SCIENCE, SOCIETY AND NEW TECHNOLOGIES SERIES

COMMUNICATION, ENVIRONNEMENT, SCIENCE AND SOCIETY SET

Volume 2

Popularizing Science

The Complex Terminological Interactions between Scientific and Press Discourses within the Field of Agroecology

Hélène Ledouble

iSTE

WILEY

Table of Contents

List of Tables

List of Illustrations

Communication, Environment, Science and Society Set

coordinated by
Andrea Catellani and Céline Pascual Espuny

Volume 2

Popularizing Science

The Complex Terminological Interactions between Scientific and Press Discourses within the Field of Agroecology

Hélène Ledouble

WILEY

First published 2024 in Great Britain and the United States by ISTE Ltd and John Wiley & Sons, Inc.

ISTE Ltd
27-37 St George's Road
London SW19 4EU
UK

www.iste.co.uk

John Wiley & Sons, Inc.
111 River Street
Hoboken, NJ 07030
USA

www.wiley.com

Library of Congress Control Number: 2023952525

British Library Cataloguing-in-Publication Data
A CIP record for this book is available from the British Library
ISBN 978-1-78630-712-5

Foreword

The book written by Hélène Ledouble, *Popularizing Science: The Complex Terminological Interactions between Scientific and Press Discourses within the Field of Agroecology*, is the result of the author's experience, as a linguist, in an interdisciplinary research project that began in 2017 at the initiative of INRAE (Institut national de recherche pour l'agriculture, l'alimentation et l'environnement – French National Research Institute for Agriculture, Food and the Environment).

It is original in more ways than one: by the questions it addresses (the popularization of science); by the field it concerns (agroecology); by the methods it presents (linguistic corpus analysis and cognitive analysis) and more generally, by the questions it raises about the possibilities of transmitting scientific knowledge to the general public. A crucial (and fascinating) problem underlies the book – is it possible to popularize science? As the author reminds us, epistemologists, educators and, of course, linguists have taken up this question and put it in another way – are scientific concepts accessible to the general public? Isn't popularization a distortion of science? Is it a simple translation? What is the relationship between popularization and education? More generally, how do political and social perspectives interfere with the goal to popularize? Hélène Ledouble introduces these questions in a manner that is highly relevant, relying on an abundant bibliography. Taking the stance that popularization is possible, she bases her reflection on the study of the media coverage of agroecology. This is a field that is not well known to the general public, although it touches on major issues such as food, health, ecology and the climate.

The analysis presented by Hélène Ledouble focuses on the detailed study of several concepts: biocontrol methods, agents and products. The corpus, made up of press articles in English and French, allows us to identify similarities in the way the two languages work. The systematic exploration of the contexts leads Hélène Ledouble to identify processes that may seem contradictory. For example, the significant use of terminological variation (denominative competition), which does not necessarily result in the “simplification” that is assumed to be the primary concern of journalists. This dual tendency (terminological variation versus simplification) underlines a specific construction of meaning, one that is not inherent to the terms but rather developed during the discursive process, involving both journalists and the readers they are trying to inform.

The popularization of any subject through the media brings into play other issues in addition to didactics alone. It is necessary, in one way or another, to spark an interest or even to seduce the reader, who is also a consumer, even if it means putting knowledge on show, sometimes in a way that borders on sensationalism. Hélène Ledouble shows that the use of metaphors (gastronomy, control, conflict), of childish discourse or of specific (binary) arguments to convey a perspective are frequent, and undoubtedly characteristic of popularization as a journalistic genre.

Regarding sensitive issues such as those related to ecology (in one way or another), the reader approaches general press articles with “knowledge” that is more or less accurate, as well as opinions and expectations that can create cognitive biases. Hélène Ledouble describes how, in the specific case of agroecology, a binary framing is implemented, which may introduce incorrect representations. Thus, “organic” and “natural” methods and products are seen as positive, while chemical and

traditional methods (and products) are assumed to be negative. In popular imagination, this binary vision has generated negative connotations that are associated with linguistic structures such as the prefix *phyto* (as in *phyto*sanitary products) or the suffix *cide* (as in insecti*cide*), connotations that are not present in the etymology. Journalists must consider the impact of these implicit meanings, in order to try to rectify them without "offending" the readers' beliefs too much. The popularization of a discipline such as agroecology therefore appears to be a complex process that must combine the simplification (of concepts) and the increasing number of terms, collective thought and scientific knowledge, as well as interest from the reader and the transmission of proven facts. Far from being a predefined path from expert to novice, the popularization of scientific knowledge thus appears to be a construction that is developed by the generalist journalist, who hopes to make the reader part of this process, with a necessary effort to interpret science.

