AC 2012-4678: ARE ENGINEERING STUDENTS CULTURALLY INTELLIGENT?: PRELIMINARY RESULTS FROM A MULTIPLE GROUP STUDY

Andrea Mazzurco, Purdue University
Prof. Brent K. Jesiek, Purdue University, West Lafayette

Brent K. Jesiek is Assistant Professor in the School of Engineering Education and School of Electrical and Computer Engineering at Purdue University in West Lafayette, Ind., USA. He is also an Associate Director of Purdue's Global Engineering Program, and leads the Global Engineering Education Collaboratory (GEEC) research group. He holds a B.S. in electrical engineering from Michigan Tech and M.S. and Ph.D. degrees in Science and Technology Studies (STS) from Virginia Tech. His research involves social, cultural, historical, and epistemological studies of global engineering, electrical and computer engineering, and engineering education research.

Ms. Kavitha D. Ramane, Purdue University

Are Engineering Students Culturally Intelligent?: Preliminary Results from a Multiple Group Study

Abstract

Engineers and other technical professionals are increasingly expected to work across cultural boundaries and national borders. This need will only intensify in coming years as demographic shifts make the U.S. ever more multicultural, and globalization trends encourage further economic and social interdependencies across disparate geographic regions. Given these trends, engineering educators are being challenged to provide engineering students with a variety of global and professional competencies needed for career mobility and success. At the same time, many reformers are looking beyond traditional bodies of knowledge and skill sets to ask what values, attitudes, and dispositions are important for future engineers. These kinds of "affective" characteristics comprise a key – and yet often overlooked – part of identity formation for many professionals, including engineers. This paper argues that such attributes are especially important for global engineers, who require high levels of cross-cultural competence, which can in turn be understood and operationalized using the multidimensional construct known as Cultural Intelligence (CQ). We begin with a literature review to discuss how cross-cultural competence is typically framed in the engineering education literature, and then review some prior studies of CQ. We then turn to findings from our own empirical, multiple group study of CQ among undergraduate engineering students (n=230) in five different courses/programs at two schools. We more specifically investigate whether a number of key factors impact CQ scores, including prior international experience, foreign language proficiency, gender, and international student status. As discussed, our subjects tended to have higher CQ scores as compared to other undergraduate student populations, likely due to a variety of demographic and programmatic factors. Additionally, students reporting that they had previously lived abroad for two or more months had significantly higher scores across all dimensions of CQ. The paper concludes by discussing some of the implications of our study, along with suggestions for future research.

Introduction

Whether working in small, local firms or rotating through expatriate assignments for multinational corporations, most engineers and other technical professionals are expected to work across cultural boundaries and national borders. This need will only intensify in coming years as demographic shifts make the U.S. ever more multicultural, and as globalization trends promote further economic and social interdependencies across countries, regions, and localities. As summarized by Duderstadt, "employers increasingly seek social and cultural skills such as the ability to communicate, to function in an increasingly diverse environment, to be committed to and capable of lifelong learning, and to not only adapt to but actually drive change."[1]

The expanding range of global and professional competencies needed by the engineers of today and tomorrow poses major challenges for engineering education, including in regular degree programs and in the context of continuing education and professional development. Alongside more traditional technical knowledge and skills, for instance, educators are being pushed to think about the wider array of values, attitudes, and dispositions needed for career success.[2-4] In fact, these kinds of "affective" characteristics comprise a key – and yet often overlooked – part of identity formation for many professionals, including engineers. As a more specific example, Radcliffe argues that ability to innovate can be viewed as an "integrative meta-attribute" linked to many other domains of competence, including various facets of "emotional intelligence."[3]

Following a similar logic, we argue that globally competent engineers require high levels of cross-cultural competence, which can in turn be understood and operationalized using the multidimensional construct known as Cultural Intelligence (CQ). In the literature review that follows we first discuss how cross-cultural competence is typically framed in the engineering education literature, and then review some prior studies involving CQ. We then present findings from our own empirical, multiple group study of CQ involving hundreds of undergraduate engineering students. More specifically, we investigate whether a number of key factors impact CQ scores, including prior international experience, foreign language proficiency, gender, and international student status. The paper concludes by discussing some implications of our research for engineering educators, and suggestions for future research.

