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The Metacognitive Component of Academic Self-Concept: The Development of a Triarchic Self-Scale

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Self-concept—more specifically academic self-concept—and its connection to academic achievement have long been studied. It has been widely accepted that one's self-concept is formed through interaction with one's environment and significant others. Here we suggest that an internal metacognitive component of self-concept is also critical to its development. This hypothesis is investigated here by the development of a metacognitive-academic self-concept scale as part of a larger battery based on Sternberg's triarchic model of successful intelligence. The academic self-concept scale's psychometric properties, with respect to both children and adults, and its correlations with a group-administered cognitive assessment are presented. Additionally, a series of Q-factor analyses of the results on the scale are provided, revealing multiple distinguishable academic self-concept profiles. Collectively, these data suggest that a self-concept scale regarding one's abilities can provide an additional source of information for the cognitive profiles of students.

Keywords: academic self-concept; meta-cognition; self-assessment; successful intelligence

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When students respond to a question by stating "I am good/not good at *x* in school," on what basis do they make this statement? Is it based on their parents always telling them that they can do anything that they put their minds to? Is it based on their teachers' appraisal of their ability? Is it based on how their ability compares with that of their classmates? Maybe it is based purely on their academic achievement. The students' responses are most likely based on a combination of all of the above possibilities, and it is generally believed that all of these factors may contribute to students' self-concept, or more correctly, students' *academic* self-concept (Marsh & Craven, 2006; Shavelson & Bolus, 1982; Shavelson, Hubner, & Stanton, 1976). But what about the contribution of internal evaluations to self-concept? Although it is indisputable that one's self-perception is highly influenced by feedback from the environment and the opinions of parents, teachers, and peers, we would like to propose here the possible contribution of the individual's internally generated view of self—specifically, his or her metacognitive evaluations—to the development of his or her self-concept. Although this hypothesis appears to be obvious, it has not been carefully evaluated in the literature. Here we propose a first step toward this evaluation.

In the pages that follow, we will present a brief overview of self-concept, including the prevailing model of self-concept, a definition of academic self-concept, and its relationship to academic achievement. We will then discuss the definition of metacognition and argue for its relevance to academic self-concept. And finally, we will describe a self-assessment developed to assess the academic self-concept of students aged 9–12. This measure is based upon the theory of successful intelligence (Sternberg, 1997, 1999a, 1999b), which posits intelligence as the use of one's analytical, creative, and practical abilities, such that strengths are capitalized upon and weaknesses are corrected or compensated for, toward successful outcomes. Because of this theory's emphasis on metacognition as an integrative component of intelligence, this self-scale brings metacognition into the realm of academic self-concept. We will examine the effectiveness of the scale at determining individuals' self-perceptions with regard to their analytical, creative, and practical abilities in different domains; the possible developmental aspects of metacognition in the comparison of child versus adult responses; and the convergence between the self-scale and performance on a group-administered triarchic ability test.

SELF-CONCEPT

Self-concept has been studied for more than a century (James, 1890/1963, as cited in Marsh & Craven, 2006). However, early investigations were criticized for their use of a variety of poorly devised conceptual definitions and instruments for self-concept, which made it difficult to compare results of the studies and gain insight on the construct (Shavelson et al., 1976). In an attempt to remedy the situation, Shavelson and colleagues (1976) reviewed the existing literature and instruments used to measure self-concept and offered the following definition of the construct: "In very broad terms, self-concept is a person's perception of himself. These perceptions are formed through his experience with his environment, and are influenced especially by environmental reinforcements and significant others" (p. 411). That is, self-concept develops gradually through interaction with one's environment and via feedback from "significant others." Here, by "environment," we mean the interactive atmospheres of home and school and other communities, and "significant others" as peers, parents, and teachers.

Elaborating on their proposed model, Shavelson and colleagues (Shavelson & Bolus, 1982; Shavelson et al., 1976) highlighted seven important features of self-concept, describing self-concept as organized, multifaceted, hierarchical, stable, developmental, evaluative, and differentiable. Shavelson and Bolus (1982, p. 3) offered a brief description of each of these features:

- Self-concept is organized or structured, in that people categorize the vast amount of information they have about themselves and relate the categories to one another.
- It is multifaceted, and the particular facets reflect the category system adopted by a particular individual and/or shared by a group.
- It is hierarchical, with perceptions of situation-specific behavior at the base moving to inferences about self in subareas (e.g., academic—English, history), then to inferences about self in academic and nonacademic areas, and then to inferences about self in general.
- General self-concept is stable, but as one descends the hierarchy, self-concept becomes increasingly situation specific and, as a consequence, less stable.
- Self-concept becomes increasingly multifaceted as the individual develops from infancy to adulthood.
- It has both a descriptive and an evaluative dimension such that individuals may describe themselves (I am happy) and evaluate themselves (e.g., I do well in school).
- It can be differentiated from other constructs such as academic achievement.