However, the journalist's position does raise certain ethical questions. Indeed, on sensitive subjects such as the one dealt with in this book and given the journalists' complex intentions (to inform but also to spark interest), the way in which knowledge is presented can give the reader a distorted vision of the situation, even to the point of feeling that science has become "crazy". In order to not move too far into sensationalism and emotion, the journalist must maintain a close relationship with the scientific world. Their texts are also situated in a social, political, economic and sometimes local context, which has an impact on how they write. As Hélène Ledouble maintains, the journalist must also clarify the role of the scientist, which is to not only tell a "truth" but to also doubt and share uncertainty, even if that may be unsettling for the reader. In the process of circulating terms, the journalist thus maintains a sort of

partnership with the scientists and the readers (and other actors). Together, they participate in the process of popularization and even in the development of the discipline.

The complexity of the popularization process could lead Hélène Ledouble to question the possibility of popularizing via the media. However, her conviction that such an undertaking is possible and necessary leads her to propose alternatives (or rather complementary approaches). She thus evokes the very current work that is being done in various fields to design simplified languages (plain languages). She also suggests assistance that would help the journalist's writing and the reader's interpretation by constructing a resource to reflect the different points of view, so as to shed light on all the facets of the problem. We may think that this could mean building a fairly standard terminological resource. However, several aspects would make this resource more adapted to this specific purpose, including links to usage, links to needs or joint construction of the research question. The author thus develops a real plea for the joint involvement of scientists, citizens and mediators in the development of agroecology.

Hélène Ledouble's work is based on a terminological approach based on corpus. However, by evoking the complexity of the popularization process, it opens up numerous perspectives on the nature of expert knowledge. It therefore raises questions to do with the role of language in developing knowledge, the possibility of a "neutral" approach, the possibilities of disseminating knowledge to non-experts and the role of simplification (linguistic and conceptual) in this undertaking. Of course, a linguistic study in which the reflection combines detailed analysis with proposals for the general public and decision-makers is most welcome. There is no doubt that the author's reflections, which are anchored in a solid corpus analysis,

will not only give food for thought to linguists but also to epistemologists, scientists, students and, of course, journalists.

Anne CONDAMINES
Research Director, CNRS, CLLE (Cognition, Langues, Langage, Ergonomie) and Université Toulouse Jean Jaurès

Preface

By way of a preface to this entire work, and following the example of Jeanneret (1994), we wish to state that, for us, the work of journalists popularizing science is unconditionally “worthy of respect and requires great vigilance”, regardless of the form it may take. In this book, therefore, everything is thought out, analyzed and written with a deep consideration for this desire for dialogue, between two perspectives that are divergent by nature – the scientific approach and the media approach – the meeting of which is not only necessary, but a decisive factor for good cross-comprehension. The objective of this book is therefore to try to contribute to the reinforcement and enrichment of this dialogue between science and society.

February 2024

Acknowledgments

First of all, I would like to thank Anne Condamines for proofreading this manuscript before its publication and for writing the foreword. We share the belief that both the linguist and linguistics (applied but also “engaged”) have a role to play, in the professional world and in society in general.

I would also like to pay tribute to the late Professor Henri Zinglé, Director of the Laboratory of Linguistic Engineering and Applied Linguistics (LILLA) at the University of Nice, who shared this same vision. He knew how to spark vocations in young researchers thanks to his passion for linguistics and language processing tools.

I would also like to express my gratitude to my colleagues in linguistics at the University of Toulon, for our enriching exchanges and seminars. I would like to thank Michèle Monte in particular, for infusing her energy into our research team, and for her open-mindedness, which ensures the interdisciplinarity that is so essential to scientific research.

