SPEAKING Biotech: An ethnography of communication at a conference on biomedical applications of new biotechnologies[1]

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Abstract

The discursiveness of digital health and precision medicine taking place at the confluence of the positions of the developers of the biotechnologies, the medical applications of these technologies and the reactions of the public establishes and stabilizes the final form of precision medicine's socio-technological alignment matrix. Hence, the analysis of this discursive alignment process, which is largely designed by the debate at conferences, is of pivotal importance for the understanding of current biomedicine. Realizing the importance of this discursiveness construction for the final expression of future healthcare practices, I conducted an analysis of the discourses produced through the various communications that were presented at an international congress on the applications of biotechnologies in biomedicine. This paper aims to present some outcomes of such analysis.

Keywords: Biomedicine; Biotechnology; Conference; Discourse; Ethnography.

Introduction

Due to the vibrant moment in the development of ICTs, research on the biomedical applications of new technologies promotes many discourse events, usually in the form of conferences and debates. In this context, one of the major functions of such events is to articulate the new languages which emerge at an increasing speed and in great quantity because of the technological acceleration observed especially in genomics with the aim of expressing them in new healthcare practices. The way how this future practical expression is constructed by present days' discursiveness will inevitably model tomorrow's health policies, as denoted by the European Digital Agenda discourse, notably in the Action Plan for eHealth 2012-2020 (EC, 2012), which is one of the main guiding plans of European policies aimed to promote personalised health care.

1. SPEAKING biotechnologies

Scientific conferences and meetings are fundamental means for scientific communication and are particularly relevant in dynamic and multidisciplinary fields of knowledge, such as biotechnology and precision medicine (Martens & Saretzki,

[1] This article summarizes the outcomes of an ethnographic fieldwork aimed at investigating the modes of production and circulation of biotechnology experts' discursiveness at the II International Congress in Health Sciences Research: Towards Innovation and Entrepreneurship - Trends in Biotechnology for Biomedical Applications, which took place at the Universidade da Beira Interior, in Covilhã, Portugal, from May 17th to 20th, 2017. All consideration about the moment must be understood within this temporal context. I would like to thank the Organization Committee of the Congress for opening the doors of the field and for giving me all the support needed to perform the fieldwork.

[2] CRIA/NOVA-FCSH.

1994). Despite this reality, conferences have been poorly used as a field for ethnographic observation (Brown et al., 2017). The existing work in the context of biotechnology-related meetings has been focused on the quantitative aspects of communications, by analysing the content of the papers using methods to calculate the linguistic categories (Hill et al., 1997). It is well known that, although useful, this type of analysis removes the communication act from its social scene, which is, after all, the main component of communications in congresses and conferences (Schwartzman, 1989). Consequently, I think that discourse analysis is the most adequate method to capture the dynamics of knowledge production in environments that associate both formal and informal aspects of communication processes as is the case of scientific conferences and meetings.

Since language is *played as we go along* on an everyday life contextual basis, as Wittgenstein used to say, its rules are not exhaustive of the set of possibilities in which its outcomes may appear in society. This property of linguistic games makes formal logic an unsuitable means to analyse *live* communication processes. Such an analysis must imply a methodology that allows to capture the discourse as a reflex of everyday life's speech acts, i.e., an ethnography of speaking or of communication (Hymes, 1962, 1964b; Cicourel, 1964) which opens particular speech events to the broader social milieu. By such procedure, we shall be able to reconstruct the processes by which social reality is constructed, since this construction happens in and through communicative interactions (Luckmann, 1999). This is the approach I'm trying to apply in the present essay. The following items summarize the results found from the analysis of the discourses produced at the II International Congress in Health Sciences Research: Towards Innovation and Entrepreneurship - Trends in Biotechnology for Biomedical Applications. The results are presented accordingly to the SPEAKING structure, as suggested by Dell Hymes (1967). The reasons behind the adoption of Hymes' model lie in the fact that, due to its simplicity, the model's structure has been easily understood by the organizers of the conference and, simultaneously, due to its broad acceptance among anthropologists, I believe it successfully ensures a reliable way for ethnographic data collection and systematization.

Setting, or Scene[3]

The conference took place during a period of four days in a medical school facility.

