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## A Baby's Day: Capturing Crawling Experience

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Independent mobility invites a new world of opportunities for learning. Dozens of studies show that infants' crawling experience is related to improvements in motor, perceptual, cognitive, and social domains (e.g., for review see Bertenthal & Campos, 1990). For example, experienced crawlers show more proficient, skillful gait patterns on motor tasks. They outperform novice crawlers on perceptual tasks such as avoiding a drop-off on a visual cliff and on cognitive tasks such as searching for hidden objects. Similarly, they show more mature patterns of visual exploration and display more social independence by venturing farther away from caregivers.

Although empirical evidence indicates that locomotor experience is related to psychological development, we know surprisingly little about underlying mechanisms. Why should locomotor experience facilitate motor skill, perceptual learning, cognitive achievements, social independence, and so on? The literature is replete with putative mechanisms for various developmental improvements: e.g., experience facilitates locomotor skill by giving infants practice stabilizing their torsos while moving extremities; keeping balance on varied surfaces promotes avoidance of risky ground; viewing objects from multiple perspectives fosters formation of object concept; crawling away from caregivers promotes social independence. Indeed, locomotor experience is central to theories of notable developmental psychologists such as Myrtle McGraw, Eleanor Gibson, Jean Piaget, Anna Freud, and Margaret Mahler. However, previous researchers defined everyday locomotor experience only as number of days since crawling onset. To date, theoretical claims about experience-related mechanisms cannot be verified because there are no empirical data about what infants experience.

The current project is the first to redress these deficiencies. We developed a longitudinal, "telephone diary" method to obtain a detailed, quantitative description of infants' locomotor experience. Parents report infants' activities in their everyday home environments—how much time infants spend on the floor, where they crawl and how often each location is visited, number of surfaces infants traverse and transitions between surfaces, crawling distance, excursion shapes around landmarks and rooms, whether infants crawl away from or follow after caregivers, aversive experiences such as falls, and experience on special apparatus such as stairs and playground equipment. Such a detailed archival database is important in its own right for documenting developmental change in opportunities for learning. Moreover, results from this descriptive study can address the plausibility of various theoretical claims about experience-related change mechanisms, and lay the groundwork for future investigations testing the developmental relationship between particular mechanisms and infants' performance on specific tasks.

## Method

Parents of six crawling infants participated 3-6 nights/week for 10-16 weeks. Crawling onset was defined as infants' ability to crawl 270 cm four times consecutively. Three infants were observed longitudinally from their first week of crawling and three other infants as more experienced crawlers. Infants' body dimensions and kinematic measures of their crawling skill were assessed periodically in the laboratory. We visited infants' homes and created blueprints of the floor plans, noting dimensions of rooms, furniture, and surfaces.

During nightly telephone interviews, parents reported infants' activities and locomotor experience. Each telephone call began with parents' reports of the day's landmark events: wake-up, naps, eating, out-of-home trips, and nighttime sleeping. The interviewer then used these regular, daily events and home blueprints to prompt parents to report the rest of the day's activities, especially noting whether infants were on the floor, how they moved from place to place (crawled or carried), whether they followed after caregivers, and excursion shapes.

Using computerized spreadsheets, we transformed parents' continuous narratives into quantitative measures of experience in 15 minute time blocks. First, we coded each time block into mutually

exclusive activities: when infants could obtain locomotor experience because they were on the floor crawling or playing, and when they could not because they were eating, napping, or restrained. We used home blueprints and drawing programs to calculate the frequency and variety of rooms and surfaces that babies visited and the distance they crawled during each excursion.

## Results and Discussion

We report preliminary data from two infants' first to sixteenth weeks of crawling. Sam was 6.5 months old at crawling onset and Ann was 12.3. Sam was small and muscular with slender body proportions and Ann was large, chubby, and hypoactive. Both babies began crawling on hands and knees. Preliminary data consisted of 78 telephone interviews and 758 data hours.

Daily Activities. Infants can only acquire independent locomotor experience when they are on the floor. On average, infants were awake 12.0 hours/day and they spent 26.8% of this time crawling and 18.6% playing on the floor (Figure 1A). These results indicate that, from their very first week of crawling, floor activities comprise a major part of infants' lives—presenting rich opportunities for learning about mobility and balance control on various surfaces.

Places to Crawl. Babies' homes differed greatly in size and layout. Ann's bi-level home had 10 rooms with 15 different floor surfaces; Sam's single-level home had only 5 rooms with 6 surfaces. However, both infants were predominately in just 3 rooms with 5 surfaces. This finding illustrates that parents determine when and where infants can crawl and apparently new crawlers are constrained to primary living spaces. Such results suggest that large differences in home environments may have surprisingly little impact on individual differences in locomotor experience.

Crawling Distance. Across days, Sam's increasing crawling pattern suggests that she tended to crawl longer distances as she obtained more crawling experience (Figure 1B). Increased distance resulted from more trips per hour in the same amount of space. In contrast, Ann's relatively flat crawling pattern over days of experience suggests that her locomotion may have been more function driven, using mobility primarily to go

somewhere. Ann's top-heavy body proportions may have inhibited exploratory and spontaneous crawling.

This study provides the first empirical description of infants' actual locomotor experience. We demonstrated the feasibility of the telephone diary method and provided preliminary information about infants' crawling experiences in their everyday environment. Further analyses will address important unanswered questions about developmental changes concerning infants' locomotor experience and resulting changes in opportunities for learning. The long-term aim of compiling such a detailed, longitudinal database is to constrain theorizing about experience-related change mechanisms that underlie the link between locomotor experience and psychological development. In addition, results will inform us about the most promising avenues for future research.

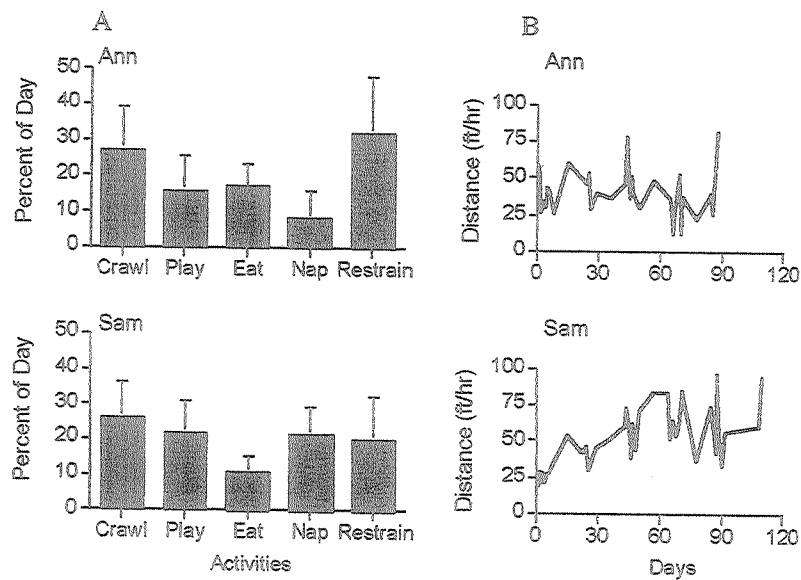


Figure 1. (A) Mutually exclusive daily activities. Dotted bars = crawling and playing on the floor (possible to obtain locomotor experience). Solid bars = non-floor activities (no locomotor experience). (B) Crawling distance plotted across days of experience.

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