



Dropout in looking time studies: The role of infants' temperament and cognitive developmental status



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ABSTRACT

Dropout of infants in looking time studies sometimes occurs at high rates, raising concerns that the representativeness of the final sample might be reduced in comparison to the originally obtained sample. The current study investigated which infant characteristics play a role in dropout. Infants were presented with a preferential looking task at 6 and 9 months of age. At 9 months of age, an additional habituation task and a subsequent novelty preference task were conducted. In addition, temperament was assessed via the Infant Behavior Questionnaire – Revised (IBQ-R, Gartstein & Rothbart, 2003), and cognitive developmental status was assessed via the Cognitive Scale of the Bayley Scale of Infant and Toddler Development (BSID-III, Bayley, 2006). Dropout was positively related to the IBQ-R temperament scales Distress to Limitations and Approach, and negatively related to the scales Falling Reactivity and Cuddliness. The representativeness of the final sample regarding situation-specific temperament dimensions is affected by dropout. Dropout was not related to cognitive developmental status as measured via the BSID-III, habituation speed and novelty preference. Dropout at 6 months of age was associated with dropout at 9 months of age. We concluded that in looking time studies, the representativeness of the final sample regarding performance-relevant temperament dimensions or cognitive developmental status is not affected by dropout.

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1. Introduction

Dropout in infant studies is a problem which all researchers have to face when testing infants and toddlers at home or in a laboratory. Possible reasons for the termination of a test session are crying, lack of responding, restlessness or sleepiness. This change in some infants' affective and arousal state can be caused either by random factors such as the infants' state on the day or by predictable factors such as the infants' temperament. If the latter is the case, the obtained sample is not representative of the original sample. Especially in research with pre-linguistic infants, the looking time task is a widely used method. Looking time tasks enable the assessment of attention-related processes and infants' discrimination abilities (Saayman, Ames, & Moffett, 1964). Looking time tasks are especially prone to dropout, because infants are required to sit still for several minutes. Average dropout rates of up to 26% are normal (Wachs & Smitherman, 1985), and studies examining which factors account for dropout in looking time tasks have provided mixed results so far. In order to investigate this phenomenon in more detail, we tested whether infants' temperament and cognitive developmental status predict dropout

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in a looking time study at 9 months of age. Additionally, dropout in a looking time study at 6 months of age was assessed in order to predict dropout in a looking time study at 9 months of age.

1.1. Dropout and temperament

Temperament is an infant characteristic which might influence dropout in looking time studies. A standard method to measure temperament in infancy is the assessment via the Infant Behavior Questionnaire – Revised (IBQ-R, [Gartstein & Rothbart, 2003](#)). The questionnaire is based on a model of temperament which “refers to individual differences in reactivity and self-regulation” that are assumed to be a “relatively enduring biological makeup of the organism” ([Rothbart & Derryberry, 1981](#), p. 40).

Temperament has been defined as “relatively enduring” ([Rothbart & Derryberry, 1981](#), p. 40), which suggests a high stability of temperament over time in the first years of life. There is mixed evidence for the idea of a high stability of temperament in empirical studies. On the one hand, some longitudinal studies on infant temperament showed high stability for different aspects of temperament (e.g., [Gartstein, Putnick, Kwak, Hahn, & Bornstein, 2015](#); [Mink, Henning, & Aschersleben, 2013](#), for general infant temperament; [Buss, Block, & Block, 1980](#), for activity level; [Putnam, Gartstein, & Rothbart, 2006](#); [Rothbart, Derryberry, & Hershey, 2000](#), for positive emotionality). On the other hand, other longitudinal studies on infant temperament showed low stability for temperament (e.g., [Bridgett et al., 2009](#), for regulatory capacity; [Carranza Carnicero, Pérez-López, González Salinas, & Martínez-Fuentes, 2000](#), for emotional tone, social orientation, activity level, and vocalization). There are several explanations for these inconsistent findings. First, low stability of infant temperament measures might be related to problems in the concept and measurement of temperament ([Hubert, Wachs, Peters-Martin, & Gandour, 1982](#)). For example, it is difficult to control for other factors in the longitudinal measurement of temperament. That is, disentangling temperament development and environmental and parental influences can be problematic; it has been shown that parenting practices are related to temperament development ([Bridgett et al., 2009](#)). Second, the expression of temperament in young infants might change over time as the infant develops. The low stability of temperament might therefore result from developmental changes in the expression of temperament rather than from changes in the underlying structure of temperament ([Riese, 1987](#)). The authors of the IBQ acknowledge the idea of developmental changes by recommending taking the “possibility of developmental change and individual differences in developmental timetables [...] into account” ([Rothbart, 1986](#), p. 356).

