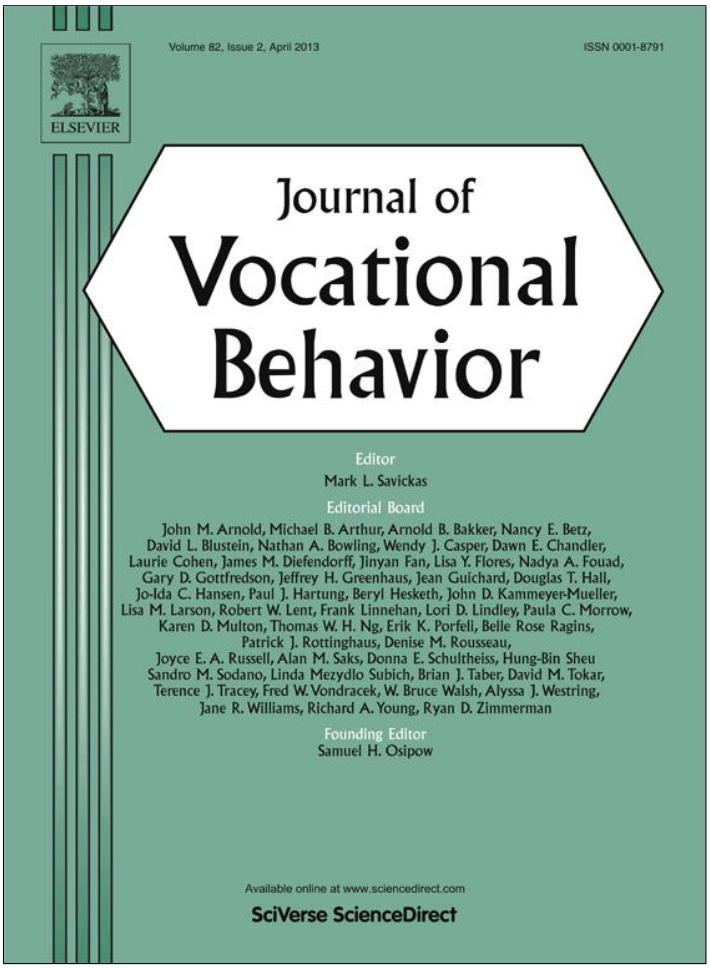

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Development of indigenous basic interest scales: Re-structuring the Icelandic interest space ☆

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ABSTRACT

The present investigation used an emic approach to develop a set of Icelandic indigenous basic interest scales. An indigenous item pool that is representative of the Icelandic labor market was administered to three samples ($N = 1043$, 1368, and 2218) of upper secondary and higher education students in two studies. A series of item level cluster and factor analyses combined with scale construction techniques was used to develop unidimensional basic interest scales. These analyses yielded 28 basic interests scales in the upper secondary education samples and 35 basic interest scales in the university sample. The 35 indigenous interest scales or I-BIS are close to a complete description of the vocational interest domain in Iceland. About one-fourth of the 35 I-BISs were culturally specific to Iceland with the majority of Icelandic scales similar to the US Strong Interest Inventory Basic Interest scales (Donnay, Morris, Schaubhut, & Thompson, 2005) and Basic Interest Markers (Liao, Armstrong, & Rounds, 2008). Several interest categories found in the US inventories did not emerge in the Icelandic data: religious, military, and family activities. Multidimensional scaling (MDS) and cluster analysis were applied to the intercorrelation of the 35 I-BIS in the university student sample. The results from the MDS yielded four dimensions that were not interpretable. The cluster results indicate that a hierarchical model of eight general interest clusters and facets measured by the 35 I-BIS best describes the vocational interest landscape in Iceland. The hierarchical model is a comprehensive representation of interests in Icelandic culture and can be used as benchmark in future research of commonalities and differences across cultures. This study has implications for emic and etic approaches in vocational interest research and can a serve as a prototype for the development of indigenous measures and models for use in career counseling.

1. Introduction

International studies of vocational interests have typically used models and measures developed in the US (e.g., Long & Tracey, 2006; Nagy, Trautwein, & Lüdtke, 2010; Rounds & Tracey, 1996). These etic approaches obscure the possibility of detecting culture specific constructs (Ægisdóttir, Gerstein, Leung, Kwong-Liem, & Lonner, 2009; van de Vijver & Leung, 1997). The present study follows the pioneering emic-research (Primavera et al., 2010) on the structure of interests in Filipino adolescents. Primavera et al. (2010) had participants indicate their interests in 303 culturally relevant occupational titles and 93 major fields of study. Item level analyses yielded culturally specific factors of Unskilled/Semiskilled Labor, Male-dominated, Engineering/Technology, Science, Medical, Arts, Commerce, Government/Law, and Education. The present investigation also uses an emic approach focusing on indigenous vocationally-relevant items to investigate the kinds of interests in Iceland.

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A critical step in developing an emic approach for vocational-interest research is the identification of work tasks and occupations that reflect the country's domain of vocational interests (Einarsdóttir, Rounds, & Su, 2010; Primavera et al., 2010). The development of a set of Icelandic indigenous basic interest scales, using an item pool that is representative of the Icelandic labor market is reported. We also used these indigenous scales to examine the structure of vocational interests in Iceland. The emic method of test adaptation presented here has the added advantage of not assuming cross-cultural construct equivalence (van de Vijver & Poortinga, 2005) and can provide an independent comparison of basic interest categories previously identified in the US. Indigenous basic interests can also be used to lay the groundwork for the development of a culture specific and ecologically valid vocational interest models and measures for career counseling and research.

