

NEPS

National Educational Panel Study

## Information on Competence Testing

NEPS Starting Cohort 4 — Grade 9

*School and Vocational Training —  
Educational Pathways of Students in Grade 9  
and Higher*

Wave 2: Grade 9



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<b>Information on testing</b>				
Test situation	Group testing, normally taking place in the classroom, single seats, 1 test instructor, normally 1 supervisory teaching staff			
Test sequence	<p>The tests are held on two test days. On the first test day, all students take part in the sample, on the second test day only students whose families immigrated from Turkey or former Soviet Union take part. The tests are predefined in a fixed order per test day:</p> <p><b>Sequence test booklet on test day 1:</b> Reading competence + procedural metacognition, declarative metacognition, cognitive basic skills: perceptual speed and speed of information processing as well as reasoning</p> <p><b>Sequence test booklet on test day 2:</b> Russian or Turkish locator test, listening comprehension Russian or Turkish (L1 test)</p>			
Test duration (net processing time)	Test day 1: 56.5 min Test day 2: 34.5 min			
Breaks	Test day 1: only short breaks between the individual tests Test day 2: 5 min break after the L1 locator			
<b>Information on the individual tests</b>				
<b>Construct</b>	<b>Number of items</b>	<b>Allowed Processing Time</b>	<b>Survey mode</b>	<b>Next Measurement (until 2013)</b>
Reading competence	33	28 min	paper & pencil	after 2 years
Declarative metacognition	8	15 min	paper & pencil	
<i>Cognitive basic skills (non-verbal)</i>				
Perceptual speed and speed of information processing	3 x 31 = 93	3 x 30 sec	paper & pencil	-
Reasoning	3 x 4 = 12	3 x 3 min	paper & pencil	-
<i>Listening comprehension Russian or Turkish</i>				
Russian or Turkish locator test	8	ca. 2.5 min	paper & pencil, given by CD	-
Russian or Turkish L1 test	32	ca. 31 min	paper & pencil, given by CD	-

<i>Stage-specific procedural metacognition</i>				
Regarding reading competence	6	3 min	paper & pencil	See above
Regarding Russian or Turkish L1	1	1 min	paper & pencil	See above

## **Preliminary note**

The development of the individual tests is based on framework concepts. They constitute 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 that served as a basis for the development of the test tools to measure the above-mentioned constructs are identical in the different studies.

## Reading competence

The ability to understand and use written texts is an important precondition for further developing personal knowledge and personal skills, and a prerequisite for participating in cultural and social life. Manifold areas of knowledge and life are made accessible through reading. The range of reading occasions is very wide, and reading fulfills many different functions (cf. Groeben & Hurrelmann, 2004). They range from reading for expanding knowledge which is crucial to further education and lifelong learning to literary-esthetic reading. Not only do texts convey information and facts, but they also transport ideas, moral concepts and cultural contents. Accordingly, the concept of reading competence in the National Education Panel takes functional understanding as a basis for reading competence, as is also reflected in the Anglo-Saxon *Literacy Concept* (also see OECD, 2009), with the focus on competent handling of texts in different typical everyday situations.

In order to represent the concept of reading competence over the entire life span as coherent as possible, three characteristic features were specified in the framework concepts for the NEPS reading competence test. They are considered in the following age and stage-specific test forms:

1. Text functions, text types respectively,
2. Comprehension requirements,
3. Task formats.

### 1. Text functions/text types

NEPS distinguishes between five text functions and associated text types which are represented in each version of the test: a) factual texts, b) commenting texts, c) literary texts, d) instructions and e) advertising texts. This selection is based on the assumption that these five text functions are of practical relevance to the study participants of various ages. The text functions and/or text types can be characterized as follows:

Texts conveying factual information represent basic texts for learning, fundamental acquisition of knowledge and extraction of information; examples are: articles, reports, reportages and announcements. Texts with a commenting function are texts in which a stand is taken or a controversial question is discussed and in which a reflecting level is integrated. This is where, for the study and adult cohorts, for example, ingenious essays or humorous comments are found; and where, in the student cohorts, the blessing and curse of smoking could be discussed. The literary-esthetic function of texts was included in the third category; here short stories and extracts from novels or stories can be found. As a result of their specific reception that is presumably strongly dependent on educational track and curriculum, specific literary text types such as stage plays, satires or poems were excluded. The fourth category comprises text types conveying product inserts such as engineering and operating instructions, package inserts for medication, work instructions, cooking recipes etc. The fifth category (appeals, advertising) includes text types such as job advertisements, recreation programs etc. The five selected text functions and, thus, associated text types are realized as a longitudinal concept in each test booklet over the life span, which means that each test/each test booklet, for measuring the reading competence, contains a total of five texts corresponding to the five text functions.

