



Impact of Gender and Conference Size on Conference Preferences – Employing Natural Language Processing *

Eyal Eckhaus

Ariel University, ISRAEL

Nitza Davidovitch *

Ariel University, ISRAEL

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Abstract: This pilot study focuses on the impact of academic conferences from a gender-based perspective. What motivates faculty members to attend conferences? Which conferences do they choose? Can differences be found between men and women in their attitude to the effect of the conference and its contribution to their academic work, in light of many studies on the significance women attach to the value of family and its prioritization over their career? The study dealt with a case study of one university in Israel. Ninety four academic faculty members from a variety of departments completed a questionnaire, including 60.9% women and 39.1% men. The main finding is that, among both men and women, academic conferences are perceived as contributing to their professional development. Faculty members addressed the contribution of conferences to their professional development. Findings showed that professional focusing during conferences results in publications and develops interest in the conference – and not vice versa, i.e., it is not interest in the conference that leads to publications. It was also found that the size of the conference predicts the significance of the focus on professional aspects. From a gender perspective, women prefer small conferences. In addition, for women, although they prefer small conferences they attach significance to collaborations that lead to professional focusing on their fields of research. Women appear to bring their "family-oriented patterns" to their work, explaining their inclination to small and more intimate conferences. The research findings might have an impact on the consideration given to planning academic conferences in order to reach the academic outcomes expected by faculty members who perceive conferences as an essential platform for their professional development.

Keywords: *Gender, conference, natural language.*

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Introduction

This study focuses on the effect of academic conferences on men and women, as perceived by them. It is accepted that academic conferences have an effect on the work of academic faculty – academic conferences are an essential part of the work environment of academic faculty. Conferences enable exposure to innovative scientific works and to researchers from different countries and institutions – with whom it is then possible to develop scientific ties. Notably, participation in academic conferences is an inseparable part of the promotion and appointment process of faculty members, part of their academic identity and status in the world. At the same time, faculty are also exposed to different countries, different cultures. In fact, a field of "academic tourism" is gradually emerging, one that also includes commercial aspects.

There are "small" conferences, i.e., focused on a topic that interests an academic community dealing with a certain field of research. Members of this academic community usually meet at regular intervals, sometimes at conferences that become a "tradition", as part of their professional-research development. Then again, there are also large and even very large conferences, both in the number of participants (hundreds and even thousands) and in the number of topics discussed – usually with a enveloping topic that attracts an extensive array of studies.

Beyond the extent of the conference and its size, there is also a conspicuous phenomenon of conference commercialization, tourism, cultural evenings – all these raise the question of the conference's contribution to academic faculty.

*** Corresponding author:**

Nitza Davidovitch, Ariel University, Education Department, ISRAEL

Email: d.nitza@ariel.ac.il

Hence, we conducted an initial pilot study focusing on the effect of academic conferences from a gender perspective. What motivates faculty members to attend conferences? Are there differences in the attitude of men and women to the effect of conferences and their contribution to academic work?

Gender, limits, and disparities between men and women in academia

Data generated by the Shmuel Neaman Institute indicate that a post-doctoral position overseas is one of the most significant barriers in the process of appointing and promoting women in academia after earning their PhD (Weinreb, 2016).

The low number of women among senior academic faculty, and in the exact sciences and engineering in particular, is a complex global problem: On one hand, women are currently studying for advanced degrees at higher rates than ever before, and in many subjects and universities they number more than male students, right up to the PhD level. But then there is a sharp shift – the rate of women among the faculty drops to nearly half their rate in PhD programs. This is true in the fields of exact sciences and engineering, where the representation of women is low to begin with, but also in fields that have a conspicuous female majority in lower degrees, such as education and the therapeutic professions – in all of these there is a sharp drop in the rate of women from the PhD level to the faculty level. In contrast, even men who study for "feminine" degrees manage to receive faculty positions, at a disproportionate rate to their representation in study programs – from undergraduate through PhD studies (Weinreb, 2016).