2. Indigenous items and basic interests

How do researchers develop an indigenous item pool to reflect the domain of vocational interests? How is the vocational interest domain defined? In the present study, we used a similar analysis for identifying and selecting interest items that is used in cross cultural research on personality traits (Primavera et al., 2010; Saucier, 2003). Personality trait research has been guided by the lexical hypothesis that the most important individual differences are encoded in language (Goldberg, 1993). The coverage of the personality trait domain is then achieved through selecting trait-descriptive adjectives from a dictionary and developing items from these descriptors.

In the case of vocational interests, interest scale development has used a variety of item domains. Strong (1943) and revisions of the Strong Interest Inventory (e.g., Donnay et al., 2005), have used items from content domains such as occupational titles, school subjects, activities (work and leisure), types of people, and personal characteristics. Stewart, Ronning, & Stellwagen (1965) demonstrated that items from 11 different content domains (e.g., characteristics preferred in jobs, how to spend a day of free time, and nonfiction books one might choose for a review) yielded homogeneous interest scales supporting the traditional practice of combining items dealing with rather disparate content. By far the most common way of defining the vocational interest domain is through occupations and work activities that are generated from occupations (Rounds, 1995). In the present paper we assume that all significant individual differences in vocational interests are embodied in occupations and the occupational work tasks. The coverage of the vocational interest domain is achieved through selecting occupations and work tasks from occupational classifications that are representative of the variety of employment opportunities in the country. For cross-cultural and cross-nation comparison, it is important to have a common interest domain for comparison. We used both work activities from occupational descriptions (Óskarsdóttir, 1990, 1996, 2001) and occupational titles from the Icelandic job market classification (Statistics Iceland, 1994) to capture the vocational interest domain in Iceland.

Basic interests group together work tasks based on a shared, context, setting, object of interests and processes that are common to many specific occupations (Day & Rounds, 1997). They contain items that are similar in content (homogenous), are easily interpretable, meaningful and communicable in counseling (Borgen, 1999). Basic interests have an advantage over broad, general interest categories (e.g., RIASEC categories) in cross-culture research because they provide flexibility and a level of specificity in the categorization of vocational interests that can capture interest constructs that are both context bound and common in different cultures and countries (Armstrong, Smith, Donnay, & Rounds, 2004). Because basic interests are homogenous, they can be more accurately compared across cultures than general interest categories that are multi-dimensional and heterogeneous in content. Basic interests have been shown to be better predictors of educational and occupational membership than general interest categories (Donnay & Borgen, 1996) and provide an excellent foundation to develop general interest categories and organize occupations (Armstrong et al., 2004; Jackson, 1977; Rounds, 1995). In the US, vocational interest researchers have identified basic interest dimensions through the use of cluster (Campbell, Borgen, Eastes, Johansson, & Peterson, 1968; Liao et al., 2008) and factor analysis (Rounds & Dawis, 1979). In the present study we used hierarchical cluster analysis allowing flexibility to identify basic interest categories.

We next describe the social context, job market and educational opportunities and transitions to understand the kinds of interest categories that may be identified among Icelandic youth.

3. Icelandic context for interest assessment

Iceland is a European country with 300 thousand inhabitants who endorse common western values and assumptions (Ólafsson, 2003). As is common in the feminine cultures (Hofstede, 1998) of social democratic and equalitarian Nordic welfare states (Ólafsson, 1999), active equal-opportunity policies are implemented to eliminate economic barriers for making educational and vocational choices. The whole education system is almost exclusively public with open access and free of charge. In Iceland the level of economic development is advanced, employment participation is general, and until recently unemployment rate has been low (Organization for Economic Cooperation and Development, 2011).

Icelandic youth face two to three major educational transitions and choice periods creating often a need for assistance with career choice. The first transition is at the end of compulsory education (10th grade) at the age of 15–16. The organization of the upper-secondary education system and the choices facing students reflects Icelandic values and opportunity structure that probably influence the development of interest categories. The upper secondary education system offers four years of academic education to be eligible to attend universities in four different tracks: natural sciences, languages/humanities, social sciences, and business/economics. For the vocational track, 80 programs of two-four year degrees are offered (e.g. car mechanics, carpentry, hair dressing, cook, waiter, school attendant, navigation, electronics, see Blöndal, Jónasson, & Tannhäuser, 2011). In principle, both students graduating from four-year academic and vocational tracks are eligible to enter Universities. However, traditionally students from academic tracks comprise the majority of students entering higher education. Approximately 95% of each cohort begins upper secondary education (Statistics Iceland, 2010).

The second major transition occurs with the completion of a upper secondary education (Ice: stúdentspróf) most often around age 20. At this time graduates become eligible to apply to Universities for a three-year undergraduate degree (B.A., B.Ed., and B.S.). The clear differentiation between vocational and academic education and the definition of different educational tracks offered in the upper-secondary schools system are likely to influence the development of vocational interest categories. We, therefore, expect to see interest categories that reflect these educational opportunities. Accordingly, categories of interests that involve the areas of natural sciences (e.g., physics, geology, and biology), humanities/languages (e.g., foreign and domestic languages, history, and literature), social sciences (e.g. psychology, sociology), and business/economics are expected to emerge in the present investigation. These interest categories should largely mirror basic interest categories found in the US (Liao et al., 2008). We also expect to see a clear differentiation between different types of skilled work that will mirror the opportunities in the upper secondary education system. For example, interest categories related to skilled work in fishing and sailing (e.g., navigation, mechanics), construction (e.g., carpentry, electricians) and catering and services (e.g., chef, waiter) are expected to emerge.