Unlike the PISA studies, NEPS does not include discontinuous texts such as graphics, tables, road maps etc. Discontinuous texts are not contained in the NEPS concept as they pose high demands on

readers and, in addition, are not significant for every age group for which reading competence is tested in NEPS.

*Age-specific selection (text complexity, topic selection/task requirements):*

For each age cohort, texts were and are selected according to thematic orientation and lexical, semantic and grammatical properties that have to be appropriate for the respective group of readers. By increasing text complexity (larger vocabulary, longer words, foreign words), increased complexity of the sentence structures) as well as the basic length of texts, the test design takes into account the increasing reading competence from childhood to early adulthood. In addition, texts are selected in order to ensure that topics correspond to the environment of the respective age group. This covers a wide spectrum of topics ranging from animals (for children) to social and philosophical questions relating to the meaning of life for adults. Additionally, the test material is adjusted to the respective age group through age-adapted phrasing of the questions, answering options and the comprehension requirements of the tasks.

## **2. Comprehension requirements / task types**

From the literature on reading competence and text comprehension (e.g. Kintsch, 1998; Richter & Christmann, 2002), it is possible to derive different types of comprehension requirements reflected in the NEPS concept in three specific requirement types of the tasks (task types). The variants are called *types* as there is no explicit assumption that tasks of one type are necessarily more difficult or easier than tasks of another type.

For tasks of the first type ("finding information in the text"), detailed information must be identified at sentence level, in other words deciphering and recognizing statements or propositions. For tasks on this requirement cluster, the information needed to solve the respective tasks is, in terms of the wording, either contained in the text and identical with the task itself, or phrasing varies slightly.

In the case of the second task type ("drawing text-related conclusions"), conclusions have to be drawn from several sentences to be related to each other in order to extract local or global coherence,. In some cases, this takes place between sentences located closely together, in others, several sentences are spread over entire sections. In another form of this type, the task is to understand the thoughts expressed in the entire text, which requires the comprehension and integration of larger and more complex text portions.

For the third type, the requirements of "reflecting and assessing" are in the foreground, which in the literature is often linked to the mental representation of the text in the form of a situation model. In one version of this task type, the task is to understand the central idea, the main events or the core message of text, whereas in another version, the purpose and intention of a text has to be recognized and the readers are asked to assess the credibility of a text.

The different comprehension requirements occur in all text functions and are considered in the respective test versions in a well-proportioned ratio. (cf. Fig. 1.).