The event was proceeded along three main stages: the auditorium, where speeches were essentially formal, structured, and mainly expository; the coffee break stage, where speeches were informal and apparently chaotic; and the lunch break stage, where speeches were mostly informal, but the behaviours showed to be more regulated than in coffee break scenario. All these three stages configured the core of the event as it is expected. Although, without the social program and the final dinner, the event remains incomplete. As it is understandable, due to the fact that formal experts' discursivity was largely unattainable in its real sense and that the one-way communication flow impedes the redundancy effect, it is along informal settings that I have captured the most insightful information.

[3] "By setting is intended of course time, and place, of a speech event. In addition, psychological setting, and cultural definition of the setting as a certain type of *scene,* may be implicated here" (Hymes, 1967:21).

The main scene, staged inside the school's main auditorium, configures a scientific meeting typical event. It is thoroughly structured, and the intention is clearly to limit spontaneity and to make speech acts predictable and foreseeable, to avoid any surprise. The concern about this avoidance was always present. This is, at least in part, due to the kind of agents involved in the event organization and their own motivations and expectations on the outcomes. Surely, such expectations included the promotion of an image of rigour and competence. The engagement of organizers revealed a special attention to the management of their impressions aiming to influence public perceptions about not exclusively the event, but also about themselves.

Participants or Personnel[4]

The preoccupation with the management of the impressions is better understood when we are given to know the fact that the event was organized by a group of PhD students on biotechnology who study at the same school where the event took place. Of the 35 speakers who were present, 12 were local students with or in the process of obtaining their doctorate degrees. A glance over the audience suggested that the most part of the attendants were students of biotechnology as well. This is a very exclusive speech event. I was clearly out of the frame.

Apart from such participants, the other speakers were from several places, foreign ones included. 77% of the speakers were from Portugal. The remaining speakers came from Spain (4), France (1), Poland (1), Finland (1), Netherlands (1), Austria (1), although some of these were Portuguese who work or collaborate in abroad or international labs.

So, the great majority of the speakers were biotechnicians, both newly graduated PhDs and researchers with a consolidated career working in labs. Other qualities of speakers were present, such as representatives of pharmaceutical industry, public biotechnology and bioengineering institutes, or other universities and private research institutes.

Ends[5]

The event was markedly oriented to promote possible synergies, as it is easily detected in the congress presentation discourse. Here, we can see that the event´s explicit main goal was to provoke "knowledge interchange" and "to build new networks with young and senior researchers, improving the discussion of new scientific ideas", as stated in the Congress's website. In order to *translate* this intention in concrete functions, the key expression is, as one of the speakers said, "translate science into industry products" by "transferring ideas". This key speaker was aware about the fact that "investors have difficulty in understanding how this transference may be done". In the end, this is the core of the message the event was intended to cope with.

[4] "Schemes of components usually distinguish Speaker and Hearer (Sender and Receiver, Addressor and Addressee)" (Hymes, 1967: 21)

[5] "Here an English homonymy is exploited, two types of *ends* being meant: *ends* in view (goals, purposes), and *ends* as outcomes. In one sense, intentions and effects; in another, manifest and latent functions" (Hymes, 1967:22).

Paying attention to the functions, we find a focus on the presentation of "biotechnology applied to biomedical research" outcomes.

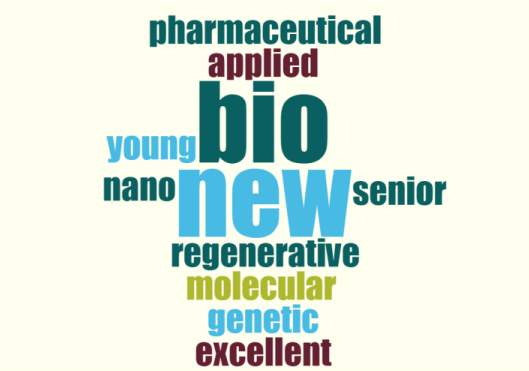
Art Characteristics[6]

Through a brief lexeme counting, we can see that the textual information clearly focuses on *newness* (see words cloud below) and discussion of ideas about biotechnology and engineering.

Verbs as "(to) present", "(to) interchange", "improving", "beneficiating", "providing", "(to) build", "bringing", "(to) focus", and "(to) hope", referring to a positive message, also suggests an intention of project(ing) toward the future, as if the event was animated by an enacting function (see verbs cloud below).

This is also verifiable from the spirit of innovation and entrepreneurship that animated the congress. In fact, "newness" keeps being the most important keyword and the most salient adjective (see adjectives cloud below).

