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Changes in self-perceptions of competence and intrinsic motivation among elementary schoolchildren

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Background. Children's perceived competence and intrinsic motivation are assumed to be very high at the outset of schooling. However, how they change and how they relate to each other and to academic achievement across early schooling years remain open to question

Aims. This 3-year longitudinal study was aimed at examining the following questions. Do children's perceived competence and intrinsic motivation about reading and mathematics change across the first 3 years of schooling? Do their perceived competence and intrinsic motivation differ according to academic domains? Do their perceived competence and intrinsic motivation relate to their academic achievement in each academic domain?

Sample. A total of 115 elementary schoolchildren (63 boys and 52 girls) were examined in first grade (mean age = 84,5 months, *SD* = .67) and for the next 2 years.

Method. Children responded to questionnaires about their perceived competence and intrinsic motivation in reading and mathematics. Year-end grades in these two subjects were used as a measure of performance.

Results. Changes in perceived competence and intrinsic motivation, and between-year intercorrelations, were observed to differ according to academic domains and gender. Intrinsic motivation did not make a significant contribution to academic achievement at either school grade or in any academic domain, whereas perceived competence was significantly related to achievement at each school grade in both reading and mathematics.

Conclusions. Differences between boys and girls observed in this study were not linked to a specific domain and cannot be attributed to gender-role stereotypes. Girls

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appeared to be more precocious in differentiating their competence and intrinsic motivation according to academic domain, as well as in being able to process and integrate information about their ability from past performances in a domain to judge their competence in the same domain.

The importance of students' perceptions of competence and intrinsic motivation in school functioning and achievement has been documented by a strong body of researchers in both cognitive and educational psychology (Bandura, 1986, 1993; Bordeleau & Bouffard, 1999; Bouffard-Bouchard & Pinard, 1988; Bouffard & Vezeau, 1998; Deci & Ryan, 1992; Gottfried, 1990; Harter, 1990, 1992; Marsh, Craven, & Debus, 1991; McCombs, 1988; Ryan, Connell, & Grolnick, 1992). According to Deci and Ryan (1992; Deci, Vallerand, Pelletier, & Ryan, 1991), intrinsic motivation is strongly linked to the basic human need to feel competent. Moreover, empirical studies have confirmed that children's perceptions of competence are positively related to their intrinsic motivation (Boggiano, Main, & Katz, 1988; Gottfried, 1990; Harter, 1981, 1992). This led some authors to suggest that the development of perceptions of competence in a domain is necessary to develop and maintain intrinsic motivation in this same domain (Skaalvik & Rankin, 1995; Stipek, 1992).

According to the constructivist perspective, children's perceptions of competence are not innate but rather the result of development and construction over time through learning experiences (Alexander & Entwisle, 1988; Bouffard & Vezeau, 1998; Grolnick & Ryan, 1989; Harter, 1992; Hokoda & Fincham, 1995). Self-perceptions of competence are important because they affect students' cognitive and motivational functioning. Depending on a positive or negative appraisal of their capacities, students will take interest or not in what they are learning and, consequently, will make efforts or be passive in their work. When confronted with difficulties, students having a positive view of their capacities will be prone to persevere and eventually succeed whereas those who consider they have poor capacities will be likelier to abandon and fail (Assor & Connell, 1992; Bandura, 1986; Berry & West, 1993; Boggiano *et al.*, 1988; Bouffard-Bouchard & Pinard, 1988; Entwisle, Alexander, Pallas, & Cadigan, 1987; Harter, 1990, 1992). While achieving successes contributes to maintain and even improve the confident students' initial perceptions, failures will have the reverse effect on the less confident ones.

