

## 13 Kindergarten and elementary school

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**Abstract:** The German National Educational Panel Study covers educational processes during Kindergarten and elementary school age in two stages: “Kindergarten and transition to elementary school” and “elementary school and transition to lower secondary school.” One cohort covers both of these two stages, starting in winter 2010/2011 with a cluster sample of 3,000 target children at about age 4 in Kindergarten. When most of these children enter school, the cohort will be more than doubled by integrating their classmates into the survey. In addition to direct assessment of children’s competencies, their parents are interviewed and teachers and principals fill out self-administered questionnaires. In these stages, assessments focus on early scientific and mathematical literacy as well as language competencies (e.g., vocabulary, grammar, phonological awareness). We survey the structure and aspects of the quality of Kindergarten and elementary school, families, and nonformal learning environments. Information on parents’ socioeconomic status and their evaluation of decision-relevant aspects allows us to model school choice and disentangle primary and secondary effects of stratification. Theoretically relevant aspects of migrants’ situation are surveyed. Further aspects are children’s health, social competencies, and the different care settings.

**Keywords:** Kindergarten · Elementary school · Education · Panel study · Early childhood

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## Kindergarten und Grundschule

**Zusammenfassung:** Bildungsprozesse im Kindergarten und in der Grundschule werden im Nationalen Bildungspanel durch zwei Etappen abgedeckt: „Kindergarten und Übergang in die Grundschule“ und „Grundschule und der Übergang zur Sekundarstufe“. Diese beiden Etappen haben eine gemeinsame Startkohorte, die im Winter 2010/2011 mit einer Clusterstichprobe von 3.000 Kindergartenkindern im Alter von ca. 4 Jahren startet. Bei der Einschulung dieser Kinder wird der Stichprobenumfang mehr als verdoppelt, da nun auch deren Mitschüler in die Studie aufgenommen werden. Zusätzlich zur direkten Erfassung der kindlichen Kompetenzen werden die Eltern der Kinder telefonisch befragt und die pädagogischen Fachkräfte und Leitungen der Kindergärten bzw. Schulen füllen Fragebögen aus. In den beiden Etappen werden primär frühe naturwissenschaftliche und mathematische Fähigkeiten sowie Sprachkompetenzen (z. B. Wortschatz, Grammatik, phonologische Bewusstheit, Lesekompetenz) erhoben. Zudem werden Struktur- und Qualitätsaspekte von Kindergärten, Grundschulen, Familien sowie von informellen/non-formalen Lernumwelten erfasst. Die Erfassung des sozioökonomischen Status der Eltern und deren Bewertung relevanter Aspekte von Schulwahlentscheidungen ermöglichen die analytische Unterscheidung zwischen primären und sekundären Effekten der sozialen Herkunft. Zudem werden theoriegeleitet migrationsrelevante Indikatoren von Kindern, Eltern und pädagogischen Fachkräften erhoben. Weitere erfasste Bereiche sind Sozialkompetenzen, der Gesundheitszustand und die Betreuungssituation der Kinder.

**Schlüsselwörter:** Kindergarten · Grundschule · Bildung · Panelstudie · Frühe Kindheit

### 13.1 Importance of early education and elementary school

Early childhood is a period of extensive development in various cognitive and noncognitive domains—as emphasized by different research traditions in education science, psychology and biology. Despite ongoing debates on the relative importance of either nature or nurture, there is abundant evidence for the influence of not only individual characteristics and preconditions but also environmental features on children’s developmental progress and outcomes (e.g., Brooks-Gunn and Markman 2005; Silbereisen and Noak 2006). Ecological theories of development point out how development is influenced by the different environments children live and participate in (e.g., Bronfenbrenner and Ceci 1994; Marjoribanks 2002). A related major issue in educational research and current politics concerns the effect of quantity and quality of early nonparental care and education on the development of children and the reconciliation between family life and parental participation in the labor market (e.g., Roßbach 2005; Roßbach et al. 2008a, b). Public expectations are high: Nonfamilial early child care and education settings should raise the level of educational attainment for all children. Another issue concerns early disparities and their long-term consequences. Early disparities in skills, competencies, and educational pathways are observable ahead of school enrollment and during elementary school and—again—there are strong expectations that nonfamilial care and education settings will make a special contribution to compensating for early disparities (e.g., Roßbach 2004). However, to gain more insight into the mechanisms generating differences in achievement, it is necessary to take a longitudinal perspective. Theoretical explanations and empirical data on the development of competencies are needed to allow for subgroup-

specific analyses of students in preschool institutions and elementary school. It is beyond question that—in addition to child characteristics—both family and institutions like Kindergarten and school influence the development of competencies. Current questions are addressing the relative importance of these environments and the mediating mechanisms that carry the effects. Answering these and similar questions could tell us, for instance, whether and to what extent early educational institutions serve as “great equalizers”—an issue that has important policy implications.