There have been a number of small revisions made to this model over the years, but the general framework suggested is still widely used. Some of these revisions concerned the suggested stability of the structure of self-concept and the proposed increased stability toward the top of the hierarchy (Marsh & Shavelson, 1985; Shavelson & Bolus, 1982). Shavelson and Bolus (1982) further questioned whether changes in self-concept begin at the bottom of the hierarchy (from specific context concept) and move to the top (general) of this hierarchy, or vice versa.

ACADEMIC SELF-CONCEPT

Fostering the development of academic self-concept is considered to be an important educational objective (Byrne, 1986; Marsh & Craven, 2006; Shavelson et al., 1976) as a result of its proposed effect on student achievement and adjustment; self-concept therefore is widely studied (e.g., Byrne, 1986; Guay, Marsh, & Boivin, 2003; Hansford & Hattie, 1982; Marsh & Craven, 2006; Marsh, Trautwein, Lüdtke, Köller, & Baumert, 2005). The Shavelson et al. model (Shavelson & Bolus, 1982; Shavelson et al., 1976) suggests that one's general self-concept comprises both academic and nonacademic self-concept. Nonacademic self-concept is composed of social, emotional, and physical self-concept, whereas academic self-concept is composed of self-concept pertaining to various academic domains. The focus of this article is on academic self-concept, which can be studied as a separate construct from more general self-concept (Byrne, 1986; Shavelson & Bolus, 1982); thus, we contend that academic self-concept can be decomposed into specific cognitive abilities, as opposed to only specific subject matters. (For discussion of self-estimated abilities see Chamorro-Premuzic & Furnham, 2006; Furnham & Dissou, 2007; Kornilova, Kornilov, & Chumakova, 2009.)

As per the definition offered earlier by Shavelson, academic self-concept and nonacademic self-concept are formed by one's experience with the environment and are influenced by environmental reinforcements and by significant others (Shavelson et al., 1976). However, academic self-concept, we propose, may be informed by metacognition as well (for reviews see

Flavell, 1979; Schraw & Moshman, 1995; Veenman, Van Hout-Wolters, & Afflerbach, 2006). Metacognition is one's awareness of one's thinking and one's knowledge. Metacognitive monitoring involves being aware of what one knows and how well one knows it (Flavell, 1979). Instead of academic self-concept being shaped solely by external input, we argue that metacognition may constitute a second source of input involved in forming self-concept. In this proposed model, academic self-concept is formed by the synthesis of external (environment and significant others) and internal sources of input (metacognition). By using a measure that looks at this metacognitive aspect, we may gain useful insight into a child's academic skills and abilities.

ACADEMIC SELF-CONCEPT AND ACHIEVEMENT

There have been numerous studies investigating the relationship between self-concept and achievement (Byrne, 1986; Guay et al., 2003; Hansford & Hattie, 1982; Marsh & Craven, 2006; Marsh et al., 2005). The nature (causal or not causal) and direction of that relationship has been a focus of these investigations. Marsh and Craven (2006) offered a comprehensive review of Marsh's (1990) model of reciprocal effects, which can be used to help resolve the chicken-and-egg (Marsh & Craven, 2006) debate regarding self-concept and achievement. Early models suggested that there is a one-way relationship between achievement and self-concept or between self-concept and achievement. In the skill-development model, achievement impacts self-concept. In the self-enhancement model, self-concept impacts achievement. Marsh's reciprocal-effects model states that the relationship between self-concept and achievement is reciprocal and dynamic. This model suggests that preexisting self-concept affects later achievement, and that early achievement affects later self-concept (Marsh & Craven, 2006). With this model, the dynamic relationship between achievement and self-concept can be understood.

DEVELOPMENT OF SELF-CONCEPT AND METACOGNITION

The development of self-concept is a central focus in the study of self-concept. Shavelson et al. (1976) held that it is only when children can begin to speak about themselves using the terms "I" and "me" "that they can begin to construct categories that may be used to develop an organized self-concept. These authors also suggested (1976) that, with age, one's self-concept becomes more multifaceted. Marsh, Craven, and Debus (1998) further argued that a child's self-concept becomes increasingly differentiated with age, and that young children generally have very high self-concept, which then decreases as children gain more experience and come to recognize their strengths and weaknesses (Marsh, 1990; Marsh et al., 1998). Marsh and colleagues (1998) suggested that children as young as eight already have a multidimensional self concept and, with age, children's self-evaluations also become more in line with others' evaluations of them. Metacognition develops from early childhood into adolescence, as it is one of the later developing cognitive abilities (Kuhn, 2000). This model provides a possible explanation as to why children's self-concept becomes more in-line with others' perceptions of them with age: as their metacognition becomes more discerning, their self-concept changes as well.

