

RESEARCH ARTICLE

Functional informality: crafting social interaction toward scientific productivity at the Gordon Research Conferences, 1950–1980

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Abstract

In the early and mid-twentieth century, scientific conferences were a popular tool to establish communication between scientists. Organisational efforts, research and funds were spent defining what makes a productive and successful scientific gathering. A unique example of this was the monitoring and evaluation system of the Gordon Research Conferences (GRCs), which conceptualized informal communication in small, specialized meetings as the best method of advancing cutting-edge research. Studying the detailed monitoring reports of the sessions and the evaluation forms filled by the participants, this paper explores how a concrete format of scientific knowledge production and identity formation was created and reproduced. The normative assessment of the participants' interactions is examined in the contexts of (a) their professional affiliations, (b) the conference presentations and discussions and (c) activities related to play. The study of the GRCs exemplifies how scientists actively conceptualised characteristics like academic affiliation, manners, leisure practices and social categories such as gender as ways to understand, describe and measure how knowledge is best produced and transmitted, turning the conferences into a fertile ground for meta-scientific reflections.

By the mid-twentieth century, large international conferences were quickly becoming standard features of scientific life in most disciplines. But criticism of them was also rising. While these gatherings successfully brought together thousands of scientists from faraway places and got them acquainted with broad overviews of the developments of their field, they seemed less conducive to advancing cutting-edge research. Presentations typically reported already published results and hence produced few new ideas, while the conferences' broad scope was ill-suited for specialized discussions. Smaller meetings might offer an alternative. If they could gather expert participants around focused topics, they could be a more organic part of scientific research practice. Yet it was still an open question what specific conference format could achieve these ends.

Searching for the right meeting format was part of a more general concern, as Jessica Reinisch shows in her contribution to this special issue. Beginning in the interwar period, conferences became conceptualized as forms of communication and 'techniques' for creating international cooperation. Internationalists around the League of Nations and later the United Nations developed a whole genre of literature dealing with 'the conference

method'. At the same time, scientists were experimenting with their own types of gatherings, also asking what conference formats gave rise to what ways of communicating and creating ideas. One set of answers was produced by the Gordon Research Conferences (GRCs), a famous series of small, focused meetings, first launched by Johns Hopkins chemical educator Neil Gordon in the 1930s and continuing after his death in 1949 until today.

GRCs were US-based expert gatherings on specific, often chemistry-related, subjects that soon became very popular for their ambition to foster 'a free and informal exchange of ideas' on cutting-edge topics, while allowing 'considerable time for recreation'.¹ Their standardized brand image, including remote locations, small numbers of expert attendants, and informal discussions on new material, clearly set them apart from the pre-existing large conferences. Due to the innovative character of the ideas to be discussed in the GRCs, there were strict rules of secrecy, forbidding the participants to take pictures and notes during the sessions. Both GRC organizers and participants regularly reflected on how to combine leisure and protocol, and, more generally, what type of interaction would be most conducive to advancing science.

Historical works on scientific conferences have not systematically studied their formats. Instead, they have focused on issues like the relationship between conferences and the creation of an international scientific community and the participation of conferences in creating and negotiating scientific standards and disciplines.² Historians have, however, analysed conventions of communication in interactions other than conferences and highlighted their importance in defining the norms of which identities are compatible with scientific practice and what scientific knowledge is.

Understanding scientific communication, often characterized by competition and controversy, requires an exploration of scientific manners in dispute based on culturally dependent notions of politeness or antagonism. Steven Shapin has studied the conventions of meeting at seventeenth-century English laboratories and lecture halls and stressed the importance of gentlemanly civil conversation and etiquette as a core part of truth-making communicational practices.³ Building on this, Raf de Bont has examined the various coexisting manners in dispute and their respective contexts in nineteenth-century Britain and Germany, showing that civility and conflict were employed to distinguish 'the moral and epistemic ideals of science from those of other spheres' while setting

¹ 'Gordon Research Conferences', *Chemical and Engineering News* (1948) 26(13), p. 932.

² Anne Rasmussen, 'Jalons pour une histoire des congrès internationaux au XIX^e siècle: Régulation scientifique et propagande intellectuelle', *Relations internationales* (1990) 62, pp. 115–33; Rasmussen, 'Le travail en congrès: Elaboration d'un milieu international, 1875–1900', in *Histoire de l'Office du travail (1890–1914)*, Paris: Syros, 1992, pp. 119–34; Rasmussen, 'Sciences et sociabilités: Un "tout petit monde" au tournant du siècle', *Bulletin de la Société d'histoire moderne et contemporaine*, (1997) 3–4, pp. 49–57; Rasmussen, 'L'hygiène en congrès (1852–1912): Circulation and configurations internationales', in Patrice Bourdelais (eds.), *Les hygiénistes: Enjeux, modèles et pratiques (XVIII^e–XX^e siècles)*, Paris: Belin, 2001, pp. 213–39; Brigitte Schroeder-Gudehus, (1990) 'Les congrès scientifiques et la politique de coopération internationale des académies des sciences', *Relations internationales* (1990) 62, pp. 135–48; Nico Randerad, 'The International Statistical Congress (1853–1876): knowledge transfers and their limits', *European History Quarterly* (2011) 41(1), pp. 50–65; Ken Alder, 'Scientific conventions: international assemblies and technical standards from the Republic of Letters to global science', in Mario Biagioli and Jessica Riskin (eds.), *Nature Engaged: Palgrave Studies in Cultural and Intellectual History*, New York: Palgrave Macmillan, 2012, pp. 19–39; Cyrus Mody, 'Conferences and the emergence of nanoscience', in Barbara Harthorn and John Mohr (eds.), *The Social Life of Nanotechnology*, New York: Routledge, 2012, pp. 52–65; Louise Miskell, *Meeting Places: Scientific Congresses and Urban Identity in Victorian Britain*, London: Routledge, 2013.

³ Steven Shapin, *A Social History of Truth: Civility and Science in Seventeenth-Century England*, Chicago and London: The University of Chicago Press, 1994; Shapin, 'The house of experiment in seventeenth-century England', *Isis* (1998) 79(3), p. 373–404.

the boundaries of who was considered to be ‘a real man of science’.⁴ These works draw direct connections between norms of interaction, the physical–social relationships of scientific gatherings, knowledge legitimization practices and the demarcation of scientific identity. All of these elements are also manifest within conferences, and the interplay between them is interpreted, stabilized and regulated through conference formats.