Three proofreaders of my manuscript have helped to nourish both the content and the form of my thoughts. Mojca Pecman, professor at Université Paris Cité, has accompanied my work since its outset, and I thank her in particular for her thorough proofreading and precious advice. Aura Parmentier, associate professor at the Université Côte d’Azur, enabled me to enrich this manuscript with her approach to social sciences and her decisive role as coordinator of the Valbio Collective since its inception. I extend my gratitude to Katharine Throssell for her outstanding proofreading and translating skills,

unwavering professionalism, and meticulous attention to detail, which significantly contributed to the refinement of (part of) the English version of this book.

I would also like to thank my colleagues at INRAE (notably Thibaut Malausa, Nicolas Ris, and Louise van Oudenhove), and the Valbio and ENI-BC collectives, who devoted time and attention to my work, as well as my colleagues from Université Côte d'Azur and the research team *Transitions*, at the heart of this project.

I am also grateful to Andrea Catellani (Université Catholique de Louvain) and Céline Pascual Espuny (Université Aix-Marseille) for their proofreading, as well as the inclusion of this book in the "Communication, environment, science and society" set, which they initiated.

On a more personal note, I would like to thank all those who read the various texts that led to this book, and who helped improve them through constructive feedback: Vincent, Sophie, Peggy C., Alexandre, David, Dany, Cyril, Isabelle, Caroline, Peggy F. and Karine.

Naturally, my heartfelt thanks go to Astier, who has understood the time I needed for this project to go forwards. In keeping with his initial promise, Astier has always accepted my work as part of our family.

Lastly, I cannot conclude this section without thinking of my parents, to whom I give my warmest thanks for their constant support in my personal and professional life, for our rich exchanges which bring so much to me and for the attention they have always given to my most important writings.

Introduction

For a long time, scientific information has reached the general public through the media. This book will question the public's ability to appropriate or to (re)construct scientific knowledge by reading the national and regional daily press. Originally, the media does not set out to transmit scientific knowledge as its primary objective, and we will discuss the role (and the responsibility) of the media in popularizing science in Part One of this book. Nevertheless, we hypothesize that it is difficult to provide information to the reader without also providing a minimum of knowledge[1]. This poses a major challenge for journalists; they must create high-quality information that is both accessible and intelligible, and which enable the reader to participate – in full knowledge of the facts – in the democratic debate on scientific issues.

In this context, it is important to avoid a simplistic approach to the process of popularizing science or minimizing the complexity of these social practices and technical and semiotic devices[2]. The paradox inherent in this process is now well established, being both "trivial", because it has existed for a long time, and "complex", mostly because it relies on a set of disciplines, and therefore on a set of perspectives. Because the popularization of science relies on the intersection of communication devices, knowledge and social logic, it is of interest to "hard sciences" (chemistry, physics, biology, agronomy, etc.), as well as to the humanities (information and communication, linguistics, history, etc.). Moreover, since the subjects covered by the media concern both the political world and society, the process is of interest to

social sciences as a whole (sociology, economics, law, management, etc.).

In his seminal work *Écrire la science*, Jeanneret (1994) suggested that the popularization project should be taken very seriously, reminding us of this necessary interdisciplinarity, a principle that is now accepted in all research on this subject[3]. The extent and development of the field in recent decades can be seen in the numerous workshops, conferences and publications in this area. They also illustrate the wide variety of approaches that are devoted to it, which we will explore in this work[4].

Our study follows on from research devoted to the "science-society dialogue" and to the dissemination of scientific information beyond experts. The scientific field at the heart of this research is agroecology, and in particular the protection of plants by natural mechanisms (insects or substances of natural origin, for example). Our objective is to study terminological and cognitive issues when popularizing the processes of *biological control* (in French and English)[5]. The analysis of this field is particularly interesting for at least three complementary reasons, which we will outline below.

First, although its denominations and concepts are still not well known to the general public, scientific research on biological control is constantly progressing, and the development of its methods is likely to have a significant societal and environmental impact in the decades to come. Faced with the pressing issue of environmental protection, society is taking up these subjects and – as already noted by Guilbert (1975) – the situation is therefore becoming favorable for the observation of an object of discourse and its evolution.

Second, this field is gaining momentum in the French and international news, as recent regulations (see the law for

Agriculture, Food and Forestry[6], the Labbé law[7], the Ecophyto II governmental plan[8], etc.) impose a transition towards more natural methods of plant protection.