The students who enter higher education face their third major transition after finishing their undergraduate degree. Students either enroll in postgraduate education, or enter the labor market. The labor market in Iceland is firmly founded in fishing and farming but has become increasingly industrialized due to the rich energy resources available (hydraulic, geothermal; see Ministry for Foreign Affairs, n.d.). Today, the basic production sectors employ around 5% of workers and industry 22%. We predict that interests categories for example related to fishing and farming and other nature-related jobs will emerge. Since the early nineties there has been a transition towards free market economy characterized by privatization and increased international trade (Ólafsson, 2008). Therefore, Iceland has a smaller proportion of employers who work in wholesale and trade compared to the US (Statistics Iceland, 2011a; U.S. Department of Labor, 2009). It is possible that fewer basic interests related to business and administration will be identified due to less developed private enterprise sector.

Another important characteristic of Icelandic labor market is the large public sector, employing about 28% of the workforce (Nordic Council of Ministers, 2010). Women tend to be concentrated in the public sector, participating in activities in education, health and welfare services (Statistics Iceland, 2011a). Men are overrepresented in engineering, physics, computer sciences, and math; additionally men comprise majority of graduates from vocational education (Statistics Iceland, 2010). In sum, Iceland is in many ways a typical industrialized economy with an extensive and growing service sector (73%) but due to history, ecology and cultural influences has a unique constellation of occupations in the job market. In general, we expect that the interest categories identified will reflect the Icelandic job sectors that are common to other western countries, and reflect the opportunities offered in education and the structure of the labor market specific to Iceland.

4. The present investigation

Two studies are reported that use representative indigenous item pools to develop Icelandic basic interest scales. In Study 1 basic interest scales were developed in two upper-secondary student samples. We selected the upper-secondary school students (ages 16–20 + years) because they have made their first major choice and are diverse in terms of their educational choices (both vocational and academic). In Study 2, we extended the kinds of basic interest scales to cover a larger number of choices available for university students. Additional items were written and a third sample consisting of university students was collected. Analyses were also conducted to identify an Icelandic structure of vocational interests.

5. Study 1

In Study 1 work activities and occupational title items were administered to upper secondary students to identify basic interest categories among students with diverse interests. This is possible given the high proportion of each cohort attending upper secondary schools in Iceland.

5.1. Method

5.1.1. Participants

We used two samples of upper, secondary school student. *Sample 1* consists of 1043 (560 females and 483 males) upper secondary education students with a mean age of 18.7 ($SD = 4.1$) and was used to identify preliminary indigenous basic interest categories. *Sample 2* consists of 1368, (699 females and 669 males) upper secondary education students with a mean age 17.9 ($SD = 3.5$). Sample 2 was used to cross-validate and refine the basic interest scales based on the categories identified in sample 1.

Both samples are representative of the Icelandic upper-secondary, education student population. The distribution of students across gender, upper secondary majors, and between rural and urban areas mirrors the distribution in the population with a few exceptions. Students in two of the main traditional academic tracks (natural sciences, and business) tend to be overrepresented (38.5% in sample 1 compared to 26% in the population), industrial skilled trade and technical education students are underrepresented (10% compared to 16.8% in the population) in both samples (Statistics Iceland, 2011b).

5.1.2. Indigenous interest item pools I and II

To create an item pool that is representative of the Icelandic labor market, we used the Icelandic job market classification (Statistics Iceland, 1994). The classification contains approximately 1800 occupational titles categorized at different levels of generality and specificity; 10 major groups, 28 departments, 114 clusters, and 380 occupational categories. The first aim was to select occupations from

all 114 clusters (e.g. CEO's and managers, retail and sales jobs, unskilled jobs in fishing and fish harvesting) and as many as the 380 categories as possible. Another aim was to choose occupations that cover 80–90% of the labor force. The Bureau of Statistics does not have this information but we did contact unions to get a ball park estimate of how many people work in different occupations. We then created an item pool that covered approximately 80% of the labor force.

We used a combination of occupational titles and work tasks. The work tasks came from 278 occupational descriptions that had been published in Iceland to use in career counseling (Óskarsdóttir, 1990, 1996, 2001) and descriptions from companies and institutions. The indigenous item pool administered to sample 1 consisted of 133 work tasks (e.g. guide children in leisure activities; shell and clean shrimp; write a computer program, collecting hay) and 125 occupational titles (e.g. mechanical engineer, preschool teacher, sailor) for a total of 258 items. Participants were asked to indicate their interests in terms of likes and dislikes on a 5-point scale (1 = dislike very much to 5 = like very much with a neutral option in the middle). In Icelandic they are labeled: 1 = líkar mjög illa, 2 = líkar frekar illa, 3 = hlutlaus, 4 = líkar frekar vel, and 5 = líkar mjög vel). We refer to this item pool as *interest item pool I*.

A modified 243 item pool consisting of 143 work tasks and 100 occupational titles was administered to sample 2. Items were based on the results of the analysis on the responses to the interest item pool I. Item selection is more fully explained in the results section. Approximately, two-thirds of the items were common to both item pools. We refer to this item pool as *interest item pool II*.