Like civility and conflict, secrecy and openness have been studied for their rhetorical, performative and symbolic role in setting boundaries of access to scientific knowledge.⁵ Koen Vermeir has conceptualized them as complementary, ‘gradational categories’ of scientific communication associated with different degrees of competition and collaboration. Secrecy and openness function simultaneously as norms which define practices and as components of practices themselves.⁶ Mario Biagioli, on the other hand, has discussed secrecy as not a value but an ‘inescapable predicament of the process of making knowledge public and of establishing its author’s priority’.⁷ As indicated by the case of the GRCs, free, informal sharing of cutting-edge knowledge can coexist with strict rules of secrecy within conferences. Unpacking their relationship allows for a deeper understanding of how conference communication can participate in bringing together highly competitive scientific communities, such as the academic and industrial chemical communities of the twentieth century.

Communicational conventions are, therefore, closely related to epistemic virtues and vices, which articulate ‘performance standards, scientific personae, or ideals of scientific selfhood’.⁸ Various collective cultural images, such as subdisciplinary distinctions and nationalized characteristics, shape epistemic virtues and vices. These ideas are crystallized in historically contingent cultural shared identities, physiognomies or personae that individual scientists rely on and reproduce.⁹ Herman Paul’s work on late nineteenth-century German physics and chemistry identifies the use of epistemic virtues by historians and scientists as a way of critically reflecting on opposing ideas about the practices, goals and priorities of scholarly work. A relevant example surviving into the twentieth-century conference discussions of chemistry is the attribution of scientific identities and behaviours to researchers based on whether they practised pure or applied chemistry.¹⁰

⁴ Raf de Bont, ‘Writing in letters of blood: manners in scientific dispute in nineteenth-century Britain and the German lands’, *History of Science* (2013) 51(3), pp. 309–36, 328.

⁵ David Hull, ‘Openness and secrecy in science: their origins and limitations’, *Science, Technology, & Human Values* (1985) 10(2), pp. 4–13; Michael A. Dennis, ‘Secrecy and science revisited: from politics to historical practice and back’, in Ronald E. Doel and Thomas Söderqvist (eds.), *The Historiography of Contemporary Science, Technology, and Medicine*, London: Routledge, 2006, pp. 188–200; Koen Vermeir, ‘Openness versus secrecy? Historical and historiographical remarks’, *BJHS* (2012) 45(2), pp. 165–88.

⁶ Vermeir, op. cit. (5).

⁷ Mario Biagioli, ‘From ciphers to confidentiality: secrecy, openness and priority in science’, *BJHS* (2012) 45(2) pp. 213–33, 214.

⁸ Jeroen van Dongen and Herman Paul, ‘Introduction: epistemic virtues in the sciences and the humanities’, in Van Dongen and Paul (eds.), *Epistemic Virtues in the Sciences and the Humanities*, Cham: Springer International Publishing, 2017, pp. 1–10, 2.

⁹ Lorraine Daston and H. Otto Sibum, ‘Introduction: scientific personae and their histories’, *Science in Context* (2003) 16(1–2), pp. 1–8; Mineke Bosch, ‘Persona and the performance of identity: parallel developments in the biographical historiography of science and gender, and the related uses of self narrative’, *L’Homme* (2013) 24(2), pp. 11–22; Pieter Huistra and Kaat Wils, ‘The exchange programme of the Belgian American Educational Foundation: an institutional perspective on scientific persona formation (1920–1940)’, *BMGN: Low Countries Historical Review* (2016) 131(4), pp. 112–34; Paul Herman, ‘What is a scholarly persona? Ten theses on virtues, skills and desires’, *History and Theory* (2014) 53(3), pp. 348–71; Kirsti Niskanen, Mineke Bosch and Kaat Wils, ‘Scientific personae in theory and practice: ways of creating scientific, scholarly, and artistic identities’, *Persona Studies* (2018) 4(1), pp. 1–5; Paul Herman (ed.), *How to Be a Historian: Scholarly Personae in Historical Studies, 1800–2000*, Manchester: Manchester University Press, 2019.

¹⁰ Herman Paul, ‘Weber, Wöhler, and Waitz: virtue language in late nineteenth-century physics, chemistry, and history’, in Van Dongen and Paul, *Epistemic Virtues in the Sciences and the Humanities*, op. cit. (8), pp. 91–

This paper seeks to take these approaches to conventions of interaction and communication in science to the setting of scientific conferences. Erving Goffman has called week-long conferences ‘interactional mastodons that push to the limit what can be called a social occasion’.¹¹ His notion of social occasion highlights that conferences are composed of both material and symbolic aspects, combined and recombined in different ways, allowing the creation of multiple – even contradictory – social realities during the same conference. Conference formats are developed to manage the diversity of etiquettes and identities brought on site by their participants by incorporating them into the conference structure. At the same time, they create ‘a distinctive ethos, a spirit, an emotional structure’, serving their own epistemic and social goals and projecting it onto their participants.¹² They are, as a result, a unique site for exploring norms of communication and personae related to ideas of scientific advancement.

The organization of GRCs makes them a particularly useful case study of conference formats as epistemic norms. The organizers’ approach articulated concrete principles of how scientific knowledge is best communicated in a conference setting and instructions about their implementation. This approach was developed partly based on the beliefs of the GRCs’ inspirer, Dr Neil Gordon, and on a progressively more standardized evaluation and monitoring system, which allowed the organization to learn from attendees’ experiences and use them to make changes. The numerous evaluation forms sent to attendees to evaluate the GRC they had just attended can hence serve as sources both on their experiences and expectations and on the organizers’ own implicit norms and assumptions as to what aspects of meeting formats mattered and why. Both the forms and extensive correspondence about meetings’ formats are kept at the archives of the Science History Institute and lie at the basis of the following analysis.

