

## **Consolidated vs. fragile science communication culture:**

### **A comparison of science coverage of the BBC and Israeli media**

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#### *Introduction*

The modern world exposes us to constant contact with science and technology in our daily lives including transportation, medical information and technologies effecting our quality of life (Burke, Bergman, & Asimov, 1985; Getz, Peled, Buchnik, Zatzovetsky, & Even-Zohar, 2010; Smith & Faniel, 2014; Yaar, 2006). This requires the lay public's to make evidence-based decisions based on media presented information. In addition to decision making at the individual level, democratic society depends on the voice of its members to impact policy making such as where to allocate funds or why promote specific research fields. Hence, communication between science and society is crucial for the development of both (Lewenstein, 1992; Lewenstine, 2003). This communication requires a mediator to sustain the dialogue between the public and its scientists. Frequently, the mass media play this role.

The mass media mediate new scientific findings - discoveries and advances originally published in specialized journals and intended for an expert audience - by making them accessible to the lay public. As the mass media constitute the public's main source of information in science and technology (Castell et al., 2014; Dgani & Dgani, 2015; National Science Board, 2016; Smith & Faniel, 2014), it is essential to explore the content it presents to the public.

Although much has been written about 'science and the mass media', there have been relatively few systematic studies of the extent and nature of science coverage in the mass media. Since the 1960s, over 200 studies have been conducted around Europe and the United States, depicting the coverage of science in the news media (Albaek, Christiansen, & Togeby, 2003; Badenschier & Wormer, 2012; Collins, Abelson, Pyman, & Lavis, 2006; Hijmans, Pleijter, & Wester, 2003; Leon, 2008; Schäfer, 2012). However, the majority of them concentrated on a specific medium, scientific field or on only one country (Schäfer, 2012). A comparison of media representation of science from several countries may imply on the impact of cultural differences on the way science is presented

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in different science communication cultures. One aspect of science communication culture according to Mejlgaard et al., (2012) is the degree of institutionalization accustomed in the country, namely “the presence of popular science magazines, the regularity of a science section in newspapers, dedicated science communication in TV etc.” (Mejlgaard et al., 2012).

This presentation compares similarities and differences of two ends of science communication scale – Israel's broadcasted public science news coverage and the BBC in the UK to shed light on the ways institutionalization impacts science communication culture.

## Research background

In 2011 Mellor, Webster, & Bell published a report entitled "Content analysis of the BBC's science coverage". In 2015 Barel, Baram-Tsabari, Peleg, Armon, & Raveh published a similar study on science news coverage in Israel.

Both countries share a number of features as compares science indicators:

**Science indicators in the UK and Israel:** In terms of the public's attitudes toward science in the UK and Israel, in both countries respondents stated that that science was very important or extremely needed in their day-to-day lives (72% and 59% respectively) (Castell et al., 2014; Dgani & Dgani, 2015). Moreover, both publics are similar regarding level of education, in that 26% of the UK public and 28% of the Israeli public have a basic level of academic education (e.g. bachelor's degree) (Getz et al., 2013). In terms of scientific publications the levels are comparable, with the UK at 156.2 and Israel at 156.5 publications per 100k inhabitants (Getz et al., 2013). The absolute number of the competitive ERC grants awarded by the EU from 2007 to 2015 indicates that the UK ranked higher than Israel with 636 grants for institutions located in the UK, while Israel was positioned in fifth place with 200 grants (European Research Council, 2016). However, the population of the UK is about 8 times larger. Normalizing these data flips the difference between the countries.

Although the countries are similar with regard to public attitude and science capacity, one of the major differences between these countries is in the field of science communication. The case of science communication in Israel is a very perplexing one. On the one hand, Israel is positioned 22nd in the world regarding its scientific research and publications (Getz et al., 2013) and is very similar to the UK as shown above. On the other hand, it was classified as having a “fragile” science communication culture (Mejlgaard et al., 2012), while the UK is considered “consolidated”. An aspect of this categorization is the level of institutionalization of science communication in the country and culture that in turn, may affect the science and technology coverage in the daily news media reaching the public.

## *Research question*

How do the differences between institutionalized and non-institutionalized science communication culture affect science coverage in the broadcast media? The UK's and Israeli public broadcast news media used as a case study.