Literature Review

Cross-Cultural Competence in Engineering

While many commentators and reports agree that technical professionals must be able to work effectively across countries and cultures, there remains a lack of consensus about what specific attributes define a globally competent engineer. Nonetheless, cross-cultural competence is often viewed as an essential part of this equation. For instance, the ASCE's *Civil Engineering Body of Knowledge for the 21st Century* indicates that civil engineers must be trained to ''work alongside and report to people from other cultures'' and ''meet challenges that cross cultural, language, legal, and political boundaries while respecting critical cultural constraints and differences.''[2] Parkinson similarly argues that globally competent engineering graduates should be able to "appreciate other cultures," "communicate across cultures," and work in or direct "a team of ethnic and cultural diversity."[5] And in another recent study by Warnick, industry representatives were asked to rank the importance of various attributes for hiring engineers.[6] Among eight "global" attributes in the survey, the top three ranking were: "communicate cross-culturally," "work in international teams," and "appreciate and understand different cultures."

As this overview indicates, many aspects of cross-cultural competence are viewed as important for globally competent engineers. And while definitions and terminology vary, prior literature suggests that cross-cultural competence is a multi-dimensional construct comprised of a number of partially distinct yet complimentary facets. In his review of previous studies and reports on global competency, for example, Rollins highlights the importance of global *knowledge* (i.e. understanding globalization trends and historical context), global *skills* like cultural awareness and adaptability, and global *attitudes*, such as being open and respectful toward cultures and belief systems that are different from one's own.[7] Spitzberg and Changnon similarly describe intercultural competence as requiring a compound mix of essential knowledge, skills, and attitudes.[8] They also review prior research on interpersonal, communicative, and intercultural competence, and list many dozens of specific factors that have been studied in categories ranging from motivation, knowledge, and skills to various context- and outcomes-based competencies.

The realm of cross-cultural competence is populated with countless definitions, frameworks, and assessment tools. However, relevant work in engineering education remains limited, save for a few notable examples. For one, the Intercultural Development Inventory (IDI) has been used widely, with Georgia Tech undertaking the largest and most ambitious study to date.[9-10] Based on Bennett's Developmental Model of Intercultural Sensitivity, IDI measures perceived and actual levels of intercultural development on a scale ranging from denial of cultural difference to defense/reversal, minimization, acceptance, and adaptation.[11] Other studies have employed the Miville-Guzman Universality-Diversity Scale—Short form (MGUDS-S), which uses affective, behavioral, and cognitive subscales to measure an individual's openness to and appreciation of cultural diversity.[12] This paper, on the other hand, opens up a new line of research by exploring whether Cultural Intelligence (CQ) may serve as yet another useful instrument for assessing various aspects of cross-cultural competence among engineering students and professionals.

Cultural Intelligence

Research based on the Cultural Intelligence (CQ) framework has proliferated in recent years.[13] However, it has attracted relatively little attention in the engineering education community. One exception is a paper by Gash, Ressler, and Crispino, which reviews pertinent literature and discusses the need to promote CQ among civil engineering students.[14] Citing the ASCE's report titled *The Vision for Civil Engineering in 2025*, these authors emphasize the importance of CQ in relation to: communication, business and public administration, globalization, humanities, social sciences, leadership, and teamwork.[15] Along similar lines, Del Vitto argues that it is essential for engineering students to develop Cultural Intelligence, and uses the work of Thomas and Inkson to describe CQ and its associated developmental stages.[16-17] Both of these papers are descriptive, however, and neither reports any new empirical data related to CQ.

Casting a wider net, other papers have discussed aspects of CQ that are directly relevant to the study presented here. In developing and validating the CQ instrument, for example, Van Dyne et al. have reported results for many hundreds of undergraduate students from universities in the U.S. and Singapore.[18] Other researchers have studied CQ in relation to previous sojourns abroad, including both professional and non-work experiences.[19-20] Along similar lines, Crowne has examined how the duration and types of prior experiences abroad impact CQ scores among a broad cross-sample of individuals.[21] Below we discuss some of these studies in more detail, especially in relation to our methods and study findings.

