

**VERBAL COGNITIVE PROCESSING AND EMOTION REGULATION
AMONG INDIGENOUS SAMI CHILDREN**

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The study investigated the impact of cultural changes on children's cognitive and socioemotional development. Research among Arctic indigenous populations suggests that their ancient lifestyles and living environments have caused the development of a specific cognitive profile featured by strong simultaneous, as opposed to successive, style of information processing. Furthermore, Greenfield's model of social change and child development suggests that the sociodemographic features of children's living environments affect the way their self-regulative abilities emerge. These propositions were tested among indigenous Sami children. It was hypothesized that the Sami children would show (1) superior simultaneous processing skills together with lower general verbal ability and successive processing ability as well as (2) better emotion regulation ability compared to their non-indigenous peers. Additionally, the association of cognitive processing tendencies and emotion regulation was investigated.

Seven-year-old Sami children and their Finnish and Norwegian peers ($N = 52$) were assessed with selected subtests of the NEPSY Developmental Neuropsychological Assessment and the Wechsler Intelligence Scale for Children – Third Edition (WISC-III) as well as with parental ratings of emotion regulation capacity.

The Sami children's general verbal ability was in part poorer than that of the non-indigenous group. The Sami did not show any specific tendency to simultaneous information processing nor better emotion regulation ability. Strong successive processing was found to correlate positively to paternal ratings of emotion regulation and negatively to maternal ratings.

The results suggest that the cultural transition toward Nordic majority societies has diminished or eradicated the specific cognitive and socioemotional features of the indigenous Sami. It is proposed that the development of emotion regulation may owe more to implicit learning than to verbal communication within the social environment.

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INTRODUCTION

Child development follows the rough laws of biological and psychological ontogeny but in the meantime is strongly shaped by the cultural context within which the child grows. Cultural influences are evident at many levels, beginning with the family environment of the child and ending with global societal circumstances and changes in them (Bronfenbrenner, 2002). Ecocultural phenomena such as natural ecology, economic affluence, education, availability of mass media, population indices, and religion have been found to yield variation in psychological features at the level of individuals as well as nations (Georgas, van de Vijver, & Berry, 2004). Societies are going through swift changes in terms of these phenomena. An arctic indigenous population, the Sami, provide a good example of a group of people who have experienced major transitions in lifestyles and values during the previous decades. This study focused on how the Sami children's cognitive and emotional development has changed due to these transitions.

Culture and child development

Greenfield (2009) offers a model for predicting and conceptualizing the influence of societal changes on individual development in her theory of social change and human development. The theory begins with the assumption that all sociocultural ecologies can be placed on a continuum between two sociodemographic prototypes, which Greenfield calls *Gemeinschaft* and *Gesellschaft*. The descriptions of these prototypes were in part adapted from Keller's cultural research (2007). The opposing features of *Gemeinschaft* and *Gesellschaft* are gathered in Figure 1. The features are regarded as continua, not as binary categories. A *Gemeinschaft* refers to small-scale rural communities with simple social structure and low division of labor, little technology, no public education, a homogenous population, and close and enduring familial relationships. A typical *Gemeinschaft* is relatively self-contained and isolated from the surrounding ecologies, dependent mainly on natural resources or agriculture. *Gemeinschaft* members are typically poor. In the other extreme of the continuum there is a *Gesellschaft* recognizable of urbanity, large population, social complexity, highly differentiated social roles, high level of technology and literacy, and heterogeneity of the population. A *Gesellschaft* is in regular

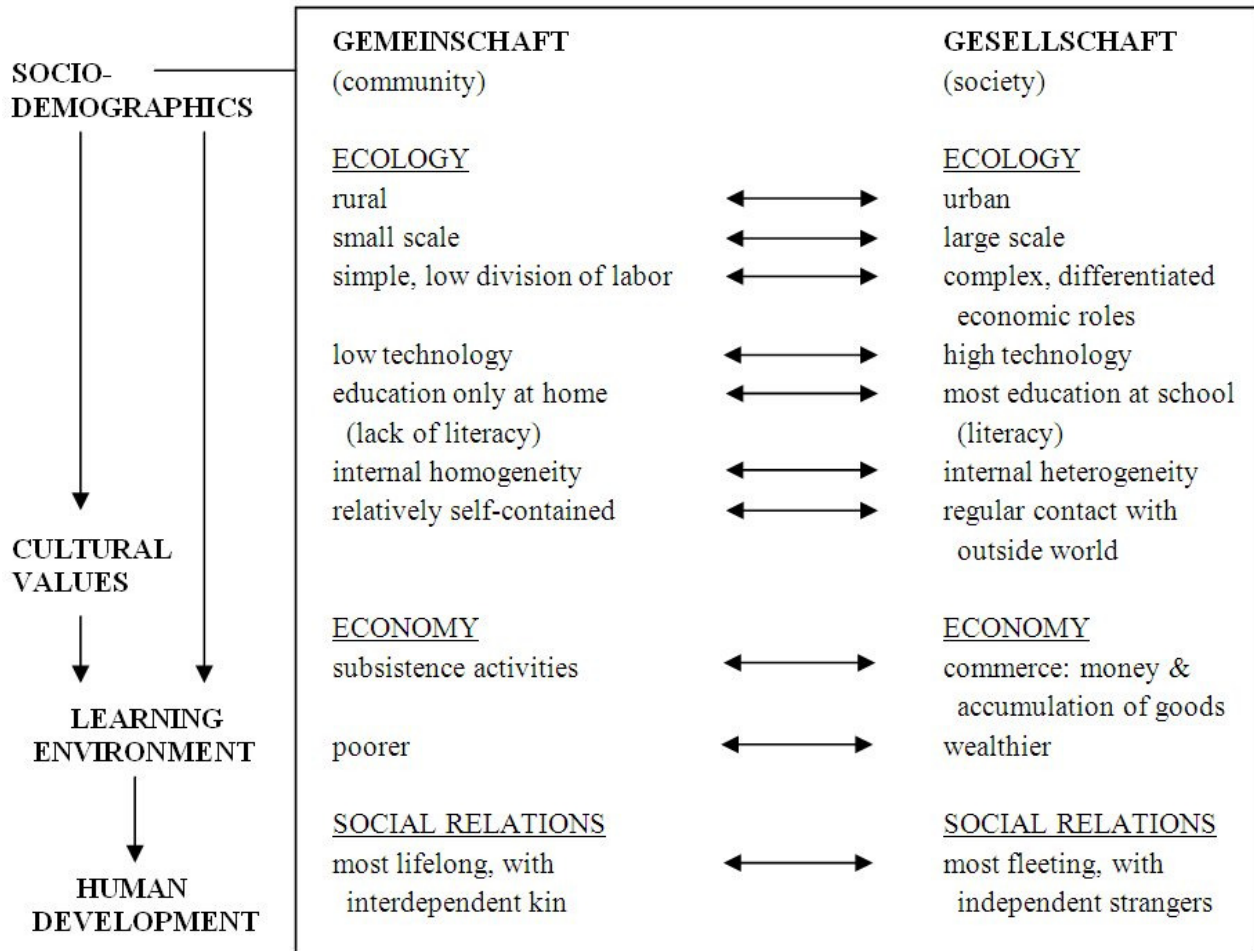


Figure 1. The model of social change and child development (Greenfield, 2009).

contact with the outside world, with its economy and affluence based on commercial activity. Relationships between people are less enduring and more incidental. Due to its internal heterogeneity, a Gesellschaft may have Gemeinschaft communities nested inside it.

Communities' sociodemographic features change over time, and in Greenfield's model, the change may take the direction toward a Gemeinschaft or a Gesellschaft. However, when it comes to present-day communities, change toward a Gesellschaft is more the rule, as the world in general is becoming more commerce-driven, urban and richer, with higher technology and education.

Each human ecology sets certain circumstances for human development by offering diverse learning environments for developing individuals. Changes in sociodemographic features influence these learning environments in two ways (see Figure 1). The direct influence comes from learning environments adapting to social circumstances, as different ecologies prefer different qualities, skills, and social relations among individuals. The indirect influence refers to learning environments adapting

to shared cultural values that as such are modified by social changes. For children, central in the shaping of learning environments are the adaptations that parents do. Parents realize social changes in children's every-day lives by adapting their infant care practices, child socialization goals, and ethnotheories to the prevailing cultural values and environmental requirements (Keller & al., 2007; Keller, Borke, Yovsi, Lohaus, & Jensen, 2005). Parental ethnotheories refer to parents' culture-specific conceptions about how children develop and how their development should be supported.

What are the concrete mechanisms of change that influence child cognitive and socioemotional development? Greenfield, Maynard, and Childs' (2003) work presents an example of the impact of economic changes on child cognitive development. They conducted a study among the Zinacantec Maya in Mexico between 1969 and 1991 comparing two generations of girls. During the period, the Zinacantec went through a drastic transition from agriculture and subsistence economy to commercial economy. The children's everyday lives changed in that they entered formal education and started helping their parents in commercial activities (e.g., weaving clothes for sale) instead of subsistence activities (weaving family clothes). The Zinacantec mothers were now preparing their daughters for the commercial economy by teaching them to weave textiles differently. Contrary to what the mothers themselves had learned as children, they taught their daughters to use innovative instead of conservative designs and to practice weaving independently instead of imitating adults' work or with close adult guidance. Both generations of girls were tested on a task that required visuospatial reasoning with weaving patterns. The younger generation evidenced a more abstract style of visual representation and dealt more skillfully with novel visual patterns than the earlier generation. Thus, new means of livelihood demanded new kind of cognitive processing, which was trained in the way the parents employed their children and supported their learning.