### *Method*

This work compares two reports on science coverage in the news media - one on the BBC (Mellor et al., 2011) and the other on the Israeli media (Barel et al., 2015). Both reports had a wide scope, but in this work the comparison will focus solely on public broadcast (e.g. television and radio) news media.

Mellor's BBC report sampled four alternate weeks over the summer (end of May – mid July) in 2009 and 2010 for a total of eight weeks, and collected 359 science items from 16 TV and radio sources.

In the Israeli study a systematic examination of the scope and characteristics of science and technology coverage in the Israeli news media was conducted over a period of six consecutive months. For 183 days a total of 1,064 science items were collected and cataloged from 20 media sources.

STEM items were cataloged according to a codebook based primarily on Mellor's (2011) BBC study. Scientific news items were included if they covered STEM fields - Science (Physical sciences, life, medical, climate and interdisciplinary sciences), Technology, Engineering and Mathematics. Archeology was also included in the Israeli study because of the scientific methods used by archeologists and the impact and importance of the field in Israeli society (Greenberg, 2012; Rosen, 2003). The items had to meet at least one of the following criteria: activities or findings from the natural, applied and medical sciences or mathematics, references to scientific institutions, experts, specialists' opinions, researchers, a profile item about a researcher or scientist, new technologies or scientific development, new research, new research project, nominee or recipient of a scientific award or science and society items. The items also had to include an explanation of scientific concepts or procedures, principles or references to a scientific body of knowledge. These criteria exclude, among other things, research in the fields of social sciences, as was the case in the Mellor et al. report.

	<b>Mellor et al. 2011</b>	<b>Barel et al. 2015</b>	<b>Changes made to allow for comparison</b>
<b>Criteria for a "Science" item</b>	Science (Physical sciences, life, medical, climate and mixed sciences), Technology,	Science (Physical sciences, life, medical, climate and mixed sciences), Technology,	Items about archeology were removed from Barel et al.'s database

	Engineering, Mathematics	Engineering, Mathematics & <u>Archeology</u>	
<b>Sources</b>	Six BBC radio and television channels (16 news programs), the BBC's formal webpage, and 3 non BBC news programs for a total of 9 sources and 20 programs	Twenty media sources including two radio stations (9 programs), 4 television channels (9 programs), three internet news sites and six newspapers for a total of 15 sources and 18 programs	Only broadcast news programs from the BBC and public broadcasts in Israel were included (16 programs from the BBC and 7 from Israel)
<b>Sampling period</b>	Eight weeks from four alternating weeks in the summer of 2009 and 2010	Six consecutive months over 2013-2014	Items corresponding to the above changes from each database were used from the original duration of each study
<b>Number of items</b>	$N_{BBC}=8777$	$N_{Israel}=1064$	$N_{BBC}=359$ $N_{Israel}=202$

**Table. 1:** Criteria, source and sampling in Mellor et al. 2011 and Barel et al. 2015 and adaptations of databases to allow for a comparison

In order to accurately compare the two reports, this work relates solely to items collected from public broadcast (e.g. television and radio) news programs in both countries. For example, the Israeli report looked at all news media in Israel - including print (newspapers), broadcast (TV and radio news shows) and online (news sites) media, and collected a total of 1064 items. For this comparison, we only included public broadcast news media to compare to the (public) BBC broadcasts (n=202). The BBC report included blogs and the BBC's website which we excluded from this work (n=359).

*Statistical methods.* In order to compare findings from the two reports a z-score test for two population proportions was conducted.

### *Results & Discussion*

Overall, a similarity was found in the scientific field covered, concentration on local research and the level of certainty in the research findings. The most popular topics covered were mostly medicine and the life sciences (70% in the BBC and 42% in Israel), with a focus on research done at local universities (80% in the BBC and 62% in Israel) and about third of the items indicated

uncertainty about the research or findings within the presented item (35% in the BBC and 31% in Israel). The main differences between the countries had to do with the frequency, volume and the agent conveying the scientific information in the science related items coverage.

**How much science is there in the public broadcast news media?** As a first step we examined the prevalence of science items in both countries' news. Two parameters were chosen – the number of science items (frequency) and the air time dedicated to them (volume). The overall frequency of science items comprised a total of 3.6% of the news published in the public broadcast at that time in Israel. These numbers were significantly smaller than the 4.6% reported in Mellor's BBC study ( $p < 0.05$ ). As for the volume (e.g. the amount of air time dedicated to science items), there was a significant difference between 1.7% in the BBC broadcast and the mere 0.24% in the Israeli public broadcast news ( $p < 0.05$ ).

