

Infant Perception of Object-Affect Relations

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Abstract

According to the intersensory redundancy hypothesis (IRH) infants' perception of amodal information such as rhythm and tempo is facilitated when information is presented redundantly across more than one sense modality. In contrast, perception of modality specific information such as color or pitch is facilitated in unimodal stimulation (Bahrick & Lickliter, 2000, 2002). Previous research indicates that young infants perceive the amodal properties of rhythm and tempo better in bimodal (audiovisual) stimulation than in unimodal stimulation (Bahrick, Flom, Lickliter, 2002; Bahrick & Lickliter, 2000, 2002). The present study investigates infants' perception of the relation between the motion of a novel toy and the contingent affective expression it elicits in an actress. Information about affect is amodal and conveyed by temporal and intensity patterning common to auditory and visual stimulation. Consistent with the IRH, it is expected that detection of affect and thus affect-object relations should be enhanced under bimodal audiovisual stimulation as compared with unimodal stimulation. Infants were habituated to videos of two moving toys eliciting an actress' emotional expressions. One of the moving toys elicited an excited/happy expression and the other toy elicited a fearful/disgust expression. During the test trials, the object-affect pairing was reversed. Visual recovery to the change in object-affect pairing was the dependent measure. Results supported predictions of the IRH and demonstrated that infants were able to relate the toys and their actions to particular emotional expressions when the presentation was bimodal audiovisual but not when it was unimodal visual. These findings indicate that by 5 ½-months infants detect and relate the contingent affective responses of unfamiliar adults to moving objects in bimodal audiovisual stimulation.

Introduction

It is important for infants to perceive the affective meaning of expressions and relate the expressions to particular contexts or objects in order to guide their actions toward objects and events in appropriate ways. Most social interactions involving affective expressions occur in multimodal, dynamic, contingent contexts. Research has demonstrated that by 5 to 7 months of age infants are capable of discriminating several emotional expressions and matching facial and vocal affective expressions (Walker-Andrews, 1997). Research has also demonstrated that infants are sensitive to contingencies in early development (Bahrick & Watson, 1985; Rochat, 2001). Furthermore, research on social referencing has demonstrated that by 12 months, infants can use another's emotional expressions to guide their behavior toward an ambiguous object or context. However, few studies have explored the precursors of this ability in multimodal contexts. One possible basis for learning to relate an affective expression and an object is detection of the contingency between the behavior of the object and the affective expression it elicits. The present study investigated whether 5 ½-month-old infants could detect the relationship between an individual's emotional expression and the object to which it referred, when the expressive behavior was contingent upon the object's motion. Further, infants experienced the events under bimodal (audiovisual) or unimodal (visual-silent) conditions. Consistent with predictions of the IRH, it was predicted that infants would detect the contingent affect-object relation better in bimodal than in unimodal stimulation.

Stimuli

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. The actress looked at the toy and immediately after movements of the toy, the actress responded with the affective expression while saying "oh it moves, look it moved!" The bimodal audiovisual condition portrayed dynamic films that included the soundtrack. The unimodal condition was identical to the bimodal one except that no soundtrack accompanied the visual presentation.

Figure 1



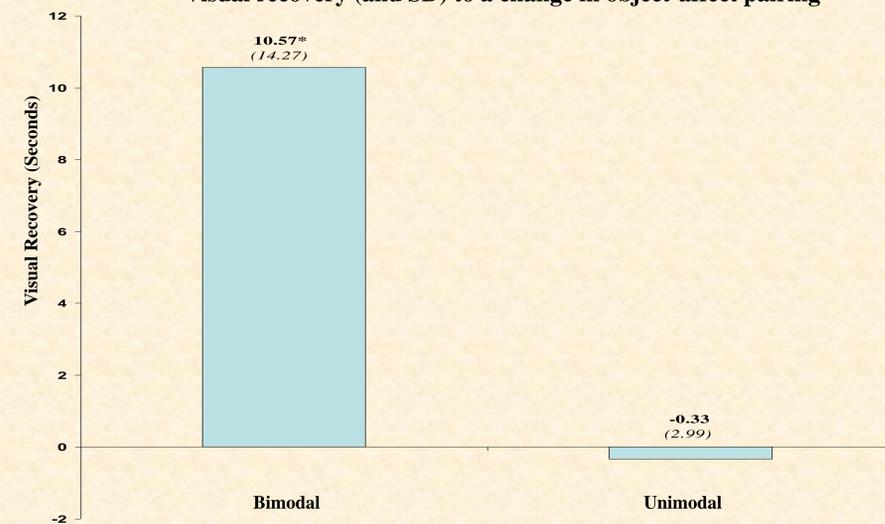
Procedure

Seventeen 5 ½-month-old infants viewed two alternating events in an infant controlled habituation procedure. Infants were habituated to alternating films of an actress responding with a contingent happy expression to a moving toy horse and a contingent fearful expression to a moving toy robot or the reverse pairing (counterbalanced). Infants' looking time to the films was recorded by trained observers. Once infants were habituated (a decrease in looking time by 50% of the initial looking time), two test trials were presented. The test trials were identical to those of habituation except that the object-affect pairing was reversed. Thus, if an infant had been habituated to the actress responding happily to the toy robot, and fearfully to the horse toy, then they saw the actress responding fearfully to the robot toy and happily to the horse toy during the test trials. Visual recovery to the change in affect-object pairing was the dependent measure. It was predicted that infants in the bimodal audiovisual condition would perceive the object relation and therefore would show a significant visual recovery to the test trials. In contrast, the infants in the unimodal silent condition were not expected to show visual recovery to the change in affect-object pairing.

Results

Preliminary results (see Figure 2) found that infants in the bimodal condition (N=11) demonstrated significant visual recovery to the change in object-affect pairing, according to a single sample t-test ($M = 10.586, SD = 14.265, t(10) = 2.571, p = 0.026$). Infants in the unimodal condition (N=6) did not show significant visual recovery to the change in object-affect pairing ($M = -0.326, SD = 2.993, t(5) = -.244, p > 0.1$). Additionally, a two sample t-test demonstrated that infants' visual recovery to a change in the object-affect pairing in the bimodal condition was significantly greater than the infants' visual recovery in the unimodal condition, $t(16) = 2.599, p = 0.023$.

Figure 2
Visual recovery (and SD) to a change in object-affect pairing



Conclusions

These results indicate that by 5 ½-months of age, infants can perceive the relation between an object's motion and an individual's contingent emotional expressions in bimodal, dynamic, audiovisual displays, but not in unimodal, visual displays. The superiority of bimodal over unimodal perception of object-affect relations is consistent with predictions of the IRH and likely reflects the fact that perception of affect and social referencing emerges first in a multimodal redundant context. These findings also suggest that the failure of young infants to social reference in previous studies (e.g., Mumme & Fernald, 2003), was not due to an inability to relate a person's emotional expression to an object. Indeed, the present results demonstrate that infants as young as 5 ½-months can perceive object-affect relations when the individual's affective expression is contingent upon the object's motion. This ability is fundamental to the development of social referencing.

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