It is important to stress that students' perceptions of competence do not necessarily reflect their real capacities. Studies have shown gifted students sometimes to have very negative self-perceptions and lower performances than their capacity level because of the maladjusted patterns of intellectual functioning these self-perceptions generate (Borkowski, Carr, Rellinger, & Pressley, 1990; Bouffard-Bouchard, Parent, & Larivée, 1990; Phillips, 1987; Phillips & Zimmerman, 1990). With regard to young children, it is often argued that their appraisals of their intrinsic motivation and competence level are very high and exaggerated at the outset of schooling (Coster & Jaffe, 1990; Dweck, 1989; Flink, Boggiano, Main, Barrett, & Katz, 1992; Harter, 1981, 1992; Paris & Byrnes, 1989; Stipek, 1984, 1992). Very different reasons are invoked to explain such initial unrealistic optimism. For example, Ruble, Grosouvsky, Frey, and Cohen (1992) suggested that it could be due to the young children's tendency to make judgments consistent with desires. For Nicholls (1978, 1979), because young children tend to equate effort with ability, having tried hard or mastered a task could lead them to feel smart and to positively evaluate their own abilities. Finally, according to Flammer (1995), because teachers want to encourage kindergarten and preschool children, they

usually give them feedback that is relatively arbitrary and positive.

It remains unclear, however, as to what age children are able to make different judgments of their motivation and competence in different academic domains. Some authors argue that first grade children are already able to make such differentiation (Bordeleau & Bouffard, 1999; Eccles, Wigfield, Harold, & Blumenfeld, 1993; Marsh *et al.*, 1991, 1998; Wigfield & Harold, 1992; Wigfield *et al.*, 1997), whereas others affirm that this ability only appears around grade three (Harter, 1992; Harter & Pike, 1984; Paris & Byrnes, 1989). Authors also disagree about how appraisals of intrinsic motivation and self-perceptions of competence evolve along school years.

According to some authors, children's initial optimism rapidly and systematically declines all along elementary school years (Licht, 1992; Miller, 1987; Stipek, 1981; Wigfield *et al.*, 1997). Marsh *et al.* (1991) reported linear decreases in children's self-perceptions of competence in various academic domains across elementary school years. Eccles *et al.* (1993) reported similar results in a study among grade one to four elementary schoolchildren (see also Stipek & Mac Iver, 1989, for a review). The generality of this phenomenom led some authors to suggest that changes in cognitive processing abilities and in school environment as children get older are likely to be involved in this decline (Bouffard, Markovits, Vezeau, Boisvert, & Dumas, 1998; Stipek & Mac Iver, 1989). So, with age and school experience children would become more able to use information from past performances and to differentiate their motivation and competence in different domains (Eder, 1990; Gottfried, 1990; Marsh *et al.*, 1991; Wigfield *et al.*, 1997).

Other authors also observed this inflation of young children's self-perceptions but disagree with the frequently reported rapid decline in early elementary school years. In a study about children's reading self-concepts, for example, Chapman and Tunmer (1995) observed that while children's attitude about reading began to decline from grade four to five, reading self-perceptions of competence remained very stable across the first 5 elementary years. Harter (1982), and Harter and Pike (1984) reported no decline in perceived competence between preschool and second grade. Even though changes in school environment from elementary to junior high school may bring about re-evaluation of self-competence, Harter (1992) argued that there is no unique direction, self-perceptions remaining intact for some students, increasing or decreasing for others.

These controversial findings clearly indicate the need for more research on the development of self-perceptions of competence and intrinsic motivation during elementary school years. In addition, because little research has been done with young children, the study of how self-perceptions of competence and intrinsic motivation evolve across the early schooling years is warranted. The present 3-year longitudinal study was aimed at addressing the following questions. Do children's self-perceptions of competence and intrinsic motivation about reading and mathematics change across the first 3 years of schooling? Do young elementary schoolchildren's self-perceptions of competence and intrinsic motivation differ according to academic domains? Finally, do young elementary schoolchildren's self-perceptions of competence and intrinsic motivation relate to their academic achievement in each academic domain? Reading and mathematics were chosen because they are central domains of learning at the early schooling years.