Using the case study of the GRCs, I will investigate how scientists actively conceptualized characteristics like academic affiliation, manners and leisure practices and social categories such as gender as ways to understand, describe and measure best practice in the production and transmission of knowledge, turning the conferences into a fertile ground for meta-scientific reflections. To highlight the unique role of conferences in the emergence and distribution of this informal sociology of knowledge, I will discuss how such ideas become attached to specific settings, objects or persons within conferences. In search of how the brand image of the GRCs was standardized, I will follow the creation of the GRC monitoring and evaluation system and reflect on the advantages and limitations of using evaluation forms as sources. I will then introduce the main categories of participants defined in the evaluation forms and analyse their expected behaviours in relation to their perceived conference roles. Finally, I will discuss the preferred interactions and etiquettes that the evaluations associated with (a) the presentation of papers and the open, informal discussions and (b) the social activities associated with play.

The evaluation forms: measuring communication

The GRC organization was dedicated to evaluating and improving its work from the very beginning. Taking the form of letters written by the attendees and directed to Neil Gordon, these informal evaluations included personal comments and acknowledgements of the conferences’ content, form and facilities. They were based on the ‘philosophy’ of

107; Paul, ‘German thoroughness in Baltimore: Epistemic virtues and national stereotypes’, *History of Humanities* (2018) 3(2), pp. 327–50.

¹¹ Erving Goffman, *Interaction Ritual: Essays on Face-to-face Behavior*, New York: Pantheon Books, 1982, p.1.

¹² Erving Goffman, *Behavior in Public Places: Notes on the Social Organization of Gatherings*, New York: Free Press of Glencoe, 1963, p. 19.

the conferences appearing in their early promotional material. In this material, as well as in retrospective accounts created for the celebration of the conferences' anniversaries, Dr Neil Gordon was presented as the central figure setting the conferences' practical foundations, but also their fundamental ideas about knowledge transmission, the promotion of chemistry and education.¹³

'A mediocre scientist, but a man full of ideas for the advancement of science', Gordon was concerned about the future of scientific research.¹⁴ Unsatisfied with the size and format of his contemporary scientific conferences, he believed that over-specialization would inevitably create communicational problems between different disciplines, inhibiting the advancement of science. As a result, improving the exchange of ideas between scientists was seen as the best strategy to stimulate research. Large gatherings were, in his opinion, a non-suitable form of communication due to their focus on formal presentations and established results, conflicting interests among scientists and the inevitable presence of outsiders, 'who lacked the deep insight and true interests of scientists'.¹⁵ Therefore selective and precise ideas of who should be excluded from scientific communication were essential to the GRC philosophy.

After taking over the JHU summer sessions, a pre-existing local annual conference format, he divided the sessions into concrete disciplinary topics and encouraged the attendance of governmental and industrial chemists. In 1934, the sessions moved to Gibson Island, a private island located on the western shore of the Chesapeake Bay, and by 1938 they had evolved to a more standardized series of conferences called the Gibson Island conferences. After Gordon's death (1949), the GRCs were renamed to honour him and moved to several private high schools in New Hampshire, such as Brewster Academy, New Hampton and Tilton School. They retained their small-scale research focus and held conferences for each important chemical field, repeated annually and biannually. Participation was by invitation only, and the people invited were meant to be the elite of their fields and to present cutting-edge unpublished work. GRCs were self-declared to be international, even though their location predominantly attracted US scientists. Including a regulated number of foreign scientists of specific backgrounds and expertise was among the organization's priorities.

Scientists were filtered through an invitation process that first gave them insider status before detaching them from their everyday comfort, interests, activities and sometimes even clothes, to focus their attention on one activity: informal discussion. Disconnecting from the outside scientific world was seen as ensuring more freedom in exchanging ideas and was also compatible with the conferences' policy of secrecy. Recordings and photographs of the presentations were not permitted, and it was made clear that no publications were meant to occur directly from the conferences.

Different organizers have attributed the longevity and continued success of the Gordon Conferences to a simultaneously flexible and standardized approach to scientific gatherings. They were flexible in terms of content, as new conference topics constantly emerged and older ones were dropped depending on the developments in each field and standardized due to the relatively fixed locations, numbers and modes of participation. Their much-celebrated informality and freedom are still presented as the GRCs' prominent

¹³ Scrapbook (loose material), 1941–1981, articles on the activities of the Gordon Conferences, Records of the Gordon Research Conferences, Series I, Box 1, Folder 7, Othmer Library, Science History Institute, Philadelphia.

¹⁴ Quoted in Carlyle B. Storm, 'The Gordon Research Conferences: a brief history, GRC: 50 years in New Hampshire', 8 August 1997, Records of the Gordon Research Conferences, Series I, Box 5, Folder 6, Othmer Library, Science History Institute, Philadelphia, p. 4.

¹⁵ 'The Gordon Research Conference 1931–1956: A quarter century on the frontiers of science', 27 December 1956, Records of the Gordon Research Conferences, Series III, Box 19, Folder 19.2a, Othmer Library, Science History Institute, Philadelphia.

desirable characteristics. Terms like 'informality' and 'free discussion' have a situational character which calls for a close examination of specific interactions, settings and atmospheres created in the conference spaces. Since these modes of communication are linked to the quality of sharing and producing scientific knowledge, unpacking them is essential to understand the functions and continuity of this conference format.

Due to the diligent and goal-oriented organization of the GRCs, there were attempts to capture and decompose these situational moments to their constitutive elements. Evaluation forms were distributed to the participants which actively sought from them descriptions of instances during the conference. At the same time, members of the organization took over the role of monitors and created reports to assess the conferences' scientific and interpersonal value. This constant evaluation indicates that the Gordon Research Conferences format outlined concrete ways in which the participants were meant to perform. Monitors and participants expressed clear expectations about the presenters, the pace, the content and the type of the audience's responses and the behaviours developed during the social activities. Language, attitude, attire and atmospheres shaped within specific contexts were assessed based on what makes a good conference and enhances scientific knowledge. Therefore the evaluation forms express an informal sociology of scientific knowledge, making explicit connections between social interactions and scientific knowledge production.