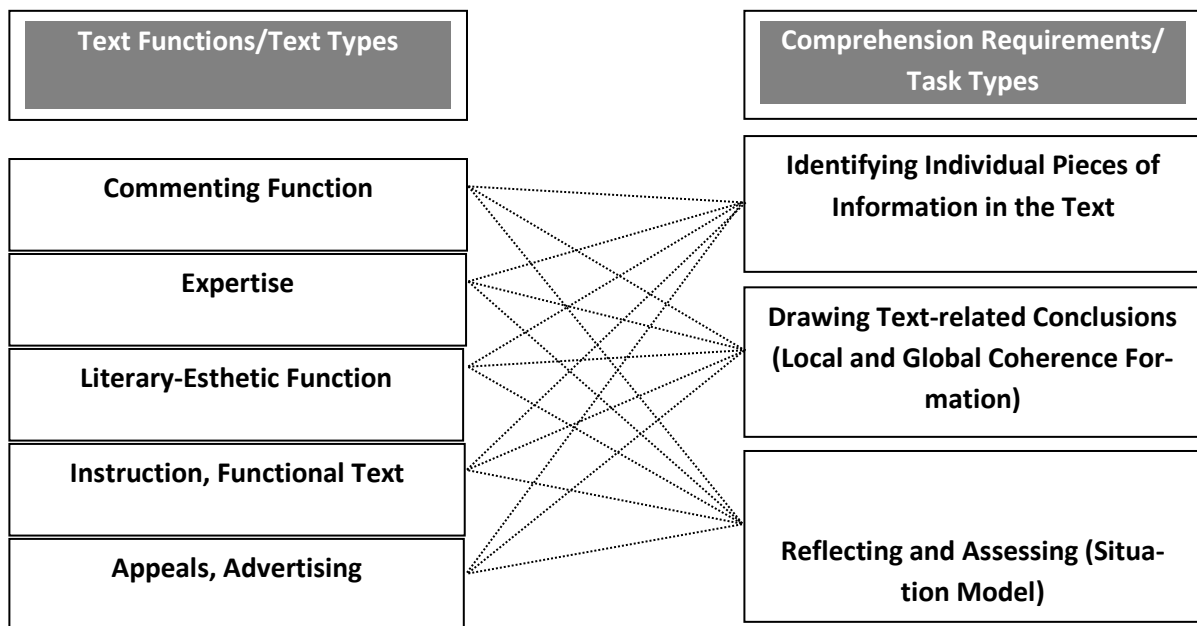


Fig. 1: Text functions and comprehension requirements

### 3. Task formats

The majority of tasks match the multiple choice format. Tasks of this type consist of a question/assignment on a text for which four different answers are offered, one of which is the correct answer. As another task format, decision-making tasks are used where individual statements have to be judged on whether they are right or wrong according to the text. The so-called correlation tasks represent a third format where, for example, a partial title must be chosen and assigned to different sections of a text. For tasks of the second and third type, summaries are made, if necessary, thus creating answers with partly correct solutions (partial credit items).

By systematically considering different text functions, which are implemented in different age groups in realistic and age-related texts, text themes and different comprehension requirements of the related tasks, it is possible to operationalize reading competence as a comprehensive ability construct.

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## Cognitive basic skills (non-verbal) – Perceptual speed and reasoning

In NEPS, cognitive basic skills are measured based on the differentiation between “cognitive mechanics” and “cognitive pragmatics” following Baltes, Staudinger and Lindenberger (1999). While the former is measured using task contents as education-independent, new and domain-unspecific as possible, the tasks for measuring cognitive pragmatics are based on acquired skills and knowledge (Ackerman, 1987). Consequently, some of the domain-specific performance tests used within the framework of NEPS may serve as indicators of pragmatics.

In contrast to this, the tests of basic cognitive skills aim at assessing individual differences of fluid cognitive abilities. While these are subject to age-related changes, in comparison to the education- and knowledge-related competences they prove to be less culture-, experience- and language-dependent. In this context, these tests provide an individual basis and differentiating basic function for the acquisition of education-dependent competences.

Among the facets of cognitive mechanics, two common marker variables stand out: perceptual speed and reasoning.

Perceptual speed marks the basal speed of information processing (“*speed*”). In NEPS, this is measured by the Picture Symbol Test (NEPS-BZT). This is based on an improved version of the Digit-Symbol Test (DST) from the tests of the Wechsler family by Lang, Weiss, Stocker and von Rosenblatt (2007). Analogously to this improved version, the NEPS-BZT requires the performance to enter the correct figures for the preset symbols according to an answer key.

Reasoning serves as key marker of mental performance (Baltes et al., 1999). The NEPS reasoning test (NEPS-MAT) is designed as a matrices test in the tradition of the typical reasoning tests. Each item of the matrices test consists of several horizontally and vertically arranged fields in which different geometrical elements are shown – with only one field remaining free. The logical rules on which the pattern of the geometrical elements is based have to be deduced in order to be able to select the right complement for the free field from the offered solutions.

Both tests have been designed in such a way that they can be effectively used without changes to the item sets across as many age groups as possible and relatively independent from the subjects’ mother tongue. Currently, they are administered as paper-and-pencil tests, while computer-aided administration is generally possible.

The results of both tests provide an estimator of basic cognitive skills which, however, is not directly comparable to the overall result of a traditional intelligence test (IQ). It rather permits controlling for differential initial capacities in the competence acquisition process.

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## Metacognition

Metacognition is the knowledge and control of the own cognitive system. According to Flavell (1979) und Brown (1987), declarative and procedural aspects of metacognition are differentiated which are both covered in the National Education Panel.

### Declarative Metacognition

Declarative metacognition refers to knowledge about person, task and strategy variables that an individual can verbalize (Flavell, 1979). This includes, for example, knowledge about the strengths and weaknesses of one's own memory and learning, knowledge about cognitive requirements of tasks (i.e., their difficulty), as well as knowledge about strategies of attaining cognitive learning and achievement goals. It is assumed that the declarative aspect of metacognition constitutes a necessary prerequisite for strategic learning. Knowledge about different kinds of strategies can again be divided into declarative, procedural, and conditional strategy knowledge. Declarative strategy knowledge is the awareness of strategies, that is, the awareness that a certain strategy exists. Procedural knowledge describes how a strategy works effectively and conditional knowledge helps to understand which strategies are more useful for solving a certain task than others (Borkowski, Milstead, & Hale, 1988; Paris, Lipson, & Wixson, 1983).