The effects of the family on the acquisition of competencies and, hence, on achievement differences are also known as primary effects of social stratification (Boudon 1974). In addition, decisions are of great importance for educational success in the German education system. The first decisions are mainly made by parents. Beside school enrollment, the transition to the explicitly tracked school system is of great importance. Parents are forced to make very early decisions about their child’s future educational track—in most cases, this transition takes place after the 4th grade and thus around the age of 10. Theories that explicitly model educational choices may help us to understand what happens at the transitions and shed light on the mechanisms leading to group differences in educational choices—even conditional on competencies (Breen and Goldthorpe 1997; Erikson and Jonsson 1996; Esser 1999). It is also through these so-called secondary effects of stratification that parents influence the educational outcomes of their offspring (Boudon 1974).

Therefore, stages 2 and 3 of the National Educational Panel Study (NEPS) focus on the transitions from Kindergarten to elementary school, the later transition to the tracked school system, the development of competencies, and the different learning environments during this time. To provide appropriate data, a cohort is drawn starting with children attending Kindergarten 2 years before their transition to school. This cohort will be surveyed year by year and expanded at school entry. Extensive, theory-guided tests and interviews will be carried out with the children (as target persons), their parents, Kindergarten and elementary school teachers, and principals.

The subsequent sections give a brief overview on previous findings and theoretical explanations regarding educational participation and educational processes in preschool age, on the transition from Kindergarten to elementary school, on educational processes in elementary school, and on the transition from elementary school to secondary school. Then, Sect. 13.3 presents the stage-specific measures of the major theoretical perspectives, the pillars of the NEPS. In Sect. 13.4 information on respondents and instruments is given. We conclude with an outlook on the research potential of the data being collected within stages 2 and 3 of the NEPS in Sect. 13.5.

### **13.2 Previous findings and theoretical considerations**

In this section, we refer to earlier findings and address theoretically relevant questions along the educational pathway. We start at age 4 in Kindergarten and end at the transition from elementary school to the tracked school system.

### 13.2.1 Educational participation and processes in preschool age

From birth onward, development is influenced by familial and—later on—institutional conditions (for more information on developmental issues concerning children age 0–3 see Chap. 12, this volume). The family is a child's first environment for socialization and learning processes. Furthermore most children in Germany experience institutional learning environments before entering school. In 2009, about 92% of all 3- to 6-year-olds in Germany were attending Kindergarten<sup>1</sup> (Statistisches Bundesamt 2010) that provides child care and education (*Erziehung, Bildung und Betreuung*) in mainly age-mixed groups. This percentage drops to about 17% for children younger than 3 years. Despite these high rates and legally guaranteed places for every child from age 3 onward, there are social and regional disparities in utilization (Büchner and Spieß 2007; Kreyenfeld and Krapf 2010). It has to be borne in mind that even though Germany has a federal law governing nonfamilial care and education settings (including Kindergarten) that stipulates the same frame conditions, the 16 federal states are responsible for these settings and interpret federal law with their own laws in different ways. This leads to more or less significant differences in Kindergarten regulations between the states. In 2004, the Standing Conference of the Ministers of Education and Cultural Affairs and the Conference of the Youth and Family Ministers agreed on curricular principles (“education plans”) for institutional preschool education and adopted a common framework. However, the federal states have different education plans specifying the basic notion of education, and there are also differences regarding how compulsory these curricula are for the individual Kindergarten. Hence, although the German Kindergarten is oriented toward future educational processes and the acquisition of competencies, large differences in the implementation of the legal guidelines are possible.