The evaluation system became progressively more standardized, taking the form of long yearly reports. Responsible for the evaluation's standards, variables and implementation and for the changes adopted based on the assessment was the Scheduling and Evaluation Committee. The committee was assisted by Gerald Tallman, associate professor at the MIT School of Industrial Management. Tallman was recommended as a suitable collaborator because of his experience as head of the Sloan Fellowship Program at MIT, exposing small groups of industrial scientists to their senior colleagues using conference techniques. The evaluation results were used for deciding the continuation or discontinuation of conferences and the selection of the participants and chairs. In addition, as Tallman suggested, 'a probable by-product would be that awareness of the research effort itself might cause conferees to feel that a pretty good job of planning and administration was being done'.¹⁶ Informal letters were still part of the reports, while new data were collected through questionnaires and individual interviews with the participants, and the monitors adopted a quantitative uniform ranking system. The directors and the Board of Trustees chose the monitors due to their familiarity with several scientific fields and were encouraged to attend the same conference over a more extended period to obtain historical reference points.¹⁷

The GRC administration was interested in finding out the following: what was the quality of the scientific content of the presentations? How was the discussion inside and outside the meetings? How efficient was the management of the sessions? What was the general atmosphere of the conference? The detailed descriptions, personal tone of the monitors and quotations from the participants referring to material and sensory components are some crucial features of the reports, making them a rich source for examining the conferees' behaviours and the monitors' attitudes. Attendance was registered in comparison to previous years, and the attendees were separated into categories based on the participants' nationality, professional background and role in the conference: foreign or non-American scientists, industrial/academic, wives and non-residents, the participants

¹⁶ Gerald Tallman to George Parks, 14 October 1957, Records of the Gordon Research Conferences, Series III, Box 43, Folder 1, Othmer Library, Science History Institute, Philadelphia.

¹⁷ Frank Fisher, evaluation of certain Gordon Research Conferences, Records of the Gordon Research Conferences, Series III, Box 28, Folder 6, Othmer Library, Science History Institute, Philadelphia.

who chose accommodation outside the conferences' premises. Despite the oddity that some of these categories might present at first glance, they are further explained in the evaluation reports.

Overall, the committee's discussions indicate a reflexive approach to the evaluation reports and an understanding that the reference points used 'to measure the worth of conferences in terms of the Gordon Research Conferences objectives are by necessity quite subjective and to some extent transient'.¹⁸ This reflexivity, however, did not extend to their core ideas about the ideal conference format, informality, free discussion, elite participation and secrecy, which remained unchanged throughout the years. The GRCs' concrete approach to how scientific knowledge is best communicated was embedded in the evaluation forms and frames all the interactions developed in the conferences. In addition, it had a key role to play in the company's mythmaking, surrounding Neil Gordon's persona and a narrative of the GRCs' innovative role in the conference landscape of the early twentieth century.

As a result, the data from the evaluation forms, while expressing broader ideas about norms of scientific communication and the personae of the people manifesting these norms, are inseparable from the conference method and goals of the GRC organization. The conference method is the adopted lens through which actions are examined, and attention is given to specific identity characteristics, thoughts and categories of action, while others are not represented. This becomes more evident in the fact that the language, keywords and categories of the evaluation forms and the promotional material of the GRCs are reproduced in the anonymous evaluation forms and the informal letters filled in and written by the participants.

The participants: defining elite scientists

A primary way of categorizing the GRCs' participants was their contribution to the conferences' purpose: the free exchange of ideas for advancing science. The grouping was done both by the monitors and by the participants, who sometimes modified the organization's categories to reflect their opinions regarding successful conferencing. The number of participants for each group was registered, indicating that their embodied presence was seen as crucial for a good conference and that there was an ideal balance of quantitative representation. The balance was usually maintained by the Scheduling and Selection Committee through the selection of participants.

Participants were divided by the organization into academic, governmental and industrial researchers. Attitudes were attributed to these categories, connecting the content and quality of the scientists' research to their affiliations. Industrial scientists were the epicentre of controversy in the evaluation reports. They were perceived as technology-oriented scientists who attended to learn as much as they could about the materials, technology and art of the presenters' research and asked many content-related questions. This practice was very often criticized or surrounded by disbelief in the eyes of the rest of the participants due to their 'reticence', as they 'tried hard not to say too much' and instead made 'some rather obvious remarks'.¹⁹ The assumed reason for this attitude was that their companies' policies did not allow them to present unpublished research and sent them to the GRCs only to gain inspiration from other people's work

¹⁸ Minutes of the meeting of the Committee on Selection and Scheduling, 6 December 1957, Records of the Gordon Research Conferences, Series III, Box 43, Folder 1, Othmer Library, Science History Institute, Philadelphia.

¹⁹ Annual evaluation report, participants' comments, inorganic chemistry, 1958, Records of the Gordon Research Conferences, Series VI, Box 126, Folder 1, Othmer Library, Science History Institute, Philadelphia; annual evaluation report, monitor's report, adhesion, 1970, Records of the Gordon Research Conferences, Series VI, Box 127, Folder 2, Othmer Library, Science History Institute, Philadelphia;

without contributing new ideas. Their presentations were criticized as outdated and only made available when their ‘company was no longer interested in the process’.²⁰

Such an attitude created tensions with the rest of the participants, who often demanded either the inclusion of more academic scientists or making the substantial participation of industrialists more obligatory. In one of the evaluation forms, academic and industrial scientists are referred to as ‘scientists’ and ‘pragmatists’, reflecting how their approaches to research, one more philosophical and the other more practical, were framed by their affiliations.²¹ It is worth pointing out that a more substantial industrial presence characterized the GRCs due to the ability of industrial scientists to receive more funding for conference participation. In addition, the GRCs received industrial sponsorship. Discussions of the Evaluation and Selection Committee indicate that it was ‘felt that there is too much of a “reward” idea in sending sponsor representatives ... and that this should be drastically altered to try and secure outstanding scientists’.²² Governmental participants were registered but not discussed, and their participation was usually much lower than that of academic or industrial scientists.