An example by Keller (2007) illustrates the indirect impact of social circumstances on learning environments and child development, cultural values being the mediating factor. Keller found that in rural, traditional, subsistence-based *Gemeinschaft* communities, parental ethnotheories emphasize interdependence as an agenda for child socialization. Group goals, norms, duties and relatedness are prioritized. Parents realize the interdependence socialization in favoring extensive body contact, social stimulation, and interactional warmth that enhance relatedness, acceptance of familial norms and values, compliance, and obedience (Keller & al., 2004). Practices cultivating independence socialization are deemphasized. These include replacing much of body contact and social stimulation with extensive face-to-face contact and stimulation with toys. These practices are thought to strengthen

the idea of individual separateness. Independence socialization is common in urban, educated societies (Keller & al., 2005), equal to Greenfield's *Gesellschaft*. Personal goals, needs, and rights as well as autonomy and separateness are emphasized, and curiosity and exploration are encouraged in children.

These socialization practices set up very different learning environments. Keller (2007) concluded that these differences lead to earlier emergence of self-regulation and later emergence of self-recognition in the child in a *Gemeinschaft* environment. Self-regulation is an important aspect of social development and necessary for socially acceptable behavior, and is of special relevance for tight familial relationships that are valued in a *Gemeinschaft*. Self-recognition refers to children's understanding of themselves as separate individuals. In a *Gesellschaft*, child development is characterized by later self-regulation and earlier self-recognition. In sum, the influence of social changes on child socioemotional development is mediated by parental values and rearing practices.

The indigenous Sami

The models of Greenfield (2009) and Keller (2007) can best be tested by studying indigenous populations, which most often represent typical *Gemeinschaft* communities. The term *indigenous people* does not have a universally agreed definition. Typical of indigenous people is that (a) they identify themselves as an ethnic group culturally separate from the dominant society; (b) they live in a region originally occupied by their ancestors and later colonized by another ethnic group; (c) they have preserved ancestral traditions, habits, religion, language, or social systems and rules despite adapting to the laws, norms, or structures of the dominant society (International Work Group for Indigenous Affairs, n.d.). Many indigenous populations live nowadays within a *Gesellschaft*-type dominant culture, and most of them have more or less recently gone through a transition toward a more *Gesellschaft* lifestyle.

The *Sami* (also Sami, Saami) are the only indigenous population within the European Union and one of the populations referred to as Arctic indigenous people living within or close to the Circumpolar North. Circumpolar regions include Greenland and parts of Norway, Sweden, Finland, Russia, Canada, and the United States (Wessendorf, 2009). The approximately 80,000 Sami reside the northern part of the Scandinavian Peninsula and large parts of the Kola Peninsula. Most of them live in the northernmost parts of Norway (ca 50,000–65,000 Sami), and the rest in Sweden (20,000), Finland

(9,000), and Russia (2,000) (Saamelaiskäräjät, 2008; Sametinget, 2009). These areas form the so-called Sami Homeland, *Sápmi*. In Finland, the Sami live mainly in the municipalities of Utsjoki, Enontekiö, Ivalo and Sodankylä in the county of Lapland. In Norway, they reside in at least five counties: Finnmark, Nordland, Nord-Trøndelag, Sør-Trøndelag, and Troms. There are three Sami languages and these divide into altogether ten dialects (Aikio-Puoskari & Pentikäinen, 2001). The Sami languages belong to the Fenno-Ugric language family and are related to the present-day Finnish.

The Sami descent from the original inhabitants of North Fennoscandia who occupied the area 10,000 years ago (Saamelaiskäräjät, 2008; Sametinget, 2009). The nomadic Sami diverged as an ethnic group from the agricultural Nordic societies in 2000 BCE. The first millennium of the Common Era the Sami lived hunting, fishing, gathering, and trading with the more southern Europeans (Lehtola, 2002). In the 16th century, nomadic reindeer herding was introduced and became a central livelihood for the following centuries. At the same time, the indigenous culture and livelihoods started to suffer under the reign and social control of the expanding Nordic societies. The originally unitary Sápmi land was divided in four areas when the country borders were closed at the end of the 19th century. In Finland, the State took over the forests that formerly belonged to nobody and were utilized by the Sami to gain their livelihood (Näkkäljärvi & Pennanen, 2000). This led many Sami to turn into agriculture.

At that time, in each of the countries, began the era of forced assimilation policy ruining the Sami ethnicity and languages and continuing until the end of the 20th century. Until recent decades, the Sami lived as a relatively isolated nomadic community, a distinct *Gemeinschaft* within a *Gesellschaft*. After the World War II, transition from nomadic herding and subsistence economy toward commercial economy and the Nordic majority cultures' social structures accelerated. The changes caused confusion about social roles and ethnic identity. The Sami were sent to Finnish and Norwegian schools although their command of the languages was commonly weak (Aikio-Puoskari & Pentikäinen, 2001). Contact with the majority cultures increased, and today it can be said that the Sami are highly assimilated in the Nordic cultures. In 1956, the Norwegian, Swedish, and Finnish Sami established the Sami Council to collectively protect the rights of and to represent the Sami people within the dominant societies (Seurujärvi-Kari, 2005). The rights of the Sami to preserve and cultivate their culture and language were included in the constitutional law of Norway in 1989 and of Finland in 1995. According to the Finnish Basic Education Act of 1998, children in elementary schools speaking Sami as their first language and living in the Sápmi area are entitled to receive teaching primarily in Sami. However, it is estimated that majority of Sami are bilingual nowadays (Aikio-Puoskari & Pentikäinen, 2001;

Lehtonen, 2002). The last decades in the past of this population represent an excellent example of a cultural shift from a *Gemeinschaft* toward a *Gesellschaft*.

Indigenous cultures and cognitive processing

Research has established fundamental differences in the basic cognitive processes of Circumpolar indigenous people as compared to the majority populations residing the same areas. The indigenous people seem to have superior visual-perceptual skills together with weaker level verbal skills. The differences are thought to result from their ancient ways of living.

In Kleinfeld's (1971) early study, Canadian village Inuit children outperformed urban Caucasian children in visual memory for figures. The 9-to-16-year-old subjects were briefly shown abstract figures and then asked to draw the figure from memory. Throughout the age range, the Inuit children scored higher than the Caucasian children. The Inuits came from two villages, one village having a relatively high level and the other village an intermediate level of contact with the Caucasian majority. The level of contact did not yield differences in the Inuit performances. In other words, the Inuit children's special ability was evident despite the level of acculturation to the majority society. Additionally, when asked on a questionnaire, the children's teachers reported the Inuits to have an unusual ability to perceive and recall visual details. According to Kleinfeld, the reason for the Inuit visual superiority lies in their traditional living environment, the monotonous and flat tundra and sea ice, which require especially good detection of and memory for directions and small details for correct orienteering. In the Inuit languages and narratives shared with children, there is a strong emphasis on extensive description of visual and spatial details. The line of thinking receives support from Wright, Taylor, and Ruggiero (1996) who examined 4-to-6-year-old Canadian Inuit children with Color Progressive Matrices and observed that the Inuits constantly scored above age-appropriate U.S. norms.

Also Sami and Greenlandic children seem to process visual-spatial information outstandingly efficiently (Seitamo, 1991; Brunner, 1992). Their well-developed ability has been evidenced on tasks of perceiving missing details and parts of entities (the WISC subtest Picture Completion; Wechsler, 1949) and construing two-dimensional representations of objects from pieces (the WISC subtest Object Assembly). In Brunner's study, conducted in 1989–90, the subjects were second-graders from

Greenland and Norwegian Sami core areas. Both the Greenlander and the Sami children exceeded the Norwegian norm average values on visual perceptual tasks.

In the 1960's and 70's, Seitamo conducted a broad field study among Skolt Sami in the Finnish Lapland with 6-to-15-year-old children and compared their cognitive performance with that of Finnish majority children. The effect of acculturation was examined by recruiting one group of Sami from an area with little contact with the dominant culture and another group from an area with more frequent contact with the dominant culture. Both the Sami groups showed better developed visual perceptual skills than the Finns, whereas the degree of acculturation had no impact. However, at that time, the Sami had already drifted away from the traditional nomadic culture, and thus their cognitive processing should already have taken the features of the dominant population. Seitamo concluded that despite the changes in the demands of the ecological circumstances, historically functional features of cognitive processing had been preserved. This is partly incongruent with the idea that individual development is defined by adaptations to the *prevailing* circumstances.

Seitamo also studied Sami parents' explanations for their children's superior visual perceptual performance. The parents' experience was that "a Saami sees things as a whole" and "a Saami sees the whole object at once". Their explanations give a good picture of the demands of their people's life style and ecology. They considered well-developed visual perceptual skills as necessary for survival in the challenging arctic environment they lived in: "The first essential for surviving in the wild is to look all around you. Then you know where you are and where you are going." "You can see the whole scene from the top of a hill." Also, accurately recognizing reindeer earmarks was considered necessary. (Seitamo, 1991, p. 179.) In Brunner's conclusions, hunting in the wild and the topographic features of the Arctic nature require special visuospatial skills for survival. Developing these skills has thus been essential for these populations.