The quality of the different familial and institutional learning environments is assumed to be crucial for the acquisition of competencies. Pertaining to the quality of learning environments, here understood in respect to their cognitive stimulation, three dimensions are often distinguished (cf., Roßbach et al. 2008): (a) The quality of proximal processes pertains to interactions, such as parent-child activities or just as equally teacher-child activities or peer activities in Kindergarten. (b) Orientations refer to parent's and teacher's action-guiding cognitions, such as child-rearing values, belief systems, expectations, and aspirations. (c) The quality of structure, in contrast, is related to distal and more stable conditions of learning environments (e.g., socioeconomic status [SES] of families, group sizes, or SES composition in Kindergartens).

Considering the research on effects of the use of institutional child care on children's outcomes, empirical findings show that the duration of use influences cognitive outcomes (Sammons et al. 2008), the timing of school entry (Kratzmann and Schneider 2009), and further educational pathways through the tracked school system (Büchner and Spieß 2007; Seyda 2009). However, these studies normally do not control for the selectivity in entering Kindergarten (Becker and Lauterbach 2010). Looking at measures of the quality of institutional care and education, high quality is associated with better outcomes in social and cognitive competencies. Several studies reveal that particularly the quality of processes is associated with children's language competencies (Peisner-Feinberg et al. 2001; Roßbach 2005; Sammons et al. 2008; Tietze et al. 2005), and these are important

for the further educational career (Weinert 2007; Weinert et al. 2008). Sometimes the effects of quality are long lasting; at other times, they wash out and disappear within the first years at school. Moreover, more distal structures such as group size or teacher-child ratio seem to influence development as well. Findings on whether use and quality of institutional care and education can reduce social disparities in achievement and have compensatory effects are somewhat inconsistent. However, all children seem to benefit from high quality. With regard to educational investments in disadvantaged young children, Heckman and Masterov (2007) have reported unexpectedly large returns for individuals as well as for society as a whole. However, German longitudinal research on aspects of quality or (language) support programs is sparse.

Comparisons of the power of effects of home learning environments and institutional learning environments on children's developmental outcomes reveal that the characteristics of home learning environments are more powerful predictors (e.g., Melhuish et al. 2008; Sammons et al. 2008; Sylva et al. 2004; Tietze et al. 2005). Most studies show that taking into account processes of the home learning environment the influence of distal family variables is reduced. Activities such as reading aloud with the child showed a significant long-term impact after controlling for other more distal influences such as socioeconomic status. Especially with regard to the discussions on educational lags and the emergence of social disparities in the development of preschool children, there is a need for a more thorough understanding of mediating features within and between children's preschool learning environments.

### 13.2.2 Transition from kindergarten to elementary school

Compulsory education in Germany starts with elementary school when children are about 6 years of age—depending on the federal state they live in. However, school enrollment is possible ahead of time or later. It may be delayed because of the parents' wish or because the child is classified as not yet ready for school. More children from lower social class families and with a migration background are denied school readiness (Biedinger et al. 2008).

This first transition is the most regulated in Germany's education system: In most federal states, each child is assigned to the one school responsible for the neighborhood she lives in—an exception being North Rhine-Westphalia that allows completely free parental choice. Nonetheless, parents are able to circumvent these regulations by picking a private school, often denominational schools, or simply moving to another neighborhood and hence school district. There is evidence that German upper middle-class families exploit both paths, thereby increasing levels of segregation along socioeconomic and ethnic lines in elementary schools (Kristen 2008; Riedel et al. 2010). Sociological models of educational choice have been applied to this transition using geographically restricted data (Kristen 2008).

### 13.2.3 Educational processes in elementary school age

As the first institution of compulsory schooling, elementary school in Germany aims to develop both cognitive and noncognitive competencies, while providing a first solid base

of general education (Einsiedler et al. 2008). As in other countries, there is an achievement gap along social and ethnic lines at school entry (Becker and Biedinger 2006).

International large-scale assessments, such as the Progress in Reading Literacy Study (PIRLS, in Germany called IGLU: Internationale Grundschul-Lese-Untersuchung) and the Third International Mathematics and Science Study (TIMSS) conducted at the end of 4th grade, which coincides with the end of elementary school in Germany, provide evidence that students in Germany perform equally well as their counterparts in countries with similar socioeconomic conditions. Whereas inequality measured as variation in test scores is rather low, the correlation between socioeconomic indicators such as number of books at home or migrant status of the parents is—albeit not significantly—higher than the international average (Bos et al. 2008, 2007). According to the Programme for International Student Assessment (PISA), both indicators are very pronounced at the end of compulsory schooling in Germany (PISA-Konsortium Deutschland 2007).