5.1.3. Procedure

Efforts were made in the choice of sample 1 to ensure participation from all the educational majors in the Icelandic upper secondary school system. Eleven out of 30 upper secondary schools in the country participated. The major aim for sample 2 was to closely represent the upper secondary school population. Twenty-two out of then 31 upper secondary schools participated in the project. In the participating upper secondary schools, career counselors selected classes of students and provided instruction for using the web based interest inventory. Participants and parents of students younger than 18 years old where informed about the study and the students signed a informed consent form. Very few students, and no parents, declined participation, resulting in about 99% response rate. The study was approved by the Icelandic Data Protection Authority.

5.2. Results

Because the major aim was to create indigenous scales that reflect the full range of Icelandic occupations, explorative data reduction methods were emphasized. We checked the distributions of the items. All the response options were being used in all items and none of the items was judged unusable due to skewness. The development of basic interest scales began with a complete-linkage cluster analysis. The computational simplicity and resulting hierarchical representation (Bartholomew, Steele, Moustaki, & Galbraith, 2002) is useful in identifying possibly meaningful interest clusters at different levels of specificity. Factor analysis was then applied to evaluate the unidimensionality of the item clusters.

Complete-linkage method was applied to the correlation matrix of the 258 interest items, based on the responses from sample 1. Complete linkage is a common method used for agglomerative hierarchical clustering and was chosen because it produces compact and tightly grouped clusters and has been successfully applied to vocational interest data (Armstrong et al., 2004; Liao et al., 2008). The clustering was done on the occupational and work task items both separately and jointly. The two types of items formed meaningful and more comprehensive clusters when analyzed together.

Starting with a broad set of parameters of distances ranging from .4-.6 in the cluster hierarchy, we based our further analysis on 21 identifiable categories containing from 5 to 25 items each. Items in each interest category were then factor analyzed using principal axis factoring to test if the items formed a unidimensional scale (Clark & Watson, 1995). If two or more conceptually meaningful factors were identified in the cluster, the items were split into separate scales to mirror the factors. For instance, a large cluster comprised of skilled work was separated into Electronics and Construction scale versus Mechanics and Operations scale based on several factor analyses. This first set of cluster and factor analysis resulted in 23 unidimensional basic interest scales given tentative names such as: Social Sciences, Property Management, Teaching, Public Administration, Visual Arts, Fashion and Design.

Several clusters emerged that did not contain a sufficient number of items to form a scale with acceptable psychometric qualities (e. g. cluster with items related to language and writing). Therefore, new items were written that share a similar content as identified in these preliminary clusters (e.g. teach foreign languages and write poems). Additional items were also written to improve the psychometric qualities of several of the tentative 23 BI scales. A total of 42 new items were written and 57 items that were considered redundant or had a factor loading below .10 on the respective basic interest scale were eliminated from the item pool. This resulted in 243 interest items (interest item pool II) that was then administered to sample 2.

The 23 basic interest scales and the scales based on preliminary clusters were refined using the responses from sample 2. The dimensionality of each scale or clusters previously identified, was reanalyzed with new items added, using principal axis factor analysis. Several of the scales were found to contain more than one factor. The category named finances contained a separate set of items related to sales that were then used to create a Sales scale. The Natural Science scale was also split into two, Physical and Health/Life Sciences. Engineering and technicians items were also more clearly identified in the responses of sample 2 as a separate scale. Two unidimensional scales; Creative Writing and Mathematics, with acceptable psychometric qualities emerged. This resulted in the development of 28 indigenous basic interest scales (I-BIS) listed in Table 1. To finalize the scales, items were deleted if they had lower loading on the first factor compared to the second factor. The intercorrelation of the items was also calculated and items that showed correlation below .25 and above .65 with other items were eliminated from the scale (Clark & Watson, 1995). Item selection also emphasized the conceptual coverage of each scale by deleting items with high correlations and redundant meaning (e.g., realtor, showing and selling real estate) but we retained items that referred to similar tasks in different sectors of the job market. As shown in

Table 1, Cronbach Alpha reliability estimates for the basic interest scales are in the .80 and low .90 range. The mean inter-item correlations range from .40 to .62 and the first factor explains from 47.5% to 67.1% of the variance across the scales.

6. Study 2

The purpose of Study 2 is to cross-validate and further develop the basic interest categories and scales from Study 1 with items that more extensively represent the Icelandic labor market. We used a sample of university students (age 20–30+) to evaluate whether the interest categories developed on the secondary students would generalize to older students facing different developmental issues and transitions. A second purpose was to develop an indigenous vocational interest structure using the resulting Icelandic Basic Interest Scales.

6.1. Method

6.1.1. Participants

The sample consists of 2218 undergraduate and graduate students; 1621 females (73%) and 597 males (27%) from six universities. Mean age was 28.7 years ($SD = 8.2$). The participants are representative of the Icelandic undergraduate and graduate student population. Most notably, the students came from all eight categories of major fields of studies offered in the Icelandic higher education system. There is a small underrepresentation of students from the humanities and arts in the sample (10.5% compared to 13.6% in the population) and overrepresentation in engineering, production and construction (12.6% compared to 9.2% in the population) (Statistics Iceland, 2009a).