Whereas the Arctic indigenous children show strength in visual perceptual processing, their verbal processing seems remarkably weaker. In Seitamo's study the less acculturated Sami were the poorest group on verbal subtests. Differences between the more acculturated Sami and Finnish were less obvious. Wilgosh, Mulcahy, and Watters (1986) similarly found weaker verbal ability relative to perceptual ability among Inuit children. In many studies American Indian adolescents' verbal performance has proved to be on a substantially lower level than their visual perceptual performance (Devers & Bradley-Johnson, 1994; McCullough, Walker, & Diessner, 1985; Tempest, 1998;

Vanderpool & Catano, 2008). The imbalance between indigenous children's verbal and nonverbal abilities is an interesting phenomenon for closer investigation.

Cultural differences in information processing tendencies

Cultural differences in *preferred modes of information processing* or *cognitive styles* have been one approach to explain the imbalanced cognitive profile of the Arctic children. An information processing model put forward by Luria (1966) suggests that human cerebral regions integrate incoming information in two different forms, in *simultaneous* and *successive* modes.

In simultaneous syntheses, the arriving stimuli are organized into a group constituting a larger entity. Simultaneously coded information is available all at once (Languis & Miller, 1992), "at a glance". Intuitively, simultaneous information processing is most easily understood in the context of spatial perception of targets. However, simultaneous and successive coding are independent of modality, and both forms are required even in the most elementary cerebral processes. Simultaneous coding appears not just in perceptual functions, but also in, for example, operating the grammatical rules of language, arithmetics, understanding verbally received spatial or semantic relationships, memorizing a word list repeated many times, or retrieving an event or a narrative from memory (Das, 1999; Languis & Miller, 1992; Luria, 1966).

In successive syntheses, information is organized into a temporal or serial order (Languis & Miller, 1992). Successive processes are needed, for example, in the perception of rhythmic or tonal melodies, producing motor actions, syntactic language operations, or receiving and producing narrative speech (Das, 1999; Languis & Miller, 1992; Luria, 1966). Luria proposed that the main sites for the simultaneous synthesis are the parieto-occipital areas and for the successive synthesis the frontal-temporal areas. Luria's proposition receives preliminary support from EEG studies evidencing distinctive patterns of cortical activation in these areas during simultaneous and successive processing tasks in adults (Okuhata, Okazaki, & Maekawa, 2007, 2009).

Cognitive styles are what Riding and Rayner (1998; cited in Riding, 2001, p. 48) consider as "an individual's preferred and habitual approach to both organizing and representing information". Riding and Cheema (1991) reviewed the literature and ended up with two principal styles, the *wholist-analytic* and the *verbaliser-imager*. The two styles are to be interpreted as two continua independent of each other. The wholist-analytic dimension describes how strong a tendency an individual has to organize information in wholes as opposed to parts (Riding, 2001). Wholist processing is needed, for instance, in

judging the overall similarity of two figures, and the analytic processing in judging the similarity of certain parts of figures. The verbaliser-imager continuum refers to whether the individual tends to represent information during thinking verbally or in mental images (Riding, 2001). A verbaliser operates more readily with abstract, conceptual categories, and an imager efficiently retrieves and organizes concrete and visual information.

What factors contribute to the formation of the cognitive profile of an individual? Berry (1976) has investigated cognitive styles in terms of field dependence/independence. He considers cognitive styles as adaptations of a human group to ecological demands and cultural socialization practices. The sociodemographic variables that Berry proposes to shape an individual's cognitive style are similar to those brought up by Greenfield (2009): subsistence pattern, settlement pattern, population density, family type, social/political stratification, socialization, education, and wage employment level (Berry, Poortinga, Segall, & Dasen, 2002). Considering the ecological demands posed by Arctic environments on ancient indigenous populations, certain forms of cognitive processing have certainly been beneficial for surviving (Brunner, 1992; Kleinfeld, 1971; Seitamo, 1991). According to Berry, the survival skills based on cognitive processing styles have presumably had an influence on the genetic heritage of these populations, and to some degree, cognitive styles might have a biological basis. Indeed, the biological basis is evident in that EEG activation patterns distinguish between adult subjects with differing cognitive tendencies (Glass & Riding, 1999; Riding, Glass, Butler, & Pleydell-Pearce, 1997).

Despite their intrinsic tendencies, individuals have some control over the coding mode and can modify their problem-solving strategies when approaching a new or complex task (Peterson & Deary, 2006). They may prefer simultaneous strategies over successive, or vice versa, independent of the form in which the original task is presented (Dean & Reynolds, 1997; Languis & Miller, 1992). Cognitive styles are thought to be separate from intelligence (Peterson, Deary, & Austin, 2005; Riding, 2001). Nevertheless, in practice, the methods used to measure intelligence are tasks that favor certain processing style or strategy over others for efficient completion. Furthermore, it seems as though individuals with lower overall ability in cognitive working are less adept at shifting strategy according to the task requirements (Riding & Read, 1996).

Research among indigenous children suggests that they tend to apply simultaneous strategies rather than successive strategies to solving novel problems. Based on research on cognitive styles, Hilberg and Tharp (2002) proposed that “among American Indian and Alaska Native students, there is some tendency toward (a) a global, or holistic, style of organizing information, (b) a visual style of

mentally representing information in thinking”. Interpreted in Lurian terms, this sort of a cognitive style corresponds to the tendency toward simultaneous information processing strategies. Research lends support to this proposition when it comes to not just North American Natives but Sami and Greenlandic children, too.

In Davidson’s (1992) study, Native American children outperformed their non-Native peers on tasks based on simultaneous processing. On tasks of successive processing, their performance was weaker compared to the non-Natives. More (1989) and Janzen (2000, cited in Das, Janzen, & Georgiou, 2007) made similar findings among American Indian children. Among Davidson’s (1992) subjects, 47% of the Native children preferred simultaneous processing over sequential processing as compared to 16% of the non-Native children. However, the findings were not equivocal, as 49% of the Native children (and 73% of the non-Native) did not show any preference between the processing styles. Furthermore, Das and colleagues (2007) investigated Canadian First Nations children’s reading. They did discover a relative weakness in successive processing skill, but only in the group of poor readers, not good readers. This is in line with Riding and Read’s (1996) proposition that individuals with weaker overall cognitive performance may have difficulty adapting their processing strategy to the task demands.

The holistic, visual tendency to organize information might explain the specific cognitive profile of Sami and Greenlandic children. These children surpass their non-indigenous peers (Seitamo, 1991) and norm average values (Brunner, 1992) in tasks considered to rely on simultaneous processing of visuospatial content, such as the WISC subtests Picture Completion and Object Assembly (Bannatyne, 1974; Brunner, 1992; Kaufman, 1979, as cited in Allen, Lincoln, & Kaufman, 1991; Meesters, van Gastel, Ghys, & Merckelbach, 1998). Meanwhile, their performance remains clearly poorer on the WISC subtests Coding and Picture Arrangement (Brunner, 1992; Seitamo, 1991) that are claimed to require successive processing (Bannatyne, 1974; Brunner, 1992; Kaufman, 1979; Meesters & al., 1998; Naglieri & Das, 1990). The indigenous children’s performance on the WISC subtest Block Design reclaiming both simultaneous and successive processing differed neither from the performance of the non-indigenous counterparts nor from the country norms (Brunner, 1992; Seitamo, 1991).

Whether the tendency to simultaneous processing explains the relative weakness on verbal tasks among Sami and Greenlandic children is yet to be answered. Most verbal tasks favor successive processing (Brunner, 1992; Chow & Skuy, 1999; Das, 1999; Naglieri & Das, 1990), and the Sami and Greenlandic groups generally seem to lag behind country norms and non-indigenous groups on verbal

tasks (Brunner, 1991; Seitamo, 1991). Two of the WISC verbal subtests, Similarities and Arithmetic, seem to make an exception since they also reclaim simultaneous or holistic organization (Kaufman, 1979; Luria, 1966). On these subtests the performances of the indigenous and non-indigenous children were at the same level (Seitamo, 1991). It must be noted, however, that Seitamo's results from verbal tests should not be interpreted as pure measures of verbal ability, since the tests were administered in Finnish, which was the second language of the Sami subjects. Good performance on most verbal tests requires extensive cultural knowledge and adept use of the administration language. Any basic cognitive differences are masked by these factors.

The present study allows better investigation of the fundamental verbal processes because both indigenous and non-indigenous children were tested in the same language (Finnish or Norwegian), equally well commanded by both ethnic groups. The first research question of the current study is whether differences in cognitive processing tendencies exist in verbal functions between Sami and non-Sami children.

