

# Detection of Multimodal Affect-Object Relations Guides Young Infants' Manual Exploration of Objects

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## Introduction

Although research on social referencing has demonstrated that by 12 months of age infants can use another's affective expression to guide their behavior toward an ambiguous object or situation (Klennert, 1984; Moses, Baldwin, Rosicky, & Tidball, 2001), few studies have investigated the precursors of this ability in multimodal contexts. Most social interactions involving affective expressions occur in multimodal, dynamic, contingent contexts. Research indicates that infants are highly sensitive to amodal information such as tempo, rhythm, and affect and that detection of this information emerges in multimodal, redundant (audiovisual) stimulation, and later in development is extended to nonredundant (unimodal) stimulation (Bahrack & Lickliter, 2000, 2004; Flom & Bahrack, 2007; Lewkowicz, 1996). Affective information is amodal and conveyed by temporal and intensity patterning common to auditory and visual stimulation. The present study explores infants' ability to use affect-object relations depicted in unimodal and multimodal video presentations of moving toys to guide their manual exploration of the 3-dimensional toys. Five-and-a-half month-old infants (assigned to either an audiovisual or visual only condition) were habituated to alternating videos of one novel toy moving, eliciting a contingent happy/excited expression in an actress, and another novel toy moving, eliciting a contingent fearful expression. Previous results indicated that infants habituated in the audiovisual condition were able to relate the affective expression with the moving toy, but infants in the visual condition were not. Following habituation, infants were presented with the 3-dimensional (live) toys and their touching preference for the toys was measured. It was predicted that infants in the multimodal audiovisual condition, but not the unimodal visual condition would show a significant touching preference for the toy previously paired with the positive expression as compared with the chance value of .5.

## Stimulus Events

Filmed events of a woman responding contingently either with a happy/excited or a fearful/disgust expression to intermittent movements of a toy horse and a toy robot (see Figure 1) were used as events for the habituation phase. The actress looked at the toy and immediately following the movements of the toy, she responded with one of the affective expressions while saying "oh it moves, look it moved!" The bimodal audiovisual condition portrayed dynamic films that included the synchronized soundtrack. The unimodal visual condition was identical to the bimodal one except that no soundtrack accompanied the visual presentation. The live 3-dimensional toys were presented to the infants after the habituation phase (see Figure 2).

## Procedure

Twenty-nine five-and-a-half-month-old infants participated in the study. Infants were first habituated (in an infant control procedure) to alternating videos of the moving toys (robot and horse) eliciting the actress' affective expressions in either a bimodal audiovisual condition or a unimodal visual condition. The video presentations depicted one toy paired with the actress' positive expression (happy/excited) and the other toy paired with her negative expression (fearful/disgust). After the habituation phase, infants were presented with the 3-dimensional toys placed side by side on a tray in front of them and infants' touching preference for the toys was measured. The lateral position of the two toys was counterbalanced across two 30-second trials and across participants. Infants' proportion of total touches (PTT) to the toy previously paired with the positive expression served as the dependent measure. Infants in the bimodal habituation condition were expected to show a significant PTT to the toy paired with the positive expression, however, infants in the unimodal habituation condition were not expected to show a significant PTT to either toy.