6.1.2. Indigenous interest item pool III

The university students responded to an item pool that consisted of *all* the initial items (from item pool I and II) administered to both upper secondary samples in Study 1. We added 47 new work tasks and occupational titles to cover additional aspects of the labor market and updated the item pool based on a new job classification that was in progress (Statistics Iceland, 2009b). Majority of the items that were added were from categories that do not require formal education (e.g. stock shelves in supermarket; design and knit sweaters; and road construction worker); these items may have been somewhat underrepresented in Study 1. New occupations and activities especially related to law, management, and finance were added (e.g., advise companies regarding legal matters, evaluate job satisfaction among workers, bank manager) since these fields had recently expanded in the private and financial sector in Iceland. The final item pool consisted of 190 work activities and 155 occupational title items, a total of 345 items, representing approximately 90% of the job market.

Table 1
Names and descriptive statistics for the 28 basic interests scales in the cross-validation upper secondary school sample.

	N items	*M*	*(SD)*	α	*M inter-item r*	*VAF*
Business	7	3.09	(.95)	.87	.48	55.5
Computers	9	2.83	(1.03)	.94	.62	67.1
Counseling and Therapy	8	2.96	(.91)	.86	.43	51.7
Creative Writing	7	2.82	(.99)	.87	.49	57.1
Driving and Mechanics	12	2.19	(.87)	.92	.49	53.9
Electrics and Construction	11	2.19	(.91)	.93	.54	58.2
Engineering and Technology	9	2.40	(.84)	.85	.40	47.5
Farming	6	2.38	(.98)	.86	.51	59.3
Fashion and Design	7	2.68	(1.03)	.89	.52	59.4
Finances	10	2.22	(.86)	.91	.52	56.7
Fishing	11	1.86	(.80)	.92	.51	56.4
Health and Life Sciences	9	2.70	(.91)	.87	.42	49.8
Humanities	9	2.52	(.88)	.86	.41	47.9
Mathematics	6	2.11	(.92)	.88	.55	63.3
Media	10	2.94	(.88)	.88	.43	48.6
Medical Services	13	2.59	(.88)	.91	.45	49.6
Physical Sciences	8	2.41	(.96)	.90	.53	59.2
Office Work	7	2.20	(.78)	.84	.43	51.2
Performing Arts	6	3.12	(1.09)	.87	.52	60.3
Property Management	4	2.40	(.90)	.82	.53	64.5
Protective	9	2.73	(.86)	.86	.41	47.8
Public Administration	9	2.55	(.91)	.89	.47	55.5
Retail and Services	9	2.61	(.84)	.87	.43	49.3
Sales	8	2.42	(.82)	.84	.40	48.2
Social Sciences	8	2.70	(.91)	.87	.45	52.0
Sports and Health	6	2.84	(1.06)	.88	.54	61.9
Teaching	9	2.84	(.95)	.90	.50	55.5
Visual Arts	11	3.04	(.92)	.90	.45	50.7

Note: The VAF is variance accounted for by first factor in a principal axis factoring of the final set of items in the scale.

6.1.3. Procedure

All the students, in six out of seven existing universities in Iceland, were sent an e-mail with a link to the inventory and asked to respond to the interest items and sign an informed consent.

6.2. Results

6.2.1. Replication and extension: I-BIS

A complete-linkage cluster analysis was applied to the inter-item correlations to test if the basic categories identified in Study 1 would replicate in a better educated, older, university sample. We also expected to identify new interest categories in the extended item pool. Based on the cluster analysis, 32 basic interest clusters were identified. To test for unidimensionality (Clark & Watson, 1995), the inter-correlations of the items belonging to each preliminary scale were subjected to principal-axis factor analysis. As a result of the factor analysis, three additional scales were identified (see below). Finally, the inter-item correlations within each of these 35 scales were inspected. As a general rule we deleted items with small (less than .25) or large correlation (greater than .65) with other items. If the number of items in scale were small we did retain items that did not fall within those cut-offs based on conceptual considerations (e.g. coverage, lack of redundancy). Table 2 reports scale development statistics and the labels for 35 indigenous basic interest scales. The internal consistency estimates (Cronbach alpha) range from .80 to .94. The mean inter-item correlations range from .40 to .50 for the majority of the scales, an acceptable range for narrow-band constructs (Clark & Watson, 1995). Across the scales the first factor explains from 46.9% to 75.9% of the variance, indicating that most of the scales are unidimensional.

The 35 I-BIS scales created using the extended item pool and responses of University students largely replicated the scales developed in the upper secondary samples. Twenty-two of the resulting scales are very similar. Four scales are similar but are not completely identical. For example, the Social Science scale in the younger sample includes educational science items also in the university sample and is hence named Social and Educational Sciences. Electrical and mechanical items form a scale together but the electrical items belonged to the Construction scale in the upper secondary sample. The somewhat heterogeneous Public Administration scale identified in the upper secondary samples splits into three separate more homogenous scales: Human Relation Management (HRM), Politics, and Law. Most notably, new scales emerge in the fields that require skilled and semi-skilled workers. For example, the items related to fishing form now two scales one reflecting interest in work taking place on sea, catching fish and exporting, and the other includes tasks related

Table 2
Psychometric properties of the 35 indigenous Icelandic basic interest scales developed in the university student sample.

