Infant Object Mastery in the Home: A Robust Phenomenon

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Abstract

In this study, it was hypothesized that experimentally introduced noise would disrupt infant object mastery performance in the home environment. Twenty-four 12-month-old infants performed under control and experimental test conditions on alternating home visits. A tape-recording of talk radio conversations was introduced during the experimental test visit. Each videotaped visit included a test session with 6 short object mastery trials. The hypothesis was not supported. The implications of the findings are addressed.
Infant Object Mastery in the Home: A Robust Phenomenon

Infants attempt to understand objects in their environment by attending to and exploring those objects. With focused exploration, infants can gain competency in exerting control or mastery over objects. Object mastery refers to this attempt to control inanimate objects. We would expect to see a great deal of object mastery in familiar settings such as one’s home. Imagine a one-year-old exploring the world of her kitchen floor. There she may find toys and also household objects. She may find that a particular object can be moved easily but not opened easily. With further exploration the child discovers how to release a handle and open the found object. There are numerous opportunities for discovery such as this in one’s home. There may also be many things that interfere with this process. Barriers to object mastery can include significant distracters such as other objects, sounds and nearby activity. There may be too many things or people in the way for full exploration. Past research has shown that home environmental variables, including measures of noise and crowding have been found to be correlated with reduced object mastery performance measured in the lab environment (Wachs, 1987). Yet, a stimulus shelter or retreat has been shown to buffer the negative effects of noise (Wachs, 1987). In order to gain competency, an infant needs some type of buffer from extraneous noise, clutter and activity or they need to be moderately resistant to distracters.

Most of the research on mastery performance has been done in laboratory settings (Yarrow et al., 1982; MacTurk et al., 1987; Hron-Stewart, Lefever & Weintraub, 1990; Busch-Rossnagel et al., 1993). If researchers were interested in the impact of the home environment they made home assessments and measured infant mastery behavior in the laboratory. The relationship between the two types of variables was then measured. In a previous study that was an exception to this pattern, infant object mastery was studied in the home environment while
extraneous noise and object clutter were experimentally introduced to during the test period (Weinberger, 1999). The study demonstrated that object mastery tasks could be adapted and done in the home context using experimental controls. In addition, the level of performance on the object mastery tasks done in the “home reached, and sometimes surpassed, the performance of infants tested in laboratories”, 57. The extraneous stimuli however, did not have the disrupting influence on the infants as predicted. Some of the possible experimental limitations included, ecologically-invalid distracter stimuli, stimuli that were presented too briefly to be disruptive and live scoring rather than video recorded scoring. Live scoring limited the number of behavioral categories that were scored and therefore it may not have fully captured infant behavior.

The current study was developed to overcome these constraints. It was hypothesized that experimentally introduced sound would disrupt infant object mastery performance in the home setting. The level of disruption was expected to be the greatest when infants were exposed to introduced sound for relatively longer period of time during the home visit testing procedure.

Method

Participants & Design

The research participants were 24 healthy 12-month-old infants (12 females and 12 males). As seen in Table 1, a within-subject, counterbalanced design was used. Each infant performed under both control and experimental test conditions on alternating home visits within a two-week period. Each visit consisted of a 15 minute warm-up period in which the experimenter asked the parent some background questions and made general conversation with the parent. The child was allowed to play freely at this time. The warm-up was followed by the test period, which
included 6 short object mastery trials. For the test period, each infant was placed in a low booster seat on the floor. The test session was video recorded for later observation and coding.

In order to test the effect of noise on object mastery, the infants were placed in either one of three experimental groups: warm-up; test or both groups. For the warm-up group, the introduced stimulus was presented only during the warm-up period prior to the test period. For the test group, the introduced stimulus was presented during the test period only. Finally, for the both group, the introduced stimulus was presented during the warm-up and the test period. The introduced stimulus was a tape-recording of conversations from a talk radio program that alternated for periods of 10 seconds on and 10 seconds off. The recording was placed out of infant reach and was set for 60dB, which is considered to be a conversational level.

Tasks

The same tasks were presented for both visits using two sets of stimuli that were similar but not identical to each other. Each child was presented with 3 sets of object mastery tasks. Each task had two versions; one version used objects that had noisy features while another version had softer and quieter materials. The task stimuli can be seen in figures 1-6.

1. Novelty tasks

Each infant was briefly presented with a pair of differently patterned boxes for three 10-second trials. On the following test trial, each infant was given a familiar box and a novel box to explore for 60 seconds. The quiet version of the task had bumps with different densities for exploration. For the noisy version of this task, the boxes made sounds when shaken. Mastery behavior would involve direct contact with the bumps on the quiet boxes and shaking the noisy boxes.
2. **Container tasks**

The experimenter modeled putting 3 small objects into a plastic container and then gave the infant 60 seconds to explore the objects and the container. The objects were either soft (for the quiet version) or hard (for the noisy version). Mastery behavior would require the infant to drop all three objects in the container as was modeled by the experimenter.

3. **Persistence tasks**

Infants were presented with objects for 60 seconds that were impossible for them to open. For the quiet persistence task, each infant was shown a clear plastic box or a jar with a toy and time to explore the toy. The box was locked and given to the infant. For the noisy task, each infant was shown how a jack-in-box operates, and then it was closed and given to the infant. Mastery behavior would involve attempting to open the box or jar by manipulating the box’s knob or the jar’s lid or by manipulating the jack-in-the-box handle.