SUBCOMPONENTS OF ACADEMIC SELF-CONCEPT

In the original model (Shavelson et al., 1976), academic self-concept is further divided into subject-specific self-concepts that interact with each other: Math, English, History, and Science.

Marsh (1986) proposed a model to explain how one's self-concept in one subject affects self-concept in a different subject; this framework has been titled the Internal/ External Frame of Reference. The Internal/External Frame of Reference posits that people engage in two kinds of comparisons to inform their self-concept. In the external process, people compare their ability within a domain to the abilities of others, which allows them to make a relative judgment of their abilities. In the internal process, people compare their ability in one domain against their ability in a different domain. It is this internal comparison that causes one to believe one is stronger in one domain and not the other and describe oneself either as a "math person" or a "verbal person" (for a recent review see Brunner, Lüdtke, & Trautwein, 2008). These subject-specific evaluations may be enhanced by the additional view of abilities provided by the meta-cognitive aspect of self-concept that we propose, whereby cognitive or processing strengths or weaknesses may be understood as working across domains or subject-matters.

CURRENT STUDY

The current study examines the development of an academic self-concept scale using the framework of Sternberg's triarchic theory of successful intelligence (Sternberg, 1997, 1999a, 1999b); it is one of several instruments being developed based on the triarchic theory under the Aurora Project (for further review of the battery see: Chart, Grigorenko, & Sternberg, 2008; Sternberg, 2009; Sternberg, Grigorenko, & Jarvin, 2006; Tan et al., 2009). One notable aspect of Sternberg's theory of intelligence is the central role of metacognition. Sternberg defines successful intelligence as the ability to succeed in life according to one's own definition of success, within one's sociocultural context, by capitalizing on one's strengths and correcting or compensating for one's weaknesses, in order to adapt to, shape, and select environments through a combination of analytical, creative, and practical abilities (Sternberg, 1997, 1999a, 1999b). The theory brings to the fore the importance of universal (cross-cultural), complex, and integrated processes: those involved in the recognition of strengths and weaknesses, and in the adaptation to, shaping, and selection of environments.

Sternberg (1997) classified these processes into three categories: metacomponents, or executive processes that are involved in planning, monitoring, and evaluating; performance components that carry out the instructions of the metacomponents; and knowledge-acquisition components that acquire declarative knowledge and assemble that knowledge to solve a given problem. These processes, in turn, draw upon analytical, practical, and creative thinking in various combinations, depending upon the demands of the situation (Sternberg, 2005).

In this conception of intelligence, memory, analytical, creative, and practical abilities are equally important to intellectual functioning. Analytical intelligence is involved in analyzing, evaluating, judging, and comparing and contrasting. Analytic abilities are exhibited in reasoning and logical thinking as they are exercised in activities such as persuasive writing, debating, research, and mathematical problem-solving. Creative abilities are reflected in the capacity to generate new ideas, and create and design in activities like writing, drawing, building, and imaginative play. Creative intelligence also covers one's ability to cope with novelty. Practical intelligence is involved when individuals apply their abilities to the kinds of problems that confront them in daily life, such as on the job or in the home. Practical abilities are exercised in leadership and other social interactions, as well as in the adaptation and application of knowledge in real-world problem-solving.

In their new battery of assessments (Aurora), Sternberg and his collaborators have recognized the need for a new kind of assessment (Chart et al., 2008). Aurora's assessment battery is composed of five modules: a group-administered paper and pencil/computer assessment (Aurora-a and -g); a parent interview (Aurora-i); a teacher rating scale (Aurora-r); an observation schedule (Aurora-o); and a self-assessment (Aurora-s), which is the focus of this current study. Each module is designed to measure ability in the areas of memory (except Aurora-a), analytical, creative, and practical thinking via a particular informational avenue. Each ability area is also looked at within the specific domains of numbers, words, and images. By measuring this broad range of skills through multi-tools/multi-informants, it is hoped that intellectual strengths that might not have been apparent through conventional testing may be detected.