**Who reports on science in the public broadcast news media?** One of the key parameters affecting the frequency of science items in the news is the peoplepower allocated to that means. The number of reporters assigned to STEM coverage may help capture these differences in frequency and volume. At the time of Mellor et al.'s report (2011) there were eleven BBC reporters assigned to science, health, technology and environment coverage. In Israel there was only one science reporter in the public broadcast media at the time of the report (2015). When looking at the productivity of the reporters in charge of bringing science to the news about 66% of the items (with known reporters) were by reporters with science-related beats in the BBC broadcasts. In Israel, about 69% of the items in the public broadcast media (with known reporters) were by the only science reporter present at that time.

**Who talks about science in the public broadcast news media?** Another aspect of science items affecting the public is the presence of scientists in the item as interviewees or providing expert opinions etc.. In the BBC report about 28% of speakers were introduced as professors, of whom 11% were women. In the Israeli public news public broadcast about 19% of the speakers were introduced as professors, but none were women. About 20% of speakers in the BBC news were introduced as Dr. (there is no way to differentiate between PhD and MD degrees), of whom 10% were women. On the Israeli news, about 41% of speakers were introduced as Dr., and women comprised 38% of these speakers.

The last point of comparison was about the main source of information the scientific news item relays on. In Israel, the main source of information contributing to the science news item was the researchers themselves (53%), whereas in the BBC the items were primarily derived from peer - review journals (25%).

	<b>Mellor et al. 2011</b> (N=359)	<b>Barel et al. 2015</b> (N=202)
<b>Frequency of science items*</b>	4.6%	3.6%
<b>Volume of science items</b> *	1.7%	0.24%
<b>Active science reporters</b>	11	1
<b>Productivity of reporters with science-related beats</b>	66% of the items (with known reporters) were by reporters with science-related beats	69% of the items (with known reporters) were produced by one reporter
<b>Main source of information</b>	Peer review 25%	The researchers 53%
<b>Research institutes</b>	80% of the research reported was done in local universities	62% of the research reported was done in local universities
<b>Was uncertainty indicated in the item?</b>	In 35% of the items	In 31% of the items
<b>Main speakers represented in the items</b>	28% of speakers were introduced as professors (11% women)	About 19% of speakers were introduced as professors (none were women)
	20% of speakers were introduced as Dr. (10% women)	41% of speakers were introduced as Dr. (38% women)

**Tab. 2:** Key results summarized. \*The z-score test for the proportion of the two populations were significant at  $p < 0.05$

### *Research limitations*

These two reports had a similar but not identical methodology, a difference that may have affected the findings. To decrease the effect of differences in methodologies we narrowed down the items for the sake of this comparison to be as similar as possible. Another limitation of this work is the emphasis solely on science items in the news and in other genres or media. However, given that

the public's main source of information about science and technology is the news media (Castell et al., 2014; Dgani & Dgani, 2015; National Science Board, 2016; Smith & Faniel, 2014; Yaar, 2006), it represents the information that the majority of the public is exposed to. We concentrated on the broadcast public media because of the constraints, attribution and funding source legislation concerning Israeli public broadcasts as compared to the BBC. The BBC report's new media were not included because the Israeli public broadcast does not have a similar format corresponding to the BBC website.

### *Conclusion*

This comparison attempted to shed a light on the similarities and differences between the characteristics of science items in UK and the Israel public news broadcasts. The UK public news broadcast was represented by BBC news and was based on Mellor et al.'s report. The Israeli public news broadcast was represented by the results from the Barel et al. 2015 report. The BBC news items were used as a representative of an institutionalized science communication culture (or "consolidated" according to Mejlgaard et al., 2012), to highlight the differences between it and a "fragile" non-institutionalized science communication culture. The institutionalization of science in the public news media appears to account for the resources allocated to producing science items in the news. This can manifest as the number of reporters assigned to science coverage (BBC – 11 designated reporters, Israel only one). Another form of resource allocation is the frequency and air time dedicated to science items. If science is perceived as an integral part of news reporting, both the frequency and volume dedicated to science should be larger. The constant presence of science in the public broadcast news positions science topics in the public's agenda (McCombs & Shaw, 1972).

In conclusion, the Israeli broadcast public news media has a lot more to learn from the UK's BBC as an institutionalized model for science and as a science communication culture.

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