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Social Expressions In Infant Locomotion: Vocalizations And Gestures On Slopes

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Previous research on infant locomotion has focused on perceptual, motor, and cognitive aspects of crawling and walking. However, infants acquire locomotion in a social context. Infants' first steps are into the open arms of encouraging parents. Further, infants both interpret social expressions produced by others and produce such expressions themselves. Previous research showed that infants may gauge possibilities for locomotion by monitoring parents' facial expressions (Sorce et al., 1985). The current study shows that infants produce vocalizations or gestures in potentially risky situations. We expand on a previous longitudinal analysis of infants' exploratory activity and perceptual judgments as they coped with crawling and walking over slopes (Adolph, in press). Here, we report how infants' social behaviors reflect their ability to detect safe versus risky hills.

Method

We observed 29 infants longitudinally for a total of 219 test sessions. Fifteen experimental infants were tested once every three weeks from their first week of crawling until several weeks after walking onset. Fourteen control infants were tested at three matched sessions (first and tenth weeks of crawling and first week of walking) to control for experience on laboratory slopes. At each test session, infants encountered both safe and impossibly steep slopes (0°-36°) as determined with a psychophysical staircase procedure (Adolph, 1995).

Coders scored two types of social expressions on the starting platform: *vocalizations* (crying, babbling) and people-directed *gestures* (e.g., finger points, "gives", "pick-me-ups", head shakes). Coders also scored *anti-social* behavior when infants disengaged from social exchange (e.g., looking at ceiling

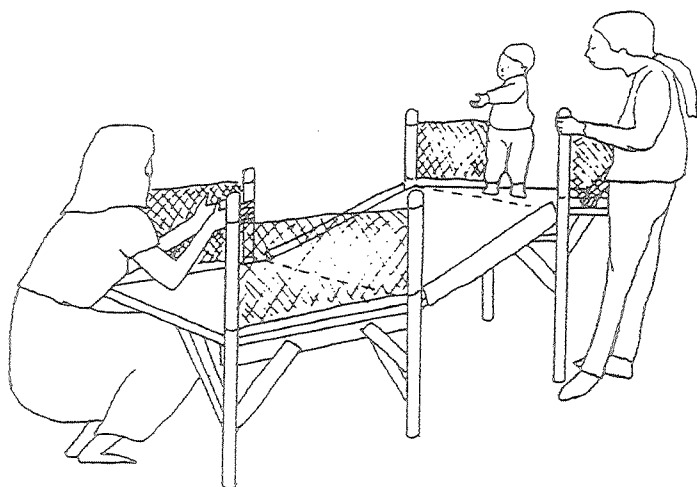


Figure 1. Parents stood at the far end of the adjustable ramp (0° - 36°) and encouraged infants to come up or down, while an experimenter followed alongside infants to ensure their safety.

lights, playing with their clothes). A trial could include all types of social and anti-social behaviors.

Results and Discussion

Infants' social behaviors were discriminating from the start of independent mobility and became increasingly selective over weeks of crawling and walking (Figure 2a). At each session, infants exhibited more vocalizations and gestures when the consequences of falling were most aversive—on downhill, risky slopes. Across sessions, infants decreased their social expressions and limited them primarily to downhill, risky slopes. Repeated measures ANOVA collapsing across sessions confirmed that infants produced more social expressions (vocalizations and gestures combined) on downhill, risky slopes [$F(1,25) = 22.84; p < .001$]; experimental and control infants did not differ. Overall, 72% of social expressions included babbling with neutral or positive affect, 27% included crying, and 32% included gestures. Crawlers emitted