Here we briefly describe the various instruments of Aurora. Aurora-a (-a for augmented) is composed of 17 subtests that assess the child's analytical/memory, creative, and practical abilities within the domains of numbers, words, and figures. (Aurora-g, the battery's nod to the *g*-factor of intelligence, is composed of nine subtests designed in the manner of conventional IQ tests.) Aurora-o, the battery's observation schedule, is a set of one-on-one tasks designed to assess and explore in depth a child's particular ability (analytical, practical, or creative) in a particular domain (verbal, numerical, figural). Using Aurora-r, the teacher rating scale, the child's teacher rates the child's memory, analytical, creative, and practical abilities as demonstrated in classroom work and activities. The scale—a 5-point Likert-type scale—focuses on a student's *approaches* to classroom assignments and situations (as opposed to solely looking at academic performance), as well as the student's social skills as they are exercised in the classroom setting. The parent interview, Aurora-i, is a semi-structured interview that explores, with the child's primary caregiver, the ways in which a child's analytical/memory, creative, and practical abilities are demonstrated outside the school setting, that is, in the various activities the child engages in by him or herself, with family, with friends, and in his or her approach to schoolwork and school projects.

RATIONALE FOR THE DEVELOPMENT OF AURORA-S

It is well established that when identifying children for intellectual giftedness, it is important to have multiple sources of information (Ford & Trotman, 2000; VanTassel-Baska, Feng, & De Brux, 2007). The impetus behind the development of Aurora-s was the recognized importance of students as useful informants by reporting on their academic self-concept. Sternberg's (1999b) theory explicitly incorporates the importance of people recognizing their strengths and weaknesses. Because of the highly metacognitive nature of this theory of intelligence, this scale can be seen as locating an individual's metacognitive contributions to self-concept.

METHOD

Instrument

The development of Aurora-s was based on the existing teacher rating scale (Aurora-r) and parent interview (Aurora-i). Questions that the authors thought most informative were adapted to be part of the self-assessment. New questions were developed based on common classroom activities (e.g., projects, group work, presentations). A small focus-group discussion with students was conducted to assess the appropriateness of the language of the scale for children. A small piloting of the scale resulted in the revision of the scale's formatting and layout.

Aurora-s contains 20 questions and is designed to assess students' self-concept of their memory, analytical, practical, and creative abilities in the domains of words, numbers, and images. There are five questions for each of the abilities (constituting the Memory, Analytical, Creative, and Practical subscales of the instrument) and each question is subdivided into the three domains (constituting the Words, Numbers, and Images subscales), for a total of 60 items. Examples below illustrate the general structure of the scale, as well as the highly metacognitive aspect of its lines of questioning:

It is easy for me to remember:

things with words, like things I have read or things someone has told me.
things with numbers, like phone numbers, addresses, math tables.
things with pictures, like maps, charts, and graphs.

I think critically about:

things involving words, like things I have read, stories or nonfiction.
things involving numbers, like math problems, statistics, or other numerical measures.
things involving the way things look.

The students then rate themselves on a 5-point Likert-type scale:

1. The exact opposite of me.
2. Not like me.
3. Somewhat like me.
4. A lot like me.
5. Exactly like me.

Participants

Data were collected from 107 students in the age range 9–12 years (63% female; $M = 10.79$, $SD = 1.05$) and 56 adults. For the adult samples, ages were not gathered; however, an approximate range is 30–60 years, and an approximate gender distribution (gathered by subject name) is 90% female and 10% male. All of the children were students attending one of two public elementary schools located in average, middle income areas—one in Illinois and one in Connecticut. One sample (IL) was somewhat familiar with the triarchic approach to learning, as they are routinely applied in the teaching throughout that school. Students were administered Aurora-s as an accessory instrument to Aurora-a, which some of the students had taken the year before. The other sample was not familiar with triarchic methods, but filled out Aurora-s as part of a new classroom experience.

In addition, Aurora-s was collected from two sets of elementary school teachers and/or administrators. Teachers at one school filled out the scale as part of a presentation on Aurora in order to gain experience with the scale. Teachers at another school were engaged in a 10-session course (30 hr) on the triarchic theory. In all cases, with both children and adults, the participants were asked to complete the scale to the best of their ability without a time constraint, though most finished the scale within 30 min.

We administered the Aurora-a test to 83 students. Aurora-a scores were obtained via item-response theory modeling using Rasch analysis in FACETS for Windows v. 3.65.0 (Linacre, 2009). Participants' data were included in the larger dataset to produce stable ability and item difficulty estimates. The total ability/domain scores were computed by averaging subtests within abilities and domains and then rescaled to have a mean of 100 and a standard deviation of 15.

