NEPS
National Educational Panel Study

Research Data

Information on Direct Measures

NEPS Starting Cohort 1 — Newborns

Education From the Very Beginning

Wave 2: 17 months

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Direct measures (observations and test information)					
Test situation	Seventeen-month-old children were observed/tested individually in their homes in the presence of the anchor person and the interviewer.				
Sequence of tests/observations	The direct measures were administered in the following sequence: 1. Habituation-Dishabituation Paradigm 2. Semi-standardized Parent-Child-Interaction (Linberg, A., Mann, D., Attig, M., Vogel, F., Weinert, S., & Roßbach, H.-G. (2019). *Assessment of interactions with the macro-analytic ratings system of parent-child-interactions in the NEPS at the child's age of 7, 17, and 26 months* (NEPS Survey Paper No. 51). Bamberg: Leibniz-Institute for Educational Trajectories, National Educational Panel.) The direct measures were recorded on video and coded afterwards.				
Duration of observations/tests (excluding setup)	approx. 17,5 minutes				
Information about the administered direct measures					
Construct	Number of tasks	Duration	Mode of administration	Number of coded items	Next assessment
Habituation-Dishabituation Paradigm	1 task with 13 trials	approx. 7,5 minutes	visual stimuli presented on a laptop; coding of visual attention/fixations	132	-
Parent-Child-Interaction	-	approx. 10 minutes	observed interaction behavior (standardized tasks)	18	Wave 3

Preface

The development of the individual tests is based on framework concepts. They are overarching concepts on the basis of which education-relevant competences are to be shown consistently and coherently over the entire personal history. Therefore, the following framework concepts, which served as a basis for the development of the test tools to measure the above-mentioned constructs, are identical in the different studies.

In addition to the competence measures, which are coherently assessed across the lifespan, stage-specific measures are assessed at specific points in time at which these measures are especially meaningful (cf. Berendes, Weinert, Zimmermann, & Artelt, 2013[1]). Usually, these assessments are not repeated.

[1] Berendes, K., Weinert, S., Zimmermann, S., & Artelt, C. (2013). Assessing language indicators across the lifespan within the German National Educational Panel Study (NEPS). *Journal for Educational Research Online/Journal für Bildungsforschung Online*, *5*(2), 15–49.

Habituation-Dishabituation Paradigm

The habituation-dishabituation paradigm is an empirical procedure that is frequently used to study and assess early processes and abilities of attention and information processing that are considered fundamental for the cognitive development of very young children (Colombo & Mitchell, 2009).

Using visual habituation-dishabituation tasks, children are presented with visual stimuli (e.g., pictures), and their looking behavior and fixation times are observed or recorded and analyzed. In such standard procedure tasks, a sequence of stimuli that are identical or similar with regard to certain aspects (habituation phase) is followed by markedly different stimuli (dishabituation phase). Depending on the exact design, the tasks allow a broad spectrum of early child abilities to be investigated, such as (early) memory (e.g., McCall & Carriger, 1993), sensitivity to and the ability to distinguish properties of objects (e.g., Oakes et al., 1991), recognition of concrete or abstract features (e.g., Casasola, 2005), categorization skills (e.g., Oakes, 2010), early understanding of numerical relations (e.g., Wynn, 1992), and skills in intermodal information processing (e.g., Streri & Féron, 2005).

Experimental paradigms examining visual habituation are used to assess children's information processing skills, mostly based on the decrease in looking times during the presentation of a sequence of visual stimuli (Colombo & Mitchell, 2009). The repeated presentation of identical or similar stimuli during the habituation phase leads to a decrease in the children's visual attention (i.e., their orientation response decreases). Children look at the pictures less because they classify them as familiar (habituation). If a new stimulus that differs from the previously presented stimuli is introduced and is recognized as such by the children, this triggers a new orientation response and, thus, an increase in visual attention (dishabituation; Oakes, 2010).