The most recent data in this matter is presented in a report by the Shmuel Neaman Institute. The report, which summarizes the situation in Israel, reveals that in 2014 women constituted 57% of all undergraduate students, 53% of PhD students (similar to their proportion in the population), but only 29% of academic faculty. That same year, the rate of women in the exact sciences and engineering was 32% in undergraduate programs, 36% in Master's degree programs, and 46% in PhD programs, but they constituted only 13% of faculty members in these subjects. This sharp drop is evident in all technological subjects: In 2014 women constituted 27% of engineering students but only 14% of the faculty, about 29% of math and computer sciences students but only 11% of the faculty, about 37% of physics students but only 13% of the faculty.

And what happens in female dominated subjects? In paramedical professions 82% of the students are female but only 62% of the faculty are female; in education and teacher training 80% of students are women but only 53% of the faculty are women; in social sciences women constitute 68% of students, but only 37% of the faculty, and in biology they are 64% of students for undergraduate and graduate degrees and only 30% of the faculty.

As stated, these disparities are not unique to Israel. The proportion of women who earn a PhD in European universities is 47%. Their rate among the junior faculty is 45%, among the middle rank faculty 37%, and among the most senior faculty 21%, over all subjects. In the sciences, the rate of female PhD graduates is 37%, the rate of women on the faculty is 25%, and the rate of women among the most senior faculty – 13%. In all these measures, there was an improvement of one or two percentages from 2007 to 2013, the last year for which data were gathered in Europe, such that there is still hope.

But what happens from PhD graduation to the faculty appointing stage that cuts the rate of women in about one half? Are there cultural, familial, personal, and/or institution-related factors that we can change?

A main conclusion of the report (2016) was that *one of the significant reasons for the disparities is the post-doctorate issue*. The academic world encourages researchers to occupy a post-doctoral position in a different institution than where they earned their PhD and this requires mobilizing the entire family – a more complicated matter for women because men are still less inclined to leave a place following their spouse than are women. In Europe, this mobility discrepancy is gauged at 9%. Among Israelis the situation is even more severe because it is customary that a successful post-doctoral position is one that takes place overseas, i.e., the move is more dramatic. According to Arnon, receiving a post-doctoral position is a critical barrier. *"When a woman earns a PhD, her spouse usually already has a position that he does not want to leave. At present, the man's occupation still dictates the family's course."*

"The age of post-docs is exactly women's age of fertility", adds Prof. Erhard, "and precisely the age at which they are caring for young children (still more than men, despite the cultural transitions in this area). Israeli culture is the most encouraging of childbirth of all western cultures. I hear talk here in the offices about a fourth child. And studies published show that it is not only the fact of motherhood that is detrimental to one's career, rather every additional child further reduces the ability to invest in one's career in the critical years."

Prof. Erhard: *"The post-doctorate is the stage in the researcher's life when he is no longer under the guidance of a supervisor rather develops his identity as an independent researcher. Instead of investigating questions raised by the supervisor, he must ask completely new questions and sometimes also lead a research team. He must obtain his own grants, submit publications in his own name, decide when the paper is ready for publication, travel to conferences, and promote himself. All this happens when women are mothers, busy running from swimming class to speech therapist to a PTA meeting. Sometimes a woman who is torn between these roles is compelled or decides that she wants to relinquish one of them."*

But even this may not be the entire story. *"The stage of transition to a post-doctoral position is complex for both women and men and requires a change in their entire self-concept. Is it more complex for women? That's a good question. Men are indeed considered more assertive but I think that this is not a barrier. To begin with, these are strong-willed women. A woman who earned a PhD at Tel Aviv University has the potential to be an independent scientist and I am sure that she has what it takes",* says Prof. Erhard, while also adding that in general *"women submit their candidacy for a position or grant when they meet 100% of the requirements and men might submit their candidacy even when they do not meet all the requirements. When an experiment does not succeed a man will be more quick to think about the next experiment, while a woman will put more thought into finding the reason for the failure. That's why I say that when there are both men and women in the laboratory the discourse is the most productive. It is the differences that I want."*

Prof. Kerem relates that recently a program was launched at the Hebrew University for post-doctorate travel scholarships for women only. *"The difficulty is mainly in the experimental sciences, because a post-doctorate can take 4-5 years and it appears that it is much harder for women to relocate their family than for men. A lot of our female students give up to begin with because they understand that they won't be able to do it. We are trying to find solutions to how women can be employed in academia without spending years overseas."*