RESULTS

Psychometric Properties of Aurora-s: Reliabilities

Using classical test theory, we have established reliability coefficients (Cronbach's alpha coefficient of internal consistency) of Aurora-s subscales for both the children and adult samples. For children, high internal consistency was revealed for all of the Aurora-s subscales: $\alpha = .81$ for the Memory subscale, .85 for the Analytical subscale, .82 for the Creative subscale, and .83 for the Practical subscale. Within domains, the reliabilities were $\alpha = .88$ for Words, .93 for Numbers, and .90 for Images. Such high reliability estimates suggest that items within both the ability and domain subscales consistently measure the same constructs.

For the adults, the reliabilities were generally lower but still satisfactory: $\alpha = .68$ for the Memory subscale, .69 for the Analytical subscale, .75 for the Creative subscale, and .76 for the Practical subscale. The reliabilities within domains resembled the reliabilities for children in the sample and were .89, .94, and .89 for the Words, Numbers, and Images subscales, respectively.

Psychometric Properties of Aurora-s: Construct Validity

Table 1 presents intercorrelations between different ability and domain subscale scores obtained with Aurora-s. The results suggest that the Memory, Analytical, Creative, and Practical subscales are interrelated, with r ranging from .62 ($p < .01$) for the correlation between the Creative and the Practical subscales, to .77 ($p < .01$) between the Analytical and Memory subscales. The correlations between the domain scores are lower and range from .37 ($p < .01$) for

TABLE 1. Aurora-s Ability and Domain Scale Intercorrelations

Aurora-s subscales	1	2	3	4	5	6	7
Ability							
1. Memory	1.00	0.27*	0.22	0.20	0.19	0.47*	0.19
2. Analytical	0.77**	1.00	0.69**	0.70**	0.24	0.58**	0.64**
3. Creative	0.65**	0.69**	1.00	0.66**	0.23	0.57**	0.64**
4. Practical	0.63**	0.76**	0.62**	1.00	0.30*	0.60**	0.53**
Domain							
5. Words	0.65**	0.74**	0.71**	0.78**	1.00	–0.24	–0.06
6. Numbers	0.72**	0.78**	0.60**	0.65**	0.47**	1.00	0.25
7. Images	0.71**	0.70**	0.73**	0.63**	0.54**	0.37**	1.00

Note. Below the diagonal are intercorrelations for the schoolchildren, above the diagonal the coefficients for the adults sample are present.
*$p < .05$. **$p < .01$.

the correlation between the Numbers and Images subscales, and .54 ($p < .01$) for the Words and Images subscales.

In adults, the Memory subscale was only related to the Analytical subscale ($r = .27$, $p < .05$). The Analytical, Creative, and Practical subscales demonstrated a pattern similar to that found in children, with *r*'s ranging from .66, $p < .01$, between the Creative and Practical subscales, to .70, $p < .01$, between the Analytical and Practical subscales. In general, the Memory subscale seemed less related to the other subscales in adults than in children. Moreover, domain scores were not significantly related to each other in the adult sample as compared with the sample of children.

The evidence for the construct- and criterion-related validity comes from Table 2, which reveals that the Aurora-s subscales were related to the corresponding subscales of a group-administered ability test, Aurora-a. The Memory and Analytical subscales of Aurora-s positively correlated with the Aurora-a Analytical ability score ($r = .22$, .24, $p <.05$, respectively). Creative subscales from both instruments were also related ($r =. 21$, $p <.05$), as well as the Practical subscales ($r = .25$, $p < .05$). Although small, these correlations are significant and provide evidence that Aurora-s may tap self-appraisals of relevant abilities in children. However, the predicted relationship between the domain scores was only obtained for the Numbers subscales ($r = .42$, $p < .01$).

It is worth noting that the Analytical and Practical ability scores obtained through the use of Aurora-s and Aurora-a were related—that is, both the Aurora-s Analytical and Practical subscales correlated with the Aurora-a Analytical ($r = .24$, .23, $p < .05$, respectively) and the Practical subscales ($r = .22$, .25, $p < .05$, respectively). This result suggests some overlap between the two types of abilities as measured by the two different instruments—a cognitive-ability test and a self-rating scale.

