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de Groot-Reuvekamp, M.; Ros, A.; van Boxtel, C.

**DOI**

[10.1080/03004279.2017.1385642](https://doi.org/10.1080/03004279.2017.1385642)

**Publication date**

2019

**Document Version**

Final published version

**Published in**

Education 3-13

[Link to publication](#)

**Citation for published version (APA):**

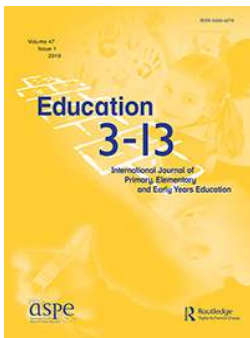
de Groot-Reuvekamp, M., Ros, A., & van Boxtel, C. (2019). 'Everything was black and white ... ': primary school pupils' naive reasoning while situating historical phenomena in time. *Education 3-13*, 47(1), 18-33. <https://doi.org/10.1080/03004279.2017.1385642>

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## Education 3-13

International Journal of Primary, Elementary and Early Years Education

ISSN: 0300-4279 (Print) 1475-7575 (Online) Journal homepage: <https://www.tandfonline.com/loi/rett20>

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To cite this article: Marjan de Groot-Reuvekamp, Anje Ros & Carla van Boxtel (2019) 'Everything was black and white ... ': primary school pupils' naive reasoning while situating historical phenomena in time, *Education 3-13*, 47:1, 18-33, DOI: [10.1080/03004279.2017.1385642](https://doi.org/10.1080/03004279.2017.1385642)

To link to this article: <https://doi.org/10.1080/03004279.2017.1385642>



Published online: 09 Oct 2017.



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# 'Everything was black and white ... ': primary school pupils' naive reasoning while situating historical phenomena in time

Marjan de Groot-Reuvekamp<sup>a</sup>, Anje Ros<sup>a</sup> and Carla van Boxtel<sup>b</sup>

<sup>a</sup>School for Child Studies and Education, Fontys University of Applied Sciences, 's-Hertogenbosch, Netherlands;

<sup>b</sup>Research Institute of Child Development and Education and the Amsterdam School for Culture and History, University of Amsterdam, Amsterdam, Netherlands

## ABSTRACT

This study focuses on problems in pupils' reasoning when they situate historical phenomena in time. The context is the Dutch curriculum with 10 eras and characteristic features, which was implemented to support pupils in orientating themselves in time. Twenty-two pupils aged 6-12 conducted assignments in which they had to place historical phenomena in time. Next to problems that were described in previous studies, problems were identified that related to the names and icons of the 10 eras, which sometimes helped, but also hindered pupils in their reasoning. Awareness of these problems is helpful for teachers, teacher trainers and educational policymakers.

## ARTICLE HISTORY

Received 18 September 2017  
Accepted 22 September 2017

## KEYWORDS

Understanding historical time; primary school; history education; Dutch curriculum for history; pupils' reasoning

## Introduction

The concept of the understanding of historical time is often restricted to 'chronology'. However, understanding historical time is more than chronology. Next to an understanding of dates and knowing the names and sequence of historical eras, the understanding of historical time also involves knowledge and understanding of events and changes in the past, and of change and continuity within and between periods (Stow and Haydn 2000; Wilschut 2012). This understanding includes knowledge of characteristics of different historical eras and how people lived in those eras: 'a sense of period' (Dawson 2004). In our rapidly changing society with numerous technological developments, the understanding of historical time becomes increasingly important to help children to interpret the constantly available information about contemporary and historical events and changes.

However, evaluations indicate that the teaching and learning of historical time in primary schools is not always optimal (Wagenaar, Van der Schoot & Hemker 2010; Ofsted 2011). Although there are some older studies on teaching programmes about the understanding of historical time for primary school pupils (Blyth 1978; West 1981; Hodkinson 2003a), little still is known about problems that pupils might encounter while situating historical phenomena in time.

This study is part of a more comprehensive study, in which 1457 pupils carried out a paper and pencil test, which concluded that performances on the understanding of historical time increased through grades 3-8 (de Groot-Reuvekamp et al. 2017). The present study focuses on pupils' reasoning while placing phenomena in time.

## Pupils' reasoning on events, people and changes through time

In a previous study (de Groot-Reuvekamp et al. 2017), five objectives for primary school pupils' understanding of historical time were defined:

- (1) Apply the vocabulary relating to time and periods of time.
- (2) Identify characteristic features in texts and images to place objects, situations, events and people in the correct periods of time.
- (3) Place objects, situations, events and people on a timeline.
- (4) Identify changes, differences and similarities in the way people lived within and across periods.
- (5) Sequence objects, situations, events and people of different periods of time in chronological order.

A small body of empirical studies describes primary school pupils' development on some of these objectives (Levstik and Pappas 1987; Harnett 1993; Barton and Levstik 1996; Hoge and Foster 2002). For instance, pupils' understanding of the vocabulary of time develops from the use of relative time phrases, such as 'long ago' and 'very long ago', to names of historical eras, dates AD and BC and centuries. Identifying characteristic features of historical periods develops from concrete everyday life characteristics, such as clothing and architecture, to more abstract social and cultural characteristics, and economic and political structures.

A number of empirical studies investigated primary pupils' reasoning with tasks about sequencing and dating pictures, stories or artefacts (Levstik and Pappas 1987; VanSledright and Brophy 1992; Brophy, VanSledright, and Bredin 1993; Harnett 1993; Barton and Levstik 1996; Wood and Holden 1997; Foster, Hoge, and Rosch 1999; Vella 2001; Hoge and Foster 2002; Hoodless 2002; Blow, Lee, and Shemilt 2012). With regard to sequencing pictures of situations about daily life in different historical periods, most pupils of all ages performed these tasks more or less correctly, but their reasoning on justifying their choices showed three types of problems.