Scale name	*N* items	*M*	(*SD*)	α	*M inter-item r*	*VAF*
Arts and Crafts	8	2.45	(1.05)	.91	.56	61.9
Business	8	3.08	(1.01)	.89	.51	57.6
Carpentry and Maintenance	9	2.08	(.82)	.88	.45	51.2
Computers	9	2.38	(1.02)	.92	.56	60.7
Construction	10	1.67	(.76)	.94	.60	63.6
Counseling and Therapy	9	2.83	(.97)	.90	.49	54.7
Creative Writing	5	2.76	(1.22)	.92	.70	75.9
Driving and Operations	7	1.53	(.66)	.89	.53	59.9
Electrics and Mechanics	8	1.79	(.82)	.91	.57	61.9
Engineering	9	2.14	(.90)	.90	.50	54.8
Farming and Husbandry	9	2.32	(.99)	.91	.52	57.8
Finances	9	2.43	(1.08)	.94	.62	65.9
Fishing	9	1.69	(.75)	.91	.53	58.3
Fish Processing	6	1.58	(.68)	.86	.51	59.4
Humanities	9	2.58	(.94)	.87	.44	50.2
Human Relation Management	8	3.02	(1.06)	.92	.59	64.5
Law	5	2.41	(1.22)	.93	.73	78.6
Life Sciences	7	2.47	(.98)	.87	.49	56.3
Manual Services	10	1.55	(.59)	.89	.45	50.2
Mathematics	6	2.39	(1.07)	.90	.60	67.2
Media	10	2.62	(.97)	.91	.49	54.7
Medical Services	13	2.46	(.92)	.92	.46	49.9
Physical Science	8	2.41	(.98)	.90	.52	57.7
Office Work	9	2.01	(.80)	.89	.47	52.8
Performing Arts	5	2.73	(1.05)	.80	.44	55.4
Personal Services	8	2.19	(.82)	.85	.42	49.5
Politics	6	2.72	(1.08)	.89	.58	65.5
Protective and Rescue	10	2.20	(.81)	.87	.41	46.9
Sales	8	1.90	(.72)	.85	.42	49.7
Retail and Services	8	1.95	(.76)	.86	.43	50.2
Social Educ. Sciences	10	2.90	(.92)	.89	.44	50.2
Stocks and Delivery	6	1.90	(.80)	.85	.49	58.1
Sports and Health	6	2.38	(1.04)	.90	.59	66.2
Teaching	8	2.72	(1.00)	.91	.55	60.4
Visual Arts	12	2.78	(.98)	.92	.49	53.1

Note: The VAF is variance accounted for by first factor in a principal axis factoring of the final set of items in the scale.

to processing and preparation of fish for export. The scale called Property Management did not hold up in the university sample but instead a cluster formed reflecting interest in carpentry and maintenance of property. Three new scales: Stocks and Delivery, Personal Services, and Manual Services were constructed probably due to addition of items reflecting work tasks and occupations that do not require formal education.

6.2.2. Comparison to US basic interest categories

The emic approach applied in this study provides an independent development of basic interest categories in Iceland. Are the Icelandic categories and scales similar to US basic interest categories? The answer is important for the continued examination of the etic–emic study of vocational interests.

In the US the best established set of basic interest categories and scales for comparison purposes can be found in the Strong Interest Inventory (US BIS; Donnay et al., 2005) and the recent public domain Basic Interest Markers (BIM; Liao et al., 2008). The comparison between I-BIS and US-BIS and BIM was made by two independent bilingual judges based on the meaning of the items in the scales and their names were detailed information on items was lacking. The raters agreed on the categorization in all but two cases where a discussion was needed to arrive at a consensus.

Several similarities and differences were identified (see Table 3). About quarter of the scales are specific to Iceland. Some of these culture specific scales reflect interests in occupational fields that are important in Iceland's economy, for example, Fishing, Humanities, and Arts and Crafts. The skilled trades break down into specific fields such as Electrics and Mechanics, Carpentry and Maintenance, Driving and Operations, reflecting fields that require specialized vocational education. Similar items indicating interest in diverse skilled trades are lumped into the US-BIM's Manual Labor scale and the Skilled Trades in the Strong. Occupations that do not require much education and most often belong to the service sector break down into five basic interest facets (e.g. Office Work, Personal Services, Retail and Services, , Sales, Stocks and Delivery) allowing for more fine grained analysis of interests of people seeking jobs in this extensive and recently growing sector.

Table 3
35 Indigenous Icelandic Basic Interest Scales, Strong basic interest scales and US basic interest markers.

I-BIS	*BIS-Strong*	*US BIM*
I-BIS same or similar as US BIS		
Business	Entrepreneurship	Business
Computers	Computer Hardware & Electronics Programming & Information Systems	Information technology
Construction	Mechanics & Construction	
Counseling and Therapy	Counseling & Helping	Social service
Creative Writing		Creative writing
Electrics and Mechanics	Mechanics & Construction	
Engineering		Engineering
Farming and Husbandry	Nature & Agriculture	Outdoor-agriculture
Finances	Finances & Investing	Finance
Human Relation Management	Human Resources & Training	Human relation
Management		
Law	Law	Law
Life Sciences	Medical Science	Life science
Manual Services		Manual labor
Mathematics	Mathematics	Mathematics
Medical Services	Healthcare service	Medical service
Media	Writing & Mass Communication	
Physical Science	Science	Physical science
Office Work	Office Management	Office work
Performing Arts	Performing Arts	Performing arts
Personal Services		Personal service
Politics	Politics and Public Speaking	Politics
Protective and Rescue	Protective Service	Protective
Sales	Sales	Sales
Social and Educational Sciences	Social sciences	Social science
Sports and Health	Athletics	Athletic coaching
Teaching	Teaching & education	Teaching
Visual Arts	Visual arts & Design	Creative arts
BIS and BIM specific in Iceland and US		
Arts and Crafts	Culinary Arts	Family activity
Carpentry and Maintenance	Management	Management
Driving and Operations	Marketing & Advertising	Religious activities
Fishing	Religion & Spirituality	Military
Fish Processing	Skilled Trades	Professional advising
Humanities	Taxes & accounting	Physical risk taking
Retail and Services	Technical Writing	
Stocks and Delivery		