Method

Participants

The sample comprised 115 regular French-speaking children (63 boys and 52 girls, mean age = 84,5 months) enrolled in four public schools of the Montreal area. Schools were located in predominantly middle-class communities. The study began when children were in first grade and they were assessed around April at each year of the study. They were met twice to fill out questionnaires about each academic domain. The order of presentation was counterbalanced for academic subjects. Half of the children responded to the questionnaire about either mathematics or reading in the first session, and to the other questionnaire in the second session.

Instruments

Self-perceptions of competence and intrinsic motivation in each academic domain were assessed using a pictorial form of scale developed by Harter (1982, 1983). Each item is a description of two groups of children (group of circles or squares) with opposing characteristics from which children must first indicate the most similar to themselves and then indicate the large figure if the description is 'really true' or the smaller one if it just 'sort of true'. Both instruments are presented in the Appendix.

Two versions of a 10-item questionnaire were constructed to assess children's *perceptions of competence* in reading and in mathematics. Four questions were selected from the Inventory Reading Awareness developed by Paris and Oka (1986). Four other questions were adapted from the Perceived Competence Scale of Harter (1982). The last two items were taken from the Control Beliefs subscale of the Control, Agency, and Means-ends Interview for Children, created by Skinner, Chapman, and Baltes (1988). A factor analysis of data from a previous study among another sample of over 250 first-grade children showed that the items form two factors corresponding to the two academic domains. In the present study, internal consistency was good for both academic domains and ranged from .75 in reading and .78 in mathematics at grade one and reached .81 in reading and .84 in mathematics at grade three.

Intrinsic motivation was assessed using 11 items among which eight were taken from the Young Children's Academic Intrinsic Motivation Inventory developed by Gottfried (1990) and three others were created for the aims of this study. A validation study examined the French version of the questionnaire. A factor analysis of data from a previous study among another sample of over 250 first-grade children confirmed that the items form two factors corresponding to the two academic domains. In the present study, internal consistency was good for both academic domains and ranged from .83 in reading and .79 in mathematics at grade one and reached .85 in reading and .86 in mathematics at grade three.

Procedure

Each child was interviewed individually during two sessions focusing either on reading or on mathematics. The order of academic domains was counterbalanced and each session lasted approximately 15 to 20 minutes. The experimenter first explained how the pictogram facing the child functioned and worked with him/her on two examples. In order to minimise a systematic bias toward a particular group, the second example was adapted so that the child answered by choosing each of the two groups (circles/

squares) once. The experimenter engaged in a dialogue with the child about the target academic domain and provided concrete examples of relevant activities (e.g.: Reading is learning to recognise the letters of the alphabet, it is reading sounds like 'ma'...; Can you name me some letters? etc.). Questions were then read aloud by the experimenter who scored the child's response on the questionnaire. Children could answer either by saying aloud or by pointing on the pictogram the group which most corresponded to them. Special attention was given by experimenters to the child's understanding of the questions.

The final marks obtained by the children in reading and in mathematics at the end of each school year were used to measure academic achievement in each domain.

Results

Do self-perceptions of competence and intrinsic motivation about reading and mathematics change across the first three years of schooling?

Correlational analyses were performed to examine between-year relations of each variable within academic domains respectively for boys and girls. Table 1 presents the results of these analyses. Between-year relations of self-perceptions of competence and intrinsic motivation seemed generally stronger among boys than among girls. However, Fisher's z test conducted to examine these differences ($p < .05$) showed that the only significant difference of correlation was for between grade two and three intrinsic motivation in reading. Similarly, despite that links between grade two and three seemed stronger than between grade one and two among boys, the test for the difference of correlations showed that none of these differences reached significance.