Firstly, the use of dates appeared difficult for the youngest pupils (Barton and Levstik 1996), who are still learning the meaning of numbers. For instance, Barton and Levstik (1996, 435) found that younger 'pupils sometimes did not understand that dates in the past are smaller than the present date or that dates from later in time must be larger than those longer ago'. Especially pupils in grades 3–5, but also older pupils, often used broad time phrases like 'long ago' and 'very long ago' (Levstik and Pappas 1987; Harnett 1993; Barton and Levstik 1996; Foster, Hoge, and Rosch 1999; Hoge and Foster 2002). This can be problematic, as Hodkinson (2003b) described, because pupils can have very different interpretations of these terms. Pupils in grades 6–8 understood the arhythmical meaning of dates (Barton and Levstik 1996) and more often used dates and names of historical periods. However, they often lacked the historical knowledge to apply dates accurately (Foster, Hoge, and Rosch 1999; Hoge and Foster 2002).

The second type of problems relates to applying knowledge of characteristics of historical periods. Although older pupils more often applied historical knowledge than younger pupils (Barton and Levstik 1996; Foster, Hoge, and Rosch 1999; Hoge and Foster 2002), they did not always apply their knowledge accurately. For instance, VanSledright and Brophy (1992) reported that pupils often mixed accurate historical information with naive conceptions and imaginative elaborations. Also Wagenaar and Hemker (2004, 111) found that pupils in grade 8 (ages 11–12) sometimes tried to compensate their lack of knowledge with 'speculations and phantasies'. Furthermore, pupils' reasoning when identifying characteristics in pictures was sometimes affected by the type of source, as for instance with regard to a picture with an artists' impression of a dinosaur, on the basis of which a seven-year-old pupil reasoned that dinosaurs are very old, but that the picture did not look old at all (Harnett 1993).

Thirdly, with regard to comparing pictures from different historical periods, pupils in the studies mentioned above regularly compared historical situations with their present-day experiences, by identifying characteristics in present-day society that were 'not yet' present in 'earlier times', assuming that history is a linear story of progression (Harnett 1993; Barton and Levstik 1996; Hoge and Foster 2002). Present-oriented thinking, or presentism, could lead pupils to think of people in present times as superior (Hunt 2002) and people in the past as stupid (Lee and Ashby 2001). This kind of reasoning, in which the past is judged from a contemporary perspective, can cause

misconceptions about the past. In several of the studies mentioned above pupils demonstrated these kinds of misconceptions, for instance in reasoning that black-and-white pictures and appearances as 'dirty' or 'broken' must be older than coloured pictures and bright shiny artefacts (Harnett 1993; Barton and Levstik 1996; Foster, Hoge, and Rosch 1999; Vella 2001; Blow, Lee, and Shemilt 2012).

From literature can be concluded that in pupils' reasoning, while accounting for their choices in sequencing and dating, several problems arose with regard to the components of the understanding of time: problems in using the vocabulary of time, problems in identifying characteristic features of historical eras, and problems resulting from present-oriented thinking in comparing historical periods with each other and the present. There are hardly any studies that focus on problems in placing historical phenomena on timelines, which is also an objective on the understanding of historical time. In a study of de Groot-Reuvekamp et al. (2017), two different kinds of timelines were used. For the items in which pupils placed phenomena on a timeline with only the names of eras, the number of correct answers increased through grades 3–8 from 33% to 84%. For phenomena that had to be placed in periods of time on a timeline with dates and without the names of eras, correct answers for grades 5–8 ranged from 22% to 41% (de Groot-Reuvekamp et al. 2017). These findings indicate that pupils found it hard to relate phenomena that are characteristic for certain eras to periods of time on the timeline. This is remarkable, because a new curriculum for history was introduced in the Netherlands during the last decade, with a framework of 10 eras and characteristic features to support pupils in placing historical phenomena in time. The next section elaborates on the renewal of the Dutch history curriculum.

### **The Dutch curriculum: a chronological framework of orientation knowledge**

The present curriculum for history in Dutch primary and secondary education was implemented in 2006, in response to a public debate about history education failing to provide pupils with factual knowledge and chronological understanding (Van Drie, Logtenberg, and Riessen 2009; Klein 2010; Wilschut 2010; Van Boxtel and Grever 2011). This curriculum aims to improve pupils' understanding of historical time through the introduction of a framework of 10 eras with symbolic icons and 'easy to remember' associative names, such as the Era of Cities and States (Late Middle Ages) and the Era of Regents and Princes (seventeenth century) (Commission on History and Social Sciences 2001). For each era, characteristic features are described, with a total of 49 characteristics, of which 20 apply for primary education. Examples of characteristic features for primary education are 'the emergence of agriculture and agricultural communities' in the era of Hunters and Farmers and 'the striving for fundamental rights and political influence of citizens in the French and Dutch revolutions' in the era of Wigs and Revolutions. The majority of the 20 characteristics that apply for primary education have a political or economic perspective (See [Appendix 1](#) for the names of all 10 eras, with 20 characteristic features). These characteristic features are meant to support pupils, as a frame of reference, to orientate themselves in time. They contain no specific names of persons or events, because the idea is that teachers and pupils themselves can think about meaningful and significant events that relate to the characteristics. For example, for one pupil, knowledge about the Reformation can be illustrated with Luther or Calvin, whereas another pupil might use Zwingli or Erasmus, or yet another reformer. These kinds of examples should function as 'coat pegs' with which pupils can remember to which era certain phenomena belong (Commission on History and Social Sciences 2001). In addition to this predominantly European framework, a historical-cultural canon was developed, consisting of 50 events and persons in Dutch history, which can be used to illustrate the eras (Van Oostrom 2007). Some examples from this Dutch canon are: The Roman *limes*, Charlemagne, William of Orange, Rembrandt, Slavery, World War I and II, and Anne Frank. Both the 10-era framework and the Dutch canon are part of the core objectives in primary and secondary education (Dutch Ministry of Education, Culture and Sciences 2006, 2010). In most primary schools the teaching of the history curriculum starts from grade 5 or sometimes 6, at the ages of 8 or 9.