Seniority seemed to be another categorization related to the researcher’s role in the conference. Despite the structural hierarchy between seniors and early-career scholars, their presence at the GRCs was also desired in a balanced way. Young scholars were seen as giving more interesting presentations than senior scientists, who sometimes presented published material or recycled presentations. Inviting them was increasingly treated as necessary and special funding was reserved to allow them to pay their expenses. The interactions between the senior and younger scholars were also characterized by expectations connected to the advancement of the careers of the latter, as well as the reproduction of the conferences and the professional community they represented. Fred Basolo, the organizer of several conferences in inorganic chemistry, remembered,

To get an academic position after completing their research, students go to a Gordon Conference and meet someone from a university that has an opening for new faculty ... In conversation, the older person in the department can find out what the younger person is interested in and capable of. I helped two or three of my students over the years exactly that way ... the Gordon Conference is a place of opportunities.²³

It has already been mentioned that inviting ‘selected foreign specialists’ was very important because their presence ‘increased the value of the conferences’.²⁴ The GRC organization ensured their attendance through personal invitations, sponsorships and the management of the scientists’ travelling and visa arrangements. Rather than being perceived as national representatives of their country diversifying attendance at the conference, foreign scientists were seen as individual experts in cutting-edge fields, offering new, unique contributions to the sessions. The national component of their identities was only brought up in relation to the concentration of scientific advancements in the laboratories of their own countries. As Paul Yergin, chairman of the 1967 Gordon

²⁰ Annual evaluation report, monitor’s report, inorganic chemistry, 1965, Records of the Gordon Research Conferences, Series VI, Box 126, Folder 5, Othmer Library, Science History Institute, Philadelphia.

²¹ Annual evaluation report, participants’ comments, inorganic chemistry, 1958, op. cit. (19).

²² Minutes of the meeting of the Committee on Selection and Scheduling, op. cit. (18).

²³ Fred Basolo, interviewed by Arthur Daemrich and Arnold Thackray at Northwestern University (Evanston, IL), 27 September 2002, Science History Institute, Philadelphia, n.d., Oral History Transcript 0264, at <https://digital.sciencehistory.org/works/5425kb591>.

²⁴ George Parks to John Hayes, 8 December 1954, Records of the Gordon Research Conferences, Series III, Box 28, Folder 8, Othmer Library, Science History Institute, Philadelphia.

Conference on Photonuclear Reactions, stated in his invitation directed to Soviet scientists,

In the past years when these conferences have been held (since about 1951 ...) the participation of scientists from the U.S.S.R. has been of great value. Particularly in more recent years the very great expansion of photonuclear research in the U.S.S.R. has made it most urgent that adequate representation from the Soviet laboratories be available at the conferences.²⁵

As a result, the invitations of foreign scientists depended on the organizers' perception of which scientists were internationally acknowledged and on their own personal networks. The majority of them came from Western European countries (mostly Germany and the UK), with smaller representation from the Soviet Union and Japan.²⁶ The organizers' emphasis on the professional and scientific status of foreign scientists pushed aside any discussions on the role of global politics in the geographical distribution of scientific innovation. At the same time, it didn't problematize the invitation of scientists from a mostly Western scientific community, which was taken for granted as the one offering the most value to the participants of the GRCs.

The inclusion of female scholars appeared to be treated similarly, but their attendance was not measured, and they were hardly even mentioned in the evaluation forms or monitor reports. Robert Parry recalled how women scientists were included in the early GRCs:

It never became a formal issue. But, you see, it was becoming something that universities were talking about. Someone said, 'We need to invite this lady to give a talk. She is doing good work here.' That was the way it started. People never said, 'We've got to get a woman.' We have always felt, 'Here is good work being done by this chemist who just so happens to be a woman.'²⁷

The organization chose, therefore, to emphasize as a selection criterion the scientific achievements of the scholar and their ability to fit the organization's standards of a good scientist. Such emphasis allowed them to employ these established standards rhetorically to avoid reflecting on the issues of gender bias and inclusivity in terms of nationality or race – issues which were very much affecting the composition of the GRCS, as indicated by the silent absence of female scientists and the reproduction of mostly white, male-dominated conferences all throughout the 1950s, 1960s and 1970s.

As can be seen, participants at the GRCs were categorized based on their identity as science practitioners. The scientists' communicational styles, which, according to the monitors, originated in their epistemological and professional backgrounds, manifested in their interactions in this in the form of personae that were either compatible or incompatible with the goals of the GRCS. The two main sets associated with distinct approaches to science were the reticent, practical approach of the industrialists contrasted with the theory-, education- and sharing-oriented approach of the academic scientists. Likewise, the foreign, early-career and senior scientists were all seen as having a background of

²⁵ Paul Yergin to Academician Keldysh, 9 March 1967, Records of the Gordon Research Conferences, Series III, Box 28, Folder 8, Othmer Library, Science History Institute, Philadelphia.

²⁶ Foreign visitor lists for the years 1956, 1958–60, 1963, Records of the Gordon Research Conferences, Series III, Box 28, Folder 8, Othmer Library, Science History Institute, Philadelphia.

²⁷ Parry, Robert W. (Robert Walter), interviewed by Arthur Daemmrich and Arnold Thackray at University of Utah on 19 July 2002, Science History Institute, Philadelphia, n.d., Oral History Transcript 0257, at <https://digital.sciencehistory.org/works/4j03d083g>.

behaviours and characteristics related to their position in the academic world. Youth and enthusiasm, experience and authority and the inclusion of foreign and female scientists could be seen as both useful and disruptive for the model of communication suggested by the GRCs, depending on whether they appeared to balance each other out.

The behaviours that were becoming the focus of the evaluations and the associations created between them and knowledge production were drawn from the evaluators' empirical observations and reflective of contemporary norms and concerns in scientific practice. The social realities of the industrial sponsorship of research, the career hierarchies between early- and late-stage scholars, and the inclusion and exclusion of scientists due to geography and gender were brought forward as relevant issues for scientific communication at conferences. However, their power structures were not problematized, leading to an affirmation of the status quo instead of its disruption.

Scientific sessions: collaboration or competition?

All the speakers were lined up at the front of the room to be shot at. The firing fizzled.²⁸

The format of the presentations varied depending on the organizational initiatives taken by the chairs. Shorter talks of ten minutes were combined with longer one-hour lectures and time reserved explicitly for open discussion. Some presentations were more structured, using slides and handouts, while others were very informal, gaining the form of discussion from the very beginning. Formality was not seen as desirable because it limited the potential for open discussion, while the originality of the material presented was of the utmost importance. Fierce criticisms were directed at presenters who reused their presentations, sometimes including even the same jokes.²⁹ Overviews of the discoveries in a particular field's published material and technical demonstrations were also rejected as non-frontier contributions.