[6] "Here two closely linked aspects of acts of speech are grouped together: the form, and the content, of what is said. The technical terms *message-form* and *topic,* respectively, are adopted for these." (Hymes, 1967:23).



In addition to the lexemes, which are the discourse's minimal meaningful units, we may now focus on maximal units, such as meaningful categories. In this regard, the conference focused in nine main topics (showed as scheduled): cell biology and genetic engineering (3 presentations), omics (4 presentations), regenerative medicine and biomaterials (2 presentations), pharmaceutical biotechnology (8 presentations), other biomedical applications (2 presentations), nanobiotechnology (1 presentation), health entrepreneurship (3 presentations), bioinformatics and biosensors (4 presentations), and bioprocess engineering (8 presentations). In decreasing order by number of participants, we find that the discourse was varied in pharmaceutical biotechnology and bioprocess engineering themes and individualized in the nanobiotechnology theme. Eventually, this outcome is an important one, as it reflects the number of participants interested in each of the themes (or, instead, both the most and the least explored research areas).

We may highlight some of the core ideas that came up in each theme as follows:

1) Cell biology and genetic engineering (3 presentations)

    - "The brighter ideas are always the simple ideas"
    - "Stability and translation efficiency of messenger RNA (mRNA) structures"
    - "Engineering bacteria to make them therapeutic agents for tumours"
    - "If we do something good for mankind, money would be not a problem, so, we must focus on problems instead on money"

2) Omics (4 presentations)

    - "There is an increasing search for proteomics analyses [because] they help to discover neoantigens to develop cancer immunotherapies"
    - "Infrared radiation used in chromatography provokes fluctuations on the protein structures, leading to crystallizations and formation of water nanodrops"
    - "The number of genes regulated by sexual hormones is huge"

3) Regenerative medicine and biomaterials (2 presentations)

    - "Peptide-based nanoparticles are suitable for wound treatment"

- "Antimicrobial peptides in synthetic skins for improved therapeutic results in wounds treatments"
- "Nanoparticle injections to fight infections"

4) Pharmaceutical biotechnology (8 presentations)

    - "Antibodies may be used as biopharmaceuticals"
    - "Making birds hyper immunity may be a solution for hyper-resistant bacteria"
    - "A specific ligand development may control the oncogene KRAS' function in order to avoid cells to become cancerous"

5) Other biomedical applications (2 presentations)

    - "The ability of cherries' nitric oxide to capture free radicals may be potentiated, avoiding them to attack erythrocytes' membranes"

6) Nanobiotechnology (1 presentation)

    - "Nanosystems may be constructed to treat cancer, diabetes, and cardiovascular diseases that operate as pills"
    - "Porous silicon/PSI is biocompatible, cytocompatible and has no toxicity"
    - "Due to the fierce competition, we are moving too fast and knowing too little"

7) Health entrepreneurship (3 presentations)

    - "The role of research centre": "Helping to boost your health-related business idea"; "Transferring knowledge and technology into the market", "Accelerating the transferring through programs like the Personalized Care"
    - Problems for health entrepreneurship: "The public divestment on science", "The maladjustment between corporations and academia". "The need for a "Virtual Library of Researchers"

8) Bioinformatics and biosensors (4 presentations)

    - "The development of transducers for bio-recognition and other immunosensors for biomarker detection"
    - "Biomedical applications in diagnostic, monitoring and combinatory applications, such as POC – Point-of-Care applications"
    - "Immunosensors for Parkinson Disease biomarkers such as the alfa synuclein protein" and "for lactic acid analysis in sports medicine"

9) Bioprocess engineering (8 presentations)

    - "Recombination of minicircle DNA and viral vectors in cell cultures"

- "Adsorption and desorption microcalorimetry techniques"
- The history of biotechnology: "the paradigm change by means of recombinant DNA technology and the impact of bioprocess engineering in health sciences".

Key[7]

Though the strong structuring of discourses, during the presentations, "the tone, manners or spirit in which" acts were done differed greatly. Some of the participants were more enthusiastic than others. This difference was more sharply detected when the speakers were representatives of companies or of research centres. The former were even empathetic.

Generally, young students or newly graduates were more rigid, as if they were expecting to meet their function without disruptions and through a way as straight as possible. Some of the participants, namely the older ones, or those with some important role in academia, turned their discourses toward the place where moderators were seated. I didn't clearly understand such attitude. It would be because the speaker sought to obtain (more) scientific recognition, since the moderators were important researchers in the area, or because the audience was largely constituted by young individuals, some of which consulting their smartphones or talking to each other.