Evidence from longitudinal studies on how competencies in different domains develop over time during elementary school is somewhat contradictory and restricted to particular regions or states. Whereas some authors find a stabilization of interindividual differences (Kammermeyer and Martschinke 2004; Weinert and Helmke 1997), others report a closing gap over the first years of schooling (see, for reading literacy, Schneider et al. 1997; for reading literacy and numeracy, Ditton and Krüsken 2010), whereas a third group find a widening gap between children performing below and those performing above average (Klicpera and Gasteiger-Klicpera 1993; see, for similar results from the Netherlands, Meijnen 1987; van der Slik et al. 2006). There is evidence from many international and some national studies that high teacher quality and high quality of instruction are capable of increasing the average performance in a class (Babu and Mendro 2003; Staub and Stern 2002; Weinert and Helmke 1997). Less clear is the evidence on whether it is possible to lessen the achievement gap at the same time (Weinert and Helmke 1997).

Interestingly, international and national evidence on the correlation between socioeconomic background and competence development is more clear-cut: The gap between children from low SES families and those from high SES families is widening over time. Studies from the United States looking at the causal effect of schooling on the achievement gap along social and ethnic lines suggest that schools may nevertheless serve as “great equalizers” (Downey et al. 2004). During the school year, cognitive competencies from children with different social and ethnic background tend to develop in parallel. However, over the summer months, students from disadvantaged families fall behind in their development (Entwisle and Alexander 1992; Heyns 1978). In a replication using data covering 4th and 5th graders from Berlin, Becker et al. (2008) found even more pronounced effects than studies conducted in the United States and other countries (Lindahl 2001; Verachtert et al. 2009). These findings underline that the family is an important, if not the main source of educational inequality.

#### 13.2.4 Transition from elementary school to secondary school

The second and probably most important transition in the German education system is the one from elementary school to the secondary school system that features explicit between-school tracking in all federal states. While there are many considerable differ-

ences between the 16 federal states' education systems, most track students after 4 years of elementary school—some states have longer lasting elementary schools; others provide a phase of orientation in 5th and 6th grade before tracking (see, for the stage covering the first years of secondary school, Chap. 14, this volume). Future policy changes may affect this transition with regard to timing and other regulations.

Evidence is inconclusive on whether this relatively early tracking contributes to the comparatively high level of educational inequality in Germany in terms of competencies, attended tracks, and attained certificates (Baumert et al. 2009; Hanushek and Wößmann 2006; Pfeffer 2008). However, it is well known that teachers contribute to this inequality. Teachers, who are legally constrained to recommend a particular track, show some bias in favor of students from families with an upper middle-class background. Whether they also discriminate against children from particular ethnic groups is not yet clear (Kristen 2006). There is also no clear evidence on the causes and mechanisms leading to these—potentially biased—recommendations. It would seem worthwhile to consider different explanations for these biases (Aigner and Cain 1977; Becker 1971; Holzer and Ludwig 2003; Pohlmann 2009).

Even more so than teachers' recommendations, parents' decisions are biased along the lines of social class. Depending on the state, parents' opportunities to choose a secondary school track are more or less constrained by federal state law. Evidence for single states and for Germany as a whole suggests that secondary effects of stratification are responsible for a considerable part of the overall level of inequality of educational opportunity (Maaz and Nagy 2009). Theories that explicitly model education decisions by taking into account different actual and perceived factors have been applied to this first transition (Stocké 2007). Evidence is needed on how secondary effects vary by educational regulations and between natives and different groups of migrants.

### 13.3 Theoretical perspectives and measures in stages 2 and 3

As in all the other stages as well, five theoretical perspectives—the five pillars of the NEPS (see Chap. 1, this volume)—are considered in stages 2 and 3. In addition, stage-specific constructs are included. The respondents are children and their parents along with teachers and principals of Kindergartens and elementary schools.