To address the question of the interdependence of the ability/domain self-concept measures obtained through using Aurora-s, we analyzed the available data using a Q-factor analysis technique (Thompson, 2000), asking whether multiple empirically distinguishable ability/domain self-concept profiles exist. This analysis allowed us to assess the degree of

TABLE 2. Aurora-s and Aurora-a Intercorrelations ($n = 87$)

		Aurora-a Ability subscales			Aurora-a Domain subscales		
		Analytical	Creative	Practical	Words	Numbers	Images
Aurora-s Ability subscales	Memory	.22*	.06	.09	.07	.23*	.10
	Analytical	.24*	.15	.22*	.20	.35**	.11
	Creative	.12	.21*	.07	.19	.09	.11
	Practical	.23*	.15	.25*	.11	.30**	.24*
Aurora-s Domain subscales	Words	.10	.09	.05	.13	.09	.06
	Numbers	.34**	.19	.29**	.19	.42**	.25*
	Images	.01	–.01	–.03	–.05	.02	.01

Note. Aurora-a ability and domain scores were adjusted for age.
$^*p < .05$. $^{**}p < .01$.

discrimination between different ability/domain self-concepts in both children and adults, called into question by the high intercorrelations presented in the previous section. A series of Q-factor analyses was performed separately for the children and adult samples, using principal components extraction for a promax rotation. We used *Z*-scores for the ability and domain scales instead of raw scores for the sake of interpretation.

A total of three ability profile factors with eigenvalues larger than 1.00 were obtained for both the adult and child samples, explaining 100% of the variance in the ability self-concept scores. The higher the participant's loading (in the pattern matrix) on a particular factor, the more characteristic the factor of that person's ability profile.

The first factor explained 39.75% of the variance for children and 27.78% for adults. Figures 1 and 2 provide illustrations of this ability profile as characterized by higher scores on the Creative subscale relative to the Memory, Analytical, and Practical subscales (18.7% of all children hold this profile). We will henceforth refer to these variations in profiles as ability- and domain-specific self-concept. The opposite of this profile is characterized by low creative self-concept relative to other scales (19.6%). Highly similar profiles were obtained for adults who showed a higher degree of a between-ability differentiation—their profile was characterized by a high creative/moderate memory and low analytical/practical self-concept profile (19.6% of all adults hold this profile; 7.1% hold the opposite profile).

The second factor explained 35.75% of the variance for children and 26.44% for adults. Children with this profile had relatively high memory/analytical self-concept and relatively low practical self-concept (14% of all children) or the opposite—relatively high practical as opposed to memory/analytical self-concept (15.9% of children). Similar profiles were also found in adults, with 10.7% holding a high memory/analytical profile and 12.5% holding a high practical profile.

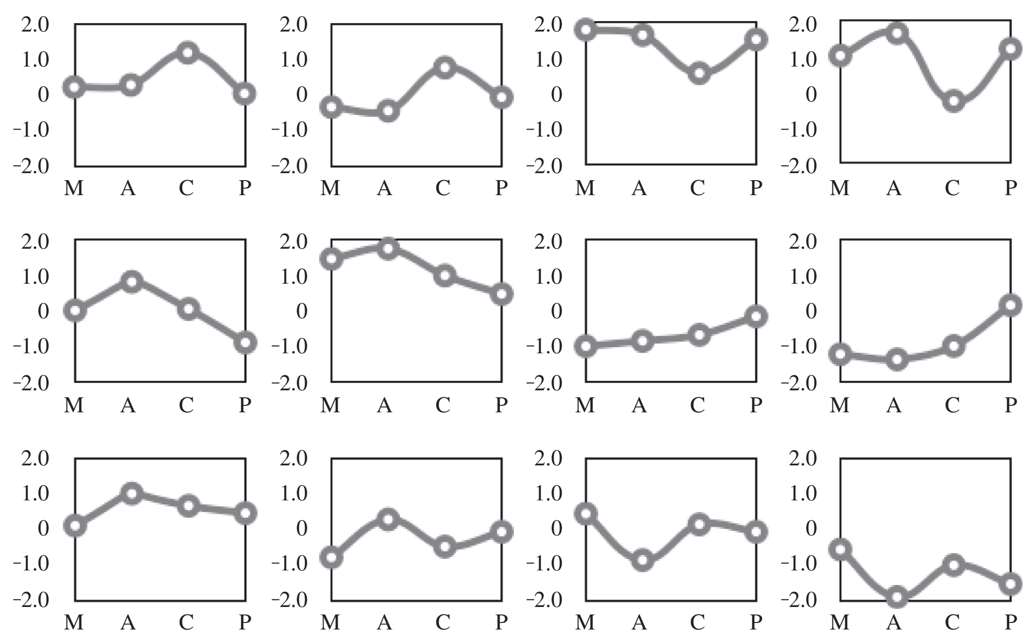

FIGURE 1. Examples of Aurora-s ability self-concept profiles for children.