Basic interest categories that have been identified in the US were also replicated. About three-fourths or 27 of the 35 Icelandic scales capture identical or very similar US categories such as Mathematics, Engineering and Natural Sciences, Teaching, Counseling and Therapy, and Medical services. Also the various artistic fields, such as Visual and Performing Arts, Creative Writing along with Computers and IT related activities are replicated in some form (see Table 3). Basic interest categories related to businesses; Sales, Finances and Office Work were identified and are very similar to existing US categories however, the US scales Marketing and Advertising, Management, Taxes and Accounting and Professional Advising were not identified as separate scales. A few other US-BIM's or BIS did not emerge in Iceland: Religious Activities, Family Activities, Technical Writing, Culinary Arts and Physical Risk-Taking (see Table 3).

6.2.3. Structure of indigenous basic interests

We used two approaches to investigate the structure of the I-BIS, multidimensional scaling (MDS) and hierarchical cluster analysis. We applied three-way MDS to the female and male inter-correlation matrices of the 35 I-BIS. It is important to evaluated gender differences because of the sex-segregated job market and educational choices. The four dimensional solution explained 90% of the variance. The dimensional weights for the four dimensions were very similar for women (.58 .53 .38 and .48) and men (.61 .61 .42 and .37), respectively, indicating that the structures for female and male students do not differ. The inspection of the group coordinates of the combined four-dimensional solution did not result in clear interpretation of the dimensions. As pointed out by Einarsdóttir et al. (2010), once a spatial model includes more than three dimensions, it becomes difficult to represent the model. A recent study has also challenged the popular view that vocational interests can be described with bipolar dimensions, possibly explaining why the Icelandic bipolar dimension were hard to interpret. After explicitly testing the assumption of bipolarity of interest response patterns, Tay, Su, and Rounds (2011) concluded that the presumption is unwarranted, questioning the use of spatial methods to understand interest structure.

Since MDS yielded uninterpretable dimensions, we applied hierarchical clustering (complete-linkage) method to the combined correlation matrix for the 35 I-BIS. Liao et al. (2008) was successful in developing a discrete structure using complete-linkage clustering with US Basic Interest Markers. Using the distance of 0.7 eight clusters were identified *business and administration*, *engineering and technology*, *life- and natural sciences*, *manual work*, *arts and humanities*, *teaching and social services*, *health service and protection* and finally *services*. We also examined cluster categories using the distance of 0.5 as a marker. This criterion yielded 16 more intermediate interest clusters or facets presented in Table 4.

Table 4
Summary of results from cluster analysis for 35 indigenous BIS scales.

8 clusters (0,7)	16 clusters (0,5)	I-BIS scale
Business and administration	Law and politics	Law
		Politics
	Human resource management	Human resource management
	Business and finances	Business
		Finance
Engineering and technology	Mathematics	Mathematics
	Engineering and technology	Computers
		Engineering
		Electrics and mechanics
Life/natural science	Life and natural science	Life and health sciences
		Natural sciences
Manual work	Production and outdoors	Fish processing
		Fishing
		Farming and husbandry
	Construction and operation	Carpentry and maintenance
		Construction
		Driving and operations
		Manual services
Arts and humanities	Applied arts	Arts and crafts
		visual arts
		performing arts
	Humanities	Media
		Creative writing
		Humanities
		Social and educational sciences
Teaching and social service	Social and educational sciences	Counseling and therapy
		Teaching
Health service and protection	Sports and health	Sports and health
	Medical services	Medical service
	Protective and rescue	Protective and rescue
Services	Sales	Sales
	Service and retail	Stocks and delivery
		Office work
		Personal services
		Retail and services

7. General discussion

We used an emic assembly approach to develop a set of 35 indigenous basic interest categories and scales in Iceland. With an item pool that is representative of Iceland's domain of work, the results indicate that about quarter of the scales reflect possible culture specific characteristics of the labor market and the education system. Majority of the scales are similar to known interest scales developed in the US, showing that basic interest categories can be independently replicated using indigenous items. Preliminary structural investigation using the 35 I-BIS indicate that a hierarchical model of eight broad categories and facets may best represent the structure of vocational interests in Iceland.

The specific scales in Iceland emerged, because they mirror the opportunities in the education system and labor market. It is notable that the skilled trade scales (e.g. Carpentry and Maintenance, Fishing, Driving and Operations) assess interests in especially male dominated fields that are very entrenched in vocational-education majors in the Icelandic upper-secondary education system. Humanities also emerged as separate scale in Iceland reflecting the emphasis on language in a small nation speaking its own obscure language but dependent on foreign languages to break its isolation. Literature and cultural studies are important where a rich history of epic sagas along with the language defines the cultural heritage (Jóhannsson, 1989).