Another reason for the small number of women is the fact that academic life is very demanding. *"Not every woman wants to take on this responsibility, particularly when it coincides with a family and children",* says Prof. Kerem. *"Both things require effort and I hear many women say that they can't do it."*

On the value of family – the gender perspective and the strategy of reducing work commitments

Steps in other directions attempt to focus on the family issue. Prof. Arnon states in the report that one approach proposed (and also carried out) was to grant scholarships to encourage women towards a post-doctorate position, which among other things will facilitate integration of their spouse and children in the new place. *"L'oreal, together with UNESCO, also awards scholarships to women, and L'oreal in Israel gives two individual monetary prizes every year in order to help out,"* she says. An arrangement combining research in Israel and overseas was also proposed, such that a researcher can become part of an international academic institution without moving her entire family.

With all the difficulties, the Neaman Institute report also includes positive aspects. According to the data presented, in recent years there has been a change in the proportion of women in academic faculty. In 2011 the Council for Higher Education initiated a multi-year plan in which 1,040 senior faculty positions at universities have been opened to date, 34% of them occupied by women. In the same time period, 522 positions were opened at colleges, and 45% of them are occupied by women. In both cases the proportion of women is high relative to their proportion of the senior faculty before the program was initiated. Over the years, studies show that most women prefer a family to a career. Recent studies on this subject also indicate that not much has changed in women's value-oriented attitude to combining career and family. Most women in Israel indeed apply a combination of family and work, each in her own way.

In recent years, research and public discourse have been dominated by the assumption of an intrinsic conflict between family and career. It now seems that this assumption does not truly represent the life of working women and that the various combinations of family and career constitute two major foci in their life. The study *"The combination of family and work and its significance for the satisfaction of working women in Israel,"* conducted by Dalia Mor, Dean of the School of Behavioral Sciences at the College of Management's academic track, and Dr. Anat Guy, included 3,000 working women in Israel, inspecting how they handle the conflict between career and family. The study showed that women employed four coping styles to handle this conflict: "traditional", "integrative", "careerist", and "personal style".

Men and women in academia

Most studies on work-related differences between the sexes reflect the following **state of affairs**:

Discrimination – The researchers find direct, blatant discrimination and indirect discrimination that derive from the education and expectations instilled in both men and women (Ariel, 1989; Churchman, 2006).

Differentiation between men and women's fields of occupation – There are many studies on the distinction between masculine and feminine occupations (Cooper & Kimberlee, 2003). A profession is considered feminine when most of those who engage in it are women, and vice versa. In practice, this distinction is a barrier to the promotion of women in the labor market (Ariel, 1989).

Barriers experienced by women in the workplace – There is a supplementary mechanism to the sexual stratification of professions (Ariel, 1989): part-time jobs, which make it possible for women to manage their "triple role" as mother, wife, and second breadwinner. Part-time jobs are common among women and rare among men. This type of job is not conducive to promotion.

Studies on the subject show attempts *to explain the differences* in rewards and promotion between women and men in Israel (Haberfeld & Shenhav, 1990; Babcock & Laschever, 2003; Izraeliy, 2003).

Assumedly, academia should be a beacon for working women. Academic faculty members are all on the same promotion scale. Here the eternal problem of the female career being sidetracked to positions with no chance of

promotion does not exist. Evaluation of scientific work is also assumedly objective. In order to receive tenure at a university, and also in order to rise among the ranks, it is necessary to publish scientific papers and books. What could be easier to measure?

Studying the performance of men and women in academia

The topic of performance quality of men and women in academia has been studied extensively, as evident from the research literature (Toren, 2005; Alterman & Cohen, 2002; Ariel, 1989). Evaluation of faculty activities and rewarding performance have become important topics in the last four decades (Wadsworth, 1994; Gillespie, Hilsen & Wadsworth, 2002). Faculty members at academic institutions perform a wide range of activities that include: teaching, research, research publications, conference presentations, submitting requests for research grants, academic administration, community service, and more.