Table 1. Between-year correlation coefficients of self-perceptions of competence and intrinsic motivation about reading and mathematics for boys (n=63) and girls (n=52)

	Self-perceptions of competence		Intrinsic motivation	
	Reading	Mathematics	Reading	Mathematics
Grade 1 & 2				
Boys	.42***	.33**	.33**	.42***
Girls	.33**	.37**	.07	.28
Grade 2 & 3				
Boys	.53***	.52***	.51***	.56***
Girls	.36**	.43***	.17	.40**

** $p < .01$; *** $p < .001$

Analyses of variance using gender (x2) as a factor and assessment time as a repeated measure were performed separately on each variable within each academic domain. Table 2 presents means and standard deviations for each variable according to gender, assessment time and academic domain. With regard to self-perceptions of competence about *reading*, the significant effect found for assessment time, $F(2,226) = 4.57$, $p < .01$, was qualified by an interaction with gender, $F(2,226) = 3.85$, $p < .05$. Examination of this interaction showed that changes in self-perceptions of competence emerged at different moments for boys and girls. Boys' self-perceptions of competence at grade two

and three were similar but lower than those they reported at grade one. Girls' self-perceptions of competence at grade one and two were similar, but higher than those they reported at grade three. No difference between boys and girls was significant at either school grade.

No significant effect was observed for gender and assessment time, nor for the interaction between factors on self-perceptions of competence about *mathematics*. Self-perceptions of competence about mathematics of both boys and girls remained very stable across time. So, although self-perceptions of girls slightly decline across years, no between-year difference reached significance.

A very similar pattern was observed for intrinsic motivation. Again, a significant effect was found for assessment time, $F(2,226) = 12.80$, $p < .001$, but was qualified by an interaction with gender, $F(2,226) = 3.35$, $p < .05$ on intrinsic motivation about *reading*. As for self-perceptions of competence, examination of the interaction revealed that the decrement in intrinsic motivation about reading occurred at different moments for boys and girls. For boys, it decreased from grade one to two and remained stable at grade three. For girls, it remained stable from grade one to two, but decreased at grade three. However, as for self-perceptions of competence about reading, no difference between boys and girls was observed at either school grade.

In *mathematics*, significant effects were again found for assessment time, $F(2,226) = 6.71$, $p < .001$, and for the interaction between the latter and gender, $F(2,226) = 3.15$, $p < .05$ on intrinsic motivation. Examination of the interaction showed that boys' intrinsic motivation remained stable across years, whereas girls' intrinsic motivation decreased from grade one to two and then remained stable at grade three. In addition, boys' intrinsic motivation about mathematics was higher than that of girls at both grades two and three ($p_s < .05$).

Table 2. Means and standard deviations of boys' (n=63) and girls' (n=52) self-perceptions of competence and intrinsic motivation according to academic domain and school level

	Reading				*Mathematics*			
	Boys		Girls		Boys		Girls	
				Grade 1				
Self-perception/competence (max.: 4)	3.51	(.37)	3.48	(.39)	3.39	(.39)	3.36	(.46)
Intrinsic motivation (max.: 4)	3.73	(.31)	3.76	(.32)	3.65	(.35)	3.60	(.44)
				Grade 2				
Self-perception/competence (max.: 4)	3.39	(.40)	3.53	(.39)	3.40	(.46)	3.32	(.45)
Intrinsic motivation (max.: 4)	3.53	(.43)	3.65	(.36)	3.59	(.39)	3.41	(.55)
				Grade 3				
Self-perception/competence (max.: 4)	3.41	(.41)	3.36	(.43)	3.41	(.40)	3.19	(.53)
Intrinsic motivation (max.: 4)	3.56	(.40)	3.48	(.47)	3.59	(.34)	3.41	(.52)

Do young elementary school children's self-perceptions of competence and intrinsic motivation differ according to academic domains?

Between-academic domain correlations of self-perceptions of competence and intrinsic motivation were computed at each school level separately for boys and girls in order to examine whether or not children made different judgments according to each academic domain. Table 3 summarises these results. Fisher's z test ($p < .05$) conducted to examine correlation differences showed that among girls between-reading and mathematics relation of self-perceptions of competence was lower at grade three than at grade one. Similarly, between-reading and mathematics relation of intrinsic motivation was lower at grade three than at grade one. Among boys, between academic domains relations of self-perceptions of competence as well as of intrinsic motivation remained the same across school grade.