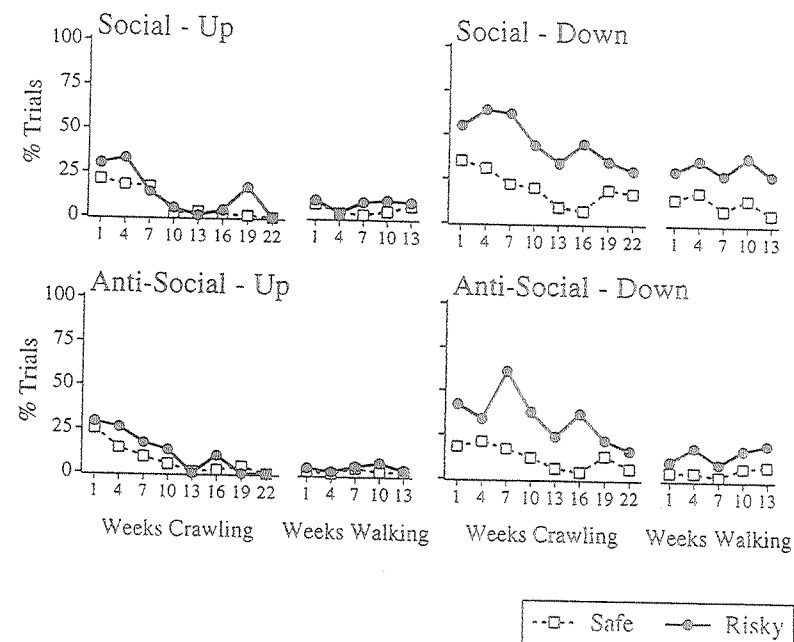


Figure 2. Social expressions (a) and anti-social behaviors (b) over weeks of crawling and walking.

more vocalizations than walkers [$F(1,25) = 5.80; p < .05$], but crawlers gestured equally often as walkers [$F(1,25) = 0.36$]. Apparently, crawling infants request more social support for locomotion than walkers, even though one means of social expression involves using the same limbs needed for balance.

Surprisingly, infants' anti-social behaviors showed a similar pattern to their social expressions (Figure 2b): high but discriminating levels of social disengagement in infants' first weeks of crawling and increasing selectivity over weeks of crawling and walking. Repeated measures ANOVA revealed more anti-social behavior on downhill, risky slopes [$F(1,25) = 4.00; p < .06$], and during weeks of crawling [$F(1,25) = 11.62; p < .01$]. Both social and anti-social behaviors parallel previous results for infants' exploratory looking and touching (Adolph, in press).

Even more surprising, despite social, anti-social, and exploratory behaviors that discriminated between safe and risky slopes on the starting platform, infants nonetheless plunged headfirst down impossibly risky slopes in their first

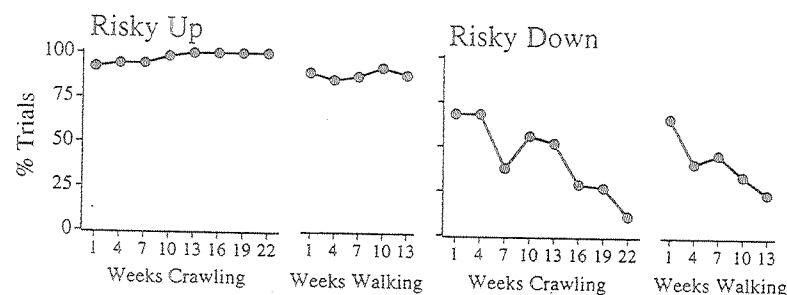


Figure 3. Errors on risky slopes over weeks of crawling and walking.

weeks of crawling and walking (Figure 3). Why might infants emit differential behaviors on the starting platform on the same trials when they show maladaptive judgments? If differential social expressions (or anti-social or exploratory behavior) reflected knowledge of potential consequences, infants should not have shown high error rates.

Rather, the data suggest that infants' social expressions may not have been wholly intentional in infants' first weeks of crawling. For example, vocalizations may result from high levels of arousal and the novelty of downward slanting surfaces. Regardless of intent, social expressions serve a useful function by alerting caregivers that infants are on the move. Later, when infants' social expressions are clearly intentional, infants may contribute to their own safety by appealing to adults for help in a potentially risky situation.

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Infants' Responses To A Visual Cliff And Other Ground Surfaces

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As new motor skills emerge and mature, infants need to constantly update their understanding of their own changing abilities, and they also need to learn about features of the environment that have consequences for their actions. The purpose of this longitudinal study was to examine the developmental sequence and interrelationships for changing locomotor skills, attention, exploratory behavior, and adaptive action. As infants begin to crawl, do they notice differences in ground surfaces and do they understand how to use this information to appropriately guide action (avoiding an abrupt drop-off or insubstantial surface versus crossing along a safe path)? This study revisited the visual cliff and added three new visual ground surfaces (one continuous and substantial, one continuous and insubstantial, and one partial and substantial). Based on previous research with infants on slanting ground surfaces (see Eppler, Adolph, & Weiner, 1996), we expected infants to use exploratory activity to differentiate ground surfaces prior to relating this information to consequences for locomotion and acting adaptively.

Method

Nineteen infants were tested every three weeks from the first week of crawling through three months of crawling experience (1, 4, 7, 10, 13 weeks). They ranged in age from 6.8 to 10.6 months at their first test session (M age = 8.4 months). A cross-sectional control group (19 infants matched for age of crawling onset) was tested once at the same endpoint (13 weeks of crawling experience) to check for effects of repeated testing.

Infants were coaxed to crawl across a 4 ft square gap centered between starting and landing platforms (4 ft wide X 2 ft long, raised 30 in above the