Note. Rows represent factors (1–3 from top to bottom) with 4 graphs given for a factor (2 for positive and 2 for negative loadings). M = Memory, A = Analytical, C = Creative, and P = Practical.

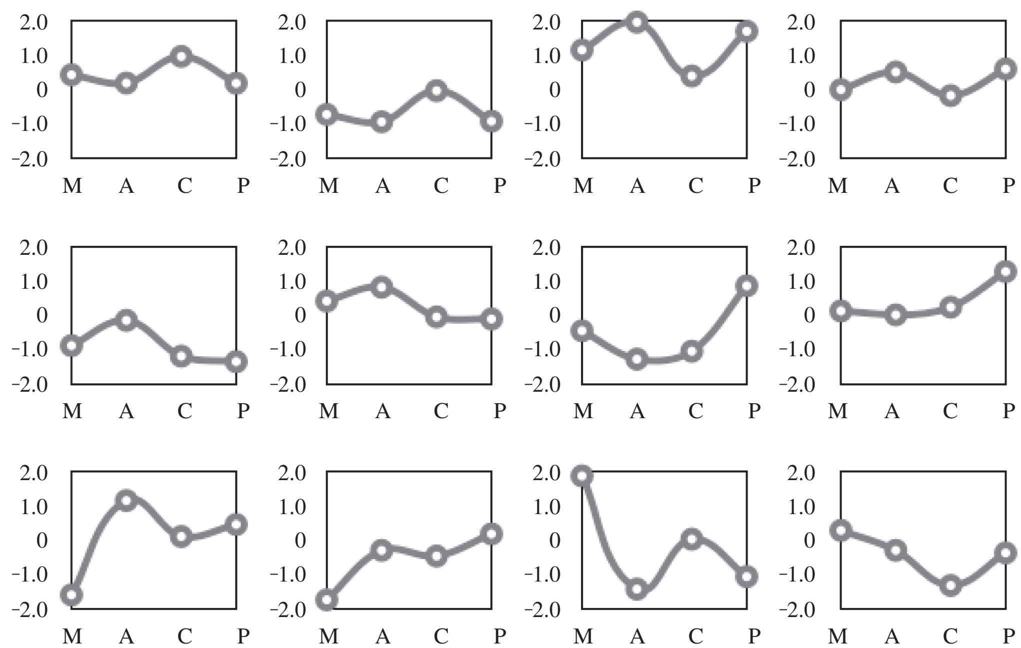

FIGURE 2. Examples of Aurora-s ability self-concept profiles for adults.

Note. Rows represent factors (1–3 from top to bottom) with 4 graphs given for a factor (2 for positive and 2 for negative loadings). M = Memory, A = Analytical, C = Creative, and P = Practical.

The third factor explained 24.5% of the variance for children and 45.78% for adults. The first profile in this factor is characterized by relatively low memory, high analytical, and moderate creative/practical self-concept (17.8% of children; 14% of children hold the opposite profile). These two profiles were also replicated in adults, with 26.8% of adults having low memory self-concept and 23.2% having high memory self-concept.

Thus, the results of the Q-factor analysis revealed six distinct ability self-concept profiles in both children and adults, suggesting the relative independence of multiple ability self-concepts.

We also established two domain profile factors with eigenvalues larger than 1.00 for both adults and children, explaining 100% of variance in the scores.

The first factor explained 57.50% of variance for children and 56.21% for adults. In the child sample, the first profile was characterized by relatively high numbers versus words and images self-concept (29% of children). The second profile was the opposite (27.1%). Just as for the ability profiles, in adults, the first profile was more differentiated, showing relatively high self-concept in the domain of numbers versus low words and moderate images (25% of all adults). Additionally, 33.9% of adults held the second profile.

The second factor explained 42.50% of the variance for children and 43.79% for adults. Children with the first profile have relatively low self-concept in the domain of Images versus high in the Words and moderate in the Numbers domains (19.6% of children). Additionally, 24.3% of children held the opposite profile. In adults, the first profile was somewhat different and is best characterized by relatively low self-concept in the domains of Images and Words versus high in Numbers (17.9% of adults; 23.2% of adults held the opposite profile).

Together, the results of the ability and domain Q-factor analyses provide evidence for the existence of multiple distinct ability/domain self-concept profiles (see Figures 3 and 4).

DISCUSSION

The objective of this article was to present an exploration of academic self-concept using the triarchic theory of intelligence in both children and adults. The focus of this exploration is the contribution of one's metacognition to the shaping of self-concept. To date, this valuable source of information about one's self has only been considered by few (Sternberg, Conway, Ketron, & Bernstein, 1981; Wagner & Sternberg, 1985). In general, only the input of one's environment and significant others have been considered. In this approach, one's metacognitive knowledge creates an internally informed self-concept that combines with the externally informed self-concept to create one's functional self-concept.