The influences of culture on emotion regulation

Research on child development should not focus on cognitive aspects alone. Cognitive and emotional development are deeply intertwined in ontogeny, and an individual manifestation of one of the two is always mediated by the other. An intersection point for cognition and emotion are regulatory processes (Zelazo & Cunningham, 2007). *Self-regulation* refers to the ability to adapt one's behavior adequately to the social context. It comprises cognitive (executive), emotional, and motor behaviors (Kopp, 2001). In this study, the focus is on the modulation of emotions. *Emotion regulation* can be defined as "the extrinsic and intrinsic processes responsible for monitoring, evaluating, and modifying emotional reactions, especially their intensive and temporal features, to accomplish one's goals" (Thompson, 1994, pp. 27–28). *Intrinsic regulation* means modulating emotions in self by means such as swinging the body, carrying along a comforting toy, redirection of one's thoughts, or cognitive reappraisal. *Extrinsic regulation* refers to modulation practices applied by other people. The internalizing of emotion regulation in a child includes acquiring and applying independently those means that first were extrinsic and used by adults to modulate the child's behavior.

Since emotion regulation is seen as adaptation to environmental demands, behaviors attached to it vary greatly across cultures despite the possibly existing biologically based universal set of basic emotions (Ekman, 1992; Hess & Kirouac, 2000; Oatley, Keltner, & Jenkins, 2006). Self-regulation develops most importantly within the relationship between children and their caregivers (Bernier, Carlson, & Whipple, 2010; Karreman, van Tuijl, van Aken, & Deković, 2006). The nature of this relationship, in turn, is highly dependent on ecological factors because parents set their child-raising goals according to the prevailing conceptions of a socially well-functioning individual. These conceptions vary across times and cultures. The models of Greenfield (2009) and Keller (2007; Keller & al., 2004) posit that extensive body contact, social stimulation, and interactional warmth favored in a *Gemeinschaft* result in earlier emergence of self-regulative abilities than do to face-to-face contact and object stimulation emphasized in a *Gesellschaft*. Empirical evidence supports this causal pattern. Positive, affective parenting has been found to relate to children's good emotion regulation abilities (Denham, Zoller, & Couchoud, 1994; Isley, O'Neil, Clatfelter, & Parke, 1999). Additionally, extensive skin contact with mother has been found to promote preterm infants' modulation of negative emotionality and arousal (Feldman, Weller, Sirota, & Eidelman, 2002).

Sociocultural features may affect not just when emotion regulation abilities emerge but also *how* emotions are regulated in different cultures. Matsumoto, Yoo, and Nakagawa (2008) studied young adults across 23 countries. They came to the conclusion that in cultures emphasizing the maintenance of social order and hierarchy (comparable to *Gemeinschafts*), suppression is a more common means of emotion regulation compared to cultures valuing affective autonomy and egalitarianism (comparable to *Gesellschafts*). Suppressive strategies serve ingroup cohesion and harmony, whereas unrestrained emotion displays are thought to harm interpersonal relations (Matsumoto & al., 2008). Thus, effective self-regulation is expected to be of special relevance to *Gemeinschafts*.

The Sami are a peculiar cultural group in the aspect of child-rearing practices. They definitely represent a *Gemeinschaft* community when it comes to the population's ecocultural features and nomadic history. Dependence on mutual responsibilities, tight family relations, and clear social structures have been vital for subsistence. Sami language and traditions as well as living in an extended family are considered important by Sami parents for the conservation of a strong ethnic identity (Javo, Alapack, Heyerdahl, & Rønning, 2003). Nevertheless, child independence and autonomy are the key values guiding Sami parenting practices, as reported by the parents themselves. Independent decision-making, self-reliance, autonomous thinking, risk taking, and novelty exploration are encouraged (Javo

& al, 2003; Javo, Rønning, & Heyerdahl, 2004; Seitamo, 1991). These qualities were earlier needed for surviving alone in the wild at the time of nomadic and hunting lifestyle. Also, earning the family's living in reindeer economy means that adults do not have much time to look after their children during the busiest seasons (Balto, 1996), which is another motive to raise self-reliant children.

What further characterizes the pattern of parenting is that physical contact and interactional warmth are strongly expressed in Sami parenting (Balto, 1996; Javo & al., 2003; Javo, Rønning, & Heyerdahl, 2004). Sami children are allowed to sleep in their parents' bedroom until later age than their non-indigenous peers, and Sami mothers breast-feed their children for longer than non-indigenous mothers. Sami mothers emphasize indulgence, closeness, and un-confrontational methods of raising more than do non-indigenous mothers. Children's reports of parental behavior confirm these principles to some degree. The Sami children considered their parents as more accepting, positively involved, less rejecting, and allowing more autonomy than did the non-indigenous Finnish children (Seitamo, 1991).

In sum, Sami parents show features from both the independence- and interdependence-directed parenting. Traditions, family relations, closeness and affect are strongly valued, but so is autonomy. The effect of this mixture on the children's self-regulation has previously been addressed in a research report by Forsius (1973) yielding small differences between 7-year-old Sami and Finnish children. When asked about amounts of anger outbursts, motor restlessness, and hyperactivity, Finnish parents reported slightly higher frequencies than Sami parents. Fears, in contrast, were more common among Sami children, which is presumably related to the tradition of threatening children with supernatural beings to keep them safe in the nature (Javo & al., 2003; Javo, Rønning, & Heyerdahl, 2004). Forsius relates the rates of aggressive outbursts to the fact that Sami have a very strict negative attitude toward expressing aggression. Adults do not quarrel with each other, and children are harshly punished for aggressive behavior (a finding repeated by Javo, Rønning, & Heyerdahl, 2004).

Another cultural curiosity that may affect the Sami children's regulatory capacity is an old form of traditional socialization, *nárrideapmi* (Balto, 1996). It does not, to the same extent, exist in Nordic majority cultures. *Nárrideapmi* refers to sort of teasing or playful interactions between an adult and a child that aim at strengthening the child's control over anger, emotional outbursts, sensitiveness, aggression, and shame (Javo, Rønning, & Heyerdahl, 2004; Seitamo, 1991). *Nárrideapmi* trains the child to develop a sense of humor and self-irony and to put up with jokes about him- or herself. Through *nárrideapmi* children are taught social roles and to tolerate hardship in life. The teasing seems to make a difference in children's psychological well-being. Javo, Rønning, Heyerdahl, and Rudmin

(2004) examined associations between parental practices and 4-year-old children's behavior problems. Whereas harsh discipline and teasing were related with higher frequency of internalizing problems in Norwegian boys, no such relation existed for Sami boys. The authors suspect that the toughness training has a positive influence on Sami children.

Thus, Sami children are actively trained to gain self-control and psychological endurance in the face of social pressure and frustration. Meanwhile, friendly and respectful behavior toward others is promoted. The importance of psychological strength and toughness is today not so much related to natural dangers as it is to sociopolitical oppression. It is now needed in preserving a healthy indigenous minority identity in the conflicts of the shift toward the Western scheme of things. However, it is believed that the meaning and importance of nárrideapmi is being ignored by parents of today (Balto, 1996). Nárrideapmi is still used by parents today, but to a lesser extent than by earlier generations (Javo, Rønning, & Heyerdahl, 2004). Since training for toughness is another explicitly pronounced key constituent of Sami child-rearing, it should be expected to increase the Sami children's intrinsic emotion regulation ability. Emotion regulation of these children as such has not been investigated before. The second research question of the current study concerns ethnic differences in emotion regulation capacity.

Verbal cognition and emotion regulation

Self-regulation is a challenging task that requires children to use their full cognitive, linguistic, social, and emotional capacity to succeed (Kopp, 2001). The importance of verbal skills in self-regulation is evident since very early age (Hebert-Myers, Guttentag, Swank, Smith, & Landry, 2006).

A child is born with one principal effective mechanism of emotion regulation: signaling distress by crying and thereby bringing the caregiver to comfort (Oatley & al., 2006). In the next months, neural development and repetitive caring interactions enable the child rudimentary self-soothing through, e.g., closing eyes or head aversion. In the prelinguistic period of development, the quality of emotion regulation emerges from the physical, perceptual, and affective nature of interactions with the caregiver. Through caregivers' touch, facial expressions, gestures, and speech, infants learn about their own needs, internal states and the transformation of these into other states. A satisfying and safe

relationship with the caregiver starts to shape into mental representations of care and form the basis of cognitive emotion regulation.

As soon as infants start moving independently and reaching objects, caregivers start organizing the infants' behavior in order to keep them and the environment unharmed. Verbal requests are used by caregivers even before the child understands speech (Gralinski & Kopp, 1993). Children start to talk about feelings in their second year of life (Kopp, 1989), and at three years of age they are able to explain feelings emerging not just in themselves but in peers as well (Denham, von Salisch, Olthof, Kochanoff, & Caverly, 2002; Fabes, Eisenberg, Nyman, & Michalieu, 1991). The ability to understand emotional reactions in self and others depends on the quality of communication, or 'feeling talk', with the parent. Explanations about causal relations between events and emotions and labeling emotional reactions promote children's emotion understanding (Dunn, Brown, & Beardsall, 1991). Lack of knowledge about emotion-related situations is associated with failure of emotion control (Garner, Dunsmore, & Southam-Gerrow, 2008). Being able to recognize emotions is necessary to regulate them adequately (Denham & al., 2002).

Toward preschool age, verbal abilities increase in importance in self-regulation. Verbal communication accelerates their learning about emotions and emotion-related rules and offers an acceptable way of expressing emotional states to others. A verbally skilled child becomes understood by adults and peers and frustration is avoided (Calkins & Hill, 2006). Additionally, the use of representation and recall memory necessary for intrinsic behavior regulation is facilitated by verbal skills (Kopp, 1989). The child is able to deal with excitatory events verbally instead of acting out.