There are some indications that pupils at the end of primary school could more often correctly place historical events on a timeline after the introduction of the 10-era framework. However, it is not clear whether this framework really leads to improvement in pupils' understanding of historical time (Wagenaar, Van der Schoot, and Hemker 2010; de Groot-Reuvekamp et al. 2014).

## Research question

The present study addresses the following research question:

Which types of problems related to the objectives of the understanding of time arise in Dutch primary school pupils' reasoning while placing historical phenomena in time?

## Method

To answer the research question we investigated pupils' reasoning in interviews with assignments that focused on the objectives of the understanding of historical time (de Groot-Reuvekamp et al. 2017). In these assignments, pupils aged 6–12 had to place pictures and stories of objects, situations, events and people in time. The pupils were interviewed in pairs, to make them feel more at ease and to give them the opportunity to interact, discuss and respond to each other's answers. In this way it was expected that pupils would show more elaborated reasoning than in individual interviews (Seixas 1993; Barton 2001). Although group interviews make it more difficult to identify characteristics of individual pupils, we did not consider this to be a problem, since the purpose of this study was not to quantify correct answers of each pupil.

## Participants

The participants in this study were 22 pupils from grades 3–8 (ages 6–12) in 2 primary schools in smaller cities in the South-East of the Netherlands. For both schools teachers of each grade were asked to select two pupils, representing the average performance in their classrooms. For school A, no pupils of grade 8 participated, because at the moment that the interviews were conducted, both selected pupils were not in school. In total, 14 girls and 8 boys participated in the interviews (Table 1).

For each participating pupil, parental consent was asked and received for their children to take part in the interview and for the video recording. The names in Table 1 are pseudonyms. In both schools history featured in the curriculum for grades 5–8, with weekly lessons of about one hour per week. History did not feature in the curricula for grades 3 and 4. The schools are representative in teaching history with a chronological approach (de Groot-Reuvekamp et al. 2014). School A taught weekly history lessons in grades 5–8 with a textbook, based on the 10 eras and the characteristic features in which all eras featured twice: in grades 5 and 6 and again, more in depth, in grades 7 and 8. School B used a programme with a thematic, integrated approach for history, geography and science, next to weekly lessons on the Dutch canon, in grades 5–8, in combination with timelines

**Table 1.** Participating pupils, with age and gender ( $n = 22$ ).

Grade	School A	School B
1.	Nora (7,f) and Samira (7,f)	Fiona (6,f) and Charlie (7,m)
2.	Ruby (7,f) and Simon (8, m)	Mandy (7,f) and Paula (8,f)
3.	Gemma (9,f) and Theo (9,m)	Alice (9,f) and Felicia (9,f)
4.	Mira (10,f) and Gino (10,m)	Kevin (10,m) and Kai (10,m)
5.	Jessie (10,f) and Jade (11,f)	Lucy (11,f) and Pearl (10,f)
6.		Mike (12,m) and Luke (12,m)

Note: f: female; m: male.

with the 10 eras. All windows of the canon were taught two times, in grades 5–6 and again in grades 7–8.

### ***Assignments in interviews***

The assignments in the interviews (Table 2) were based on the five objectives in pupils' understanding of historical time (de Groot-Reuvekamp et al. 2017), and increased in difficulty with regard to the use of vocabulary, the concreteness of characteristic features and the complexity of the timelines. Assignments 1–14 were carried out by pupils of grades 3 and 4 (ages 6–8), assignments 1–24 by pupils of grades 3–5 (ages 6–9) and assignments 9–40 by pupils of grades 6–8 (ages 9–12).

Most assignments contained pictures that represented elements of characteristic features of the 10 eras and the Dutch canon. These pictures were carefully selected from educational and museum websites. Next to the names of the 10 eras, traditional names of historical periods were used, such as Prehistory, Middle Ages and Golden Age, in some assignments, because these terms are often used in everyday language and also in history textbooks, next to the names of the 10 eras.

For pupils in grades 3–5, assignments 1–8 concerned the placing in time of concrete objects and situations from everyday life, such as toys, writing devices and living rooms, with sets of three pictures, with questions such as: Which toy is the oldest? Which living room is from long ago and which one longest ago? Assignments 9–12 were about the chronological sequence of sets of three pictures with concrete characteristics, such as classrooms or means of transport, with questions such as: What is the correct sequence, when you start with the oldest picture? Furthermore, there were assignments on the understanding of dates AD (13 and 14), in which pupils, for example, had to identify which child from three children in one family was the oldest or the youngest, from their years of birth. Assignments 15–24 consisted of pictures and little stories about different social and cultural characteristics of eras, which had to be placed in the correct historical era on a simple timeline with only three eras with icons, but no dates.

Pupils in grades 6–8 also carried out assignments 9–12 on chronological sequences, dates AD and social and cultural characteristic features. In addition, these pupils were asked to place some pictures in one of three timeframes on a timeline with only dates AD and no names of eras (25–28). Furthermore, these pupils carried out assignments on the understanding of dates AD and BC by identifying the oldest or most recent picture from sets of three pictures, such as coins or ships with given dates (29–31). Assignments 32–34 were about identifying the correct century of a historical event to which the date was given. Finally, pupils were asked to place stories and pictures about economic and political characteristics of eras on a timeline with dates and the names and icons of the 10 eras.