Third, the (plant protection) products developed in this field are presented as alternatives to (chemically produced) phytosanitary products (commonly called “pesticides”), which have been disparaged for a long time and are increasingly controversial today. Since the work of Carson (1962), many multidisciplinary studies have been devoted to these controversial products[9], as well as to the necessary transition from agrochemistry to agroecology[10].

Citizens are therefore likely to have a positive preconception of this field, given that scientific research is seen as being able to propose concrete solutions for the reduction of pollution (in soils, waterways, crops), with positive health benefits[11].

On the other hand, agroecology is a complex scientific field that also has controversial aspects, if we look into the processes involved: biological control methods involve human intervention in the natural ecosystem and affect living organisms (macro or micro-organisms). It is therefore likely to evoke other sensitive and widely covered issues that are related to human interference in natural phenomena (genetically modified organisms, cloning, etc.). The way in which these subjects are presented by the media may therefore have an impact on how the citizen understands and perceives the field (in a positive or negative light). Indeed, the capacity of any individual to understand, to accept or to reject scientific progress will largely depend on the way in which it is presented (named, designated, described) in the media, and thus popularized.

This is the central focus of this book. Here, we set out to explore the way in which the field of biological control is

presented by the written press, through the general perspective and methods of applied linguistics.

The book is divided into three parts, which will enable us to explore these questions in greater depth. Part 1 is made up of three chapters and sets the overall framework in which we place ourselves, that of the challenge assigned to the media in this dialogue between science and society. We address the multiple forms (and perceptions) of this dialogue, the role and the responsibility of the media in this process, as well as the complex relations between scientific and media methods and perspectives (Chapter 1). These elements are then enriched by a text-based approach, dealing with discourses around science and, in particular, the link between language and the different forms of knowledge that can be conveyed (Chapter 2). This first part concludes with the way we envisage textual data analysis, and the presentation of theoretical and methodological tools that are specific to textual terminology and which constitute an interesting entry point for the study of media discourse (Chapter 3).

Part 2 of this book is devoted to the case study at the heart of this research: the media coverage of the specialized field of biocontrol. After a presentation of scientific methods and products involved, and of the dual French and English corpora selected for this study (Chapter 4), the two following chapters highlight the results of the analysis in context. First, we present the different terms that refer to the same methods and products in this field of specialization, in other words, the competitive denominations throughout press articles (Chapter 5). We then discuss the description of these objects of discourse, through various simplification strategies, for example, the use of a “binary” cognitive procedure pitting the biological against the chemical, as well as the use of reasoning by analogy (Chapter 6). These discursive strategies ensure a

clear and accessible dissemination of information to a wide audience but can raise questions and even interpretation difficulties for a non-expert reader.

Part 3 of this book consists of two chapters that look back on issues and challenges related to media coverage in the field of agroecology. The first chapter (Chapter 7) presents a summary of the questions generated by the analysis of media discourse, revealing the linguistic instability that can hinder effective communication. The second and final chapter of this part (Chapter 8) identifies a set of challenges that need to be addressed in order to improve communication in this emerging field, which are related to scientific issues in environmental communication more generally.

NOTE.– This study is being conducted as part of an interdisciplinary research project (BOOST: Bioprotection and Biostimulation of Plants) initiated in 2017 by the French National Research Institute for Agriculture, Food and the Environment (Institut national de recherche pour l'agriculture, l'alimentation et l'environnement – INRAE). It is supported by the Université Côte d'Azur (UCA) as part of its structuring research projects and brings together several scientific partners (including the Institut Sophia Agrobiotech (ISA), the Group for Research in Law, Economics and Management (Groupe de recherche en droit, économie et gestion – GREDEG), the URE Transitions (UCA) and the BABEL research laboratory (University of Toulon)[12].

Notes

1 We thus follow the principles proposed by other researchers, such as Jeanneret (1994), Véron (1997) or Schiele (2005), for example, who consider that

popularizing science requires the dissemination of a minimum amount of scientific knowledge.