A child's emotion regulation is first completely external and internalizes gradually. In the first years of life, children possess memories of past situations and knowledge about contingencies and are capable of emergent planful, goal-directed regulative behavior more and more independently. They learn behavioral (e.g., problem-solving) and cognitive (e.g., redeploying attention) regulation strategies from adults. Still, during the early years, they need external support in managing emotions, especially if the situation is new or provokes high levels of arousal (Denham & al., 2002; Oatley & al., 2006). Competent, independent emotion regulation starts to show at late preschool age (Carlson & Wang, 2007; Kopp, 2001). Skillful cognitive emotion control strategies become available to children at school age. This rate of behavioral development is defined by the maturation of brain regions centrally involved in self-regulation (Ochsner & Gross, 2004).

From here it is clear that verbal abilities in general facilitate emotion regulation in children by enabling more efficient social learning. Thus, in the current study, high verbal ability is expected to relate to skillful emotion regulation. However, a question not directly addressed before is whether tendencies in verbal information processing might lead to differences in self-regulation abilities. Due to lacking research on this relation, hypotheses must be drawn indirectly from the few reports on the interaction of social functioning and cognitive tendencies.

Gross (2005) discovered a connection between global information processing and efficient recognition of emotional expressions among children aged 8 to 9 years. Global processing refers to perceiving the holistic features of visual information (Andrewes, 2001) and can be understood as the equivalent of the Lurian simultaneous synthesis. Perceiving parts of an entity is called local processing, equating the successive synthesis. In Gross' study, children who on visual perception tasks gave most frequently global responses, instead of local or unrelated responses, were most accurate at recognizing emotional expressions on human faces. The result suggests that global or simultaneous syntheses facilitate making adept judgments in social situations.

On the contrary, Riding (2001) summed up the work of his research group on pupil and adolescent samples from normal and special schools and concluded that problem behavior is more likely in individuals with an extreme wholist cognitive style compared to individuals with other styles. Riding (2001, Riding & Craig, 1998) proposes that an unstructured, global, and inclusive tendency to think may manifest itself as less well organized internal self-regulation in wholists. Wholists are also considered more outward looking, and thus, externalizing behavior problems seem to be more characteristic to them than to analysts. Meanwhile, they were assessed by peers as more assertive, friendly, and humorous than analysts. Analysts show a tendency to structured but socially isolated and shy behavior (Riding, 2001). This kind of behavior could be interpreted as overinhibition of social responses.

In addition to these contrasting findings, there is a third way to predict the association between processing styles and emotion regulation. The bridge uniting fundamental cognitive functions and higher-order processes such as self-regulation are the *executive functions* that serve to control all cortical activity. Executive functions include, for example, planning, working memory, set shifting, error detection and correction, and the inhibitory control of prepotent responses (Zelazo & Cunningham, 2007). They enable adaptive, goal-directed behavior together with inhibiting automatic or habitual responses (Garon, Bryson, & Smith, 2008) and are thus necessary for adequate cognitive and

emotional responses. The importance of fluent executive functioning is evidenced in the findings of Das, Janzen, and Georgiou (2007) and Riding and Read (1996) that flexibility at switching cognitive processing strategy according to the task demands results in best academic success. Hereby the best level of executive functioning would relate to neither a strong tendency to simultaneous nor successive processing, but a balance between the two. As fluent executive functioning is the corner stone of self-regulation, too, an empirical association between balanced cognitive processing and efficient emotion regulation is expected.

In sum, the cognitive and emotional aspects of child development are deeply intertwined, and an important contributor underlying this connection are the executive functions. They enable adaptive behavior and flexible strategy switching in both cognitive and emotional challenges. This flexibility in an individual ought to result in more adept social functioning, and therefore more competent emotion regulation than would showing the extremes of cognitive processing tendencies. In addition, a strong predisposition to simultaneous, or wholist, processing may result in difficulties in emotion regulation, as suggested by Riding (2001).

Research questions

The current study has three goals:

- (1) Comparing the verbal cognitive features of indigenous Sami and non-indigenous Finnish/Norwegian children.

Hypothesis 1. The Sami subjects will show lower general verbal performance as measured with the NEPSY subtests Comprehension of Instructions, Narrative Memory, and Phonological Processing, and the WISC-III subtest Digit Span.

Hypothesis 2. The Sami subjects will show relative strength on tasks relying dominantly on simultaneous information processing, including Comprehension of Instructions and Narrative Memory. In contrast, the Sami will show relative weakness on tasks requiring successive processing, including Digit Span and Phonological Processing. Strong simultaneous processing is expected to be evident especially in those Sami children whose families actively participate in reindeer husbandry.

- (2) Comparing the emotion regulation capacity of Sami and Finnish/Norwegian children.

Hypothesis 3. The Sami subjects will show better intrinsic emotion regulation ability compared to the non-indigenous subjects as reported by parents. The cultural difference is expected to occur especially in regulation of anger.

- (3) Investigating the association between verbal cognitive features and emotion regulation.

Hypothesis 4. Higher level of general verbal ability will be associated with higher level of emotion regulation regardless of ethnicity.

Hypothesis 5. Balance between simultaneous and successive processing will be associated with the best emotion regulation capacity. Strong tendency to simultaneous processing will be associated with weaker emotion regulation.

METHOD

Subjects

The subjects ($N = 52$) were children living in the Sami core area in Finland and Norway. They were 7 years old ($M = 7.54$, $SD = 0.37$), and 52% were girls. The children were recruited in municipality schools by their teachers. The Finnish and Norwegian samples comprised 41% and 11%, respectively, of the age groups in the municipalities attending general education classes. Altogether eight families were excluded from the study that expressed willingness to participate but did not match the inclusion criteria. The children had attended school-like education for approximately 1½ years prior to participation in the study. In Norway children enter the first grade at the age of six. In Finland the school starts at the age of seven, but most children attend preschool for a year in advance. The Finnish preschool year is comparable to the Norwegian first grade as regards structure and activities.

A child was assigned to the Sami group ($n = 15$) if both of the child's parents reported Sami as their ethnic identity and at least one of the child's parents, grandparents, or great grandparents spoke (had spoken) Sami as first language. Children with previously diagnosed learning difficulties or mental disability were excluded. Only children speaking fluent Finnish or Norwegian, as reported by parents, were included. The last criterion was practical due to lack of psychological assessment methods in Sami language and qualified Sami speaking data collectors.

Procedure

The data were collected in winters 2007–08 and 2008–09. Because of small birth cohorts and small numbers of families interested to participate in the target areas, data collection in Norway had to be performed in two rounds in successive years. Teachers gave out information letters in classes to take home to parents. The letters contained, e.g., the inclusion criteria. Families voluntary to participate were posted a background information questionnaire and, for each parent, the Emotion Questionnaire

(Rydell, Berlin, & Bohlin, 2003). The background information questionnaire was returned by 45 families and the Emotion Questionnaire by 44 families.

The cognitive test battery was administered and scored by trained undergraduate psychology students. With each child, the assessment was carried out in two sessions on successive school days in order to prevent the child from becoming tired. Finnish (in Finland) and Norwegian (in Norway) languages were used in communication and administration. Afterwards, the parents received a short feedback of the test results.

Measures

Cognitive assessment. The cognitive–neuropsychological assessment was made using selected subtests of the Finnish and Norwegian versions of the NEPSY Developmental Neuropsychological Assessment (Korkman, Kirk, & Kemp, 1998) of the Wechsler Intelligence Scale for Children – Third Edition (WISC-III; Wechsler, 1991). Table 2 displays descriptions of the verbal subtests. Subtests measuring simultaneous processing were Comprehension of Instructions and Narrative Memory of the NEPSY. Subtests measuring the level of successive processing were Digit Span of the WISC-III and Phonological Processing of the NEPSY.

Emotion regulation assessment. The original version of the Emotion Questionnaire (Rydell, Berlin, & Bohlin, 2003) includes the emotions sadness, anger, fear, and exuberance. For the purposes of this study, items for shame and guilt were added. The version used in the current study consists of 60 items, 24 regarding the frequency and intensity of the child’s emotional reactions and 36 regarding the child’s capacity to regulate aroused feelings in self and with the help of others. The parent is first asked to imagine a situation where a certain emotion arouses (e.g., “My child becomes sad”). Next, the parent is asked to estimate whether it is easy for others or for the child him- or herself to calm the child down or make the child feel better. Responses are given on a 5-point scale (1 = *doesn’t apply at all*, 5 = *applies very well to my child*). The questionnaire was returned by 44 families. In 24 cases both parents responded, in 19 cases only the mother, and in one case only the father. See Appendix for the emotion regulation items.

Emotion regulation sum scales were constructed for regulation of Anger, Sadness, Guilt, Shame, Fear, and Exuberance in self (Internal Regulation) and by others (External Regulation). Each emotion scale consisted of three items. The original External Regulation items were reversed. Thus, the higher

the score is, the better the emotion regulation ability. Additionally, sum scores for Internal, External, and Total emotion regulation ability were computed. Cronbach's alphas were generally quite high ranging from .61 to .92 for the individual emotion sum scales, and from .94 to .95 for the Internal, External, and Total emotion regulation sum scales. Group comparisons were made between ethnic groups and child gender using the Mann-Whitney U. A nonparametric test was used due to small group sizes and lack of normality of the sum scale distributions.