The interviews were conducted by the first researcher. The interviewer read all assignments aloud and asked the pupils to choose an answer from three options. Subsequently, the interviewer asked the pupils to elaborate on their answers, by probing with questions such as: 'Why do you think so?', 'Do you agree?', 'Why/why not?', 'How can you see that?', 'What makes you think so?' and 'How long ago do you think this was?' The interviews lasted about 30–45 minutes.

### ***Data analysis***

Eleven interviews were recorded and transcribed. The units of analysis were the answers that were given by pairs of pupils in the assignments. From 274 answers, 168 answers were selected in which pupils' reasoning became visible, because they explained or discussed their answer. The answers that contained hardly or no verbalisation of pupils' thinking and reasoning were excluded. The first author started with open coding of problems in pupils' reasoning. The codes were discussed with the co-authors in an iterative process of re-examining the data and refining the codes. The final codes are presented in Table 3. Firstly the codes were compared to the problems found in literature about the vocabulary of time, knowledge about characteristic features and present-oriented thinking (Levstik and Pappas 1987; VanSledright and Brophy 1992; Harnett 1993; Barton and Levstik 1996;

**Table 2.** Overview of the assignments in the interviews with objectives and questions asked.

Assignments	Objectives	Pictures/stories	Questions asked	Grades	Ages
1. Toys 2. Ships 3. Women's clothes 4. Boiling water 5. Writing devices 6. Living rooms 7. Kitchens 8. Goblets 9. Classrooms 10. Transport 11. Buildings 12. Women 13. Children 14. Historical persons	(1) Time vocabulary: relative terms relating to time. (2) Characteristic features: Concrete characteristics of everyday life. (3) Compare and contrast.	Sets of three pictures.	Which picture represents an object from the past, the present, from long ago, very long ago?	3–5	6–9
15. Hunters and Farmers 16. Anne Frank 17. Roman stadium 18. Knights on Bayeux Tapestry 19. Reindeer hunters 20. Painting of Vermeer 21. Steam factory 22. Columbus 23. Roman Aqueduct 24. Neil Armstrong	(4) Compare and contrast. (5) Chronological sequence.	Three rows of three pictures.	What is the correct chronological sequence?	3–8	6–12
25. Classroom 26. Transport 27. Building 28. Woman 29. Roman coins 30. Buildings 31. Ships 32. Television 33. Mediaeval castle 34. The euro 35. Charlemagne 36. The French revolution 37. Great depression 38. Medieval crane 39. Flourishing trade in Amsterdam 40. Abolition of slavery	(1) Time vocabulary: Dates AD. (1) Time vocabulary: names of eras (2) Characteristic features: mostly social and cultural (concrete). (3) Use of short timelines with three eras with icons (no dates).	Names with dates. No pictures. Pictures with names and dates. A picture with a short story/description and a choice from three eras.	Which person is the oldest / youngest? In which era did this happen?	3–8 5–8	6–12 8–12
	(3) Use of a timeline with dates AD.	One picture with a choice from three marked timeframes.	To which timeframe does this picture belong?	6–8	9–12
	(1) Time vocabulary: Dates BC.	Three pictures with dates.	Which picture represents the oldest coin, building, ship?	6–8	9–12
	(1) Time vocabulary: Centuries. (2) Characteristic features: mostly economic and political (more abstract). (3) Use of timelines with dates and names and icons of the 10 eras.	A picture with a short description and a date. A picture with a short story/description and a choice from three timeframes.	In which century did this happen? In which era did this happen?	6–8 6–8	9–12 9–12



**Table 3.** Coding scheme with problems and sub-categories for students' reasoning when placing historical phenomena in time.

Objectives	Problems	Sub-categories and descriptions
<b>(1) Vocabulary of time</b> Apply the vocabulary relating to time and periods of time.	Relative time phrases	Students use relative time phrases for different periods and durations, e.g. very long ago.
	Meaning of dates	Students relate the lowest date to the most recent event. Students do not know how to pronounce dates. <i>Students confuse dates AD and BC.</i>
	<i>Meaning of centuries</i>	<i>Students confuse the numbers of dates with the names of centuries, e.g. 1952 is nineteenth century.</i>
	<i>Meaning of names of eras</i>	<i>Students do not understand names in the Dutch ten era framework, e.g. regents, citizens.</i>
<b>(2) Characteristic Features</b> Identify characteristic features in texts and images to place objects, situations, events and people in the correct periods of time.	<i>Lack of knowledge about curricular characteristic features</i>	<i>Students reason with the names or icons of eras, instead of curricular characteristic features.</i> <i>Students mix up characteristics from different eras.</i> <i>Students find it more difficult to apply knowledge of economic and political characteristic features of historical periods than social and cultural characteristics.</i>
	<i>Lack of knowledge about the position of historical eras on the timeline</i>	<i>Students make intuitive guesses for placements of a phenomenon in an era on the timeline.</i> <i>Students guess for the dates that relate to an era on the timeline.</i> <i>Students start from what they assume would be incorrect, and select the era left over.</i>
<b>(3) Timeline</b> Place objects, situations, events and people on a timeline.	Presentism: progress is assumed in:	
	– people's intelligence and use of materials – appearance of objects / devices	Students reason that people get smarter in the course of time. Students reason that people could 'not yet' use electricity or other materials than for example wood or stone. Students reason that objects of the present are more beautiful, <i>richer, posh and real.</i> Students reason that objects of the past are <i>weird</i> , dirty, broken, worn-down, and old-fashioned.
<b>(4) Compare and contrast</b> Identify changes, differences and similarities in the way people lived within and across periods.	Characteristics of pictures are confusing	Students assume that black and white and grey or brown pictures are older than coloured ones. Students assume that photos are more recent and more real than drawings or paintings.
	Naive reasoning as in 1 to 4	

Note: Problems in italics were identified in addition to the previous literature.

