development during a specific period in the lifespan in which a series of repeated observation with short time-intervals between them permits the tracking of the developmental history of a small number of mother-infant dyads as it is evolving (Lavelli, Pantoja, Hsu, Messinger, & Fogel, 2005).

The mother- infant dyads were followed from ages 3 to 60 weeks. In order to avoid attrition due to the weekly recurring observations, our study was designed in 4 overlapping cohorts of 20 weekly visits. In spite of this possibility to stop the observations after 20 weeks, two dyads accepted to continue beyond those 20 weeks, allowing for inter-cohort comparisons. The distribution of the 360 weekly data points of our study are shown in *Figure 1*.

For the selection of the families the following criteria were taken into account:

1. Absence of serious problems in the family nucleus, such as depressions, traumatic situations, and other family stressors which could interfere with the mother-child relationship.
2. Absence of serious hereditary or chronic diseases in either parent or child.
3. Families from a middle social and economic level with sufficient support and social integration.
4. The child was required to be healthy and to have been born without any congenital anomaly.

Of the eighteen mothers: eleven had studied up to university level, two were university students and five qualified workers. Seven mothers did not work at any time during the investigation, either because they were students or because they had leave of absence from work. Five mothers were already working when they collaborated in the study, and six of them started work in the meantime. The age of the mothers at the start of the study ranges from 19 to 35 years old: one case of 19 years, seven between 25 and 30 years, and ten between 30 and 35 years.

Among the fathers, two were self-employed, fourteen were professionals with university studies, and two were qualified workers. Sixteen of the family units were professionals with university studies, and two were qualified workers. Seventeen of the family units were formed by the couple and the child or children. Only in one case was there a single-parent family, the mother living with the child.

All the children were born at full term, except for a girl who was born at seven months and had to be in an incubator for thirty days. The age of this girl was corrected by using the date she was expected to be born. With respect to sexes, eleven of the children were male and seven, female. As far as the position in the family, ten of the children were the couple's firstborn while seven were the second child and, in one case, the third child.

All the families recruited for the research were acquaintances of members of our research group or of students from our University, who contacted them. Their participation was voluntary and they were not paid.

Instruments

In the present study we have used non-analyzed data from the same 18 Catalan babies (10 boys and 8 girls) as mentioned in our earlier published study on regression periods (Sadurní & Rostan, 2002; Sadurní & Rostan, 2003a; Sadurní & Rostan, 2003b). Since the purpose of this earlier study was to obtain data on the hypothesis maintained by van de Rijt-Plooij and Plooij, the instruments and design of the research followed the study carried out by van de Rijt-Plooij and Plooij (1992) as closely as possible. The information collection instruments were directed principally at the study of regression- and transition-periods and can be consulted in

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van de Rijt-Plooij and Plooij (1992) or in Rostan (1998) in the Catalan version. With this premise, the instruments used for the collection of data were a weekly questionnaire and a weekly interview.

Regression Periods Maternal Questionnaire (Rijt-Plooij & Plooij, 1992).

The questionnaire was completed by the mothers and collected every week. The algorithm used to determine whether that week was a regression week or not is explained in *Figure 2*.

Part of the questionnaire referred to behavioral transitions. It included a series of questions meant to detect the appearance of new abilities in the child. These questions were asked in a more open way than those concerning regression periods. The reason for using open questions was to prevent a bias in the answers. We wanted to influence the mother as little as possible. The mother's information should refer to the new skills and behaviors as she had noted in her child, independently of what we would expect as developmental psychologists. The questions were the following:

– Has your child learnt anything new this week? If so, what? How does your child do those new things? Do you help him/her?
– Have you noticed if your child is more interested in certain things? If so, what things?
– What has made your child laugh a lot this week?
– Make a note of anything about your child that you think necessary or interesting to mention.

1. Fractious or Changeable Mood
–Baby cried or fussed more easily
–Baby had more mood-swings

Continue if either of the above are present
Else, it is not a Regression Week

2. Attachment Related Behavior
The infant:
–Wanted more closeness, body contact or proximity
–Tried to make even more intimate physical contact during feeding
–Attempted to gain proximity to mother, e.g. by clinging to her leg.
–Was more demanding of mother's attention

Continue if any of the above are present
Else, it is not a Regression Week

3. Additional Regression Items
The infant:
–Had sleeping problems or Nightmares
–Had eating problems
–Resisted being changed
–Was shy with strangers
–Was less vocal
–Was less active
–Sucked thumb more often
–Behaved more ëbabyishlyí
–Was jealous, wanted their mother all to themselves
–Was very naughty
–Was very friendly
–Threw more temper tantrums

If at least two of the above are present
the week is classed a Regression Week
Else, it is not a Regression Week

Figure 2. The Plooij Algorithm for determining Regression Weeks.

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A semi-structured weekly tape-recorded interview

Mother's received weekly home visits. The aim of this weekly home visits was to collect the questionnaire and interview the mother. The items referring to regression periods were semi-structured but those referring to transition periods were open in order to avoid suggesting the mother's answers. On the contrary, we encouraged the mother to spontaneously explain the progress she had observed in her child. In this informal and indirect way, the mothers revealed the course of the child's development, the emergence of new capacities and behavior, as well as the changes in the mother-infant relationship and interactions. All interviews were taped.

Procedure

The way in which we collected our data is summarized in the following lines: A first interview was held with each family. This helped to create a climate of confidence. Information about the purpose of the study was brief. We referred only to our interest in child development, in the child's acquisition of new abilities or interests, and in difficulties met by the parents as the child was growing up. The reason for keeping this information limited was to avoid the introduction of a bias in the collection of data. All the mothers received information on the kind of participation expected from them (careful observations of their child), the instruments to be used, and the schedule of visits. A more detailed explanation of this procedure is presented in Rostan (1998).