Table 2. Descriptions of the selected verbal subtests of the NEPSY and the WISC-III

NEPSY (Korkman, Kirk, & Kemp, 1998)

Comprehension of Instructions

The child is given a matrix of shapes of different sizes and colours and asked to point to certain shapes in a defined order. The instructions increase in complexity and require processing multiple visual features and spatial relationships simultaneously. (Das, 1999; Languis & Miller, 1992; Luria, 1966; Naglieri & Das, 1990.)

Narrative Memory

The child is read a brief story and asked to reproduce in own words. Retrieving a narrative from memory is thought to represent a simultaneous processing task (Das, 1999; Languis & Miller, 1992; Luria, 1966).

Phonological Processing

The child is read a word and asked to reconstruct it by changing or removing a letter or a syllable. The task involves sequential processing (Das, 1999).

WISC-III (Wechsler, 1991)

Digit Span

In the first section, the child is read sequences of numbers and asked to repeat them immediately in the same order. In the second section, the child is asked to reproduce the read sequences in reversal order. The task measures auditory serial memory relying on successive processing. (Brunner, 1992; Naglieri & Das, 1990; Luria, 1966; Kaufman, 1979).

RESULTS

Descriptive statistics

Table 1 displays the means and standard deviations of child age, parental schooling years, and number of siblings. The Sami children were significantly older than the Finnish children ($F_{2, 49} = 4.85, p = .012$), while the Norwegian did not differ from either Sami or Finnish. Average number of years of parental schooling did not differ across the ethnic groups (Sami, Finnish, and Norwegian) either between mothers ($F_{2, 41} = .71, p = .50$) or fathers ($F_{2, 37} = 1.35, p = .27$). Numbers of siblings were similar across groups ($F_{2, 41} = .88, p = .42$). Six Sami families and two Finnish families reported involvement in reindeer economy. In the northern reindeer management areas of Norway, reindeer husbandry is a special right of the Sami, which is why there are no reindeer-herding Norwegian families.

The family income variable was normally distributed (Shapiro-Wilk = .95, $p = .07$), the middle 50% of the sample reporting a yearly income between 48 000 and 60 000 €. No significant differences were found between the Sami and the non-indigenous families ($t(43) = 0.21, p = .83$), whereas the Norwegian families had higher yearly income compared to the Finnish families ($F_{2,42} = 5.11, p = .01$).

Table 1. Means and standard deviations of demographic variables among the Sami, Finnish, and Norwegian families

	Sami		Finnish		Norwegian		All	
	<i>n</i> = 15		<i>n</i> = 28		<i>n</i> = 9		<i>N</i> = 52	
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>
Child age	7.71 ^a	0.34	7.40	0.36	7.69	0.28	7.54	0.37
Maternal schooling years	13.91	3.45	14.1	2.85	15.38	2.07	14.28	2.88
Paternal schooling years	10.33	4.39	12.33	2.82	11.86	1.86	11.80	3.14
Number of siblings	2.2	1.3	1.6	1.3	1.6	0.7	1.8	1.2

^a a significant group mean difference in comparison to Finnish children

Analyses of ethnic group differences in cognitive test performances were made using the obtained raw scores. Child age did not correlate with the test raw scores (all $ps > .36$). Family income correlated moderately to Digit Span scores ($r = .45, p = .002$) but not to other test scores. Maternal years of education did not relate to any of the scores, but paternal years of education correlated weakly to Narrative Memory scores ($r = .32, p = .042$). Due to the uneven distribution of Sami subjects between the countries, group comparisons on cognitive and emotional variables were not made countrywise but between Sami and Non-Sami ethnicity. Ethnic group differences in Phonological Processing, Comprehension of Instructions, and Narrative Memory were analyzed with independent-samples t -tests. Mann-Whitney U was used for Digit Span due to small group sizes and the variable's positively skewed distribution ($Kolmogorov-Smirnov = .20, p > .001$; skewness score 1.18 and kurtosis score 2.23) that did not respond to transformations.

The subjects' cognitive performances were compared to the national standardized norms in terms of standard scores. The standard scores in this sample did not follow the standard distribution. The curves were slightly positively skewed (all $ps < .01$, skewness scores ≤ 0.23 , and kurtoses -0.55 – 2.23), indicating that the sample performance as a whole was somewhat lower than the country norms.

As for the Emotion Regulation scores, family income correlated to fathers' ratings of Self Regulation of Exuberance ($r = .54, p = .005$) but not to other ratings. Neither mothers' nor fathers' years of education correlated with the ratings. Correlations between mothers' and fathers' ratings did not quite reach significance ($r = .39, p = .06$) and therefore the ratings were analyzed separately.

Verbal cognition

The Sami were predicted to show lower performance than the control group on all measures of verbal cognition. The hypothesis only received partial support, as can be seen in Table 3 displaying the ethnic group differences on the verbal subtests. The Sami did receive lower scores on all subtests, but the only significant difference occurred on Comprehension of Instructions, a measure of simultaneous processing. On the other measure of simultaneous processing, Narrative Memory, the difference approached significance.

Table 3. Means and standard deviations of the verbal test scores among the Sami and Non-Sami children

	Sami		Non-Sami		<i>U / t</i>	<i>p</i>
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>		
Comprehension of Instructions	19.13	3.09	21.92**	2.56	-3.34	.002
Narrative Memory	18.53	6.40	21.54 [☆]	5.59	-1.69	.098
Phonological Processing	22.53	5.77	23.81	5.65	-0.74	.466
Digit Span	9.27	1.58	9.57	2.10	272.5	.918

** significant mean difference at level $p < .01$, [☆] mean difference approaching significance

Note. Digit Span scores were analyzed with Mann-Whitney U and other scores with independent samples *t* tests.

It was hypothesized that the Sami would show relative strength on tasks of simultaneous processing and weakness on tasks of successive processing. Against the hypothesis, the Sami did not show any strength or weakness in either of the processing modes. Figure 2 shows group performances in the subtests in z-scores. While the Sami group mean for successive processing tasks was 0.11 to 0.16 standard deviations below the sample mean, on simultaneous tasks they scored 0.36 to 0.67 below the sample mean. The Non-Sami scored slightly over the sample means on all tasks.

Individual performance levels were categorized as poor, medium, or good on successive and simultaneous tasks. Figure 3 displays the percentages of good, medium, and poor performances in each ethnic group. Poor performance level meant scoring one standard deviation or more below the sample mean. Good level meant scoring one standard deviation or more above the sample mean. The ethnic group distributions did not significantly differ in terms of poor, medium, or good performances in neither simultaneous ($\chi^2 = 2.67, p = .26$) nor successive ($\chi^2 = 1.24, p = .54$) processing. An interesting aberration against expectations was the high percentage (40%) of Sami scoring poor on simultaneous tasks. Comparing Sami families involved in and families not involved in reindeer husbandry did not affect the results, which was against the hypothesis.

At the level of individual profiles, 4 children (of whom 2 were Sami) showed the combination of poor simultaneous and poor successive processing, 2 (none Sami) showed good simultaneous and good successive processing, 1 (none Sami) showed good simultaneous and poor successive processing, and 2

(none Sami) showed good successive and poor simultaneous processing. Altogether three children displayed a z-score difference of two standard deviations or more between the processing modes. Thus, no specific cognitive tendencies occurred in either group.

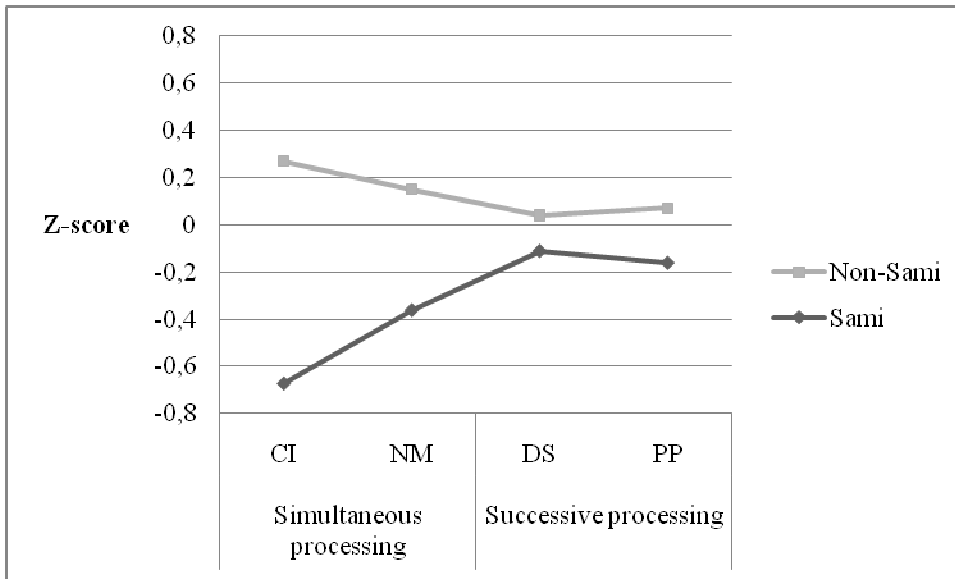


Figure 2. Performance levels of the Sami and Non-Sami children on successive and simultaneous processing tasks in relation to sample mean ($z = 0$).