Foster, Hoge, and Rosch 1999; Vella 2001; Hoge and Foster 2002; Blow, Lee, and Shemilt 2012). Based on the literature, codes were distinguished for problems with relative time phrases, problems with meaning of dates and problems with lack of knowledge about characteristic features of eras. Furthermore, expressions of presentism were coded: such as dirty or broken appearances, characteristics that were 'not yet' present, black-and-white versus coloured pictures and the type of picture (photo, drawing or painting). Subsequently, based on our data, the codes were expanded with problems that frequently appeared in pupils' answers: problems with names of historical eras and centuries, problems with the timeline, problems with characteristic features, and names and icons of eras in the Dutch curriculum and economic and political characteristic features, which appeared more problematic than social and cultural characteristics. Extra codes for expressions of presentism were added: the present being more beautiful, richer, posh and real, and the past being weird, and reasoning that people could 'not yet' use electricity or other materials than for example wood or stone. Citations were marked that were illustrative for the coded problems.

The final codes and the relation to the objectives on the understanding of historical time are presented in Table 3. For the objective on sequencing historical phenomena in historical order, no specific problems were found, but in their reasoning on justifying the sequences, pupils encountered problems related to the other objectives, for instance, with identifying characteristic features or presentism in comparing different pictures with each other. We included some examples of the coding in Appendix 2.

## Results

The problems in pupils' reasoning in assignments on placing objects, situations, events and people in time are presented in Table 3, categorised according to the objectives on the understanding of historical time. The results for each objective are presented below. The numbers between brackets refer to the assignments in Table 2.

### *The vocabulary of time*

In answering assignments 1–12, grade 3–5 pupils could easily identify which pictures showed objects or situations from the past, the present, from long ago or very long ago. In their reasoning, pupils rather often used different terms of relative time vocabulary, such as *old, older, very old, pretty old, new, newer, a little bit newer, just new, more modern, less or a little bit modern, a little bit later* and *very, very, very long ago*. However, associations with these terms differed, as for instance Charlie, grade 3, told about a picture of a Viking ship (2): 'The Vikings were very long ago, I think that my father and mother were not yet there, because my father is already forty' and Paula, grade 4, with regard to a picture of nineteenth-century toys (1): 'The past is a very long time ago, for example three years ago or ten years ago.' Gemma and Theo, grade 5, found the picture of the Parthenon in the sequencing assignment of buildings (11), 'very, very old, maybe 900 or 1000 years'.

The meaning of dates appeared to be difficult for grade 3–5 pupils, as in assignment 13, where they had to decide which one of three children, born in 2003, 2005 and 2007, was the youngest. Most pairs had discussions about the correct answer, because one of the pupils thought that the lowest date belonged to the youngest child, as Ruby (grade 4), who reasoned that a child who was born in 2003 would be younger than a child born in 2007.

For grades 6–8, only one grade 7 pupil made this mistake. The big numbers of dates appeared to be difficult for grades 3–5. Theo, grade 5, for instance dated the Second World War about 'ten thousand nine hundred ninety six, or nineteen ... ?'

For the interpretation of dates BC (29–31) several grade 6 and 7 pupils initially were confused with regard to identifying the oldest of three Roman coins (116 AD; 53 AD; 103 BC). For the interpretation of the dates of three ships (31), two grade 7 pupils and the two grade 8 pupils identified the picture of

a Roman ship (450 BC) as the oldest, because, as Pearl, grade 7, explained: 'it is still made of wood and looks like a tree trunk'. When the interviewer asked her to look at the dates, she responded: '*then C [an Egyptian boat from 1900 BC] is the oldest, because thousand before Christ is really a lot*'.

The assignments on centuries (32–34) appeared to be problematic for most grade 6–8 pupils. The date 1290 (building of a castle) was correctly interpreted as the thirteenth century by only one grade 7 pupil. About half of these pupils interpreted 1952 (first TV-broadcast) as the nineteenth century, and 2002 (introduction of the euro) as the twentieth century.

With regard to the names of eras, grade 5 pupils found some names difficult, as turned out in assignments 15–24, in which they had to place a picture with a little story in one of three given eras. Felicia, for instance, very hesitantly pronounced the names of 'monniken' (monks) and 'revoluties' (revolutions). The meaning of 'citizens' and 'regents' also appeared to be difficult for these pupils. Grade 3–5 pupils used traditional names for eras in assignments 1–12, such as 'Middle Ages' and 'time of the knights' for pictures of a Viking ship (2), a kitchen (7) and a castle (11). For grades 6–8 the names of most eras were familiar, especially when pupils just had lessons about an era or remembered learning about eras previously. In assignments 15–24, some pupils spontaneously used names of historical eras, such as *prehistory*, *the time of the Greeks and Romans*, *the Middle Ages* and *the time of Monks and Knights*. However, terms such as 'citizens', 'regents' and 'holocaust' appeared to be difficult for these pupils as well. For instance, Mira (grade 6), when answering the assignment about the French revolution (36) explained: 'it says church and nobility and that is the time of Regents and Princes [1600–1700]'. To the questions of the interviewer if she knew what 'regents' are, she answered: 'No, but I do know what princes are.' Mike (grade 8) answered in the assignment about the Great Depression (37): 'In the time of the world wars and the ho ... lo ... caust, or something.'

### Characteristic features

Pupils sometimes correctly used social and cultural curricular characteristics to explain their answers, such as 'way of life of hunters and gatherers' which was mentioned by most pupils from grades 5–8, such as Gemma and Theo in grade 3 in the assignment on reindeer hunters (19):

Gemma: 'Then they also hunted animals for food and tents'.

Theo: 'Such as deer, hares, wild boars'.