To ensure the circulation of unpublished material, particularly in the early years of the GRCs, secrecy, sharing and trust all became essential categories used to evaluate and shape the participants' interactions. Norman Hackerman, a long-time attendee of the Corrosion conferences, recalled,

You'd come, and you'd talk – no attribution, no copying, and no pictures. You just took away what you remembered of it and used it in your own work ... I don't think it works quite the same way now. I think it's a much more normal kind of conference conversation – not the kind where you let it all out. Of course, you know your ideas and findings are not going to be stolen, used, or whatever. Gordon's idea, I think, was originally just that – talk and walk away ... Researchers described things the way you would use your hands to describe a gizmo. So, there must have been enough insight transferred to permit me to understand and reproduce the idea.³⁰

Interruptions, lively questions and observations by audience members were accepted as compatible with the presentations of unpublished and unfinished papers. Hackerman's

²⁸ Annual evaluation report, monitor's report, inorganic chemistry, 1975, Records of the Gordon Research Conferences, Series VI, Box 127, Folder 7, Othmer Library, Science History Institute, Philadelphia.

²⁹ Annual evaluation report, monitor's report, inorganic chemistry, 1967, Records of the Gordon Research Conferences, Series VI, Box 126, Folder 7, Othmer Library, Science History Institute, Philadelphia.

³⁰ Norman Hackerman, interviewed by Arthur Daemmrich and Arnold Thackray in Chemical Heritage Foundation on 12 March 2002, Science History Institute, Philadelphia, n.d., Oral History Transcript 0237, p. 4, at <https://digital.sciencehistory.org/works/1831cm03g>.

comparison of the GRCs with contemporary conferences showed that they were conceptualized as a direct and unofficial system of collaborative peer review:

The conversation was not reviewed either. You had to take your chances of being misinformed. So, you had to depend on your own gut to tell you what to do, but that was all right ... At present, the difference is that there's nobody actually discussing what the person's lecturing about. I think the discussion was a form of peer review, which did exist in the 1950s and 1960s, but doesn't know.³¹

The tension and complementarity between secrecy and openness during the sessions indicate how the GRCs' organizers conceptualized collaboration and competition as a spectrum. Secrecy was a practice compatible with an already established system of competition, patent making and priority, which defined the career advancement of chemists in the early and mid-twentieth-century academic and industrial labour market. Regulating how freely ideas were copied was employed to establish trust between the participants, softening the tensions of that context. However, secrecy was also an epistemic norm, showcasing what was seen as better communication and knowledge making inside small conferences: informal, empirical, tacit ways of communicating research creating an informal peer-review system.

Secrecy, both as a practice and as a norm, was connected to the scientific personae of the academic and industrial scientists evoked in the evaluation forms. By being reticent, due to the intensive competition of their professional background, industrial scientists were practising secrecy to a higher degree than that desired by the conference organization, thus undermining the free exchange of ideas. At the same time, due to their perception as more likely to use ideas from academic scientists for their company's benefit, secrecy was necessary as an institutionalized aspect of the conferences.

Discussion time was not always a pleasant experience for those presenting. Robert Parry recalls his first presentation:

There was quite a lot of evidence supporting my theory, but my presentation was still all speculation, and the other researchers ate me alive ... Thus, the first conference that I attended was not a pleasant experience, but that was my fault ... I talked for a little over an hour. After that I didn't talk; they quizzed me. They persecuted me. [Laughter]³²

Audience engagement with the presentations was, therefore, meant to be intense, especially when they could trace weaknesses in the process of reaching conclusions. Intense questions and comments would sometimes incite conflict or aggression, which were not seen as unacceptable or discouraging, even by the people receiving them. Instead, they were perceived as necessary to motivate scientists to present more sound research. When the questions were not aggressive, the conferences were sometimes described as dull because confrontation was perceived as generating momentum for the discussion.

Nevertheless, it is essential to point out that not all types of confrontation and intensity were viewed as favourable for knowledge exchange. The most common attitudes singled out as unfavourable were arrogance and the discussion's monopolization by one or a few participants. Personal attacks or 'occasional uncalled for remarks by self-important conferees, who felt their conclusions were being doubted', were considered self-promotion and self-gratification rather than honest attempts at harsh but justified

³¹ Foreign visitor lists for the years 1956, 1958–60, 1963, op. cit. (26).

³² Hackerman, op. cit. (30).

criticism.³³ Intense commentary, in order to be effective, needed to be spread all around the session room. Many participants mentioned a tendency to have a focused group of private discussions in the front rows of the conference room, reducing the participation and audibility of the rest of the audience. When the chair could not spread the discussion, the audience restored the spatial and auditory balance of the discussion through vocal complaints.

Manners in dispute, and the role of heated debate in scientific encounters, were, therefore, a core component of the GRC's unofficial sociology of knowledge. Different views on the desired balance between controversy, honesty and politeness during scientific discussions and disagreements were connected to epistemic meanings of performances and codes of conduct. Unlike the greater politeness-, self-control- and earnestness-oriented values dominating the nineteenth-century discourses in de Bont's work, the GRCs promoted intense, disruptive, direct and often unpleasant conflict as a way to generate productive discussions during the sessions.³⁴ Conflict, loud interruptions and a jovial attitude towards disagreements, the playful competition often associated with masculinity, were conceptualized as part of the broader notion of informality characterizing successful sessions. As a result, they set the behaviour standards for participants able to stimulate and profit from this unofficial peer review, sidelining the contributions of those who were not socialized to interact in this way.

Leisure: building muscles far away from family

In contrast to the desirable informal atmosphere permeating the discussions, the organizers and participants displayed an open distrust of, or even contempt for, what they identified as a social and vacation atmosphere. For some, this atmosphere, 'based primarily on recreation and celebration, would seem to be a sign that the Conference is not fulfilling the purpose originally intended', while others saw it as 'the greatest danger to the future of the Conferences'.³⁵ Even though the terms 'social' and 'vacation atmosphere' often appear in the evaluation forms, there are no precise descriptions of what the terms mean. They usually refer to the afternoon free-time period, the Snack Bar, where the conferees spent their breaks between the presentations, meals and dinner. Socially minded groups were described as loud, drinking, playing poker and having conversations about non-scientific things, such as jazz music or politics.