Several studies have addressed the relationship between temperament and dropout, with questionnaires being the most widely used method to assess infant temperament ([Fagen, Ohr, Singer, & Fleckenstein, 1987](#); [Fagen, Singer, Ohr, & Fleckenstein, 1987](#); [Miceli, Whitman, Borkowski, Braungart-Rieker, & Mitchell, 1998](#); [Mink et al., 2013](#); [Treiber, 1984](#); [Vonderlin, Pahnke, & Pauen, 2008](#); [Wachs & Smitherman, 1985](#)). However, the findings in this regard have been mixed: On the one hand, researchers reported differences in temperament between non-completers (NC) and completers (C) of looking time tasks, with NCs being rated as more fussy and inadaptable (for female Cs and NCs, see [Wachs & Smitherman, 1985](#); for both boys and girls, see [Treiber, 1984](#)), as sadder and less able to maintain orientation for longer periods of time ([Fagen, Ohr, et al., 1987](#); [Mink et al., 2013](#)), and as more active ([Miceli et al., 1998](#)) than Cs. NCs were found to smile and laugh more often than Cs ([Miceli et al., 1998](#)), which is inconsistent with the finding that NCs were sadder than Cs ([Mink et al., 2013](#)). On the other hand, some studies reported no differences between NCs and Cs in temperament (for boys, see [Wachs & Smitherman, 1985](#); for boys and girls, see [Vonderlin et al., 2008](#)) and in their general amount of movements ([Lewis & Johnson, 1971](#)). However, the comparability of the studies is limited due to different task types, different sample sizes, different methods to assess infant temperament, and different infant ages.

All things considered, studies assessing whether Cs and NCs of test sessions differ in their temperament have produced mixed findings. NCs were reported to be less able to maintain orientation, to be more active, fussier, and less adaptable than Cs. In contrast, some studies reported no differences between NCs and Cs. Therefore, there is a clear necessity to shed further light on this question.

1.2. Dropout and cognitive developmental status

Cognitive developmental status is another infant characteristic which might influence dropout in looking time studies. Standard methods to measure cognitive developmental status in infancy are assessments via the Cognitive Scale of the Bayley Scale of Infant and Toddler Development (BSID-III, [Bayley, 2006](#)), habituation speed, and novelty preference tasks ([McCall & Carriger, 1993](#)). To the best of our knowledge, only a small number of studies have analyzed the influence of infant cognitive developmental status on dropout. One study has examined habituation speed in Cs and NCs of a habituation task ([Richardson & McCluskey, 1983](#)). Although no differences in habituation speed between Cs and NCs were found, it was not reported how the number of trials to habituation in NCs was analyzed.

There might be two possible relationships between dropout and cognitive developmental status: First, infants with high cognitive developmental status might be more likely to drop out of looking time studies because these tasks might be too undemanding, leading the infants not to complete them. This idea received support from a study in which NCs of an attention-getting procedure were more likely to drop out when presented with simple compared to complex stimuli ([DeLoache, Rissman, & Cohen, 1978](#)). The authors suggested that developmentally advanced infants were more likely to drop out of the simple stimuli conditions than less advanced infants. Second, the ability to complete a task might be a

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