The preschool and school years are a period of intense development of competencies (pillar 1). Analyzing the competence development of children throughout their Kindergarten attendance and first school years as well as their promotion in family and Kindergarten/elementary school will be a major task for the NEPS. The study of these issues will include a broad conception of indicators of (a) domain-general cognitive capacities (nonverbal reasoning, perceptual speed), (b) domain-specific competencies (mathematical and scientific literacy, language competencies such as vocabulary, reading literacy), and (c) metacompetencies (e.g., metacognition, information and communication technologies [ICT] literacy, see Chap. 5, this volume).

Furthermore, brief indicators of rather stable dimensions of the child's personality along with indicators of social behavior, motivation, self-concept, and interests will

be captured by questionnaires (see Chap. 10, this volume). Due to the age of the target persons, assessments of personality characteristics and social competencies rely mostly on reports from parents or teaching staff.

The NEPS takes formal, nonformal/informal, and familial learning environments as well as their interplay into consideration. The central indicators surveyed for all learning environments (pillar 2) are structure, support, challenge, and orientation (SSCO). Central for stages 2 and 3 are the learning environments at Kindergarten and elementary school. The connectivity of educational processes in Kindergarten and elementary school is particularly decisive (cf., Roßbach 2006). Patterns of cumulative experiences in this phase of education will be analyzed by measuring aspects of learning environments annually. In addition, the history of extrafamilial care and education up to age 4 will be assessed retrospectively through interviews with parents. Special attention will be given to the transitions—first, from Kindergarten to elementary school and second, from elementary school to lower secondary school. We investigate children's home learning environments as provided by the family and survey nonformal/informal learning opportunities in everyday life (e.g., musical and sports activities). Of special interest are home-learning activities, the educational orientations and aspirations of parents, their formation during the early stage of the educational career of their children, and their dependencies on family background (see Chap. 6, this volume).

In order to gain more information on the importance of primary and secondary effects in educational decisions and to test competing theories on the causes of social class-specific educational decisions (pillar 3) and careers, stages 2 and 3 focus on school enrollment decisions and secondary school choice. Besides the child's competencies, school decisions might be influenced by social class-specific values, cost-benefit analyses, and parents' aspirations or educational orientations. It is hypothesized that early educational decisions also influence later ones; thus, a long-term view is needed on trajectories and development in different domains depending on earlier choices (see Chap. 7, this volume).

Children with migration background (pillar 4) are, on average, less successful in the German education system (cf., Bonsen et al. 2008). They enter Kindergarten at higher ages, more often show a delayed school entry, repeat classes more often in elementary school, and have lower transition rates to the more demanding school tracks. However, large variation exists between different ethnic groups (see Chap. 8, this volume). Therefore, children from migrant families will be followed particularly closely. The data will be useful for testing whether ethnic differences in educational processes are merely social class-specific inequalities or whether there are migration-specific influences such as generation status, cultural consumption, and orientations. Of special interest is the role of parents' and child's non-German language skills for child's competence development in different domains. Beside parents' self-report on language skills, students with a non-German language background (restricted to Russian and Turkish) are tested for their competencies in this language. The longitudinal observation of these groups from an early starting point will lead to a better understanding of the causes of the noted educational disadvantages. Furthermore, potential compensatory effects of measures of Kindergarten and elementary school can be deduced.



It seems essential to capture returns to education (pillar 5). Following a broader conception of returns by viewing social behavior, health, educational level, and subjective well-being as outcomes, these returns to education can be monitored simultaneously as the children progress through Kindergarten and school. The data allow analyses of to which degree and by which mechanisms Kindergartens, schools, parents, and peers influence the health status and health-related behaviors of children. At the same time, it is important to analyze the reciprocal impact.

Although the measures of the pillars cover a wide range of educationally relevant factors, additional stage-specific measures are needed to capture further important predictors of educational processes, learning, and early literacy. For example, some stage-specific tests are additionally employed in Kindergarten. Given that language is a key competence for educational career and academic success (cf., Holler 2007), a special focus in Kindergarten is on language and phonological processing. Thus, additional indicators of grammar, phonological awareness, and working memory will be assessed. Further information on language performance, language development, and language support of the target child are provided by parents and teachers in Kindergarten and elementary schools. Moreover, questions about language support programs and the qualification of the Kindergarten staff to deliver these programs are implemented in the questionnaire. Besides language, metacompetencies such as self-regulation are predictive for academic performance and achievement and have to be assessed in a stage-specific fashion. In Kindergarten, we assess self-regulation via a delay of gratification task.