For the present analysis of progressive behaviors we first transcribed all the interviews from tape. Then, we read all the questionnaires week by week as well as the transcribed interviews. The criteria we used to determine whether the behavioral change observed by the mother was a progressive behavior or not was the following: the behavioral pattern or ability as reported by the mother (such as crawling or smiling) should be absolutely new and never reported before. Increasing mastery or complexity of a behavioral pattern or ability that was reported earlier in development was not considered a progressive behavior.

To determine the reliability of our criteria for scoring a progressive behavior, an independent person categorized a randomly chosen subset of 5 mothers (85 weeks). The inter-rater reliability for the category 'progressive behavior' was tested statistically using Cohen's Kappa and was found to be. 85.

Results

Progressive Behavior Analysis

A careful analysis of the mothers' reports in the questionnaires and interviews has revealed 266 progressive behaviors. The descriptions by different mothers of some of these progressive behaviors were very similar. For example, almost all the mothers reported a change in the bipedal walking capacity of their child, although they expressed it in slightly different ways: "He begins to walk with the baby walker", said the first; "He initiates steps holding onto the furniture", reported the second; "He wants that they hold him to walk", said a third; and "She begins to take steps with support", commented a fourth. We unified these mothers' reports in one category: "*the child begins to take steps with support"*. In this way we have found 61 different categories of progressive behavior between 3 and 61 weeks after birth. Note that we have only categorized progressive behaviors reported by at least two mothers. Three progressive behaviors that were reported by only one mother were discarded from further analysis.

Table 1 shows all the progressive behavior categories together with the number of progressive behaviors underlying the category and the mean of the ages at which these progressive behaviors emerged.

As shown in *Table 1*, mothers have been able to observe categories of new skills or behavior patterns in their child. Nevertheless, some of the progressive behavior categories have been seen by all the mothers while other categories have only been observed by part of the mothers. The latter does not imply necessarily that those categories did not emerge in all of the children. We come back to this in the discussion.

Now that the answer to question 1 of this study is positive we turn to answering the second question whether these categories of progressive behaviors are distributed over age in such a way that clusters can be recognized and whether any such cluster can be defined as a transition period.

Criteria for the detection of transition periods

The criteria we used for detecting transition periods were taken from the definition of discontinuity proposed by Werner (1948). These criteria are the following. First, the transition period has to be indicated by the emergence of (one or) more than one progressive behavior categor(y)ies. And, second, the progressive behavior categories have to be clustered in time in such a way that there is a significant lack of progressive behavior categories between the clusters.

The first criteria has been shown to be present in our data already. The presence or absence of the second criteria in our data can be tested statistically. As a null hypothesis we assume that there are no discontinuities in development. If the progressive behavior categories are distributed evenly over age, one would expect 1.05 progressive behavior categories per week (*61 progressive behavior categories* divided by the 58 weeks we studied the infants). This implies a mean time-interval between

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Table 1
The progressive behavior categories together with the number of progressive behaviors underlying the category and the mean of the ages at which these progressive behaviors emerged

Code	Progressive behaviors categories	No.	Age mean (in weeks)	Code	Progressive behaviors categories	No.	Age mean (in weeks)
25	Is quicker, more observant, more attentive,	5	4.8	33	Enjoys manipulating papers	5	29.4
24	Attention to people (face and voice)	5	5	27	Crawls on all fours	4	29.5
14	Beginning of social smile	3	6	28	Asks to be picked up	3	30.3
19	Gurgles	4	6.3	31	Fear of strangers or strange things	4	30.8
8	Distinguishes familiar faces and voices of other people	2	7	38	First meaningful words (dada. mama)	6	31.3
12	Vocalizes	3	9	37	Begins to take steps with support	6	31.5
23	Responds with sounds when talked to (proto-conversations)	5	9	36	Complains	5	31.6
13	Moves hands as if to touch objects	3	10.3	32	Recognizes images and photos	4	32.5
18	Laughs out loud	4	11	26	Opens and closes drawers	3	32.7
17	Enjoys repetitive chanted games, games involving physical contact, and surprise games (peek-a-boo)	8	11.4	45	Explores objects and takes an interest in forbidden things	3	39
15	Notices own extremities, touches them, and takes them to mouth	7	13.3	46	Begins to toddle without support	3	39
20	Holds head up for a longer time	6	13.5	47	Temper tantrums. naps	5	39
11	Notices and responds to movements, sounds and colors	6	13.7	48	Repeat a simple word on request.	6	39.5
6	Plays with sounds, makes longer babbling sequences	4	14	43	Takes an interest in games with sounds. songs. people and children	2	40
22	Grabs things within reach, manipulates them and takes them to mouth	10	14	44	Asks for things through language	3	40.7
5	Looks for familiar faces and voices, and tries to initiate communication in order to be talked to and get attention	4	15.5	41	Climbs up stairs	3	44.3
7	Holds torso steady and bears weight on legs	4	16.3	49	Repeats funny actions to draw attention	2	45.5
21	Reaches for, manipulates, throws objects	10	18.3	40	Indicates actions (ex. "that's it. bye")	2	46
30	Initiates crawling movements	2	19	61	Names objects. self	6	46.5
10	Actively explores mother's face	5	19.4	55	Climbs	3	47.3
3	Babbles when children or adults talk to him/her	4	20	56	Piles and introduces objects (relational play)	5	48
35	Rolls over	3	20	60	Locates objects	5	48
2	Shows preference for toys and activities	4	20.3	54	Beginning of functional play	4	48.3
1	Enjoys playing active games like being thrown up in the air	2	20.5	58	Imitates cultural accions (as to sweep)	4	54.3
16	Remains seated for a while without support	7	20.6	50	Vocabulary spur	2	54.5
9	Passes objects from hand to hand, drops them	4	20.8	59	Says or gestures "yes" and "no" meaningfully	4	54.8
4	Anticipates routines	5	21.2	51	Potty-training readiness related behavior	2	55
29	Looks for self in mirror	4	27.3	57	Symbolic play	4	55.3
39	Stands up with support	9	28.3	52	Defends personal objects (sense of property)	2	56.5
34	Imitates gestures (hand-clapping)	6	29	53	Dances about to music	2	57.5
42	Picks up things with pincer grasp	2	29				