In habituation-dishabituation research, there is evidence of a certain amount of intraindividual (Bornstein, 1985; Bornstein et al., 1996) and interindividual (Davis & Anderson, 2001) stability of task performance and, thus, of underlying cognitive abilities. There are predictive relations of various habituation measures and of preference for novelty in the dishabituation phase with later general cognitive performance (e.g., Bornstein & Sigman, 1986; Colombo et al., 2009; Fagan & Singer, 1983) and academic achievement in adolescence (Bornstein et al., 2013). Domain-general tasks (i.e., tasks that are thought to indicate early cross-domain abilities), for example, were shown to be predictive of later general cognitive measures such as categorization or intelligence test performance (Rose & Feldman, 1997). Domain-specific tasks focus on early precursor skills in specific domains of competence (e.g., early comprehension of numbers and quantities or linguistic skills).

In the Newborn Cohort of the German National Educational Panel Study (NEPS SC1), a visual habituation-dishabituation paradigm was used in the first survey wave as well as for half of the sample in the second wave[2]. Although the procedure is usually conducted in a laboratory, it was administered in a household context.

[2] The tasks draw on studies and experiences of the Bamberg Baby Lab of the Department of Developmental Psychology at the University of Bamberg (Head: Prof. Dr. S. Weinert). We would also like to thank Prof. Dr. S. Pauen for her advice on the implementation of the paradigm. Preliminary studies on the tasks were conducted at the Bamberg Baby Lab.

Procedure in Wave 2 (children on average 17 months old)

In Wave 2, half of the sample participated in one of the domain-general tasks of Wave 1 (Task 1) and two domain-specific tasks. In all tasks, the habituation phase was followed by two sequential dishabituation phases, which deviated from the previous habituation stimuli to different extents (testing discrimination ability and general attention). One of the domain-specific tasks (Task 3) tested domain-specific precursor skills of language (i.e., the visual stimuli were accompanied by a pseudo word on an audio track; e.g., Zhang, 2007). Task 2 tested domain-specific precursor skills of numerical cognition (i.e., visual stimuli with different number relations; see Seitz & Weinert, 2022 for a more detailed description)[3]. In the three tasks, each picture was shown for 10 seconds, and a non-linguistic auditory cue (i.e., a short sequence of three notes) was played when the picture was first presented to catch the infant's attention – except for in Task 3, which tested precursor skills of language. Between the individual trials, there was an intertrial interval of 2 seconds. For the language-specific (Task 3) and domain-general tasks (Task 1), the habituation phase consisted of nine trials and two trials per dishabituation phase. The domain-specific task assessing numerical cognition (Task 2) consisted of four trials in the habituation phase and two trials per dishabituation phase.

The coding of the child's looking times per trial – on or off target, respectively – was done offline by independent raters using video recordings of the task and INTERACT (Mangold, 2011) software (30 frames per second). The following variables were made available based on the coding of the children's looking times[4]: five variables describing looking behavior toward the target picture (maximum, minimum, mean, total fixation time, and the number of fixations on target) and five variables describing looking behavior off target (maximum, minimum, mean, and total looking time as well as the number of times looked off target).

The available data comprise information on the coding procedure and child-related issues. The corresponding method data set includes additional detailed information on distractions during stimulus presentation and on ratings of the videos' codability.

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[3] Task 2 is based on a study by Cooper (1984). The stimulus material was developed and pretested by Freund (2012).

[4] Up to and including version SC1:9.0.1, only codings of the first tasks are available. The German Research Foundation (DFG) within the DFG Priority Programme 1646 Education as a lifelong process. Analyzing data of the National Educational Panel Study (NEPS), project "Video-Based Validity Analyses of Measures of Early Childhood Competencies and Home Learning Environment (ViVA)" (grant to Prof. Dr. S. Weinert, WE 1478/7-1 & 7-2) funded coding of the remaining tasks. The codings will be made available after project completion.