In the National Educational Panel Study (NEPS), the declarative aspect of metacognition is measured by scenario-based knowledge tests. The construction of the tests is based on existing test instruments that refer to domain-specific knowledge (mostly in the domain of reading, e.g., the test on knowledge about reading strategies, Schlagmüller & Schneider, 2007) or to domain-general knowledge (Neuenhaus, Artelt, Lingel, & Schneider, 2011). These test instruments have been proven to be reliable and economic in use, they refer to concrete learning situations, and are interpretable against a clear benchmark.

The tests on declarative metacognition that are administered in the NEPS include several scenarios describing different school and leisure-time activities. For each scenario, a list of approaches of differing strategic quality is presented and participants are asked to rate the usefulness of each alternative. In order to be appropriate for the different age groups some characteristics of the tests (e.g., the number of the presented alternatives or the context in which the scenarios are embedded) are modified.

Test scoring is done with reference to the relative usefulness of the presented alternatives. Thus, the test instrument can be characterized as a test assessing conditional and relational knowledge about strategies (cf. Händel et al., 2013). The evaluation of the relative usefulness of the strategies is based on the ratings of experts who are scientists in the field of educational psychology and learning strategies. Accordingly, a pair comparison is scored as correct if the judgment on a strategy pair concurs with the expert ratings, and as incorrect if the judgment on a strategy pair contradicts the expert ratings.

### Procedural metacognition

Procedural metacognition includes the regulation of the learning process through activities of planning, monitoring and controlling. Within the framework of NEPS in combination with the competence tests of the individual domains, the procedural aspect of metacognition is not assessed as a direct measure of such planning, monitoring and controlling activities but as a metacognitive judgement

that refers to the control of the learning performance during (and/or shortly after) the learning phase (also see Nelson & Narens, 1990). After the study participants have taken their competence tests, they are requested to rate their own performance. They are asked to state the portion of questions presumably answered correctly.

Usually, one question is asked per domain. For competence domains that can be divided into coherent individual parts (e.g. reading competence referring to different texts), the inquiry of procedural metacognition is referred to these parts as well, which, of course, leads to a longer processing time.

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## Listening Comprehension in the First Languages (L1<sup>1</sup>) Russian and Turkish

The effects of immigrant students' first language proficiency on their educational success are still highly disputed. On the one hand, theoretical perspectives and empirical evidence suggest positive effects of L1 proficiency on second language acquisition and on educational success within the country of residence (e.g., Cummins, 1979). On the other hand, neutral and negative effects of L1 proficiency are proposed (e.g., Esser, 2006). The empirical evidence of this controversy is, however, unsatisfactory because there is a lack of investigations systematically assessing L1 proficiency with objective tests (cf. Kristen et al., 2010).

In order to elucidate this controversy within the NEPS, the L1 proficiency of students from the two largest immigrant groups in Germany—that is, students whose families immigrated from the area of the Former Soviet Union or from Turkey—is measured with objective tests. The NEPS assesses L1 proficiency at three measure points that are particularly relevant for educational trajectories: at secondary school level in Grade 9 and Grade 7 as well as at elementary school level in Grade 2. The proficiency in Russian and Turkish at these three measure points is assessed with listening comprehension tests specifically developed for this purpose (for Grade 9: Edele, Schotte, Hecht, & Stanat, 2012; Edele, Schotte, & Stanat, 2015; for Grade 7: Taraszow, Schotte, Edele, & Stanat, in preparation). The assessment of listening comprehension was chosen as a dimension of language proficiency because children of immigrants typically acquire the L1 within their family context and do not necessarily read or write their L1.

The L1-tests at secondary school level consist of several independent text units with a length of 100 to 150 words each. Every text unit is followed by four to five questions in a multiple-choice format, which the students were requested to answer. Both text units and subsequent questions were audio recorded by native speakers of Russian or Turkish and presented to the students in a standardized way from CD. The construction of the L1-tests was based on the aim to assess a broad range of language proficiency. Therefore, texts representing written literary language (expositions and narrations) as well as texts involving oral features (dialogues) were used. In order to ensure that the L1-tests measure language proficiency rather than prior knowledge, the texts either cover topics that should be equally familiar to all students (e.g., everyday situations in school) or topics that are likely to be equally unfamiliar to all students (e.g., an explanation of the living conditions of a rare mammal). All text units were tested and validated by extensive pilot studies.

In order to allow for comparisons of students' first language proficiency between the grades at secondary school level, two text units are part of both the L1-tests of Grade 7 and the L1-tests of Grade 9 (Taraszow, Schotte, Edele, & Stanat, in preparation). By using these 'anchor items', the objectively assessed L1 proficiency becomes comparable at different measure points of secondary school level.

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<sup>1</sup> The term first language (L1) is used interchangeably with the language of the family's country of origin, irrespective of whether the student acquired this language prior to German, as the labeling L1 suggests, or simultaneously.

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