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the progressive behavior categories of .95 week. This time-interval should be distributed along a normal curve much in the same way as measurement errors are. We did the Kolmogorov-Smirnov one-sample test (Siegel, 1956) test to find out whether the distribution of time-intervals in our sample was following a normal curve. The computed p-value turned out to be lower than the significance level alpha = .05. Therefore, we should reject the null hypothesis H_0, and accept the alternative hypothesis Ha: The sample does not follow a Normal (Standard) distribution. The fact that there are time-intervals very far apart from the mean (Mean score = .88) indicates the existence of transition periods.

Now that the answer to the second question is positive, we turn to the third question: what is the frequency and timing of these transition periods?

The frequency and timing of these transition periods

To test the statistical significance of these gaps One Sample Runs Test (Siegel, 1956) was used. The time-intervals between one progressive behavior category and the next one have been transformed into z-score, as shown in *Figure 3*

As we can observe in *Figure 3*, there are three time-intervals that are significantly longer than expected by chance: the time-interval starting with 21.2 weeks of age and ending with 27.25 weeks, $z = 3.78$, $p < .005$, one tailed; the time-interval starting with 32.67 weeks of age and ending with 39 weeks, $z = 3.99$, $p < .001$, one tailed; and the time-interval starting with 48.25 weeks of age and ending with 54.25 weeks, $z = 3.74$, $p < .005$, one tailed. One more time-interval is significantly longer than expected by chance: the time-interval starting with 40.67 weeks of age and ending with 44.33 weeks, $z = 2.00$ $p < .05$ one tailed. These 4 time-intervals are inserted between 5 transitional periods; each of them containing a cluster of progressive behavior categories (see *Figure 3*).

The first transitional period runs from 4.80 to 21.20 weeks of age; the second from 27.25 to 32.67 weeks; the third from 39 to 40.67 weeks; the fourth from 44.33 to 48.25 weeks; and the fifth from 54.25 to 57.50 weeks of age.

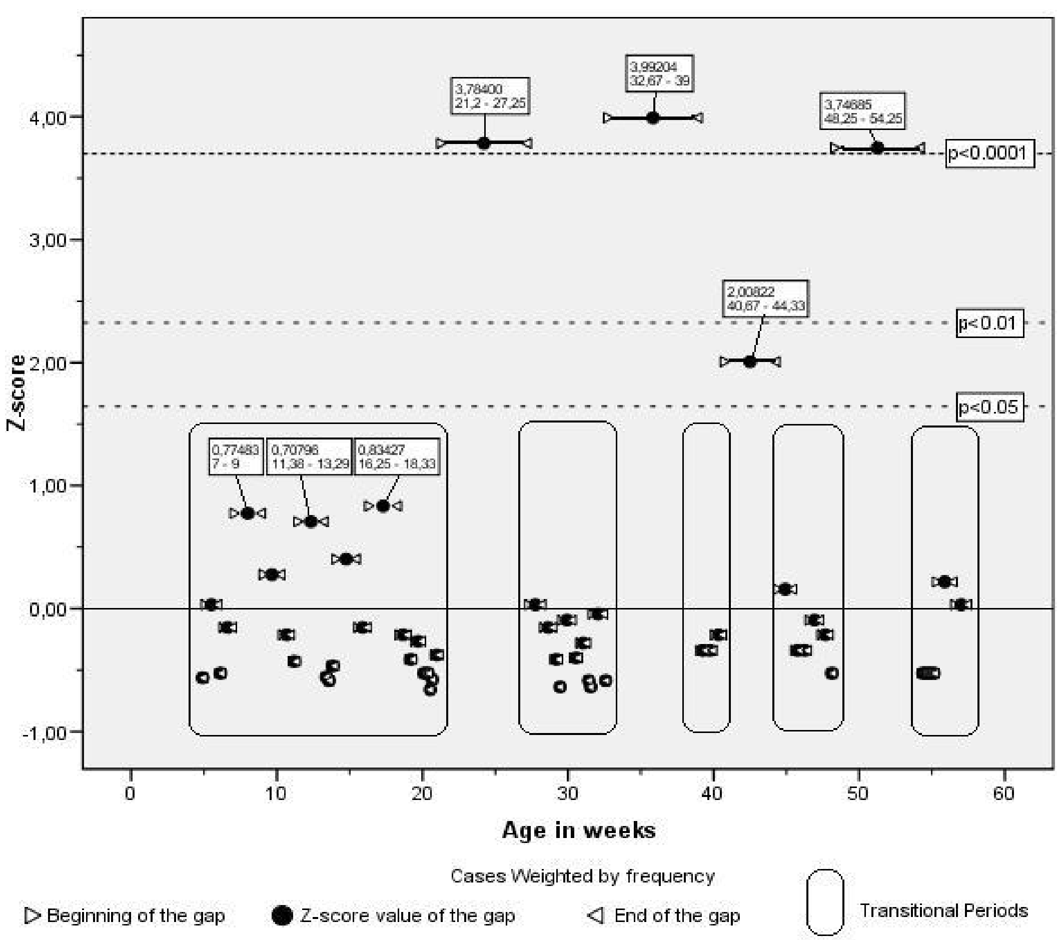

Figure 3. Calculated z scores (z test of intervals) for the duration of the time intervals observed between the mean ages of consecutive progressive behavior categories.