Table 3. Correlation coefficients between reading and mathematics for boys (n=63) and girls (n=52) at school level

	Self-perception/competence	Intrinsic motivation
Grade 1		
Boys	.56	.40
Girls	.63	.62
Grade 2		
Boys	.52	.61
Girls	.51	.40
Grade 3		
Boys	.48	.45
Girls	.28	.30

Comparisons of self-perceptions of competence and intrinsic motivation with respect to each academic domain led to different results for boys and girls. Among boys, except for self-perceptions of competence in reading that were higher than in mathematics at grade one, $t(62) = 2.72$, $p < .05$, no other difference between academic domains was observed for either self-perceptions of competence or intrinsic motivation. Boys reported similar self-perceptions of competence in reading and mathematics at grades two and three and similar intrinsic motivation in each academic domain at every school grade.

Among girls, self-perceptions of competence were higher in reading than in mathematics at grades one, $t\,(51) = 2.20$, $p < .05$, two, $t\,(51) = 3.46$, $p < .001$, and three, $t\,(51) = 2.23$, $p < .05$. Similarly, girls' intrinsic motivation in reading was higher than in mathematics at grade one, $t\,(51) = 2.19$, $p < .05$, and two, $t(51) = 3.40$, $p < .001$, whereas the difference between academic domains was marginally significant at grade three, $t\,(51) = 1.87$, $p < .07$.

Finally, the relation between self-perceptions and intrinsic motivation within each domain was also examined at each school level. Since no difference of correlation was found between boys and girls, data were computed across gender. At grade one, the relation between self-perceptions and intrinsic motivation reached .35 in reading and .55 in mathematics, at grade two the relation was .49 in reading and .49 in mathematics whereas the relation reached.57 in reading and .70 in mathematics at grade three.

How do self-perceptions of competence and intrinsic motivation relate to academic achievement across school levels?

The relations between children's academic achievement in each academic domain and self-perceptions of competence and intrinsic motivation were examined separately at each grade level. At grade one, given that self-perceptions of competence and intrinsic motivation were related, partial correlations controlling for each other alternately were used to examine how they relate to academic achievement in each domain. In reading, year-end marks remained significantly related with self-perceptions after controlling for intrinsic motivation (r =.19, $p < .05$), whereas no relation with intrinsic motivation was observed when controlling for self-perceptions ($r = -.04$). The same pattern was observed in mathematics: year-end marks remained significantly related with self-perceptions after controlling for intrinsic motivation (r =.18, $p < .05$), but no relation with intrinsic motivation was observed when controlling for self-perceptions ($r = -.03$).

Because previous school experience was likely to be linked to year-end marks at subsequent school levels, at grade two and three hierarchical regressions were performed to examine how academic achievement relates to self-perceptions and intrinsic motivation. At grade two, year-end marks at grade one, self-perceptions of competence and intrinsic motivation for the current year, and gender were entered at the first step to predict the outcome variable. Self-perceptions of competence and intrinsic motivation at grade one were entered at the second step. At grade three, year-end marks at grade two, self-perceptions of competence and intrinsic motivation for the current year, and gender were entered at the first step to predict the outcome variable. Self-perceptions of competence and intrinsic motivation at grade two, as well as year-end marks at grade one, and self-perceptions of competence and intrinsic motivation also at grade one were entered at the second step. Table 4 presents results obtained at grade two and three.

In *reading* at grade two, the variables entered at the first step accounted for 18.9% of the explained variance. The variables entered at the second step added 6.3% to the variance for a total of 25.2% of the explained variance for year-end marks in reading, $F(6,108) = 5.67$, $p < .001$. Self-perceptions of competence at grade two and both year-end marks and self-perceptions of competence at grade one remained significant at the second step of the regression. At grade three, the variables entered at the first step accounted for 14% of the explained variance. The variables entered at the second step added 11.6% to the variance, to reach a total of 25.6% of the explained variance for year-end marks in reading, $F(9,105) = 3.70$, $p < .001$. Only self-perceptions of competence at grade three and year-end marks at grade one remained significant at the second step of the regression.