Instrumentalities[8]

All the presentations were performed in English, as well as all the interactions after the presentations. This is the main sign of the qualifier "International" that adjectives the "Congress". Apart from this, I've noticed that almost all the presentations were illegible from the place where I was seated. The problems were many, since the size and the colour of lettering, the lack of contrast due to the colour saturation, or the cluttered PowerPoint slides, with lots of disordered graphics, images, and figures. Some of these presentations were really confusing and the communication of the ideas toward the audience, specially to non-expert attendees, like me, was hindered.

The practicalities of science communication are a real problem biotechnicians must face and solve. Moreover, the communicational interaction between speakers and the audience was poor, since the former often didn't hear the latter when these ones asked them some questions. The fact is that the auditorium sound system is defective. As the loudspeakers are situated in the same vertical plane of the speakers, but about a step forward, they had great difficulty in hearing the questions asked by the audience. The problem of communicating science I've referred above together with this architectural flaw results in serious problems in

[7] "This component is introduced to distinguish the tone, manner, or spirit in which an act is done. Acts otherwise the same as regards setting, participants, message-form and content, may differ in key, as between *mock; serious; perfunctory; painstaking;* and the like." (Hymes, 1967: 24).

[8] "Here are grouped together two closely linked components, those of *Channel* and *Code.* By choice of *Channel* is understood the choice of oral, written, telegraphic, semaphore or other medium of transmission. By choice of *Code* is understood a choice at the level of distinct languages. Where the distinction is necessary, varieties within a language may be designated *subcodes.*" (Hymes, 1967: 24).

the (public) understanding of science which are of paramount importance to address.

Norms of Interaction and of Interpretation[9]

As already mentioned, communication process is hampered by both technical and architectural issues. Additionally, some of the attendees were sometimes noisy and relatively distracted. Despite this, such issue has not prevented communication. In fact, at no time has the flow of expositions been interrupted.

Genres[10]

As it has been said, the type of discourse was structured accordingly to a common code shared with similar speech events. The strong structuration of speech and the various agents' awareness of the protocol and the interaction and interpretation norms ensure a regular operation during all the conference.

2. Some notes on the biotechnology's deep play and two (main) derived ethical plateaus

As Deborah Cameron points out, in order to be complete, an ethnography of communication, must address the way how a certain discourse fits a whole social set of significant networks, such as modernity's underlying rationality premises, or *the deep play of modernity* (Fischer, 2004), or, even, a particular communicative pattern, as is the case of particular disciplines' vocabulary repertories which constitute professional based ideologies (Wright Mills, 1943) such as biotechnicians'. In other terms, in order to acquire meaning, to a given form of discourse must be associated a given social function (Cameron, 2001).

That said, questions as "Why the biotechnology congress has occurred, and why with such characteristics? What is the function of the resultant discourses?" must be addressed through a discourse analysis. In my opinion, seeking to develop such questions, we must also develop a kind of a parallax view, i.e., we must dislocate the focus from the formal auditorium fieldsite to the informal social interactions, adopting a collaborative approach, which implies shifting the speakers' status away from the *informant* and bring it closer to that of the *interlocutor* (Costa, 2019a, 2019b). This collaborative technique in anthropology provides significant insights that enable us to study *how biotechnicians understand and live our world*, as Holmes & Marcus (2008) allude. Indeed, this is the very goal of the social anthropology of biotechnological imaginary, isn't it?

2.1. The opacity of biotechnological discourse

As Charles Bazerman (1983: 292-3) puts it,

[9] "By Norms is meant not the normative character that may attach to all rules for choice among components, but specific behaviours and proprieties that may accompany acts of speech that one must not interrupt, for example, that normal voice must not be used except when scheduled (e.g., in church service). Here, too, may be considered shared rules for the understanding of what occurs in speech acts, e.g., as to what can be ignored or discounted." (Hymes, 1967: 24).

[10] "By Genres are meant categories or types of speech act and speech event: conversation, curse, blessing, prayer, lecture, imprecation, sales pitch, etc." (Hymes, 1967: 25).

> "…when we look to the formulations created by science as reflected in symposia (...), we certainly see a very specialized development of language, distinct from our everyday conversation and newspaper reading. [T]his specialized language of science seems constantly filled with evidence, numbers, observations, pictures, to ensure that the formulations correspond to real things".