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The first transitional period deserves a more detailed analysis. The three longest time-intervals beyond this first transitional period are statistically so very significant that this might withhold the three longest time-intervals within the first transitional period from becoming statistically significant. If we isolate the data collected during the first 21.2 weeks and recalculate the z scores for those data alone, we will obtain new z scores that are presented in *Figure 4*.

With this analysis three additional time-intervals are found that are significantly longer than expected by chance: the time-interval starting with 7 weeks of age and ending with 9 weeks, $z = 1.96$ $p < .05$, one tailed; the time-interval starting with 11.38 weeks of age and ending with 13.29 weeks, $z = 1.96$ $p < .05$, one tailed; and the time-interval starting with 16.25 weeks of age and ending with 18.33 weeks, $z = 2.18$ $p < .05$, one tailed. These 3 time-intervals divide the first transitional period from *Figure 3* in 4 transitional periods, each of them containing a cluster of progressive behavior categories (see *Figure 4*).

The first transitional period in *Figure 4* runs from 4.80 to 7 weeks of age, the second from 9 to 11.38 weeks, the third from 13.29 to 16.25 weeks, and the fourth from 18.33 to 21.20 weeks of age.

Summarizing *Figures 3* and *4*, we have found 8 transitional periods between 3 and 60 weeks of age. Now we turn to the fourth research question.

The temporal relation between the regression periods and the transition periods

In the earlier study mentioned in this paper Sadurní and Rostan (2002, 2003) found 8 age-linked regression periods. The main results of this earlier study are depicted in *Figure 5*. This Figure gives the frequency-distribution over age (in weeks) of the number of mothers reporting their baby to show regressive behaviors during that particular week. *Figure 5* shows that the regressive behaviors are not distributed in a uniform and continuous manner over age, but rather are concentrated in clusters.

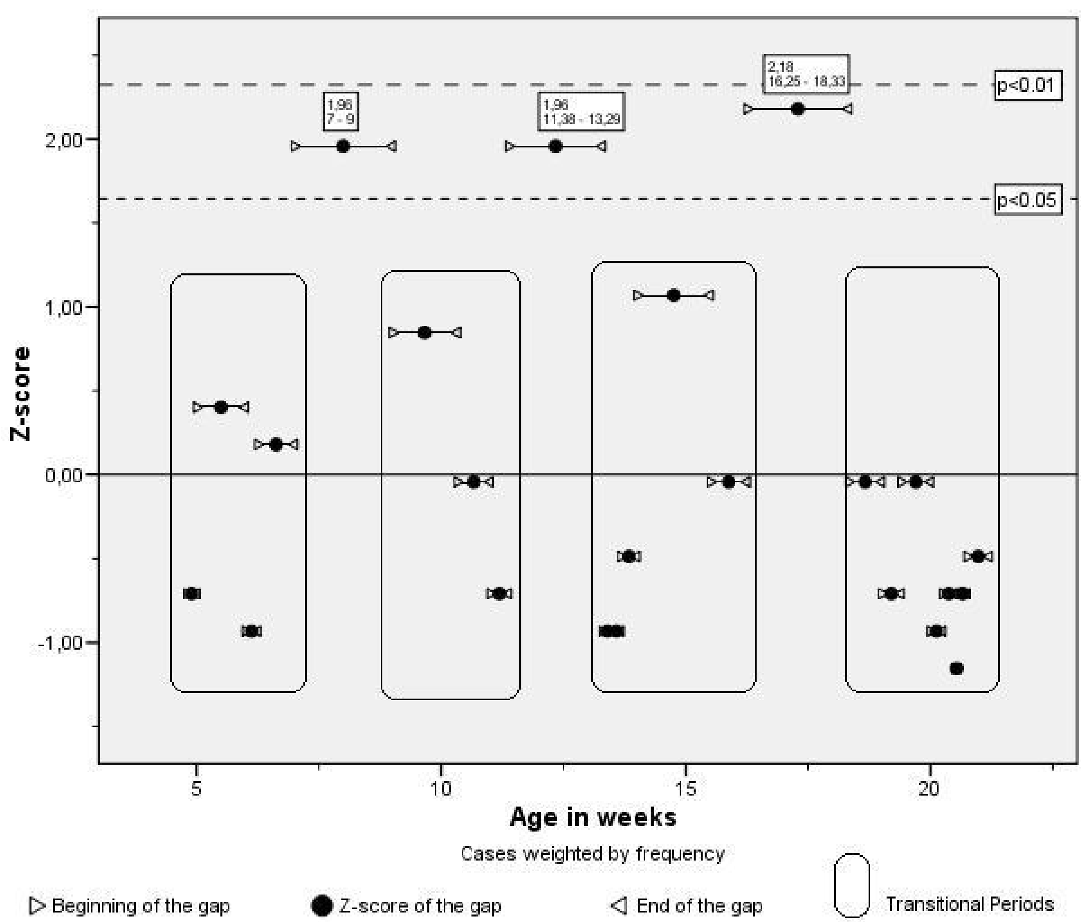

Figure 4. Calculated z scores (z test of intervals) for the duration of the time intervals observed between the mean ages of consecutive progressive behavior categories from 3 to 21.20 weeks.