In *mathematics* at grade two, the variables entered at the first step accounted for 11.6% of the explained variance, while the variables entered at the second step added 1.3% to the variance for a total of 12.9% of the explained variance for year-end marks, $F(6,108) = 2.53$, $p < .05$. Year-end marks at grade one and self-perceptions of competence at grade two were significant at the second step of the regression. At grade three, the variables entered at the first step accounted for 19% of the explained variance . The variables entered at the second step added 14.7% of the variance to reach a total of 33.7% of the explained variance for year-end marks in mathematics, $F(9,105) = 5.59$, $p < .001$. Self-perceptions of competence at grade three and year-end marks at grade two remained significant at the second step of the regression.

Table 4. Hierarchical regression analyses (beta values) predicting academic achievement in reading and in mathematics at grade two and three (N=115)

	Reading achievement		*Mathematics achievement*	
	Step 1	Step 2	Step 1	Step 2
Variables in equation	ß	ß	ß	ß
Grade 2				
Year-end marks at grade 1	.29***	.26**	.25**	.26**
Self-perception at grade 2	.31**	.28***	.19	.20*
Intrinsic motivation at grade 2	−.09	−.08	−.08	−.09
Gender	.05	.08	−.08	−.08
Self-perception at grade 1		.23*		.00
Intrinsic motivation at grade 1		−.05		.02
R^2	.189***	.252***	.116**	.129**
Change in R^2		.063**		.013
Grade 3				
Year-end marks at grade 2	.31***	.18	.17	.34***
Self-perception at grade 3	.26**	.22*	.43***	.29**
Intrinsic motivation at grade 3	−.08	−.07	−.15	−.08
Gender	.03	.05	−.03	−.06
Year-end marks at grade 1		.30***		.16
Self-perception at grade 1		.19		.08
Intrinsic motivation at grade 1		−.02		−.13
Self-perception at grade 2		.10		.13
Intrinsic motivation at grade 2		.02		−.15
R^2	.14***	.256***	.19***	.337***
Change in R^2		.116***		.147***

** $p < .01$; *** $p < .001$

Discussion

Many authors argue that at the beginning of elementary school children have high self-perceptions of competence and intrinsic motivation (Coster & Jaffe, 1990; Dweck, 1989; Flink *et al*., 1992; Harter, 1981, 1992; Paris & Byrnes, 1989; Stipek, 1984, 1992). As already reported in other studies, our findings showed that these optimistic self-perceptions and motivation about various academic domains decline through the following two school years (Eccles *et al*., 1993; Licht, 1992; Marsh, 1989; Miller, 1987; Stipek & Mac Iver, 1989). However, this decrement emerged at a different time for academic domain and gender.

Similar to the Marsh *et al.* study (1998), self-perceptions of boys and girls did not decrease between grade one and three in the mathematics domain, but they did in the reading domain and the decline was earlier for boys than for girls. Intrinsic motivation in mathematics of boys remained stable across time, but it declined between grade one and two among girls leading to higher intrinsic motivation for boys than that for girls at grade two and three. Intrinsic motivation of both boys and girls in reading declined but again this was observed to emerge earlier for boys than for girls. Some researchers reported that between-year relations of both self-perceptions of competence and intrinsic motivation increase across years (Marsh *et al*., 1998; Wigfield *et al*., 1997). This general pattern was not clearly observed. Although the difference between boys and

girls did not reach significance, probably due to the small sample size, particularly for girls between-year relations of both self-perceptions of competence and intrinsic motivation remained relatively unstable. This suggested to us that girls may be more inclined or more able to reconsider their initial self-perceptions and intrinsic motivation following early schooling experience. In order to document this explanation, we examined separately for boys and girls how self-perceptions and intrinsic motivation about each academic domain at grade two and three were related to year-end marks at the preceding year. As shown in Table 5, both boys' and girls' intrinsic motivation at both grades was unrelated to the preceding year's end marks in either domain. However, girls' perceptions of competence about each domain were systematically related to their preceding year's end marks in the same domain, while for boys a relation was observed between self-perceptions of competence and preceding year's end marks but only in grade three in mathematics. Thus, as others already suggested, as children mature and gain more schooling experience, they tend to bring their self-perceptions into line with their actual performance (Chapman & Tunmer, 1995; Saarnio, Oka, & Paris, 1990; Stipek, 1984). However, results of this study also suggest that this process may come into action earlier among girls than among boys.