In this respect, I remember one of the first conversations I had with a biotechnician outside the auditorium. Then, he said with a mixture of scorn and triumph: "For me, *scientific* (emphasizing the word) analysis is made with numbers". Such position reminded me this appropriate quote from Herder, who we all know as one of the first giants of the philosophy of language:

> "The tear that swims in this clouded, extinguished eye pining for consolation – how touching it is in the whole picture of the face of sadness. But take it by itself and it is a cold drop of water!, bring it under the microscope and – I do not want to know what it may be there! This tiring breath, the semi-groan, which dies so movingly on the lip distorted by pain – separate it from all its living helpers and it is an empty blast of air. Can it be otherwise with the sounds of sensation? In their living context, in the whole image of effective nature, accompanied by so many other manifestations, they are moving and self-sufficient. But separated, torn away, from them all, robbed of their life, they are, to be sure, nothing but ciphers."

How does one explain the fact that a 18th Century philosopher goes further than a 21st Century scientist? This sinking into the chasm that separates the two cultures is, perhaps, the main cause for such a difficulty for the *scientists* reach out the humans.

The opacity of biotechnicians' and bioengineers' discourses enlarges the social-technical divide, and, such "*technicality* of talk" (Rachel & Woolgar, 1995: 267), forces us to engage in a negotiation to cross the boundary to a "foreign culture" (Rachel & Woolgar, 1995: 269). This may perhaps be the biggest cause for the public be distrustful of the science and technology discourses (Bazerman, 1983). Indeed, as Chris Toumey reminds, the "process of building public understanding must not be a one-way communication from active experts to passive laypersons. On the contrary, it must include ways for laypersons to express their questions, their concerns, and their values, and for them to receive responses from experts" (Toumey, 2006: 29).

2.2. *Naïve* realism, *encore*, or the illusion of the existence of pure objects

Since science and technology are socially constructed (Pinch & Bijker, 1984; Bijker et al., 2012), they are, like human societies, discursively and epistemologically produced facts (Knorr-Cetina, 1999) and thus "naturally artificial forms of life. [Consequently] it remains obvious that the empirical sciences cannot be ontologically neutral" (Luckmann, 2005: 4). As *communicative constructs* (Luckmann, 2005: 5), *data* are actually socially constructed *facta*, as Giambattista Vico would say, since, apart from being discursively accessed, their capture is instrumentally mediated. That said, as non-neutral products, the discourses on biotechnological applications in biomedicine are *speech acts* (Hymes, 1967;

Searle, 1969) formed through performative utterances expressing a given stock of knowledge (Schutz & Luckmann, 1973) originated on social interaction; they are grounded on social performance and thus they are constitutive of specific epistemic and practice communities (Bazerman, 1983; Lave, 1988; Lave & Wenger, 1991; Knorr-Cetina, 1999) who use them as tools (Abrams & Hogg, 1990) in order *to do things* (Austin, 1972). Therefore, we must add a critical gaze to the descriptive one. Dell Hymes' method of the *ethnography of speaking*, which shifted into an *ethnography of communication*, with the inclusion of non-verbal or non-linguistic means in the social communication processes, is excellent for descriptive purposes, but it is insufficient to critical ones (Cameron, 2001).

In fact, in addition to the descriptive aspects of communication, and in response to the unavoidable imperative of the critical analysis, due to that non-neutral nature of scientific discourse, we must address some questions as: "How and why someone has decided to organize the Biotech Congress?"; "What are the intentions and motivations of this "someone"?"; "To whom were the discourses addressed?"; "Who will hear and interpret the messages and what would him/them do with the resulting information?". All these questions must be addressed. We are looking forward to enter such an endeavour, as the present one is almost exclusively descriptive.

Conclusion

Chris Toumey concluded that few adult American have the knowledge or the skills to make informed decisions about science and technology policy" (Toumey, 2006:30). This reality may be widespread in the world, and we may confront it. Otherwise, we shall never achieve the target of developing a real science policy, and the political guiding plans remain as empty rhetoric. For us, anthropologists, this maladjustment between science and politics opens up a great opportunity to apply our skills as culture brokers and helping "to nurture public understandings of science and technology" (Toumey, 2006:30). This is the moment we must seize. Collaborative projects in collaborative experimental environments appear to be the best way to meet such demands of the present day (cf. Rabinow & Stavrianakis, 2013).

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