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Table 2
Descriptive Data (Mean, Standard Deviations, and Range) of age at which Transition and Regression Periods were found

	Regression Periods					Transitional Periods			
	M	*SD*	Min	Max		*M*	*SD*	Min	Max
First RP	4.57	.53	4.00	5.00	First TP	5.81	.91	4.80	7.00
Second RP	8.29	.49	8.00	9.00	Second TP	10.14	1.11	9.00	11.38
Third RP	12.80	.84	12.00	14.00	Third TP	14.31	1.12	13.29	16.25
Fourth RP	18.07	1.07	16.00	20.00	Fourth TP	20.00	.87	18.33	21.20
Fifth RP	26.13	.92	24.00	27.00	Fifth TP	30.24	1.66	27.25	32.67
Sixth RP	34.57	1.55	32.00	37.00	Sixth TP	39.53	.69	39.00	40.67
Seventh RP	43.65	1.37	42.00	46.00	Seventh TP	46.74	1.40	44.33	48.25
Eighth RP	50.88	1.73	48.00	53.00	Eighth TP	55.39	1.18	54.25	57.50

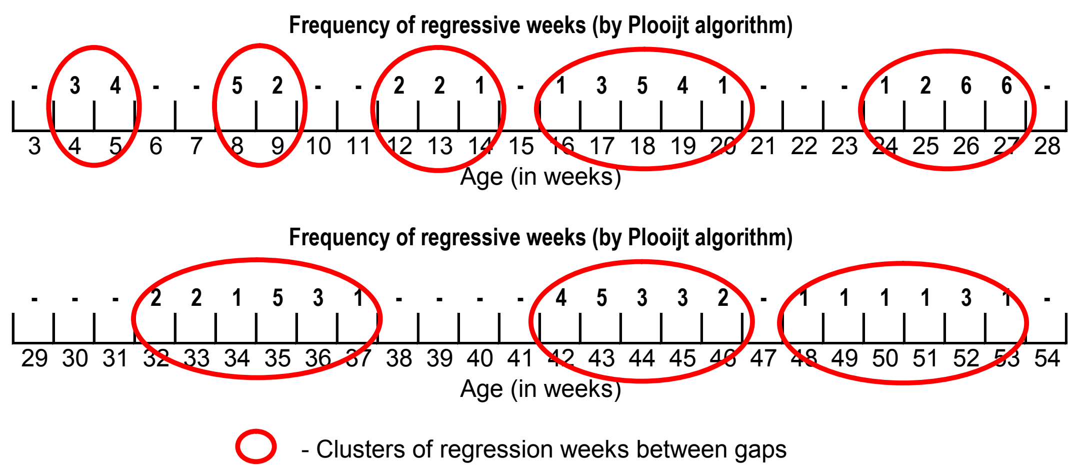

Figure 5. The frequency-distribution over age (in weeks) of the number of mothers reporting their baby to show regressive behaviors during that particular week.

These clusters of weeks where babies show regressive behaviors are encircled with the red color. It is interesting to note that in between the clusters of regression weeks there are weeks where babies show no regressive behavior at all. This is the same as the second criteria for transitions periods mentioned in paragraph 3.2: “And, second, the progressive behavior categories have to be clustered in time in such a way that there is a significant lack of progressive behavior categories between the clusters.”

Table 2 shows the descriptive data (Mean, Standard Deviations, and Range) for both transition periods and regression periods and provides information about the temporal relation between the two. We can see that, in all cases, regression periods precede transition periods.

The data in *Table 2* imply that the regression periods and the transition periods do alternate 8 times in the first year of life. In order to illustrate this more clearly, this alternation is depicted in *Figure 6* where the peaks of the two graphs are situated at the mean ages reported in *Table 2*.

Conclusions

The answers to the 4 research questions addressed in this paper were the following. First, mothers are able to observe and report new skills and behavior patterns as *progressive behaviors,* where ‘progressive’ means that the skills and behavior patterns are new and not previously acquired and being improved upon. Second, the progressive behaviors are distributed over age in such a way that clusters can be recognized and these clusters can be defined as transition periods. Third, 8 transition periods were found around the means of 5.81; 10.14; 14.31; 20.00;

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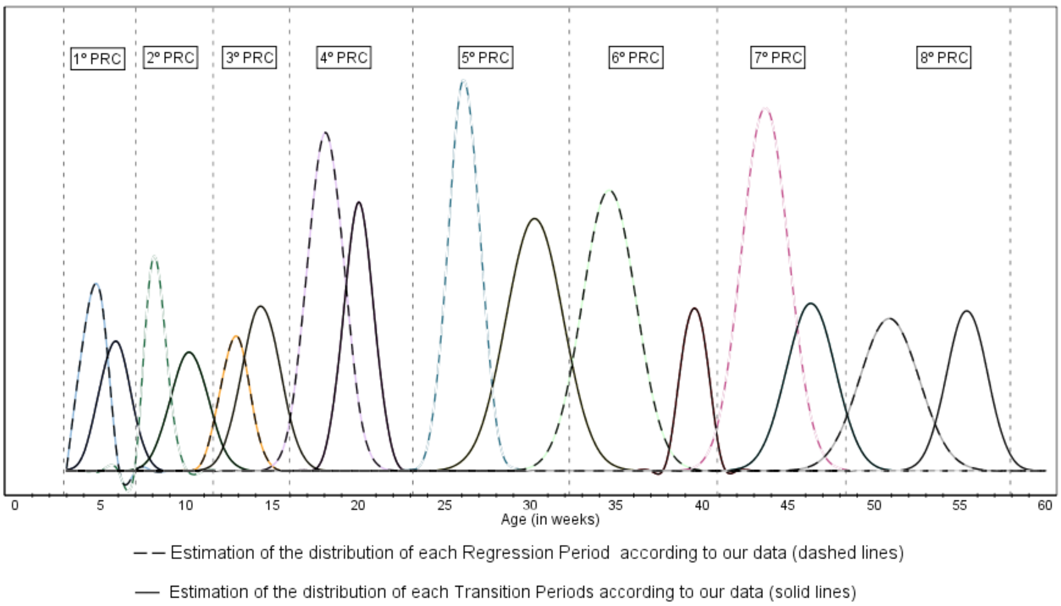