Table 5. Correlation coefficients between self-perceptions of competence and intrinsic motivation at grade two and three, and year-end marks at the preceding year for boys (n=63) and girls (n=52)

	Self-perceptions of competence		Intrinsic motivation	
	Reading	Mathematics	Reading	Mathematics
		Grade 2		
Year-end marks at grade 1				
Boys	.09	.11	.11	−.11
Girls	.29*	.41**	.07	.20
		Grade 3		
Year-end marks at grade 2				
Boys	.17	.30*	.04	.13
Girls	.32*	.46***	.10	.06

* $p < .05$; ** $p < .01$; *** $p < .001$

Gender differences were also observed regarding whether or not young elementary schoolchildren make different judgments of their motivation and competence according to different academic domains. As mentioned earlier, some authors affirm that first-grade children are already able to make such differentiation (Bordeleau & Bouffard, 1999; Eccles *et al.*, 1993; Marsh *et al.*, 1991, 1998; Wigfield & Harold, 1992; Wigfield *et al.*, 1997), whereas for others this ability emerges only around grade three (Harter, 1992; Harter & Pike, 1984; Paris & Byrnes, 1989). Results of the present study support both positions. The only difference between academic domains among boys was their higher self-perceptions of competence in reading than in mathematics at grade one. In contrast, at every school grade girls reported different levels of self-perceptions of competence and intrinsic motivation for reading than for mathematics. In addition, between-academic domains relations of both self-perceptions of competence and intrinsic motivation systematically decline across school level among girls whereas relations of boys' perceptions of competence between academic domains did not change and relations of intrinsic motivation in reading and mathematics went

up and down across school levels. These findings suggest that the controversy about the age at which children are able to make different judgments according to different academic domains may be linked to variability of gender representation in samples and to lack of consideration of gender differences in most studies examining this issue. However, in each academic domain and similarly for boys and girls, the relation between self-perceptions and intrinsic motivation increased across school level, supporting the view that children's self-perceptions of competence and intrinsic motivation are feeding each other along school years (Skaalvik & Rankin, 1995; Stipek, 1992).

Finally, the last question examined in this study was how children's self-perceptions of competence and intrinsic motivation about academic domains relate to their achievement in each domain. Not surprisingly, in first grade, little variance in academic achievement was explained, but in both domains only self-perceptions of competence were significantly related to children's year-end marks. At no school level in either reading or mathematics did intrinsic motivation or gender significantly contribute to explain variations in children's year-end marks. As could have been expected, within each academic domain, previous academic achievement accounted for a significant percentage of current academic achievement. However, self-perceptions of competence in academic domain systematically accounted for a significant percentage of the variance in year-end marks in the same domain. Although the absence of relation between intrinsic motivation and academic achievement seems to suggest that the latter is more dependent on positive self-perceptions than on the willingness to learn, this conclusion may be asserted with caution. At all school levels, self-perceptions of competence and intrinsic motivation were related. Also, higher than self-perceptions, intrinsic motivation remained quite high across school levels and its variance was low. These may have concurred to reduce the likelihood of observing significant contribution of intrinsic motivation in academic achievement. In addition, even though intrinsic motivation is not directly related to academic achievement among young elementary schoolchildren, its importance may increase with school level