However, the most distinctive characteristic of this atmosphere was the presence of the scientists' wives. Attending family members at scientific conferences was not an uncommon phenomenon around the middle of the twentieth century. Large international gatherings even included special social programmes, called the ladies' programmes, devoted to the entertainment of the scientists' families. The choice to actively include them served two critical functions related to scientific community building. On the one hand, it facilitated the continuation of a predominant conceptualization of the scientific community: a community not limited to scientists but extended to include their families. The spouses of chemists were seen as indispensable; therefore unique organizational and material resources were made available to entertain them during the scientific sessions. Making conferences a pleasant and busy experience made conference participation more attractive, while it ensured that boredom would not have disruptive effects on the rest of the

³³ Annual evaluation report, monitor's report, inorganic chemistry, 1967, op. cit. (29).

³⁴ De Bont, op. cit. (4).

³⁵ Annual evaluation report, participant's comments, elastomers, 1958, Records of the Gordon Research Conferences, Series VI, Box 126, Folder 1, Othmer Library, Science History Institute, Philadelphia; annual evaluation report, 1968, Records of the Gordon Research Conferences, Series VI, Box 126, Folder 8, Othmer Library, Science History Institute, Philadelphia.

activities. On the other hand, the ladies' programme allowed the spouses to create their own social circles and conference-based friendships separately from their husbands' networking during the scientific sessions. It opened more socialization paths, bringing together scientists who would not typically get acquainted with each other.

The presence of wives and off-session socialization were conceptualized very differently by the GRC administration. Wives were blamed for the loud and unfocused discussions during the breaks and meals, replacing the desired discussions on scientific topics. Monitors and attendees consistently commented on their presence over the years, suggesting 'eliminating' them, setting a limit on the number invited, or even having dinner and lunch at different tables from their husbands.³⁶ Norman Hackerman, a long-time attendee of the Corrosion GRCs, remembers how the GRCs in New England became a vacation arrangement:

Conferees didn't want to listen to anybody talk at night because they had to be with their wives, their kids, or both. I remember that we had a hell of an argument one night, during which someone suggested that maybe we ought to fix it so that only the participants can come – nobody else. But that was voted down.³⁷

Despite the attitudes towards the wives expressed in the evaluation forms, there was resistance to making the GRCs family-free, and their attendance remained stable over the years. This tension indicates two coexisting perceptions of participating in a scientific conference. The first conceptualizes conferences as gatherings directed to a broader community of scientists, including their families, and is compatible with socialization that is not directly connected to scientific discussion. The second, which is rather narrower, sees them as gatherings for individual scientists who meet up only to allow their ideas and research contribution to be manifested and circulated. Based on these two different conceptualizations, different boundaries of acceptable attendance, activities and performances are drawn and transgressed.

At first glance, it appears that the organization and the participants of the Gordon Research Conferences adopted a dismissive stance towards play and the actors or behaviours associated with it. Nevertheless, the conferences accepted activities and performances that suspiciously resembled a social programme. Sports were the main focus of these social activities, supported by the athletic facilities of the colleges made available to the conferees. Fred Basolo described his GRC routine during the Inorganic Chemistry conferences:

My routine was tennis in the morning and golf in the afternoon. I was much younger then and could do those things. Some people knew that I would be on the golf course in the afternoon because I enjoyed golf ... These kinds of things became traditional events. We all knew who was going to do what.³⁸

When asked about alternative social activities for those who were not very sporty types, he remembered, 'Then you'd have other ways of getting together. You could carry on conversations about chemistry or watch a baseball or football game on television.'³⁹

³⁶ Annual evaluation report, participants' comments, adhesion, 1958, Records of the Gordon Research Conferences, Series VI, Box 126, Folder 1, Othmer Library, Science History Institute, Philadelphia.

³⁷ Annual evaluation report, monitor's report, inorganic chemistry, 1967, op. cit. (29).

³⁸ Foreign visitor lists for the years 1956, 1958–60, 1963, op. cit. (26).

³⁹ Foreign visitor lists for the years 1956, 1958–60, 1963, op. cit. (26).

Due to the remote locations of the colleges, it becomes clear that playing and watching sports was one of the few (acceptable) activities that the conferees could engage in. Long-time attendees expected sports as a highlight of the conference and even adopted routines centred around these activities. Such traditions were meant to allow scientists who wanted to socialize with some of their colleagues to locate them based on the sport they were playing and have an excuse to get to know each other by enjoying a team-building activity. Athletic performances and their enjoyment were behaviours that the conferees would remember fondly and return to for each conference, creating a sense of continuity. Basolo's quotes are, however, indicative of the limitations of using sports as the predominant social activity in the GRCs. People who were disabled or unfit due to their age or health were automatically unable to become part of the traditions. Similarly, the participants who did not enjoy sports also had limited options for creating pleasant memories outside the sessions.

Play, therefore, emerges as an essential element in the GRC philosophy in the form of acceptable and dismissed but persistent behaviours. The desirability of play depended heavily on its compatibility with the conferences' ideas of how knowledge is best communicated in scientific gatherings. Sports were well suited to the colleges hosting the GRCs and their athletic facilities. They reflected the idea of combining competitive physical and mental exercise in order to enhance the latter, of using 'competitive sport in order to improve student discipline, preserve physical fitness, balance intellectual endeavour, and nurture competitiveness, perseverance, individualism, and respect for established authority'.⁴⁰ Andrew Warwick studied these ideas as a tradition in British colleges in the late 1860s and they potentially shaped the practices of the American colleges where the conferences were held. In addition, athletic play was compatible with the competitive, passionate and intense spirit that the conferees expressed during the sessions, as discussed in the previous section. It was sufficiently informal to enable flexible dynamics and identity formation but structured enough not to affect the conferee's participation in formal and informal scientific discussions.