Figure 6. Alternation between regression periods and transition periods, where the peaks of the two graphs are situated at the mean ages reported in Table 4 and the shape of the curves is calculated by the normal curve function. The Y-axis represents the proportional measure of frequency. Periods of Rapid Change in (PRCs) cover the combination of one regression period and the consequent transition period.

30.24; 39.53; 46.74; and 55.39 weeks of age. And, fourth, these 8 transition periods do alternate with the 8 regression periods found in an earlier study, where the regression periods precede the transition periods.

Discussion

The similarities between a number of progressive behaviors made it possible for us to categorize them. In a future study, it would be interesting to see whether uninformed mothers' observations of their infants' behaviors match with the behaviors that developmental psychologists hope and try to observe when they apply, for example, a developmental scale. On the other hand, some scientists could prefer the use of standardized tests or scales of development in order to observe in a more systematic and precise way the process of change. A disadvantage of the latter approach is that a weekly repetition of the same test or developmental scale may create a learning effect in the baby and produce biased results. A compromise solution to this dilemma might be the development of a parental screening instrument where the parents receive some training. A comparison between parental assessment scores and test scores at 18 months with follow-up results has shown that the two assessment methods yielded similar predictions (Sonnander, 1987). It is necessary to keep in mind this possibility for future research.

With regard to the mean ages of the progressive behavior categories one should be aware of the fact that children show huge individual differences in the age of first appearance of skills and behavior patterns, as many developmental scientists have observed (Rosenblith, 1992). This might explain why not all mothers reported a particular progressive behavior category shortly after a regression period. As long as the infants show one or more progressive behaviors that belong to the developmental leap they are going through, this is not a problem. What the infants do share is the deep, discontinuous, age-linked modification in the structure and function of the components of the child's system. One might call this the 'deep stucture'. It is this 'deep structure' that develops or emerges around the same age in all infants together with a regression. The progressive behaviors are simply the outcome or elaboration of the interaction between this new 'deep structure' and the environment and might be called 'surface structure'. Individual variation in this 'surface structure' is only to be expected. What progressive behavior develops when, is dependent on the circumstances an infant grows up in. This might be a topic for future research, but does not concern us here. We did not try to investigate what is changing deep down (although we could start this study from *Table 1*), but to observe the shape of the change. That is to say, we wanted to know if the distribution of the changes over age follows a continuous or discontinuous pattern.

Nevertheless we are aware of the debate about what it is, that is developing. (Oyama, 1993). Frans Plooij argued that "what develops are not the new behaviors, skills, or tasks accomplishments, which are manifestations of underlying processes after interaction with the environment, but

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the underlying processes themselves that lead to the learning" (Plooij, 2003) (p. 188). On the other hand, as Plooij emphasized, the study of the internal underlying changes creates a dilemma, because: "In the quest for the underlying processes, the only information available is description of overt behavior, but such descriptions cannot be used as explanations of learning and development." (Plooij, 2003) (p. 188). According to Plooij, a partial solution to this dilemma may be to restrict the study to the earliest possible age at which a new behavior, skill, or task performance was ever observed. Following these criteria: a) we have collected our data from the closest source of information of the baby (the mother), b) we gathered them with an *elevated density* of observations, and c) these observations are conducted at time intervals that are considerably shorter. Nonetheless, future research is needed to focus on a certain transition period and to make a deeper analysis of the nature of the change that underlies the emerging progressive behaviors. On the one hand, this analysis could cover the cerebral changes underlying the developmental reorganization. On the other hand, for each transition period several series of weekly experiments could be done two months before and two months after the beginning of a regression period. In each series of weekly experiments one aspect of the supposed nature of the reorganization and the resulting new perception is disturbed. If the infant is able to perceive and control for this aspect after the particular regression period, this should show in the resulting graph: before the regression period the infant should not respond to the disturbance, and after the beginning of the regression periods the infant should responOur data suggest a temporal relationship between regression periods and transition periods: every regression period is followed by a transition period. The age-related regression periods could be seen, "as lighthouses to direct the study of developmental change" (Plooij, 2003) (p.187). The discussion about the periods of rapid change (PRCs) could include many aspects. Only some of them can be pointed out in this discussion and only in a speculative way. One of them focuses on the meaning of the phenomenon of regression periods. In the framework of Evolutionary Developmental Psychology, regression periods could be understood as an *ontogenetic adaptation* in the sense sustained by Hernández, Blasi, Bering and Bjorklund (2003): "newborn and infant characteristics selected by evolution to carry out a particular adaptive function at a particular moment of development" (p. 276). In this sense, Sadurní and Rostan (2003a, 2003b) and Sadurní, Rostan and Pérez (2006) have suggested that regression periods cause a disruption in the child's behavior –crying, sleeping problems, need to be cuddled– the "purpose" of which could be to obtain precisely those environmental stimuli –parental care- which the organism needs at a time of growth and change.