**Results**

The primary measures for analyses were the cumulative duration and number of episodes for each of the 3 following measures: 1) object exploration; 2) object mastery and 3) off-task behavior. Object exploration was scored if the infant was both visually and tactiley attending to the test object(s). Object mastery was scored if the infant displayed visual attention and the tactile contact was specific to goal-directed behaviors, such as touching the knob of the jack-in-the box or shaking the noisy novelty boxes. Finally, off-task behavior was scored if the infant pushed or gave objects away, played with the booster chair, squirmed or looked out into space.

With respect to the hypotheses, it was expected that infants would spend more time involved in exploration & object mastery in the control condition as compared with the experimental condition. Conversely, more time in off-task behavior was expected during the
experimental condition as compared with the control condition. It was expected that infants in the both experimental group would demonstrate these patterns of disrupted performance to a greater degree than infants in the warm-up or test group because of the longer exposure to introduced noise. 

As seen in Figure 7, the results indicate that 12-month olds were actively engaged with the objects during the test period. The infants spent most of their time on-task during each trial. The container tasks elicited the most exploration. In this task infants held and explored the stimuli for most of the short trial. These objects were more intriguing than the novelty objects, where infants spent the least time overall involved in on-task behavior. Of course, the infants had 30 seconds prior to the test trial to explore a set of boxes. The persistence tasks elicited the most mastery behavior. This is not surprising, as it was the most challenging task.

However, based on ANOVA tests, there were no robust main effects or interaction effects for: a) condition (control v. experimental); b) group (warm-up v. test v. both) or c) gender (male v. female). Thus, the analyses do not support the hypothesis that introduced sound in the home will disrupt early object mastery.

Discussion

The findings from this study may be good news for infants; since infants were not particularly deterred by the introduced sound. However, before accepting this conclusion, three broad issues or questions will be addressed here. First, was the introduced sound too subtle for the infants to notice? This was also a concern for the prior study in which the stimulus tape of a random assortment of household sounds (e.g., doors closing and tea kettles whistling) was used and not found to be disruptive to 12-month-olds involved in object mastery tasks. (Weinberger, 1999). The stimulus in the current study was selected to be potent while maintaining ecological
validity. Informally, it was clear to the experimenter that the infants did notice and attend to the introduced sound in the current study. However, it may be that the taped radio show was not a potent or complex distracter in this environmental setting. A stimulating home setting may accommodate small increases in novel sounds, allowing children to notice a sound without being interrupted by it. The introduced sound in this study did not necessarily add significantly to the auditory complexity of the home environment. Past research has shown that the level of complexity of a distracter influences how quickly an infant’s attention is altered (Tellinghuisen, Oakes, Tjebkes, 1997). Thus, a future study could use a methodology with stimuli that varied in complexity and perhaps was more realistic as well. For example a study could include stimuli with three television conditions. The testing procedure would take place in the same room as an existing television. The object mastery tasks would be conducted either a) while the television was on; or b) while only the television sound was on; or c) while only the television picture was turned on.

Another question to address is, were the tasks ineffective in demonstrating a loss of attention? Research has shown that infants are less distracted when actively engaged with objects. (Richards & Turner, 2001). It appears that these infants were engaged in these tasks as other infants have been in similar object mastery tasks, and therefore less vulnerable to distraction. As shown in other research, noise affects different types of performance differently (Maxwell & Evans, 2000). Perhaps, if the tasks were more dependent on audition, in particular if they involved speech processing, the infants may have demonstrated reduced competency when the sound was introduced. Thus, there are likely to be limits to the apparent stability of object mastery in the home environment.
Finally, *were there undetected individual differences in performance?* Past research has shown that young boys are often more negatively affected by noise than young girls (Wachs, 1987). However, that was not the case in this study. If anything, there were statistical “trends” that boys did better than girls when exposed to the introduced sound. It may be more of a matter of temperament than gender. Recent research has suggested that temperament may matter in cognitive performance. For example, it has been shown that high noise levels more negatively affected object mastery performance for toddlers who were rated to be more temperamentally *difficult* as compared with less difficult toddler peers (Collins & Cassidy, 1999). In a study with adults, *extroverts* had less trouble with recorded noise during a cognitive task than did introverts (Belojevic, Slepcevic & Jakovljevic, 2001). Future research should include measures of temperament as a possible mediating factor on performance.

In conclusion, this study demonstrates that very young children are able to attend to novel materials in a context in which they are likely to feel comfortable, their homes. The infants tested here were also able to respond to the materials in developmentally appropriate ways. For example, they engaged in more mastery behavior when confronted with more challenging tasks. It appears that object mastery in the home is indeed a robust phenomenon. Perhaps the complex and also familiar home context buffers children’s distraction to the modestly imposing auditory stimuli. However, the extent of this good news is unknown. To have more confidence in this interpretation it would be helpful to know how infants would react if they were exposed to a wider variety of test conditions.
References


Table 1. Experimental Design

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Figure 1. Novelty task stimuli (quiet version)
Figure 2. Novelty task stimuli (noisy version)
Figure 3. Container task stimuli (quiet version)
Figure 4. Container task stimuli (noisy version)
Figure 5. Persistence task stimuli (quiet version), infant exploring
Figure 6. Persistence task stimuli (noisy version)
Figure 7. Amount of exploration and mastery behavior across tasks