A New Procedure to Examine the Role of Intersensory Integration in an Operant Learning Task in 3-Month-Old Infants

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Introduction

• Intersensory integration refers to the ability to combine information from different sensory modalities (i.e. visual and tactile) to form unified perceptual conclusions.

• This unity is aided by the detection of amodal cues; cues that are not specific to one sensory modality. Previous studies have shown that infants can detect amodal cues (e.g. Bahrick & Pickens, 1994).

• Most procedures examining the role of intersensory integration in learning have used simple procedures such as habituation and discrimination. For example, Bahrick and Lickliter (2000) found that 5-month-old infants were able to discriminate between two rhythms when the rhythms were presented in two sensory modalities (auditory and visual) but not when presented in only one modality (auditory or visual).

• Few studies, however, have assessed the influence of intersensory integration using more complex procedures, such as operant learning. The goal of the current study is to determine if a modified conjugate mobile procedure (Rovee & Rovee, 1969) can be used to analyze the role of amodal information in an operant learning task.

Purpose of Study

•To examine the use of a new, complex learning procedure to assess intersensory integration in 3-month-old infants.

Method

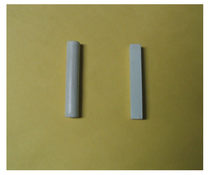
Participants

32 3-month-old infants participated
Control: *n* = 14 infants (10 females, 4 males); *M* age = 97.64 days (*SE* = 3.42); *M* SES = 52.98, (*SE* = 5.35).
Cylinder: *n* = 9 infants (4 females, 5 males); *M* age = 97.56 days (*SE* = 3.02); *M* SES = 69.69, (*SE* = 6.74).
Brick: *n* = 9 infants (3 females, 6 males) *M* age = 104.78 days (*SE* = 3.65); *M* SES = 60.01 (*SE* = 9.25).

Apparatus

Computerized Kicking Apparatus
See Kraebel, Fable, & Gerhardstein (2004) for mechanical details.

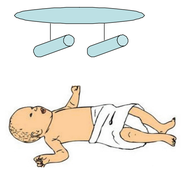
A padded shield prevented the infants from processing the shape visually and orally. The padded shield measures 63 cm in length and 19.5 cm in height. The aperture measures 10 x 8 cm.



The cylinder and cuboid both measure 8 x 1.5 cm. The objects were made of wood which had been sanded, painted, and varnished.

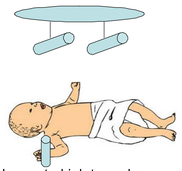
Procedure/Design

Control Group



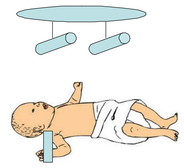
Learn to kick to make cylinders move without holding an object.

Cylinder Group

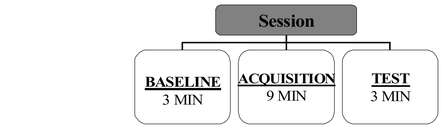


Learn to kick to make cylinders move while holding a cylinder.

Brick Group



Learn to kick to make cylinders move while holding a brick.

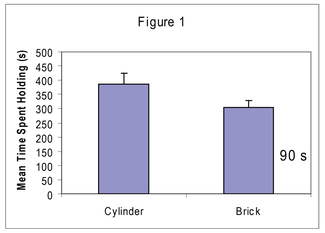


Control:	no object	no object	no object
Cylinder:	no object	held object	no object
Brick:	no object	held object	no object

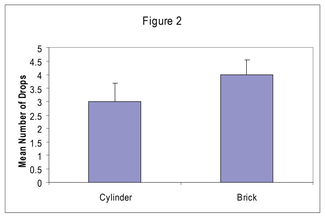
Compared kick rates and responsivity to the objects

Results

1) There was no significant difference in the amount of time the object was held between the cylinder group and brick group, t (16) = -1.73, p >.05; suggesting that the participants were able to reach the holding time criteria of 90 s regardless of which object was held and suggesting that the infants treated the two objects similarly.

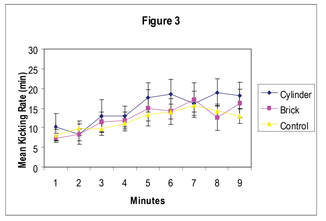


2) There was no significant difference in the number of times the participants dropped the object between the cylinder group and brick group; t (16) = 1.18, p > .05; suggesting that shape is not a factor in the participants' decision to drop the object.



3) Differences in mean kick rate during acquisition was analyzed as a function of group using a 3(Group) x 9(Minute) ANOVA.

There was no significant main effect of group, F(2, 29) = .44, p > .05; the kick rate did not differ between groups. There was a significant main effect of minutes, F(8, 232) = 11.3, p < .05; the kick rate increased for all groups. There was no significant interaction between group and minutes, F(16, 232) = .81, p >.05; the mean kick rate increased in the same pattern across all groups during acquisition.



Conclusion

- Participants were able to reach criterion (90 s) required to detect shape information haptically and they appeared to respond to objects the same.
- The presence of a shield during acquisition did not inhibit kick rates in 3-month-old infants.
- Overall, the procedure is effective to test the role of intersensory integration in an operant learning task by manipulating the amodal dimension of shape between the objects on the mobile and the object that is held.

References

Bahrick, L. E., & Lickliter, R. (2000). Intersensory redundancy guides attentional selectivity and perceptual learning in infancy. *Developmental Psychology, 36*(2), 190-201.
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