Another important question to debate would be the possible relationship between regression periods and attachment theory. Interestingly, Plooij has suggested that regression periods appear when a new type of perception and learning emerges. At these moments, the baby withdraws from the world and gets closer to the parent. A more intensive caretaking spell and social interaction follow, culminating in parent-infant conflict. In this process, the parents have become acquainted with the new motive of the baby and his/her new perceptual abilities. The baby starts to explore the new perceptual world resulting in a new type of learning. (Plooij, Rijt-Plooij, & Helmers, 2003). Therefore, we could ask about the role played by child emotions as basic motivational processes that activate parental care and attention behaviors before a developmental change. In line with what is sustained by the attachment theory (Bowlby, 1969), evolutionarily emotions play a universal role whose function is to activate and become joined with parental emotions appropriate to the system. In attachment theory, the child's emotions are goal directed to provide the child with the parental (or caretaker's) protection against possible environmental dangers or loss of the own homeostasis (for example: when the baby is in a stressful time, when his/her organism is suffering, when he/she has pain or is sad, when he/she is afraid, and so on). Concordantly, regression periods show how the infant's emotions act as indicators of two processes: first, an internal destabilization process that poses a danger –an increase in stress as Plooij and van de Rijt-Plooij have showed (1989a)-, and, second, a process of change and development (a reorganization of the system). We suggest that the theory on the functionality of regression periods should have links to attachment theory, since the regression phenomenon seems to activate attachment mechanisms between mother and child. Parental care in these moments could have the dual evolutionary objective to, first, recover the baby's homeostasis and balance in a moment of internal disorganization and change, and, second, to create a developmental matrix that opens and encourages the child's mind to seek new forms of knowledge.

References

Bever, T. G. (Ed.). (1982). *Regression in mental development: Basic phenomena and theoretical alternatives*. Hillsdale, NJ: Lawrence Erlbaum Associates.

Bowlby, J. (1969). *Attachment and loss. volt 1: Attachment*. London: Hogart.

Brazelton, T.B. (1992). *Touchpoints: your child's emotional and behavioral development.* Reading, Massachussets: Merloyd Lawrence Book.

Brazelton, T. B., & Sparrow, J. D. (2006). *Touchpoints-birth to three* (2nd ed.). New York: Da Capo Press.

Camioni, L; Aureli, T; Bellagamba, F & Fogel, A (2003) A Longitudinal Examination of the Transition to Symbolic Communication in the Second Year of Life. *Infant and Child Development, 12,* 1-26.

Fischer, K. W. (Ed.). (1983). *Levels and transitions in children's development (new directions for child and adolescent development*. London: Jossey-Bass Inc.

Fischer, K. W., & Pipp, S. L. (1984). Detecting developmental discontinuities. methods and measurement. In R. N. Emde, & R. J. Harmon (Eds.), *Continuities and discontinuities in development* (pp. 95-121). New York: Plenum.

Heimann, M. (Ed.). (2003). *Regression periods in human infancy*. Mahwah, NJ: Erlbaum.

Hernández-Blasi, C., Bering, J. M., & Bjorklund, D. F. (2003). Psicología evolucionista del desarrollo: Contemplando la ontogénesis humana desde los ojos del evolucionismo. *Infancia y Aprendizaje, 26*(3), 276-285.

Horwich, R. H. (1974). Regressive periods in primate behavioral development with reference to other mammals. *Primates, 15*, 141-149.

Kagan, J. (1984). Continuity and change in the opening years of life. In R. N. Emde, & R. J. Harmon (Eds.), *Continuities and discontinuities in development*. New York: Plenum.

Karmiloff-Smith, A. (1994). Précis of beyond modularity: A developmental perspective on cognitive science. *Behavioral and Brain Science, 17*, 693-745.

Lavelli, M., Pantoja, A. P. F., Hsu, H., Messinger, D., & Fogel, A. (2005). Using microgenietic designs to study change processes. In D. M. Teti (Ed.), *Handbook of research methods in developmental science* (pp. 40-65). Malden, MA: Blackwell Publishing.

Lewis, M., & Ash, A. J. (1992). Evidence for a neo-piagetian stage transition in early cognitive development. *International Journal of Cognitive Development, 15*, 337-358.

Lindahl, B. L., Heimann, M., & Ullstadius, E. (2003). Occurrence of regressive periods in the normal development of Swedish infants. In M. Heimann (Ed.), *Regression periods in early infancy* (pp. 41-56). Mahwah, NJ: Erlbaum.

Maratos, O. (1982). Trends in development of imitation in early infancy. In T. G. Bever (Ed.), *Regression in mental development: Basic phenomena and theoretical alternatives* (pp. 81-101). Hillsdale, NJ: Lawrence Erlbaum Associates.

McCall, R. B., Eichorn, D. H., & Hogarty, P. S. (1977). Transitions in early development. *Monographs of the Society for Research in Child Development, 42*(3), Serial No 171

Meltzoff, A. N., & Gopnik, A. (1989). Some relationships between imitation, cognitive development and early language development in the first two years of life. In G. Speidel, & K. Nelson (Eds.), *The many faces of imitation in language learning*. New York: Springer-Verlag.

Monoud, P. (1982). Revolutionary periods in early development. In T. G. Bever (Ed.), *Regression in mental development: Basic phenomena and theoretical alternatives* (pp. 119-131). Hillsdale, NJ: Lawrence Erlbaum Associates.

Oyama, S. (1993) The ontogeny of information: Developmental systems and evolution. In M. H. Johnson (Ed.), *Brain development and cognition*: *A reader* (pp. 19-30). Oxford and Cambridge, MA: Blackwell.

Perinat, A. & Sadurní, M. (1999). The ontogenesis of meaning: an interactional approach. *Mind, Culture and Activity: An interactional Journal*, *6,* 53-76.