In the assignment about Anne Frank, most pupils mentioned 'the German occupation of the Netherlands and the persecution of Jews'. For instance, Pearl and Lucy (grade 7) explained: 'Jews had to hide in the war and when they were caught, they had to go to a camp and there they had to do all kinds of things and they were separated and so.' Furthermore, some pupils mentioned 'the cultural flourishing in cities in the Netherlands Republic' in the assignment about the painting of Vermeer (20), such as Kai (grade 6), who remarked that 'in the Golden Age there was a lot of money and then they could buy many more paintings and so on'. However, in the assignments where pupils should have used economic and political characteristic features to place phenomena in one of three eras on a timeline with dates and names of eras (35–40), they often guessed and tried to find clues in the names of eras. For instance, Luke (grade 8), in the assignment about the French revolution (36), associated the nobility in the story, with the era of Regents and Princes [1600–1700]: 'because on the picture you see that they attack a castle and there would be kings and such involved'. Another example is the question about the flourishing trade in sugar, pepper, coffee and tea in Amsterdam (39), to which all grade 7 pupils answered that this was in in the era of Cities and States [1000–1500], because, as Lucy explained: 'Amsterdam is a city'.

Instead of using characteristic features in texts of images, pupils often reasoned from the names and icons of the eras. Simon (grade 4) for instance explained that the Golden Age was the time 'when they started to make gold', and Alice (grade 3) remarked: 'The Golden Age, those were all very nice years, so that there never can be war.' In the assignment about Columbus (14), Gemma and Theo, grade 5, reasoned that 'they had three ships and then they go somewhere to

discover something and there [point at the name of the era] *it says Discoverers*'. The icons with the Greek temple and with the steam factory several times helped pupils to give correct answers in the assignments about a Roman aqueduct (23) and a steam factory (22). As Felicia, grade 5, explained: *'this also has poles and it looks a bit like this* [points to the pillars of the temple in the icon]' and Alice (grade 5): *'this is all steam* [pointing at the chimney in the icon] *and here it is also steam* [pointing at the factory in the picture]'

Furthermore, pupils several times mixed up characteristics of different eras. Kai (grade 8), for instance, explained in the assignment on flourishing trade in Amsterdam (39) that 'they brought stuff to the cities to barter, so I think it is Cities and States'. Another example is Lucy's (grade 7) explanation of placing Charlemagne (35) in the era of Cities and States, because: 'here in the text it says that he protected the territory of the Pope, and I think cities and states are something like territories'.

### **The timeline**

Three different timelines were used: short timelines with three eras with names and icons and without dates in which pictures and little stories had to be placed, full timelines with only dates and three marked timeframes in which a picture had to be placed, and full timelines with dates and names and icons of the 10 eras.

Pupils of grade 5 made several mistakes in the assignments in which pictures and little stories about objects or persons had to be placed in one of three eras (15–24). They often made intuitive guesses, as Gemma, who, after some thinking, remarked about the photograph of a Roman stadium (17): 'This is difficult, I think it is the time of Cities and States, because we just learned about the Greeks and the Romans and then they did not have stadiums at all, so I think it is after that.' However, for some of these assignments pupils confidently gave correct answers, for example for the knights of the Bayeux tapestry (18), which most pupils associated with the Middle Ages. Grade 6–8 pupils more often could place objects, situations, events or people in the correct era on the timeline.

In the assignments with the timeline without dates, pupils made several mistakes with regard to relating dates to an era, for. Kevin (grade 6) for instance explained to a picture of reindeer hunters (19): 'Well, prehistory was many millions of years ago and Roman times was a hundred or two hundred year ago.' And Pearl and Lucy, grade 7, mentioned that Columbus (22) sailed to America in the fifteenth century, since the eleventh century was too early, because that was the time of the Romans. When doubting about the correct answer these pupils often started their reasoning from what they assumed would be the incorrect answers. Mike and Luke (grade 8) reasoned about a seventeenth-century painting of a classroom (25), which they had to place in one of three marked timeframes on the timeline:

- Mike: 'It cannot be C (around 1900), because now we already have modern classrooms and A (around 700), eh, it was let's say, the time of the prehistory.'  
 Luke: [interrupts] 'the Middle Ages'.  
 Mike: 'and then they lived in caves ...'

The timeline with dates and names and icons of eras (35–40) appeared to give pupils clues for the placement of pictures and stories in an era, as was explained in the previous paragraph.

### **Compare and contrast**

When pupils compared pictures to explain differences between the past and the present, they often used the words 'not yet', particularly in assignments 1–12 about objects and situations from the past and the present in which pupils used this expression in about one-third of their answers. Examples are Nora, grade 3, who characterised the past as 'the time when they did not yet have the things that we have now', and Mira, grade 6, who told that 'in the prehistory they

did not yet know so much, then they did not even know how to plant something, they had never put seed in the ground, because they had to migrate all the time'. This idea of people getting smarter through history was also expressed by Pearl, grade 7, in the assignment about Columbus (22): 'The Romans and the Greeks only thought about Europe and a bit beyond Europe, and in the 15th century they already were a bit smarter and in the 13th century they thought that the earth was a pancake.'

Grade 3–5 pupils often looked at the materials and whether there was electricity when comparing objects from different eras. For example, Ruby, grade 4, told: 'in the past they still had wooden cars and such things and no television. And they did not yet have electricity or so'. For the writing devices (5), Nora, grade 3, explained: '*and I think this [a slate blackboard] is chalk*', to which Samira added: '*they did not yet have a real board [interactive whiteboard] then*'. Furthermore, these pupils often mentioned that objects in the present looked more beautiful, richer, posh and more real, whereas objects from the past were often characterised as dirty, broken, worn-down, old-fashioned, not familiar, or weird. Nora explained in the assignment about toys (1) that the present Ferrari car '*is more beautiful, and those [Victorian doll and car] are all worn down and have scratches*'. Paula and Mandy, grade 4, found the Victorian toys 'really old-fashioned' and 'a bit dirty', Simon, grade 4, expressed that 'those old cars look really old and also really weird'. Grade 6 pupils Kevin and Kai, reasoned that in the times of a 1930s photo of cars and trams (transport, 10), 'they did not have posh cars at all'. And Mike, grade 8, explained in the assignment about the chronological sequence of buildings (11) that the Greek temple had no roof, 'so then it is really an old building'.