Methods

Subject groups and Research Contexts

Data for this paper were collected as part of a larger study on global competency. Respondents were engineering undergraduates (total n=230) recruited from the following courses and programs: 1) first-year engineering students enrolled in a global engineering learning community (ENGR103, n=21), 2) mechanical engineering students enrolled in a global engineering professional seminar (ME, n=142), 3) engineering and computing students in the Interactive Qualifying Project program (WPI, n=22), 4) engineering students participating in a one-semester China study abroad program (China Abroad, n=28), and engineering students in Global

Engineering Alliance for Research and Education in Engineering (GEARE, n=17). The IQP subject group is based at Worcester Polytechnic Institute (WPI) and the rest are from Purdue University's main campus. For groups involving sojourns abroad, data were collected prior to any orientation activities or travel experiences. Demographic characteristics are summarized in Table 1. Human subjects procedures were approved under Purdue IRB protocol #1004009220.

Table 1. Subject Group Characteristics

Subject Group	ENGR103	ME	WPI IQP	China Abroad	GEARE
Description	Global Engineering Learning Community for FYE Students	Global Engineering Professional Seminar for ME Students	Interdisciplinary PBL Program, ~1-3 Terms, including Project Work Abroad	One Semester Study Abroad Program in China	Comprehensive Study and Internship Abroad Program
Number of students (n)	21	142	22	28	17
Academic Level	First-Year: 21	Sophomore: 98 Junior: 41 Senior: 3	Junior: 22	Junior: 24 Senior: 4	Junior: 17
Gender (M/F)	14 / 7	112 / 30	11 / 11	23 / 5	11 / 6
Ethnicity	Am. Indian: 1 Asian: 9 Hispanic: 4 Caucasian: 7	Am. Indian: 1 Asian: 47 Black: 2 Hispanic: 1 Caucasian: 84 Multiracial: 7	Asian: 3 Black: 1 Caucasian: 18	Asian: 6 Caucasian: 21 Multiracial: 1	Asian: 2 Black: 1 Caucasian: 12 Multiracial: 2
International Students	9	38	1	4	2
Previously Lived Abroad (2+ months)	7	54	2	3	5

Study Instrument

The Cultural Intelligence Scale (CQS) is a 20-item instrument designed to measure an individual's Cultural Intelligence (CQ), or "the capability of an individual to function effectively in situations characterized by cultural diversity."[22] CQ is measured across four subscales: *metacognitive*, or "an individual's cultural consciousness and awareness during interactions with those from different cultural background"; *cognitive*, or "an individual's cultural knowledge of norms, practices, and convections in different cultural settings"; *motivational*, or "an individual's capability to direct attention and energy toward cultural differences"; and *behavioral*, or "an individual's capability to exhibit appropriate verbal and nonverbal actions when interacting with people from different cultural backgrounds."[18] One sample question for each CQ dimension is presented in Table 2. The survey uses a seven-point Likert scale ranging from Strongly Disagree to Strongly Agree. Higher scores indicate higher CQ.

The CQ scale was rigorously developed by Earley and Ang.[23] Since then, it has been used to assess the Cultural Intelligence of many university students and professionals, and has been demonstrated to be a valid and reliable instrument.[18] The CQ scale is also a good fit for our research because it can be completed quickly, is freely reusable in unmodified form, and aims to measure aspects of cross-cultural competence across four major psychological dimensions.

Table 2: Sample CQS Survey Questions[18]

CQ Dimension	Sample Question
Metacognitive	I am conscious of the cultural knowledge I apply to cross-cultural interactions.
Cognitive	I know the arts and crafts of other cultures.
Motivational	I enjoy interacting with people of different cultures.
Behavioral	I change my nonverbal behavior when a cross-cultural situation requires it.

Data Collection and Analysis

Data were collected using paper forms for the GEARE, China Abroad, and ENGR103 groups. Subjects from the ME and WPI groups completed the survey online. In all instances, a separate survey page or form was used to collect the demographic information presented above. Some subject groups also completed other surveys related to global competency. In instances where other measures of cross-cultural competence were taken, the CQ questions were always presented first. Data entry and analysis were performed using Microsoft Excel and SAS.

Findings

Descriptive Statistics by Subject Group

We first present descriptive statistics of CQ results for each subject group. As indicated in Table 3, this includes averages (μ, on a scale of 1-7) and standard deviations (σ) for each of the four CQ subscales and overall CQ (average of the four subscale scores).