On the other hand, lively interactions associated with non-productivity, but instead with dizziness, chance and pleasure, were frowned upon. People who 'have been coming for the past 20 years to drink it up and have a good time' or 'the perpetual poker game which contributes very little to science' undermined the structure of the GRCs.⁴¹ They shifted the attention of the groups from enthusiasm about the sessions and the scientific discussion to seeking pleasure, making them impatient and disappointed when they were not engaged in social activities, often described as lethargic, noisy and grumpy.⁴² Moreover, non-productive play, unlike the rest of the activities in the GRCs, defined which actors were not welcome in the scientific community and practice, in this case the scientists' wives.

Conclusions

This paper has explored the history of the GRCs as a unique example of how scientists reflected on conference formats and conceptualized them as an essential communicational form in scientific practice during the early and mid-twentieth century. Approaching conferences through the lens of epistemic norms, scientific personae,

⁴⁰ Andrew Warwick, *Masters of Theory: Cambridge and the Rise of Mathematical Physics*, Chicago: The University of Chicago Press, 2003, p. 225.

⁴¹ Annual evaluation report, participants' comments, analytical chemistry, 1958, Records of the Gordon Research Conferences, Series VI, Box 126, Folder 1, Othmer Library, Science History Institute, Philadelphia

⁴² Annual evaluation report, monitor's report, inorganic chemistry, 1968, Records of the Gordon Research Conferences, Series VI, Box 126, Folder 8, Othmer Library, Science History Institute, Philadelphia.

manners in dispute and knowledge-sharing practices sheds light on all the different (and sometimes contradictory) aspects of scientific culture brought together and managed by conferences. More specifically, expanding the literature of manners in dispute to the twentieth-century context was fruitful for understanding how conference formats incorporated diverse communicational styles and practices, such as controversy, civility, openness and secrecy. These styles were employed to legitimize and delegitimize knowledge claims and to regulate the information flow amongst the participants.

Works on epistemic norms and scientific personae point out that communicational styles do not exist in a vacuum. They are performed by groups of people and are often connected to typified cultural identities, physiognomies or personae associated with these groups. Introducing the concept of scientific personae in the realm of conferences demonstrated their active role in shaping the communicational and knowledge-sharing expectations that conference organizers and participants had of their peers. These expectations solidified shared understandings about how knowledge is best exchanged in conferences, forming an informal sociology of knowledge. As a result, they participated in standardizing conference formats and affected the process of selecting and including conferees.

The GRCs' monitoring and evaluation system offered rich insights into how scientists perceived conference interactions by focusing on a specific conference format: the small conference. As indicated by anthropologist Margaret Mead in her titular book *The Small Conference: An Innovation in Communication*, small, elite, goal-oriented conferences were popularized in the mid-twentieth century.⁴³ They were seen as a 'new and powerful communication form' developed in response to the large, disciplinary gatherings which focused on more broad overviews of a scientific field.⁴⁴ Due to their popularity, their organizational emphasis on enhancing knowledge exchange and their fixed format, later becoming a model for other conferences of the kind, the GRCs have been analysed as an indicative case study of the small conference.

In the late 1940s, the GRCs became standardized due to their relocation to New England colleges and a new industrial sponsorship funding regime. During that period, tension regarding the conferences' functions emerged. The GRCs were meant to perform a difficult task in the context of a corporate, competitive and interdisciplinary professional landscape: to advance the free, unrestricted exchange of ideas and simultaneously secure the individual careers of their participants. This tension was manifested in the associations between academic affiliations and scientific personae. The GRCs' evaluation system identified two opposing conceptualizations of scientific progress with two scientific personae: (a) the academic scientists performing progress as a process of informal, unrestricted, peer-reviewed discussion of novel ideas, and (b) the industrial pragmatists performing technocratic, corporate progress, oriented towards practical applications through opportunistic communication. Competition and collaboration within this context of (perceived) contradictory communicational styles were mediated and managed by a spectrum between secrecy and openness, both as norms and as practices.

Other variables that the evaluators related to behaviours increasing or decreasing the value of conferences were age and nationality. Younger scientists were associated with fresh ideas and informality, complementing their seniors' experience and professional connections. Foreign scientists were enthusiastically pursued as long as their work represented high-quality research in laboratories abroad and would benefit American scientists. The GRC organization defined the desirability of scientists by dividing them into

⁴³ Margaret Mead and Paul Byers, *The Small Conference: An Innovation in Communication*, The Hague: Mouton & Co. and Ecole pratique des hautes études, 1968.

⁴⁴ Mead and Byers, op. cit. (43), p. v.

categories. This categorization relied on scientific personae based on their professional backgrounds and existing relations to knowledge production. Consequently, it sheds light on the status quo and the professional hierarchies of the time, such as the industrial sponsorship of scientific research, the differences between early- and late-career scholars, and the inclusion and exclusion of non-Western scholars in these elite international conferences. However, the GRCs' emphasis on professional achievements brushed off other factors and power dynamics at play, such as gender, nationality and global politics, shaping the inclusion of scientists in academic conferences.

Such power dynamics were also at play during the much-advertised informal communication of the GRCs. Informality entailed multiple meanings depending on the interactions and social roles of the conference participants. On the one hand, it was connected to an enthusiastic and playful but harsh collective assessment of ideas through confrontational discussions accompanied by competitive physical activity. At the same time, informality was attached to the values of individual responsibility of consistent and full participation in the conferences with active scientific contributions during the sessions and the social activities. Leisure activities not falling under productive informality were viewed as unnecessary and potentially harmful. Informality, play and leisure were heavily gendered categories – in a direct way because they identified wives as a cause of distraction from the strictly scientific conference activities, and indirectly through the competitive, schoolboy atmosphere, not favourable for the expression of underrepresented groups, like the female scientists.

It can, therefore, be seen that scientists consciously associated academic affiliations, manners, leisure practices and social categories like gender as variables intertwined with understanding, describing and measuring how knowledge is best produced. Their associations were implemented in conference formats, and consequently were reproduced and negotiated within conferences, turning them into fertile ground for meta-scientific reflections. Studying these reflections in relation to broader scientific practices and social norms is valuable for understanding how scientific gatherings, and particularly small conferences, consolidate or render obsolete the variables assessing scientific communication.

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