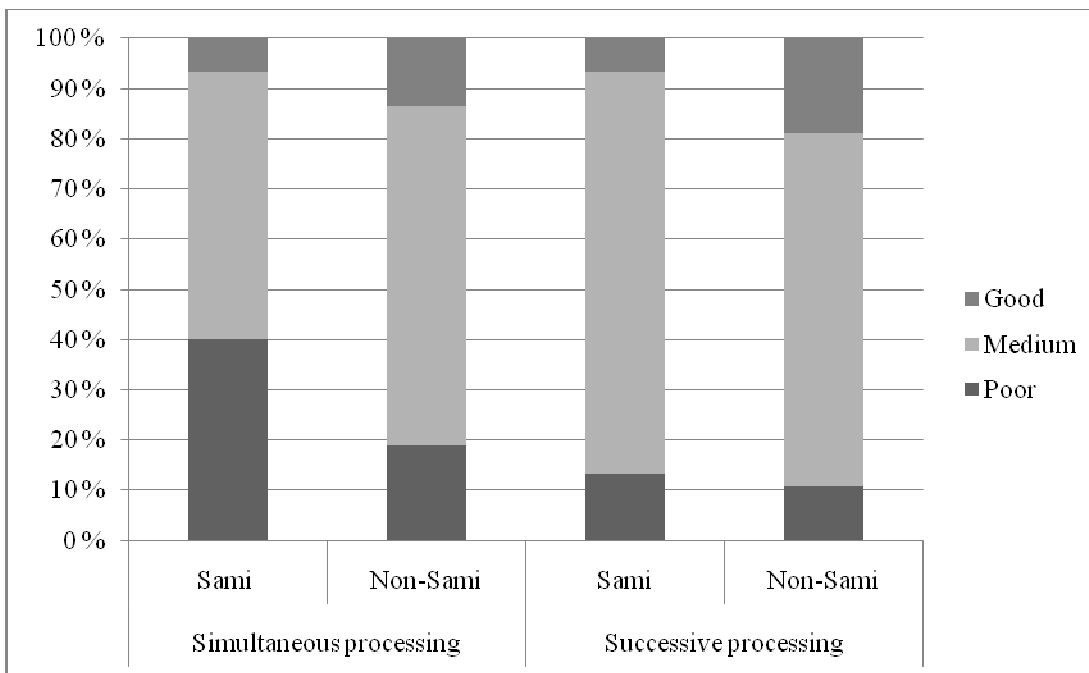


Figure 3. Percentages of the Sami and Non-Sami children performing at good ($z \geq 1$), medium ($-1 < z < 1$), or poor ($z \leq -1$) level on successive and simultaneous processing tasks.

Emotion regulation

The Sami subjects were predicted to receive higher scores compared to the Non-Sami on ratings of Intrinsic Regulation, especially of Anger. However, the only statistically significant difference was the Non-Sami group receiving higher scores than the Sami for Internal Regulation of Guilt as rated by mothers ($U = 90.50, p = .047$).

The association of cognitive processing and emotion regulation

High level of verbal ability was hypothesized to be related to good emotion regulation capacity regardless of ethnicity. The general verbal ability did significantly correlate to fathers' evaluations of Internal Regulation ($r = .52, p = .01$) but, against expectations, not to other measures of emotion regulation.

Children who had the least difference between their performance levels on successive and simultaneous tasks were expected to show the highest emotion regulation. Additionally, a strong tendency to simultaneous processing was hypothesized to relate to weaker emotion regulation. Both the hypotheses were discredited, as emotion regulation ability was found not to correlate either to the performance level difference or to the simultaneous processing tendency. Instead, there were some moderate correlations between the measures of successive processing and parental ratings of Internal Regulation. Maternal ratings were negatively related to Digit Span score ($r = -.41, p = .010$) and paternal ratings were positively related to Phonological Processing score ($r = .60, p = .002$). The correlations remained significant after partialing out the effect of family income.

DISCUSSION

The study investigated the impact of culture on cognitive processing tendencies and emotion regulation. The subjects were 7-year-old indigenous Sami children and their non-indigenous peers from Finland and Norway. The indigenous and non-indigenous groups were compared on two verbal subtests measuring simultaneous processing (Comprehension of Instructions and Narrative Memory), two subtests measuring successive processing (Digit Span and Phonological Processing), and on parental ratings of emotion regulation ability. It was hypothesized that the Sami would show poorer overall level of verbal processing, relative strength in simultaneous processing, and relative weakness in successive processing. Furthermore, this performance profile was expected to be especially visible in children whose families are active in reindeer economy. In part, poorer verbal ability did occur between the ethnic groups, but the hypotheses concerning the processing tendencies were discredited.

The results partially supported the first of these hypotheses in that the Sami performed significantly poorer than their non-indigenous peers in comprehension of verbal instructions and marginally poorer in remembering a narrative. This is in accordance with earlier research as poor level of verbal processing has been found among other Circumpolar indigenous populations (Devers & Bradley-Johnson, 1994; McCullough & al., 1985; Tempest, 1998; Vanderpool & Catano, 2008 Wilgosh & al., 1986). However, the fact that in successive processing the ethnic groups did not differ at all, is a sign that the gap between the Sami and non-Sami is narrowing. Nearly four decades earlier, Seitamo (1991) discovered more obvious ethnic group differences in verbal processing. The Sami of the current study as well as their parents had attended the same schools as their non-indigenous peers and were much more familiar than the earlier generation with the dominant languages that were used in the current assessment. These changes in the Sami learning environments have equalized their cognitive skills relative to the non-Sami, which supports Greenfield's model of the impact of cultural change on child development.

Contrary to expectations to find ethnic differences in cognitive processing tendencies, the Sami did not exhibit special strength in simultaneous relative to successive processing or vice versa. An interesting aberration against the hypothesis is that 40% of the Sami scored one standard deviation or more below the sample average in comprehension of instructions (compared to 19% of the control group). Comparing the Sami performances across subtests revealed that the two simultaneous

processing tasks were more difficult to them than the two successive processing tasks. Attending formal education may explain the fairly good level of successive processing. Reading and writing learned and practiced during the first school years strengthen successive processing skills (Das & Dash, 1989; Ostrosky-Solís & Lozano, 2006). After the acquisition of mechanic reading skills, complex grammatical and semantic operations start promoting simultaneous verbal syntheses. These results encourage rejecting the idea that a special advantage in simultaneous processing exists among the Sami children of today. The results hold not only for verbal tasks but for visual-perceptual tasks as well, as reported elsewhere (Alaraudanjoki, in preparation). The transition from subsistence economy to a modern Western lifestyle has led to children spending less time outdoors at subsistence activities and more time indoors, for example, learning for school or consuming the media. The Sami still do live in close contact with the nature, as hunting, fishing, and collecting forest food are common activities, but the survival value of efficient simultaneous processing of environmental stimuli has disappeared. The learning environments today emphasize literacy and discourse skills, and adaptation to these demands can already be seen in the Sami children's cognitive processing.

What remains unexplained is why so many more of the Sami than of the non-indigenous children scored clearly below the sample mean on the simultaneous tasks. In Seitamo's (1991) study the ethnic groups performed equally well on verbal tasks that required holistic or simultaneous information processing. There is no reason why the Sami would experience difficulties on the simultaneous tasks particularly. The finding is presumably related to the selection of measures. Understanding speech always involves successive processing (Luria, 1966), and thus Comprehension of Instruction and Narrative Memory are by no means measures of purely simultaneous processing. It might have been reasonable to analyze the subtest scores in parts, as for example free retrieval of a narrative may relate more to a simultaneous synthesis than guided retrieval cued by questions about the information content. Also, a relevant note to be made here is that in the Sami culture, children are expected to learn new skills by experience and by modeling adult activities (Balto, 1996). A similar approach to learning ("watch-then-do") has been found typical to North American natives (Hilberg & Tharp, 2002; More, 1989). Thus, obeying detailed, complex verbal instructions may not be a part of the Sami children's rearing environment.

The intrinsic emotion regulation ability of the Sami was hypothesized to be better than that of the non-indigenous children. The difference was expected to be especially clear for anger regulation, as the Sami parents traditionally strictly disapprove strong emotional outbursts and aggressive displays in

particular. However, opposed to the hypothesis, the Sami did not differ from the non-Sami in emotion regulation. The only statistically significant difference was lower ability of the Sami group in internal regulation of guilt. The finding as such is not explicable from the current theoretical point of view. Earlier research was limited to Forsius' (1973) mention that the Sami parents in her study reported slightly fewer aggressive outbursts in their children than did the Finnish parents. Thus it is uncertain whether differences have existed before. Javo and colleagues (Javo & al., 2003, 2004; Javo, Rønning, & Heyerdahl, 2004) describe specific Sami child-rearing constituents that, according to Greenfield's and Keller's propositions, should promote internal self-regulation. These are, for example, physical closeness, warmth, strictness toward aggressive behavior, teasing, and toughness training. The first thing to bear in mind is that the Sami child-rearing attitudes do not purely represent the interdependence socialization pattern typical of a *Gemeinschaft* community, since Sami parents also appreciate independence and autonomous thinking in their children.