Findings of this study support the contention made by Harter (1992) in arguing that how self-perceptions of competence and intrinsic motivation develop and evolve across young elementary schoolchildren is a phenomenon that cannot be generalised. We believe that factors such as gender and academic domains should be taken into account in addressing this issue. Gender differences in competence beliefs have often been reported. Favouring boys in mathematics and sports, and favouring girls in reading and social sciences, these gender differences have been interpreted as expressing cultural gender-role stereotypes (see Eccles, Wigfield, & Schifele, 1998, for a review). Differences between boys and girls observed in this study were not linked to a specific domain and therefore cannot be attributed to gender-role stereotypes. They concerned lower between-year relations of perceived competence and intrinsic motivation, and earlier decrement in between-academic domain relations for girls than for boys. This pattern of results suggests that boys are earlier than girls in consolidating their self-system, whereas girls would be more precocious in differentiating their competence and intrinsic motivation according to academic domain. This would allow them to structure earlier than boys a self-system that is less global and more domain specific. This line of reasoning is consistent with the earlier interplay between academic achievement in a given domain at a given year and subsequent perceived competence in the same domain observed among girls. This suggests their earlier

capacity than boys in processing and integrating information about their ability from past performances in the domain.

The issue of gender differences in how young elementary schoolchildren develop and structure their self-system has not yet received much attention. Future research should address specifically this question.

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Appendix

Self-perceptions of competence scale

In the circles group, kids find reading (mathematics) very difficult to them.	but	In the squares group, kids do not find reading (mathematics) very difficult to them.
In the circles group, kids succeed very well in their reading (mathematics) exercises.	but	In the squares group, kids do not succeed very well in their reading (mathematics) exercises.
In the circles group, kids think that if they want to, they can have good marks in reading (mathematics).	but	In the squares group, kids think that even if they want to, they cannot have good marks in reading (mathematics).
In the circles group, kids think that reading (mathematics) does take much effort for them.	but	In the squares group, kids think that reading (mathematics) does not take much effort for them.
In the circles group, kids think that they will be even better in reading (mathematics) next year.	but	In the squares group, kids think that they will not be better at reading (mathematics) next year.
In the circles group, kids often make mistakes in their reading (mathematics) exercises.	but	In the squares group, kids do not often make mistakes in their reading (mathematics) exercises.
In the circles group, kids think that if they really decide to learn something hard in reading (mathematics) they can do it.	but	In the squares group, kids think that even if they really decide to learn something hard in reading (mathematics) they can't do it.
In the circles group, kids are pretty slow in finishing their reading (mathematics) exercises.	but	In the squares group, kids are pretty fast in finishing their reading (mathematics) exercises.
In the circles group, kids easily remember what they learn in reading (mathematics).	but	In the squares group, kids often forget what they learn in reading (mathematics).
In the circles group, kids think that they are among the best in reading (mathematics) in their class	but	In the squares group, kids think that they are not among the best in reading (mathematics) in their class.

Intrinsic motivation scale

In the squares group, children are happy when the teacher says that it is time to do some reading (mathematics).	but	In the circles group, children are not happy when the teacher says that it is time to do some reading (mathematics).

In the squares group, kids think that reading (mathematics) is not interesting.	but	In the circles group, kids think that reading (mathematics) is interesting.
In the squares group, kids like learning new things in reading (mathematics).	but	In the circles group, kids do not like learning new things in reading (mathematics).
In the squares group, kids like to do as much work as they can in reading (mathematics).	but	In the circles group, kids like to do as little work as they can in reading (mathematics).
In the squares group, kids don't like to practise new things in reading (mathematics).	but	In the circles group, kids like to practise new things in reading (mathematics).
In the squares group, kids like to do difficult reading (mathematics) work.	but	In the circles group, kids like to do easy reading (mathematics) work.
In the squares group, kids would like to learn more about reading (mathematics).	but	In the circles group, kids would not like to learn more about (mathematics).
In the squares group, kids like to figure out new reading words (mathematics problems).	but	In the circles group, kids don't like to figure out new reading words (mathematics problems).
In the squares group, kids really like reading (mathematics).	but	In the circles group, kids really don't like reading (mathematics).
In the squares group, kids give up when reading (mathematics) work is difficult.	but	In the circles group, kids don't give up even when reading (mathematics) work is difficult.
In the squares group, kids like to do some reading (mathematics) during their free time.	but	In the circles group, kids don't like to do some reading (mathematics) during their free time.