Table 3: Descriptive Statistics for CQ Subscales and Total, by Subject Group

CQ Dimension →		Cognitive		Metacognitive		Behavioral		Motivation		Overall CQ	
Study Group	**n**	**μ**	**σ**	**M**	**σ**	**M**	**Σ**	**μ**	**σ**	**μ**	**σ**
ENGR103	21	3.74	1.30	5.34	1.08	4.45	0.95	6.13	0.95	4.92	0.72
ME	142	4.17	1.21	5.26	1.03	4.87	1.06	5.25	1.17	4.89	0.87
WPI	22	3.95	1.09	5.36	0.69	5.23	0.75	5.76	0.75	5.08	0.60
China Abroad	28	3.29	0.98	4.44	1.34	4.41	1.33	5.20	1.12	4.33	0.97
GEARE	17	3.85	1.22	4.79	1.44	4.34	1.08	4.34	0.75	4.33	1.08

As indicated, the WPI group had the highest overall CQ scores, followed by the ENGR103 and ME groups. The China Abroad and GEARE groups had notably lower scores. These trends are also largely consistent across the four subscales. Below we make some further observations about these patterns in the data set.

Predictor Analysis

After verifying that the normality assumption was not violated for our data set, we undertook a predictor analysis using a General Linear Modeling (GLM) approach. More specifically, we used SAS to identify which of the following predictors were significant for each of the four CQ subscales and overall CQ score:

1. Prior Experience, for subjects who had at least one experience living abroad longer than two months (coded as 1) versus those who had no such experience (coded as 2).
2. Citizenship, for international students (1) versus US citizens (2).
3. Gender, for males (1) versus females (2).
4. Language, for subjects who reported being able to take college-level courses in a foreign language (1) versus those without such an ability (2).

Table 4 summarizes the results of our predictor analysis, including averages (μ), standard deviations (σ), and significant predictors for each CQ dimension and overall CQ. As indicated, only prior experience living abroad was a significant predictor for all four CQ dimensions. Moreover, β for duration is always negative, meaning that subjects who spent two or more months abroad indicated higher levels of Cultural Intelligence across all four subscales and overall CQ. Language was a significant predictor for motivational CQ and overall CQ, with students proficient in at least one foreign language having higher scores. Citizenship was a significant predictor only for cognitive CQ, leading us to infer that international students have higher cultural intelligence in this domain. Finally, gender was a significant predictor only for motivational CQ, with women scoring significantly higher than men.

Table 4: Descriptive Statistics and Significant Predictors by CQ Dimension

CQ Dimension	μ	σ	Significant Predictor(s)*	β	p
Metacognitive	5.14	1.12	Prior Experience	-0.48	0.0109
Cognitive	3.99	1.22	Prior Experience	-0.76	<0.0001
			Citizenship	-0.55	0.0063
Motivational	5.37	1.13	Prior Experience	-0.42	0.0217
			Gender	0.42	0.0132
			Language	-0.49	0.0029
Behavioral	4.79	1.15	Prior Experience	-0.42	0.0298
Overall CQ	4.82	0.89	Prior Experience	-0.52	0.0004
			Language	-0.30	0.0207

* Significant when $p < 0.05$

Discussion

Our findings lead to four main points of discussion. First, our study is the first to report CQ results for a study group comprised exclusively of engineering students. However, the literature does offer many studies of CQ for business undergraduate students, and our results (μ=4.82 for overall CQ) are moderately different from these studies. For instance, a study of undergraduates at a large school in the Midwestern United States reported an average score of 4.55 (n=337) for all CQ questions, while another study of 447 undergraduate students in Singapore showed an average score of 4.25.[18] Our CQ scores are generally higher than these other studies. This may be due to the fact that a large number of our research subjects had prior experience living abroad, and/or were opting into courses and programs with an explicit global/international focus.

Second, we found that students who spent two or more months living abroad had significantly higher scores for all dimensions of Cultural Intelligence. This finding is similar to results from other studies. For example, Shannon and Begley found that prior international work experience is a significant predictor for all dimensions of CQ except cognitive.[19] The impact of prior international experience on CQ was also investigated by Tarique and Takeuchi.[20] They found that the length of non-work international experience predicts both metacognitive and cognitive CQ. Our study confirms that international experiences are important factors for developing aspects of cross-cultural competence, while also lending support to some of our prior research suggesting that two months or longer duration is an appropriate threshold for establishing what counts as an immersive, high-impact experience abroad.[12]

Third, we found that gender plays an important role in predicting motivational CQ, with females having higher motivational CQ. This result is supported by some other research involving CQ, as well as a previous study that used the MGUDS-S instrument to measure cross-cultural competence among similar engineering student populations.[12,18] However, prior studies exploring gender differences in CQ have been largely inclusive.[20,24,25] Therefore, we tentatively suggest that CQ is not very effective at measuring differences between males and females.