Perner, J., Leekam, S. R., & Wimmer, H. (1987). Three-year-olds' difficulty with false belief: The case for a conceptual deficit. *British Journal of Developmental Psychology, 5,* 125-137.

Piaget, J. (1950). *Introduction à l'Épistémologie génétique*. Paris: Presses Universitaires de France.

Plooij, F. X. (2003). The trilogy of mind. In M. Heimann (Ed.), *Regression periods in human infancy* (pp. 185-205). Mahwah, NJ: Lawrence Erlbaum Associates.

Plooij, F. X., & Rijt-Plooij, H. H. C. v. d. (1989a). Evolution of human parenting. canalization, new types of learning, and mother-infant conflict. *European Journal of Psychology of Education, 4*, 177-192.

Plooij, F. X., & Rijt-Plooij, H. H. C. v. d. (1989b). Vulnerable periods during infancy: Hierarchically reorganized systems control, stress and disease. *Ethnology and Sociobiology, 10*, 279-296.

Plooij, F. X., Rijt-Plooij, H. H. C. v. d., & Helmers, R. (2003). Multimodal distribution of SIDS and regression periods. In M. Heimann (Ed.), *Regression periods in human infancy* (pp. 97-106). Mahwah, NJ: Lawrence Erlbaum Associates.

Plooij, F. X., Rijt-Plooij, H. H. C. v. d., Stelt, J. M. v. d., Es, B. v., & Helmers, R. (2003). Illness peaks during infancy and regression periods. In M. Heimann (Ed.), *Regression periods in human infancy* (pp. 81-95). Mahwah, NJ: Lawrence Erlbaum Associates.

Rijt-Plooij, H. H. C. v. d., & Plooij, F. X. (1987). Growing independence, conflict and learning in mother-infant relations in free-ranging chimpanzees. *Behavior, 101*, 1-86.

Rijt-Plooij, H. H. C. v. d., & Plooij, F. X. (1992). Infantile regressions: Disorganization and onset of transition periods. *Journal of Reproductive and Infant Psychology, 10*, 129-149.

Rijt-Plooij, H. H. C. v. d., & Plooij, F. X. (1993). Distinct periods of mother-infant conflict in normal development: Sources of progress and germs of pathology. *Journal of Child Psychology and Psychiatry, 34*, 229-246.

Rosenblith, J. (1992). *In the beginning. Development from conception to age two* (2nd ed.). Newbury Park: Sage Publications.

Rostan, R. (1998). Análisis de los periodos de regresión y transición durante el primer año de vida. (Doctor, University of Girona. Spain.). Retrieved from http://www.tesisenxarxa.net/TDX-1127101-191348/

Ruff, H. A., & Rothbart, M. K. (1996). *Attention in early development: Themes and variations*. New York: Oxford University Press.

Sadurní, M., & Rostan, R. (2002). Regression periods in infancy: A case study from catalonia. *The Spanish Journal of Psychology, 1*, 36-43.

Sadurní, M., & Rostan, R. (2003a). La importancia de las emociones en los períodos sensibles del desarrollo. *Infancia y Aprendizaje, 27*(1), 105-114.

Sadurní, M., & Rostan, R. (2003b). Reflections on regression periods in the development of catalan infants. In M. Heimann (Ed.), *Regression periods in early infancy* (pp. 7-22). Mahwah, NJ: Lawrence Erlbaum Associates.

Sadurní, M., Rostan, R., & Perez Burriel, M. (2006). *The link between regression periods and transition periods*. Unpublished manuscript.

Siegel, S. (1956). *Nonparametric statistics for the behavioral sciences*. New York: McGraw-Hill.

Sonnander, K. (1987). Parental developmental assessment of 18-month-old children: Reliability and predictive value. *Developmental Medicine and Child Neurology, 29*, 351-362.

Sparrow, J. D., & Brazelton, T. B. (2006). *A developmental approach for the prevention of common behavioural problems*. Retrieved April 2nd, 2008, from http://www.touchpoints.org/nwsltrs_flyers_forms/A_Developmental_Approach_to_Behavioral_Problems_2006.pdf

Spitz, R. A. (1958). *La première année de la vie de l'enfant*. Paris: P.U.F.

Strauss, S. (Ed.). (1982). *U-shaped behavioral growth*. New York: Academic Press.

Strauss, S., & Stavey, R. (1982). U-shaped behavioral growth: Implications for theories of development. In W. W. Hartup (Ed.), *Review of child development research* (pp. 547-599). Chicago: University odd Chicago Press.

Trevarthen, C. (1982). The primary motives for cooperative understanding. In G. Butterworth, & P. Light (Eds.), *Social cognition: Studies of development of understanding* (pp. 77-109). Brighton, UK: Hasvester Press.

Trevarthen, C., & Aitken, K. J. (2003). Regulation of brain development and age-related changes in infants' motives: The developmental function of "regressive" periods. In M. Heimann (Ed.), *Regression periods in human infancy* (pp. 107-184). Mahwah, NJ: Lawrence Erlbaum Associates.

Veer, R., van der. (1986). Vygotsky's developmental psychology. *Psychological Reports, 59*, 527-536.

Werner, H. (1948). *Comparative psychology of mental development*. Chicago: Follett.

Woolmore, A., & Richer, J. (2003). Detecting infant regression periods: Weak signals in a noisy environment. In M. Heimann (Ed.), *Regression periods in early infancy* (pp. 23-40). Mahwah, NJ: Lawrence Erlbaum Associates.

Zelazzo, P. R. (1982). The year-old infant. A period of major cognitive development. In T. G. Bever (Ed.), *Regressions in mental development: Basic phenomena and theories*. Hillsdale: Lawrence Erlbaum Associates.

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