Figure 1



Figure 2



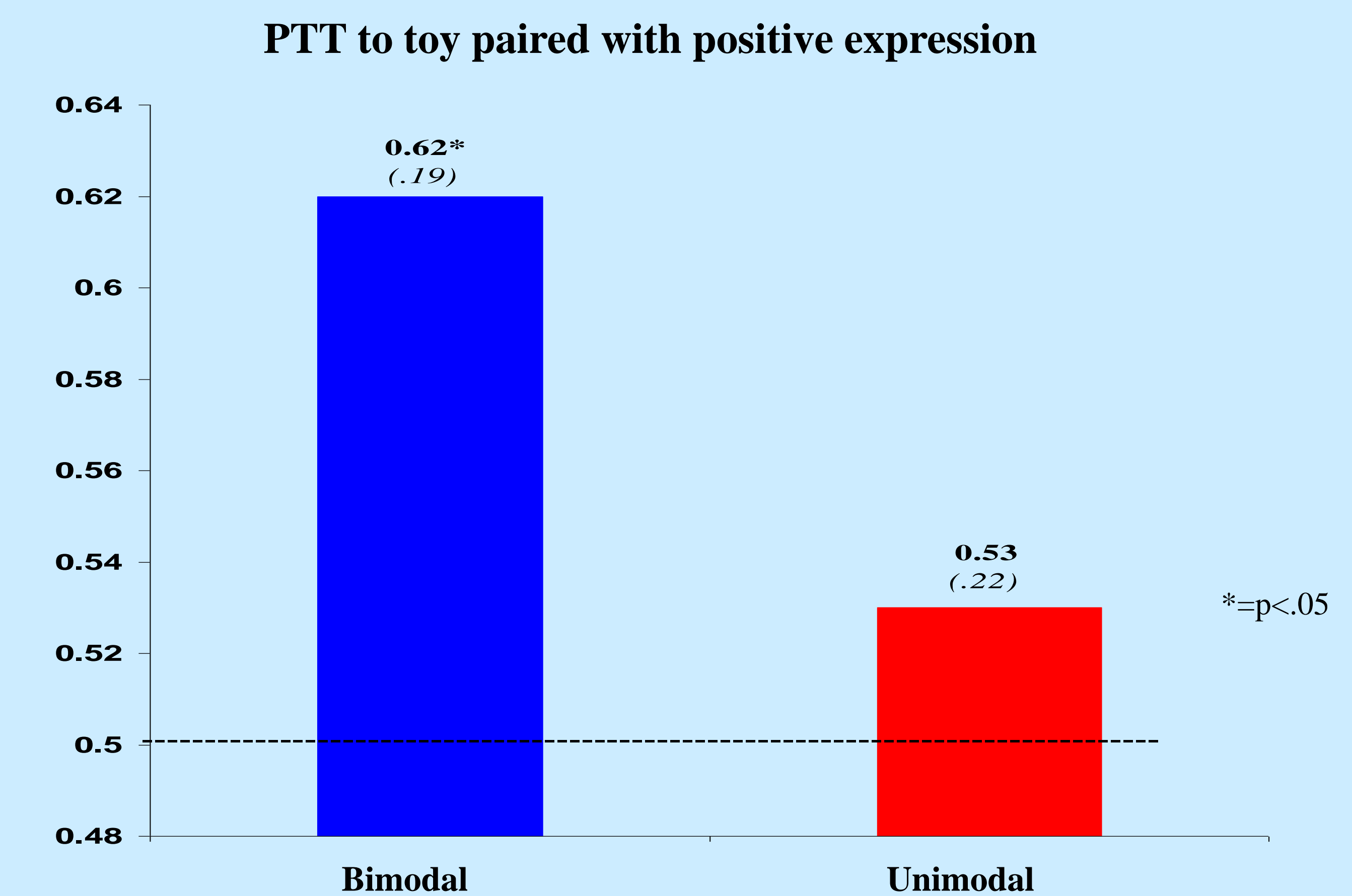
## Results

Consistent with our predictions, infants in the bimodal condition demonstrated a significant PTT to the toy previously paired with the positive expression, according to a single sample *t*-test ( $M = .60, t(13) = 2.3, p < .05$ ; see Figure 3). However, infants showed no significant PTT for either toy in the unimodal visual condition ( $M = .53, t(14) = .57, p > .05$ ).

## Conclusions

These results indicate that by 5 ½-months, infants can perceive the relation between an affective expression and the object to which it refers in contingent, multimodal stimulation. Moreover, infants can use that information to guide their manual exploration of the 3-dimensional objects. These results demonstrate an early form of social referencing in 5 ½-month-old infants. The findings highlight the importance of multimodal stimulation during infancy for promoting perception of affect-object relations and social referencing and suggest that these abilities emerge in dynamic, multimodal, contingent contexts across the first half year of life.

Figure 3



## References

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