The US interest categories that did not emerge in the present analyses do not seem to be relevant to Icelandic culture for several reasons. The military category was not identified since Iceland does not have an army and therefore no such items were generated for the indigenous item pool. Similarly, religious activities were not identified as an interest category since Iceland has a national Lutheran church with few religious occupations (Statistics Iceland, 2009b). In addition, religion does not usually play a large role in individual's life and in the society at large. Another example is family activities. Many of the traditional care-taking that is done within the bounds of family (e.g. tending to young children and the elderly) are taken care of by mostly women in the large public sector in the typical Nordic welfare context (Nordic Council of Ministers, 2010).

It is important to keep in mind when comparing the I-BIS to known US BIS that our approach is based on an item pool selected to represent the vocational domain in Iceland. Early interest scale development research focused on items that differentiate occupations (e.g. Strong, 1943). The development of BIS for the Strong was not based on items that were selected to reflect the interest domain. Factor analytic studies followed similar paths using existing item pools (e.g. Rounds & Dawis, 1979) possibly restricting the types of BIMs identified by Liao et al. (2008). Nevertheless, the comparison between Icelandic and US interest categories is important because it shows that many interest categories can be independently replicated using indigenous items, providing a more stringent test of cross-cultural applicability of the scales than traditional etic approaches.

When Icelandic students were asked to express their preferences for occupations and work tasks they seem to do so based on many factors such as social context, setting, object of interests, processes and possibly outcomes. As expected, contextual variables such as sex-type, prestige, and level of education seem to strongly influence the Icelanders responses (Deng, Armstrong, & Rounds, 2007; Einarsdóttir et al., 2010). For example, the three broad interest categories of *manual work*, *engineering and technology* along with *life and natural sciences* contain largely male sex-typed occupations and concern the physical world. *Manual work* involves operating on things but the other two interests involve analyzing and designing the physical world and also require higher education. Another example are the three broad clusters of *business and administration*, *teaching and social services*, and *services* which involve work with people but form, separate categories because they reflect interest in different kinds of involvement for various purposes such as persuading versus serving or helping (Armstrong et al., 2004). More importantly, these clusters may also be based on different contextual influences such as level of education required and public vs. private sector distinction.

The present general interest categories are based on items selected to reflect the labor market and can serve as comprehensive description of vocational interests in Iceland. Additionally the homogenous I-BIS form the foundation for a hierarchical model of general interests and their facets similar to the Big Five (Goldberg, 1993). The content of the general categories we identified bear some resemblance to Holland´s (1997) RIASEC types. *Business and administration* is almost identical to the Enterprising type and the *arts and humanities* are similar to the Artistic type. But other interest categories differ; the *services* cluster is a combination of the Social and Conventional types. There is also no clear counterpart to Holland's Realistic and Investigative types. Instead categories of *manual work*, *engineering and technology* and *life and natural sciences* emerged.

Liao et al. (2008) identified nine major interest categories in a hierarchical clustering of 31 US-BIM´s that only partly converge with the RIASEC types. The Icelandic categories also show a divergence from Liao et al. categories. Most notably only two of the general clusters resulting from the US-BIMs are very similar to the present Icelandic results: Categories that reflect interest in social services and teaching and life- and natural sciences. Primavera et al. (2010) identified nine broad interest categories in the Philippines. Comparison with the Primavera et al. results shows few interest categories convergence with the Icelandic categories, the closest counterpart are the engineering and technology, arts, and education and medical categories. Reviews of factor analytic research in the US (Hansen, 1984; Rounds, 1995) have not yielded a consensus of common interest factors. This renders the comparison of structures across cultures somewhat difficult because we lack benchmark categories.

The present investigation has limitations. The distributions for some of the items and I-BIS were skewed among university students, especially those items and scales that reflect interests in fields that do not require higher education (e.g. fishing, driving, manual services). These distributions can possibly influence the results of the data-reduction methods. The use of exploratory methods (cluster analysis) can also affect the number of and nature of interest categories. Therefore, we do not consider the 35 I-BIS as the final and completed versions of a set of Icelandic basic interests. However, the convergence in the results between the younger and older samples and the diversity of interest categories that were identified among skilled and semi-skilled jobs supports their generalizability across developmental stages. It is important to cross-validate the 35 I-BIS in a more diverse sample

of working adults and more extensively among upper-secondary students in Iceland. The hierarchical structure of interests as general clusters and facets also needs to be evaluated using confirmatory methods.

A hierarchical model of eight broad categories branching into facets at diverse levels of specificity, accurately and comprehensively reflects the interest structure in Iceland. An ecologically valid interest model representing interests at different levels of generality also can be valuable in counseling practice. Day and Rounds (1998) have argued that basic interests are best suited for use in counseling in the knowledge based economy where workers often may feel a lack of coherence in their self-managed careers (Savickas, 2005). The emic approach using basic interests opens up the possibility of developing more dynamic interest categories and models that can easily accommodate anticipated changes in the world of work.

The present investigation in Iceland and Primavera et al. (2010) study in Philippines have implications for international studies on vocational interests. These studies can serve as a prototype for the development of indigenous measures and models for use in career counseling. It shows that the importation of models may obscure the detection of interest constructs and structures that are possibly culture specific. The I-BISs have interest categories that may be common to different cultures and possibly universal and culturally specific constructs at the same time (Hesketh & Rounds, 1995). Most importantly, the use of an indigenous item pool and basic interest categories is a much more stringent test of the cross-cultural validity of interest models than the more common etic approach.

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