### 13.4 Respondents and instruments

As mentioned above, nearly all children in Germany attend Kindergarten. Thus, the second cohort of the NEPS starts with Kindergarten children aged about 4 years (stage 2) who will be followed into elementary school (stage 3) and even further (stage 4, see Chap. 14, this volume).

The stage cohort 2 “Kindergarten and transition to elementary school” starts in winter 2010/2011 throughout Germany. The target persons are children who will normally enroll in elementary school 2 years later. Since we have age-mixed Kindergarten groups in Germany, the number of eligible target children in a group will only be a subset of the total group. The planned sample size for the first wave is 3,000 children with their parents from 250 Kindergartens with 250 principals and 750 Kindergarten teachers. As the majority of respondents enter elementary school, the sample will be refreshed and expanded. Stage 3 “elementary school and transition to secondary school” will take these children from Grade 3 onward (2013)<sup>2</sup>. For more information about the sampling design and sampling model see Chap. 4 in this volume.

Children are tested individually in Kindergarten; later on in elementary school, they will be tested in groups. In higher elementary school grades, short student questionnaires will be administered as well. At the same time, one parent will be interviewed by telephone (computer assisted telephone interview, CATI). Because the NEPS is interested in the institutional effects on education processes, teachers and principals in Kindergarten and school are asked to fill out self-administered questionnaires. In addition, there is a

brief questionnaire asking teachers to give some crucial information on each participating child. One year before the current wave of the main cohort is surveyed, the procedures and instruments are tested in a pilot study with small case numbers. Parallel or prior to the pilot study, cognitive interviews with experts and qualitative as well as small quantitative pretests in the field are conducted to assure the high quality of instruments.

### 13.5 Concluding remarks and outlook

The data collected in stages 2 and 3 will provide a solid base for conducting theory-driven education research. Because of the panel nature, modern techniques of modeling longitudinal data can be used. Major topics are the development of competencies and educational careers in Kindergarten and elementary school age; Kindergarten, elementary school, and family as learning environments; the transition from Kindergarten to elementary school and from elementary to secondary school and the accompanying decisions on education; the extent and the significance of social and ethnic disparities in children's early competencies and achievements; and early returns to education. In particular, NEPS data will deliver new findings on the net effects of family characteristics, Kindergarten, and elementary school on the development of competencies over time. The data will help to figure out the most important determinants of this development.

When it comes to learning environments, researchers have the opportunity to gain a detailed picture of what institutional and familial learning environments look like in Germany. It will be possible to examine the impact of learning environments at home, in Kindergarten, and in elementary school on various educational outcomes, and how these relate to questions of inequality of educational opportunity. What characteristics of home environments and parents' activities are the most important mediators of early primary effects of stratification (Boudon 1974)? This also targets the question whether and to what extent different forms of cultural capital can be seen as causal factors influencing educational outcomes. Alongside social class differences, it will be possible to investigate the importance of characteristics of different learning environments for gender and ethnic gaps.

Educational decisions, also known as secondary effects of stratification (Boudon 1974), are of great importance in the German education system (Maaz and Nagy 2009). One of the most important transitions in the German education systems takes place at the end of elementary school when children are normally 9–10 years old. Exploiting NEPS data, researchers will gain a deeper understanding of why parents in Germany pick a particular elementary or a secondary school and how this relates to social class or ethnic group. Are the driving forces in both situations similar, and to what extent does the earlier decision influence the later one?

Regarding ethnic inequality, the data are useful for describing and analyzing disparities from Kindergarten to elementary school. The effect of educational participation, ethnic capital, and orientations on the development of competencies and on parents' school decisions can be analyzed. In addition, with respect to students with a non-German language background, it will be possible to analyze the influence of students' competencies in this language (at least in Russian and Turkish) as well as of language use at home

and special language programs on the competence acquisition of children with migration background.

## Endnotes

- 1 In this article, we shall use the German term Kindergarten as a generic term for the different forms of institutional child care, age 3 or 4 and above and until school entry. For an overview of regulations and the organization of preschool and elementary school education, see EURY-DICE (2009).
- 2 For further information see Chap. 1 in this volume.

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