The absence of systematic differences in emotion regulation ability may also implicate that, as researchers (Balto, 1996; Javo, Rønning, & Heyerdahl, 2004) have noted, the traditional child-rearing is losing its position. The parents of this study have grown at an era disrespectful of Sami cultures and traditions. They were encouraged by their own parents to accept the ways of living of the majority (Seitamo, 1991) and may have abandoned old traditions also when it comes to child-rearing. Internal self-regulation may also have lost its social significance along with the loosening of social order in the Sami community, a change that usually is involved in the transition from a *Gemeinschaft* toward a *Gesellschaft*. However, ethnic differences in parental attitudes and practices were not measured in this study but were used as a theoretical influencing factor. One must be careful when drawing conclusions from data like this.

The last research question of this study concerned the association of verbal ability and processing tendencies and emotion regulation. It was predicted that, independent of the cultural background, efficient emotion regulation would be related to high verbal ability and a balance between the tendencies to simultaneous and successive processing. Additionally, a strong tendency to simultaneous processing was thought to result in lower emotion regulation ability. General verbal ability was found to be related to high internal regulation ability as rated by fathers, but, against the hypothesis, not to other aspects of emotion regulation. The two latter hypotheses were also discredited.

The vagueness of the association between the verbal measures and emotion regulation partly contrasts previous research that has established a relationship between verbal ability and emotional

competence. It is tempting to call into question the presumption that emotion regulation development is that dependent on language ability. Leerkes, Paradise, O'Brien, Calkins, and Lange (2008) make a distinction between *understanding* and *regulation* of emotions, and found that the former was related to early indicators of academic success whereas the latter was conversely related to behavior problems. Hughes and colleagues (2000) provide support for this view and claim that disruptive behavior is more likely a cause of regulative dysfunction than of a failure to understand emotional situations. The studies establishing the link between verbal and emotional ability have mostly used emotion understanding as the dependent variable (Denham & al., 1994; Schultz, Izard, Ackermann, & Youngstrom, 2001). Emotion understanding as compared to emotion regulation ability may involve more semantic knowledge acquired through the medium of language. Emotion regulation, in turn, involves essentially a behavioral component, which suggests that emotion regulation skills are often learned by modeling others. According to Greenfield's and Keller's model, what promotes early emotion regulation are actually *nonverbal* child-rearing practices, such as body contact and interactional warmth. The importance of implicit learning of self-regulation is implicated by the fact that although emotion regulation has traditionally been of high importance for Sami people, their language includes few words for emotions, and instead of talking about their emotional problems they express them through somatic complaints (Kvernmo, 1998). Thus, the children's emotional development has hardly been supported by extensive feeling talk but through more indirect means.

Contrary to expectations, neither children with balanced skills in the two processing nor children with a strong tendency to simultaneous processing displayed a specifically good or poor emotion regulation ability. The first results cannot, however, be considered reliable since the sample did not include enough children with a remarkable difference between simultaneous and successive processing levels. A bigger sample would be needed to enlighten this association. Furthermore, the association between fluent executive functioning and emotion regulation ability might be more evident in older children or adolescents, as the executive functions are a late-maturing set of constructs (Anderson, Northam, Hendy, & Wrennal, 2001).

The second result is somewhat surprising. Riding (2001; Riding & Craig, 1998) has proposed that the wholist tendency ought more easily relate to problems of self-regulation, whereas Gross (2005) concluded that a tendency to global syntheses facilitates social functioning. Neither of the propositions was supported in that the simultaneous tendency did not relate to emotion regulation. Instead, successive processing did relate to intrinsic emotion regulation, but in an unexpected manner. Children

performing well on Digit Span received the lowest emotion regulation ratings from their mothers, and those performing well on Phonological Processing received the highest ratings from their fathers. According to Riding (2001), extreme analysts tend to be characterized as shy and socially isolated, which may be a sign of overinhibition. Overinhibited behavior is generally manifested as subdued or nonexistent emotional displays that could be interpreted by adults as good emotion regulation. However, the question rises, why do mothers and fathers rate the children's emotion regulation ability so differently. In the current study maternal and paternal ratings were not correlated. In an earlier study (Rydell, Berlin, & Bohlin, 2003), a rater effect only occurred for regulation of exuberance as children received higher scores from their fathers than from their mothers. Investigating the differences between maternal and paternal attitudes to child emotion regulation extends beyond the scope of this piece of research, but an important lesson is that parental ratings may need to be analysed separately.

Some limitations of the study should be noted concerning the sample and the applied methods. The northernmost areas of Finland and Norway are sparsely inhabited, which caused trouble in recruiting subjects. In Norway the number of active families was alarmingly low and the sample may not be representative. The exclusion of children with learning disabilities or mental retardation lowered the entry rate in Norway, but not in Finland, because in Norway children with special needs are included in general education classes. In Finland they usually attend segregated special education. The low participation activity of Sami families in the area may relate to two explanations. First, families with two Sami parents are rare even in the Sami core areas. These few families are often invited to scientific studies and may suffer from research fatigue. Second, sharing information related to psychiatric well-being with persons outside family is uncommon among the Sami. Thus, psychological research may not feel tempting to them. It might also be that the Sami would more easily be activated through direct, personal contact with the family than by an information letter laborious to read up on.

In the study were included only those Sami children who spoke fluent Finnish or Norwegian. The languages are commonly spoken by the Sami and are mostly used in school classes. However, nearly half of the Sami still do report Sami as their first language (Aikio-Puoskari & Pentikäinen, 2001). Given that the study involved verbal cognitive measures, it might have been reasonable to control for the language the children speak at home to confirm how familiar they are with Finnish and Norwegian.

The verbal subtests used in this study may not be pure measures of simultaneous or successive processing. Applying methods more directly meant for this purpose, such as the PASS assessment system (Das, Naglieri, & Kirby, 1994) might yield more reliable results. Finally, using parental reports

to measure emotion regulation ability leads to certain problems. In this study, maternal and paternal ratings were not correlated, and thus we cannot be sure of what is measured. Parental reports do not objectively reflect children's behavior, but depict the parents' subjective experiences of emotion-arousing situations with the child. Parent estimates may differ greatly from the children's actual behavior (Bodnar, Prahme, Cutting, Denckla, & Mahone, 2007; Lieberman, Giesbrecht, & Müller, 2007). The same attitudes that influence parenting behavior direct the parent's expectations and ratings of child behavior. Sami parents may be more strict in their evaluations of the child's self-regulation capacity and may not easily consider the child's efforts as successful. When investigating the relation of parental attitudes and child emotion regulation, measures based on external observations might be more reliable.

The current study contributes to the understanding of cultural influences on child cognitive and emotional development. The subjects represent a culturally interesting indigenous group, whereby it was possible to test Greenfield's model of cultural change and child development. The model received partial support in that the specific features of Sami children's psychological development detected decades ago have by now diminished or disappeared. The transition from traditional subsistence economy toward the modern Western lifestyle has changed the Sami children's learning environments, which in turn has modified the children's cognitive and socioemotional developmental pathways. In addition to taking a cultural approach, the study addressed the interplay of cognitive processing and emotion regulation from a perspective not reported before. Although the implications produced by this data remained scarce, the comprehensive point of view and simultaneous measurements of the cognitive and emotional domains represent the direction for future child developmental research.

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APPENDIX

The emotion regulation items

adapted from the Emotion Questionnaire (Rydell, Berlin, & Bohlin, 2003)

Sadness

My child becomes sad.

A toy is lost or broken.

My child has fallen and hurt him/herself.

ER: It is easy for others, for instance a parent, to make him/her feel better (e.g., by comforting, distracting or talking things through).

IR: He/she has difficulties finding something to make him/herself feel better.-R

Anger

My child becomes angry.

My child is forbidden to do something he/she wants to do.

My child gets into a conflict with a peer.

ER: It is easy for others, for instance a parent, to calm him/her down.

IR: He/she has difficulties calming down on his/her own.-R

Exuberance

My child gets happy and excited.

My child wins a game or a contest.

My child is playing a game that he/she enjoys very much.

ER: It is easy for others, for instance a parent, to make him/her quiet down.

IR: He/she has difficulties quieting down on his/her own.-R

Fear

My child gets frightened and worried.

My child sees or hears something scary.

My child becomes scared of the dark.

ER: It is easy for others, for instance a parent, to make him/her calm down.

IR: He/she has difficulties making him/herself calm down.-R

Guilt

My child feels guilty.

My child is caught doing something that is forbidden.

My child has hurt another child's feelings with his/her behavior (e.g., by calling names or pushing the child).

ER: It is easy for others, for instance a parent, to make him/her feel better (e.g., by comforting, distracting or talking things through).

IR: He/she has difficulties finding something to make him/herself feel better.-R

Shame

My child is ashamed.

My child is being scolded in front of others.

My child accidentally spills over a full glass of water (e.g., on a visit or in a restaurant).

ER: It is easy for others, for instance a parent, to make him/her feel better.

IR: He/she has difficulties finding something to make him/herself feel better.-R

ER = external regulation item, IR = internal regulation item, R = item is reversed in scoring.