Finally, motivational and overall CQ scores appear well predicted by multilingual capabilities, while cognitive CQ is predicted by student status (international vs. domestic). Such findings have not been explored extensively in other studies, suggesting a need for further research.

Conclusion

The results reported here provide important baseline data on the Cultural Intelligence (CQ) of undergraduate engineering students enrolled at two U.S. schools. Of particular note, we have shown that CQ scores for the groups in our study are higher than other comparable populations, while prior experience living abroad appears to be a major factor in predicting all facets of CQ. This latter finding is especially notable, as it suggests that immersive global experiences of two months or longer duration have significant impacts on the cross-cultural competence of students.

Our results also reveal the potential utility of Cultural Intelligence as an assessment, evaluation, and research tool in various kinds of global engineering programs. However, we acknowledge the limitations inherent in relying on self-reporting of competence, and elsewhere propose use of situation- and scenario-based strategies as complimentary measures of global competence.[26]

Finally, this study points to the need for further research, some of which is ongoing by members of our research team. In particular, we continue to collect CQ data from an even larger and more diverse cross-section of engineering students, in part to establish better baseline CQ scores for students without prior experience living abroad. In addition, some of the groups represented in this study will again complete the CQ survey after going abroad, which will allow us to evaluate whether and how various research and study abroad experiences impact Cultural Intelligence.

Acknowledgments

We thank Rick Vaz and Kent Rissmiller (Worcester Polytechnic Institute) and Dianne Atkinson and Yating Haller (Purdue University) for assisting with data collection for this study. We also recognize Joe J.J. Lin for advising us on aspects of the data analysis. Finally, we acknowledge our anonymous student research subjects, without whom this research would not be possible.

References

[1] Duderstadt, J. Engineering for a Changing World: A Roadmap to the Future of Engineering Practice, Research, and Education. Ann Arbor, MI: The Millennium Project, University of Michigan. 2008.

[2] American Society of Civil Engineers (ASCE), Body of Knowledge Committee of the Committee on Academic Prerequisites for Professional Practice. Civil Engineering Body of Knowledge for the 21st Century: Preparing the Civil Engineer of the Future (Second Edition). Reston, VA: American Society of Civil Engineers. 2008.

[3] Radcliffe, D. F. Innovation as a Meta-Attribute for Graduate Engineers. International Journal of Engineering Education. 2005. 21(2): 194-199.

[4] Walther, J., and Radcliffe, D. The Competence Dilemma in Engineering Education: Moving Beyond Simple Graduate Attribute Mapping. Australasian Journal of Engineering Education. 2007. 13(1): 41-51.

[5] Parkinson, A. The Rationale for Developing Global Competence. Online Journal of Global Engineering Education. 2009. 4(2): 1-15.

[6] Warnick, G. Global Competence: Determination of its Importance for Engineers Working in a Global Environment. Educational Administration: Theses, Dissertations, and Student Research. Paper 35. University of Nebraska at Lincoln. 2010. Available at http://digitalcommons.unl.edu/cehsedaddiss/35

[7] Rollins, H. Georgia Tech's Comprehensive and Integrated Approach to Developing Global Competence. In R. Lewin (Ed.), The Handbook of Practice and Research in Study Abroad: Higher Education and the Quest for Global Citizenship (423-444). Routledge, New York, NY. 2009.

[8] Spitzberg, B., and Changnon, G. Conceptualizing Intercultural Competence. In D. Deardorff (Ed.), The SAGE Handbook of Intercultural Competence (2-52). SAGE Publications, Inc., Thousand Oaks, CA. 2009.