The research literature (Messer-Yaron & Kahanovich, 2003; Toren, 2005) indicates few women both at the highest level of academic faculty (vertical segregation) and represented in certain fields (horizontal segregation). This phenomenon is characteristic of the situation of women in science all over the world, including Europe and the US. The Helsinki Group report (2002) indicates that of the 13 countries in the European Union for which data exists, Israel is tenth in the proportion of female researchers in the natural sciences. In engineering and technology sciences Israel is eleventh. The status of women in Israel in scientific research fields is lower than in other countries.

The purpose of the current study is to examine the evaluation of academic conference outcomes from a gender perspective, while focusing on a case study in Israel. *The study* is based on a group of senior faculty members in Israeli academia. The study continues a previous study on the subject (Davidovitch & Druckman, 2017) that examined the associations between the factors affecting the academic performance of men and women, as manifested in their academic excellence. According to the main findings, no significant correlations were found between gender-based excellence and research performance. We found the general excellence scores of male faculty members to be 10% higher on average than the excellence scores of female faculty members. But the difference was not statistically significant. This was particularly evident in the fact that male faculty members achieved higher excellence scores in research activities. In contrast, when evaluating teaching practice, significant differences were found by gender in favor of the women. With regard to the effect of age on excellence scores, no significant differences were found in the general excellence scores of faculty members by age group.

The case study described here is the first of its type to examine the evaluation of academic conference outcomes from a gender perspective in Israeli academic institutions. The researchers' point of departure is that the representation of women in academic faculty, including their research outcomes, has meaning for and an impact on the system of higher education in Israel and elsewhere.

The study also indicates that women are very strong at networking and creating collaborations and that with regard to their work women prefer more intimate forums while men prefer larger forums.

When men do organize support groups, they use them to discuss medical information and to hear the views of invited expert speakers, whereas women prefer small meetings with opportunities for intimacy with other women (Gray et al., 1996).

For women, protective networks with strong ties will increase the possibility of promotion to high levels of management. Also, women prefer small groups of friends. Reliance on colleagues for support in order to achieve greater success is usual among women (Layton, Watters & Dazeley, 2015).

Methodology

Initial Sample

A questionnaire was used for data collection, comprising six open questions regarding how the researcher chooses which conference to attend:

1. What are your considerations when selecting a conference?
2. How important for you is the conference forum?
3. How important is the opportunity to meet other members of the research community at a conference?
4. What do you believe is the greatest benefit of attending a conference?
5. Is publication in the book of proceedings a consideration when selecting a conference?
6. Do you prefer large or small conferences and why?

In light of the research literature, which showed that women have a clear preference for family, for small, for intimate, and that they tend to reduce their commitment to the job, we hypothesized that:

H1. Females would prefer small conferences.

H2. Males would prefer large conferences.

H3. The preference for small conferences would have a positive effect on the desire to form research collaborations.

H4. The desire to form research collaborations would have a positive effect on the need for professional focus.

H5. In the route taken by males, the preference for large conferences would have a positive effect on the need for professional focus.

H6. The need for professional focus would have a positive effect on the wish for interest.

H7. The need for professional focus would have a positive effect on the desire to publish.

Survey analysis

All responses for each respondent were combined to form a section of text. Ninety four completed questionnaires were collected. The questionnaires were distributed online to the senior faculty members of a single university using Google Docs. Respondents were from 17 different departments, ranging from only one respondent from some departments to a maximum of 17 from others. Of all respondents, 60.9% (56) were females and 39.1% (36) males. Respondents' age ranged from 34-39 (6.1%), 40-49 (29.3%), and 50-81 (64.6 %). With regard to marital status, 3.3% of the respondents were single, 84% married, 10.9% divorced, and 1.1% was a widower.

A path analysis was constructed to test the model's goodness-of-fit. Comparative fit index (CFI), Tucker-Lewis Index (TLI), root mean square error of approximation (RMSEA), and χ^2/df ratio were used as reported fit indices. The accepted thresholds for these indices are: χ^2/df ratio should be < 3 (Akbar & Parvez, 2009), the values of CFI and TLI values > 0.95 (Hu & Bentler, 1999), and RMSEA ≤ 0.06 (ibid). SPSS v.23 was used for the path analysis and SPSS v.23 for other statistical procedures.

Content analysis

A mixed method design was employed, with both quantitative and qualitative analyses, in order to provide a better understanding of the research problem (Ghasempour, Bakar, & Jahanshahloo, 2014).