Our scale, designed to measure metacognitive/academic self-concept, was shown to discriminate, to a certain degree, between one's analytical, practical, and creative abilities. This finding suggests that people do not only have self-concept in regard to specific subject areas but they also have specific conceptions of themselves in the analytical, practical, and creative domains. This finding is important, as ability self-concepts are broader and possibly more useful than domain self-concepts and may have greater possible utility in understanding individual learning styles. Students no longer will have to only think of themselves as "good/bad in math" or "good/bad in English"; rather, with the use of this scale, they will be able to recognize their unique strengths and weaknesses and work on compensatory strategies accordingly.

It is important to note that this self-concept scale is still under development and that it will have to be further studied. The positive correlations with the group-administered Aurora–a suggest this scale's utility in the larger Aurora battery in assessing one's abilities. Further investigation of metacognition's role in academic self-concept and related constructs is also necessary, but these initial data are encouraging.

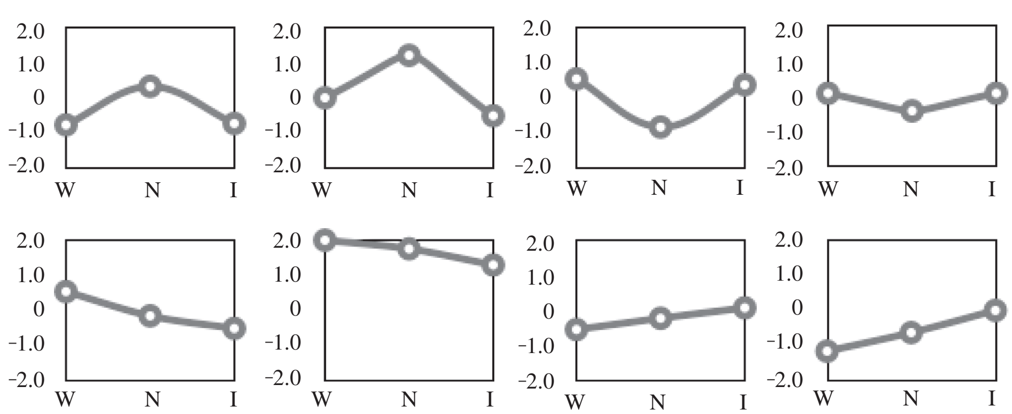

FIGURE 3. Examples of Aurora-s domain self-concept profiles for children.

Note. Rows represent factors (1–2 from top to bottom) with 4 graphs given for a factor (2 for positive and 2 for negative loadings). W = Words, N = Numbers, and I = Images.

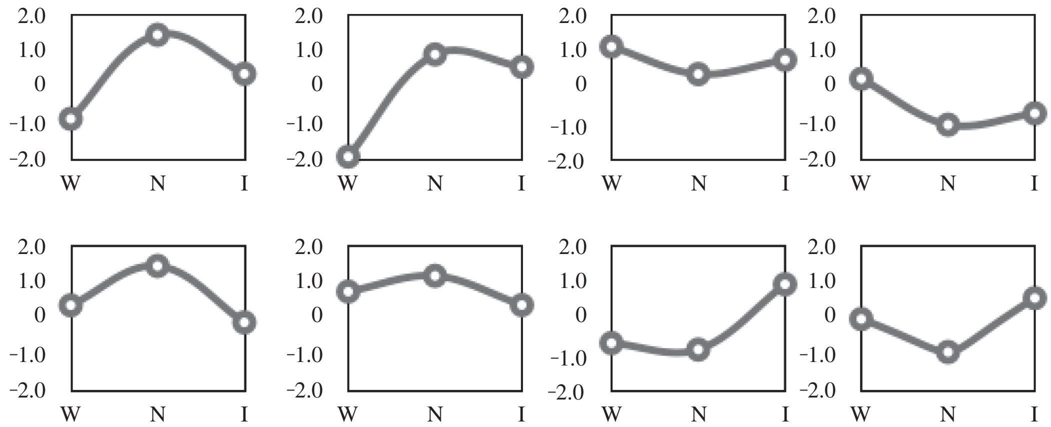

FIGURE 4. Examples of Aurora-s domain self-concept profiles for adults.

Note. Rows represent factors (1–2 from top to bottom) with 4 graphs given for a factor (2 for positive and 2 for negative loadings). W = Words, N = Numbers, and I = Images.

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