## Sequence

In the sequencing assignments (9–12) pupils of all grades could easily identify the correct sequences of pictures about daily life situations. Moreover, in assignments 1–8 pupils of grades 3–5 even automatically started to explain their answers while constructing chronological sequences. However, their reasoning was often naive with regard to the use of characteristic features and the assumption of progress as described in the previous paragraphs.

Furthermore, pupils regularly mentioned the (lack of) colours in the pictures to justify their answers. Several times pupils mentioned that objects had 'older colours', such as a seventeenth-century painting of a classroom (9) and an eighteenth-century painting of a living room (6). For example, Alice, grade 5, reasoned that a seventeenth-century painting of a classroom came first, because '*it is still a bit brownish, and there [the other two pictures] they already have colours*'. In the sequencing assignments (9–12), the assignment about three living rooms (6) particularly caused discussions, because several pupils doubted which picture would be most long ago: the black-and-white 1960s photo, or the coloured eighteenth-century painting. For instance, Mandy and Paula, grade 3 answered:

Mandy: '*This one, [points at the 1960s photo], because there are still many people in the living room.*'

Paula: '*And here everything is black and white [the 1960s photo] and here [eighteenth century painting] it is not.*'

Mandy: '*Yes, here it is in colours, and here not yet. So this one is the oldest.*'

Simon, grade 4, explained the 1960s photo: 'the television was really weird, because you watched everything in grey-and-white'.

Next to the colours, pupils also took into account if the picture was a drawing, a painting or a photo. In the assignment about the sequence of three women (12) Ruby, grade 2, reasoned: '*This [eighteenth century portrait] looks more like a painting and this [twentieth century photograph] is a real photo.*' And in the assignment on classrooms (9), Luke, grade 6, explained that the first picture came first, because it was a painting and the other two were photos.

## Conclusions and discussion

This study identified which types of problems, related to the objectives of the understanding of time, arise in Dutch primary pupils' reasoning, while placing objects, situations, events and people in time. Building on previous literature, additional problems were found that related to the Dutch 10-era curriculum.

For the use of the vocabulary of time, findings in previous studies were confirmed about young pupils having problems with the big numbers of dates and pupils having different interpretations for relative time phrases (Levstik and Pappas 1987; Harnett 1993; Barton and Levstik 1996; Foster, Hoge, and Rosch 1999; Hoge and Foster 2002; Hodkinson (2003b)). With regard to the use of characteristic features of historical periods, older pupils more often identified characteristic features than younger pupils (Barton and Levstik 1996; Foster, Hoge, and Rosch 1999; Hoge and Foster 2002), and pupils also showed lack of knowledge and naïve conceptions (VanSledright and Brophy 1992; Wagenaar and Hemker 2004). In assignments about comparing and contrasting, this study confirms that pupils have an idea of linear progression in history and of people becoming smarter through time and the present being more beautiful, richer, posh and more real (Harnett 1993; Barton and Levstik 1996; Lee and Ashby 2001; Hoge and Foster 2002; Hunt 2002). For the objective of sequencing objects, situations, events and people in chronological order, pupils' reasoning contained many elements of the previous categories. Furthermore, pupils often reasoned from the type of picture, assuming that drawings and paintings must be older than photos and that pictures with black-and-white, grey and brown colours are older than coloured pictures (Harnett 1993; Barton and Levstik 1996; Foster, Hoge, and Rosch 1999; Vella 2001; Blow, Lee, and Shemilt 2012).

Related to the Dutch 10-era curriculum, problems were identified with regard to the use of the vocabulary of time, the use of characteristic features and the timeline (Table 3). The curriculum was supposed to support pupils, with a framework of 10 eras and 20 characteristic features which in itself is a kind of timeline. Some names of the 10 eras appeared to be helpful to place pictures and stories in time, such as *Romans*, *Knights*, *Discoverers* and *World Wars*. However, other names hindered pupils in their reasoning, because they can relate to several eras, as for instance, *Farmers*, *Cities* and *Princes*. Moreover, pupils found several names difficult to understand, such as *Monks*, *Regents*, *Citizens*, *Revolutions* and *Holocaust*.

For the placement of historical phenomena in time, pupils hardly used the 20 characteristic features of the Dutch primary school curriculum. One possible explanation could be that a large majority of these features consists of economic and political characteristics, which often are rather abstract for primary school pupils, as was shown in problems in pupils' answers in assignments 35–40 about economic and political events. Another explanation could be that pupils often lacked historical knowledge and did not know what clues would be important in a picture or a story, to place a phenomenon in time. Instead pupils reasoned with the names or icons of eras, as for instance for pictures or stories about cities, which regardless of the historical period were associated with the era of Cities and States.

The timeline with names and icons of eras seemed to support pupils in placing pictures and stories in time. However, pupils' reasoning remains rather naive, if the only justification for placing a picture of a factory in the era of Citizens and Steam engines consists of the statement that the factory in the picture looks like the icon that belongs to the era. Besides, relating a phenomenon to an era did not mean that pupils could place the era correctly on the timeline.

A limitation of the present study is the rather small sample of pupils, which implicates that we have to be careful to generalise our conclusions. However, several types of problems that were found confirmed and refined problems that were found in earlier studies. Combined with the additional problems, related to the Dutch curriculum, the present study gives insights into pupils' reasoning, which could not have been revealed in a large-scale quantitative study. In future research problems in pupils' reasoning might be further elaborated on in qualitative studies including more pupils and schools, and in different countries.