[9] Lohmann, J., Gorgon, J., Harwell, K., McLaughlin, S. and Paraska, S. Annual Impact Report of the Quality Enhancement Plan on Student Learning: Strengthening the Global Competence and Research Experiences of Undergraduate Students. Georgia Institute of Technology, Atlanta, Georgia. 2008. Available at http:// www.provost.gatech.edu/assets/2007-08QEPAnnualImpactReport.pdf

[10] Georgia Institute of Technology. Georgia Institute of Technology's Quality Enhancement Plan: Impact Report. Georgia Institute of Technology, Atlanta, Georgia. 2011. Available at http://www.accreditation.gatech.edu/wp-content/uploads/2011/03/QEP-Impact-Report_SACSCOC_March-25-2011.pdf

[11] Hammer, M., Bennett, M., and Wiseman, R. Measuring Intercultural sensitivity: The Intercultural Development Inventory. International Journal of Intercultural Relations. 2009. 27(4): 421-443.

[12] Jesiek, B, Shen, Y., and Haller, Y. Cross-Cultural Competence: A Comparative Assessment of Engineering Students. International Journal of Engineering Education. 2012. 28(1): 144-155.

[13] Ang, S., and Van Dyne, L. (Eds.). Handbook of Cultural Intelligence: Theory, Measurement, and Applications. M.E. Sharpe, Inc., Armonk, NY. 2008.

[14] Gash, R., Ressler, S., and Crispino, E. Cultural Intelligence: Engineering Success for a Flat World. Proceedings of the 2009 ASEE Annual Conference and Exposition, Austin, TX. 2009.

[15] American Society of Civil Engineers (ASCE), Steering Committee to Plan a Summit on the Future of the Civil Engineering Profession in 2025. The Vision for Civil Engineering in 2025. American Society of Civil Engineers, Reston, VA. 2007.

[16] Del Vitto, C. Cross-Cultural 'Soft Skills' and the Global Engineer: Corporate Best Practices and Trainer Methodologies, Online Journal for Global Engineering Education. 2008. 3(1): 1–9.

[17] Thomas, D., and Kerr, I. People Skills for Global Business: Cultural Intelligence. Berrett-Koehler Publishers, Inc., San Francisco, CA. 2003.

[18] Van Dyne, L., Ang, S., and Koh, C. Development and Validation of the CQS: The Cultural Intelligence Scale. In L. Van Dyne and S. Ang (Eds.), Handbook of Cultural Intelligence: Theory, Measurement, and Applications (16-40). M.E. Sharpe, Inc., Armonk, NY. 2008.

[19] Shannon, L., and Begley, T. Antecedents of the Four-Factor Model of Cultural Intelligence. In L. Van Dyne and S. Ang (Eds.), Handbook of Cultural Intelligence: Theory, Measurement, and Applications (41-55). M.E. Sharpe, Inc., Armonk, NY. 2008.

[20] Tarique, I., and Takeuchi, R. Developing Cultural Intelligence: The Roles of International Nonwork Experiences. In L. Van Dyne and S. Ang (Eds.), Handbook of Cultural Intelligence: Theory, Measurement, and Applications (56-70). M.E. Sharpe, Inc., Armonk, NY. 2008.

[21] Crowne, K. What Leads to Cultural Intelligence? Business Horizons. 2008. 51(5): 391-399.

[22] Ang, S., and Van Dyne, L. Conceptualization of Cultural Intelligence: Definition, Distinctiveness, and Nomological Network. In L. Van Dyne and S. Ang (Eds.), Handbook of Cultural Intelligence: Theory, Measurement, and Applications (3-15). M.E. Sharpe, Inc., Armonk, NY. 2008.

[23] Earley, P., and Ang, S. Cultural Intelligence: Individual Interactions Across Cultures. Stanford University Press, Palo Alto, CA. 2003.

[24] Lawrence, N. The Effects of Cultural Intelligence, Self Efficacy and Cross Cultural Communication on Cross Cultural Adaptation of International Students in Taiwan. Masters Thesis. National Taiwan Normal University. 2011. Available at http://ir.lib.ntnu.edu.tw/retrieve/49356/metadata_07_12_s_05_0014.pdf

[25] Ang, S., Van Dyne, L., and Koh, C. Personality Correlates of the Four-Factor Model of Cultural Intelligence. Group and Organization Management. 2006. 31(1): 100-123.

[26] Jesiek, B. K, and Woo, S. E. Realistic Assessment for Realistic Instruction: Situational Assessment Strategies for Engineering Education and Practice. Proceedings of the 2011 SEFI Annual Conference, Lisbon, Portugal. 2011.