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Parent-Child-Interaction

From the beginning of a child's life, the home learning environment is important for child development and later educational trajectories (Bronfenbrenner & Morris, 2006; Linberg et al., 2019). Thus, the quality of early interactional behaviors in parent-child dyads affects several domains of child development, such as socio-emotional, cognitive, and language development (Newton et al., 2014; Tamis-LeMonda et al., 2001; Tamis-LeMonda et al., 1996; Tamis-LeMonda et al., 1998).

Various theories and empirical studies have emphasized the specific role of different dimensions of parental interaction behaviors, sometimes focusing on specific developmental domains (e.g., Ainsworth et al., 1974; Blomeyer et al., 2010; Linberg, 2018; Newton et al., 2014; NICHD Early Child Care Research Network, 1998; Wood et al., 1976). These dimensions include supportive and sensitive behavior as well as stimulating interactional behavior, emotionally positive and negative regard, parental intrusiveness, or detachment. The quality of parental interaction behavior can be operationalized in a variety of ways, either as a single specific rating or as a global indicator that encompasses multiple facets of parental interaction behavior (e.g., Linberg et al., 2017; NICHD Early Child Care Research, 2005).

Both interaction partners (Rogoff, 1990) mutually influence interactional behavior in parent-child dyads (Bornstein et al., 2008; Kochanska & Aksan, 2004; Masur & Turner, 2001). The child's characteristics and behaviors affect his or her interaction partner and are simultaneously influenced by his or her interaction partner's behavior.

To assess the quality of parent-child interaction in the Newborn Cohort of the German National Educational Panel Study (NEPS SC1), an adapted version of the NICHD-SECCYD study instrument was used (NICHD Early Child Care Research Network, 1991; 1992a; 1992b; see Sommer et al., 2016). Parent-child interactions were observed in a semi-standardized setting in the family home during the first three survey waves, at a time when the children were on average 7, 17, and 26 months old. The interactions were videotaped and subsequently rated off-line by trained observers (Linberg et al., 2019). More detailed information on the household setting, the coding instrument, coding instructions, and coder consistency can be found in Linberg et al. (2019) for all three waves.

The following aspects were standardized: the general setup, the playtime, and the play materials. The parents were asked to behave as they always do when spending time with their child and to play with

their child as usual. In most cases, the mother acted as the child's interaction partner, and in rare cases the father. The survey used different toys that can elicit different responses in children, for example, by means of a sudden discrete effect, an action with continuous effect, state-related goals, pretend play, and joint attention (for a detailed description of the play materials, see Sommer et al., 2016). The data on all German-language interaction situations are available in the scientific use file (SUF).

Procedure in Wave 2 (children on average 17 months old)
In Wave 2, the overall procedure was similar to in Wave 1. However, in line with the NICHD-SECCYD study (NICHD Early Child Care Research Network, 2005), the NEPS toys were given to the parents in three bags to be used in a predetermined order. The parents were asked to use all three bags sequentially and at their own pace, starting with Bag 1 and ending with Bag 3. The interaction situation lasted 10 minutes.

In Wave 2, almost identical rating scales were used as in Wave 1. The coding procedure was similar but adapted to the age of the children. Level changes in the data may therefore also be due to differences in coding. The rating scales used to code parental interaction behavior included: sensitivity to distress and non-distress, cognitive-linguistic stimulation, emotionality, positive and negative regard, intrusiveness, and detachment. The rating scales for child interactive behavior included: positive and negative mood, activity level, non-social sustained attention, and child social engagement. Each rating scale comprised five qualitatively defined levels, ranging from 1 "not at all characteristic" to 5 "very characteristic".

In addition to the eight ratings of parental interaction behavior and the five ratings of child interaction behavior, the SUF contains variables with information on whether data on parent-child interaction are available, which coder rated the interaction, whether the interaction language was German, whether there were deviations from the standardized setting, and whether the parent spoke to the child during the interaction. Apart from additional useful information on the parents in the parent interview data set, the SUF also contains information on which parent participated in the parent-child interaction.

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