Conclusions from the present study indicate that the teaching of historical time in primary school and in teacher training should take into account the problems that are related to the objectives of the understanding of historical time. Pupils should learn how to use the vocabulary of time, how to identify characteristic features of eras and how to place historical phenomena on a timeline. Activities on comparing different eras should not only focus on change, but also on continuity, for instance on phenomena such as agriculture and cities. Furthermore, teachers need to be aware of pupils' perceptions that history is a story of linear progression. Wilschut's (2012) suggestion for teachers to avoid expressions such as 'not yet' and 'already' might be helpful to counter present-oriented reasoning. With regard to the names of the 10 eras in the Dutch curriculum results of the present study indicate that some names might not be suitable for primary school pupils, because they are too abstract or too little specific. In a future revision of the curriculum this should be taken into account. Another recommendation for Dutch educational policymakers would be to include more concrete social and cultural characteristics in the primary school curriculum.

More research would be needed to investigate if the problems that were found in this study could be tackled with a pedagogy that takes these problems into account. Finally, future research could focus on professionalisation of teachers and development of curriculum materials, aimed at improving pupils' understanding of historical time.

## Disclosure statement

No potential conflict of interest was reported by the authors.

## Funding

This work was supported by The Netherlands Organization for Scientific Research (NWO) (grant number 023.001.084).

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## Appendix 1

Ten eras with dates and characteristic features for primary education.

Eras	Dates	Characteristic features
 1 Hunters and Farmers	Until 3000 BC	<ul style="list-style-type: none"> <li>– The way of life of hunters and gatherers.</li> <li>– The emergence of agriculture and agricultural communities.</li> </ul>
 2 Greeks and Romans	3000 BC–500 AD	<ul style="list-style-type: none"> <li>– The confrontation between Greco-Roman culture and the Germanic cultures of North-West-Europe.</li> <li>– Christianity in the Roman Empire: from forbidden to the only allowed religion.</li> </ul>
 3 Monks and Knights	500–1000	<ul style="list-style-type: none"> <li>– The spread of Christianity to the Low Countries.</li> <li>– Feudalism and serfdom.</li> </ul>
 4 Cities and States	1000–1500	<ul style="list-style-type: none"> <li>– The rise of trade and crafts, and the emergence of cities.</li> <li>– The emergence of an urban citizenry and a growing autonomy of cities.</li> </ul>
 5 Discoverers and Reformers	1500–1600	<ul style="list-style-type: none"> <li>– The beginnings of European overseas expansion.</li> <li>– The conflict in the Netherlands resulting in the founding of an independent Netherlands State.</li> </ul>
 6 Regents and Princes	1600–1700	<ul style="list-style-type: none"> <li>– The rise of commercial capitalism and the beginnings of a world economy.</li> <li>– Citizens in political power and cultural flourishing in the cities of the Netherlands Republic.</li> </ul>
 7 Wigs and Revolutions	1700–1800	<ul style="list-style-type: none"> <li>– Slave labour on plantation colonies and the emergence of abolitionism.</li> <li>– The striving for fundamental rights and political influence of citizens in the French and Dutch revolutions.</li> </ul>
 8 Citizens and Steam Engines	1800–1900	<ul style="list-style-type: none"> <li>– The emergence of a parliamentary system with more and more men and women taking part in the political process.</li> <li>– The industrial revolution and the emergence of emancipation movements.</li> </ul>
 9 World Wars and Holocaust	1900–1950	<ul style="list-style-type: none"> <li>– The crisis of world capitalism.</li> <li>– The German occupation of the Netherlands and the persecution of Jews.</li> </ul>
 10 Television and Computer	1950–until now	<ul style="list-style-type: none"> <li>– The division of the world into an Eastern and a Western bloc and the Cold War.</li> <li>– Social and cultural changes and the growing pluralism from the sixties.</li> </ul>

## Appendix 2

### Some examples of the coding

#### Assignment 10: Transport

Interviewer reads the question:

*'Here you see means of transport from the past till now. What is the correct sequence in time, starting from the oldest means of transport?'*

*'Tick the box before the row that represents the correct order in time.'*

There are three rows of three pictures from means of transport in different order.

- a horse tram
- a 1930s city square with cars and trams
- a highway with traffic from the end of the 20th century

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Answers grade 2, Mandy and Paula

Codes

After some thinking they select the correct order

Interviewer: Why do you think this is the correct order?

Paula: Because, here [A], cars were *not yet invented*

Presentism: not yet

Mandy: And the *horse walks with a train behind it [laughs]*

Presentism: weird

Paula: And here [B] they had invented cars, but no cars, only busses, and here [C] there are *real cars and busses and trucks*.

Presentism: real

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#### Assignment 39: Flourishing trade in Amsterdam

Interviewer reads the question:

*'From a diary: "The ships in Amsterdam were packed with crates full of sugar, pepper, coffee, and tea. The traders did good business and Amsterdam became very important for our country.'*

*'Tick the box for the era in which this was written about Amsterdam''*

A timeline with dates and names and icons of eras. There are boxes for three eras:

- (A) The era of Cities and States
- (B) The era of Regents and Princes
- (C) The era of World Wars and Holocaust

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Answers grade 5, Jessie and Jade

Codes

Jade: I think B, because *I don't think that in time of war you would try very hard to become a trading city.*

Timeline:

- Start from what they assume would be incorrect, and select the era left over.

Jessie: *I think A, the time of cities and states, because they traded a lot in the time of cities and states.*

Lack of knowledge about curricular characteristic features:

- Mix up characteristic features

Jade: yes, I also think so.

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