Manual classification

Initially, all the respondents' texts were manually reviewed and major themes were identified. While several themes were related directly to the six questions, such as "preference for small conferences" or "preference for big conferences", other themes provided further information on the decision making process involved in selecting a conference. The themes were: preference for small conferences (*SMALL*), preference for large conferences (*LARGE*), COLLABORATION (*COOP*): search for research collaboration, PROFESSIONAL (*PRO*): professional orientation (with a focus on the theme of the conference, research topics), INTEREST (*INT*): interest seeking, and PUBLICATION (*PUB*): orientation toward publication of articles.

Automated text classification

The program used was TEXTIMUS, a software developed for supporting text mining and analysis (Eckhaus & Ben-Hador, 2017). First, n-gram frequencies were generated. N-gram refers to a contiguous sequence of n words from a given sequence of text (Kongsgard, Nordbotten, Mancini, Haakseth, & Engelstad, 2017). N-gram language models are widely used in Natural Language Processing (NLP), such as speech recognition, machine translation, and information retrieval (Dang et al., 2016).

The 'Bag-of-Words' (BOW) technique, known as the most common method for text analysis based on NLP (Razavi, Matwin, De Koninck, & Amini, 2014), was utilized. This technique is based on the concept that documents are represented as a collection of words, regardless of grammar and order. A set of keywords is explored in all the documents, and each keyword is assigned a value, according to whether the word appears in a document or the number of times it appears (Layton, Watters, & Dazeley, 2015). Therefore, the researchers first analyzed the frequency of each word in the set of texts, and compiled into groups the most frequent words employed for each of the research variables. Similar to studies that employed BOW (e.g., Eckhaus, 2016), the frequencies of the groups of words were then summed to create the variables.

Results

The correlations, means, and standard deviation values between the research variables are presented in Table 1. Correlations with *GENDER*, a dichotomous variable (0=female, 1=male), were calculated using a Spearman correlation, and the rest of the variables were calculated using a Pearson correlation.

Table 1. Correlation matrix: Means, SD

	SMALL	LARGE	COOP	PRO	INT	PUB	GENDER
SMALL	-						
LARGE	-.017	-					
COOP	.21*	.14	-				
PRO	.09	.25*	.45***	-			
INT	.13	.13	.11	.25*	-		
PUB	.08	.11	.13	.31**	.15	-	
GENDER	-.28**	.22*	-.20	-.19	-.16	-.19	-
Mean	.61	.48	1.70	1.56	.90	.55	.39
SD	.64	.74	1.52	1.48	.95	1.03	.49

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

Before constructing the model, the researchers first examined whether department had an effect on *LARGE* or *SMALL*, which would indicate a need to control for this variable. Two one-way ANOVA tests were constructed, with *LARGE* and *SMALL* the dependent variables in each of the tests respectively, and department the independent variable. Results in both tests showed no statistical significance ($p > .05$). Similarly, respondents' age showed no statistical significance in the correlation with *LARGE* and *SMALL*, and neither did the respondents' marital status.

Figure 1 illustrates the model and regression weights. The hypothesized model showed a very good fit: $\chi^2/df = 1.02$, $p > .05$, CFI = 0.99, TLI = 0.99, RMSEA = 0.02. All hypotheses were supported. Females prefer small conferences (H1) ($b = -.35$, $p < .01$). Males prefer large conferences (H2) ($b = .33$, $p < .05$). The preference for small conferences has a positive effect on the desire to form research collaborations (H3) ($b = .50$, $p < .05$), which in turn has a positive effect on the need for professional focus (H4) ($b = .41$, $p < .001$). In the route taken by males, the preference for large conferences has a positive effect on the need for professional focus (H5) ($b = .38$, $p < .05$). Finally, the need for professional focus has a positive effect on the desire for interest (H6) ($b = .16$, $p < .05$), and on the urge to publish (H7) ($b = .22$, $p < .01$).

chi-square=14.327, df=14, CFI=.992, TLI=.985, RMSEA=.016

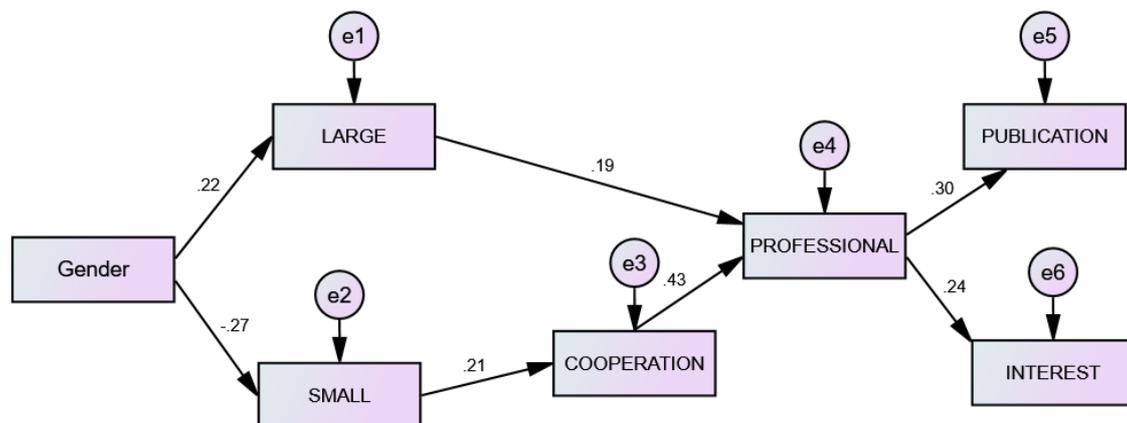


Figure 1. Model path and weights

These findings are also supported by the comments of the research participants. When asked how they choose conferences the responses given were mapped using the categories of relevance, importance of organization, and timing:

Professional aspects: Topic of the conference, relevance for my research, whether it will be followed by publication.

Administrative aspects: Time, location of the conference, expected cost.

Prestige-social aspects: Lecturers, organizers, and publication of the materials, academic importance/prestige / standard of the conference, who will be attending.

When asked about their opinion as to the added value of the conference, the perceived academic value of the conference is evident:

- Exposure to research topics of other researchers
- Encounters with researchers for the purpose of collaborations. Meeting colleagues
- Opportunity to learn new things and to meet a professional community

- Forming *international relationships*. Meeting colleagues from all over the world
- Spreading my doctrine. The possibility of *presenting research*, being exposed to knowledge and experts in this field

In summary, faculty members see conferences as having a significant professional contribution to: revealing new knowledge, meeting colleagues, encounters with potential colleagues and partners.

On the question of whether they prefer large or small conferences and why, they answered:

With regard to small conferences: This makes it easier to form new research collaborations, more opportunities for discourse, contact with research colleagues, such conferences are usually more professional, it is easier to form ties, more authentic, a small setting facilitates more thorough acquaintance with colleagues from around the world, there is no sense of "being lost" in a giant conference, the lectures are more in-depth, opportunity to form ties with colleagues, more meaningful, more intimate.

With regard to large conferences: More varied, there are more professionals with whom it is possible to talk and exchange opinions and knowledge, there are more lectures and there are more new contacts.

Doesn't matter: There is something interesting in any conference, each has its advantages and disadvantages, ultimately contact occurs in the sessions. Sessions are small. Or to be precise – in breaks between sessions, prefer large or small with a quality audience, I have no special preference, it depends on the nature of the conference.

Summary and Discussion

This study found that both men and women see academic conferences as having a real contribution to their professional development. Faculty members referred to the contribution of conferences with regard to their professional development. The size of the conference was also found to predict the significance of the profession. From a gender perspective, women prefer small conferences. Furthermore, for women, although they prefer small conferences they attach significance to collaborations, which lead to professional focusing in their fields of research.

The research findings might have an impact on the considerations employed when planning academic conferences in order to reach the academic outcomes expected by faculty members who see conferences as an essential platform for their professional development. Additionally, from an academic perspective – and not only gender-based – preference should be given to small conferences that direct the professional development of faculty members.

This is a pilot study on the subject, based on a case study of one university in Israel. This study can be expanded to a global comparative study in order to receive a wide perspective on the expectations of faculty members from international conferences. The findings of such cross-cultural academic studies in different locations around the globe might have an impact on the preparation, structuring, and betterment of conferences.

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