2 These terms (*social practices, technical and semiotic devices*) are borrowed from Le Marec and Babou (2004).

3 In the wake of other seminal works such as Schoenfeld (1980) and Nelkin (1986).

4 Among many references, let us mention for example: the conference “Parcours linguistiques de discours spécialisés” (Sorbonne and Cediscor 1992); the workshop “La communication de l’information scientifique” (Centre de recherche en information et communication, 2001); the conference “Le traitement scientifique de la complexité” (Lille, 2001); the conference “Sciences, Médias et Sociétés” (ENS Lyon, 2004); the conference “La publicisation de la science” (Institut de la communication et des médias, Grenoble, 2004); the conference “Sciences et société en mutation” (CNRS, 2007); the workshop “La mise en récit de discours spécialisés” (GERAS, 2015); the workshop “Rencontres, Sciences et Société” (University of Lyon, 2017); the conference “Les nouvelles formes de la vulgarisation et de l’écriture du savoir” (University of Sorbonne Nouvelle, 2018); the ACFAS 2019 congress “Engager le dialogue Savoirs-Sociétés” (University of Montreal, 2019); the workshop “Pesticides, approches pluridisciplinaires” (University of Burgundy, 2021), etc. There are also numerous journals or special issues of journals devoted to these topics: *Public Understanding of Science*; *Les Carnets du Cediscor*; the *Hermès* journal; *Discourse Studies, Discourse & Communication*; the proceedings of the TIA (*Terminologie et Intelligence artificielle*) conferences; *Les enjeux de l’information et de la communication* (2021); “Recherche scientifique et Médias” in the *Revue française de la SFSIC* (2020);

Études de communication; *Les Cahiers du journalisme*; *Quaderni*, and other books and multidisciplinary research works that we will mention throughout this book.

5 These and other terms related to this specialized area will be defined in Chapter 4, as well as in the glossary at the end of the book.

6 Law No. 2014-1170 of October 13, 2014. See: https://www.legifrance.gouv.fr/jorf/id/JORFTEXT000029573022 [Accessed November 1, 2023].

7 See: https://www.legifrance.gouv.fr/eli/loi/2014/2/6/2014-110/jo/texte [Accessed November 1, 2023].

8 See: https://agriculture.gouv.fr/le-plan-ecophyto-quest-ce-que-cest [Accessed November 1, 2023].

9 Examples include some recent multidisciplinary studies on pesticides: (Roussary et al. 2013; Aulagnier and Goulet 2017; Chateauraynaud and Debaz 2017; Botero 2021; Foucart 2021; Jouzel 2019; Lambert 2020).

10 Among a profusion of multidisciplinary works and publications on these issues, the following references are strongly similar to our work, by their theme or their methodology (see Galochet et al. 2008; Deguine et al. 2016; Chlous et al. 2017b; Catellani et al. 2019; FAO 2019; HLPE 2019; Fauvergue et al. 2020; Allard-Huver 2021).

11 According to the *One Health* concept, or *Global Health*, which addresses the health of humans, animals and plants in a holistic manner. See: https://www.inrae.fr/alimentation-sante-globale/one-health-seule-sante [Accessed November 1, 2023].

12 The BOOST project (under the IDEX UCA-JEDI of the Université Côte d’Azur), launched in 2017, brings together researchers in biology, agronomy, entomology, chemistry, management, sociology, linguistics, information sciences, psychology, philosophy, etc.

PART 1
The Challenge of Popularizing Science

Introduction to Part 1

This introductory section has various objectives. It begins by presenting the definitions and perceptions of the various notions discussed in this book (popularization of science, science in the media, etc.), before emphasizing their implications for society. In media publications about complex scientific issues, the terminological question is crucial. It represents the link between linguistic forms and specialized knowledge, within discourses targeted to a less expert readership. In this first part, we will explore press discourses on science (Chapter 1), analyze their terminological and cognitive characteristics (Chapter 2) and conclude Part 1 with a presentation of our methods of textual data analysis (Chapter 3).

Collection to Data Processing
(Education Set – Volume 2)

LELEU-MERVIEL Sylvie
Informational Tracking
(Traces Set – Volume 1)

SALGUES Bruno
Society 5.0: Industry of the Future, Technologies, Methods and Tools
(Technological Prospects and Social Applications Set – Volume 1)

TRESTINI Marc
Modeling of Next Generation Digital Learning Environments: Complex Systems Theory

2017

ANICHINI Giulia, CARRARO Flavia, GESLIN Philippe, GUILLE-ESCURET Georges
Technicity vs Scientificity: Complementarities and Rivalries
(Interdisciplinarity Between Biological Sciences and Social Sciences Set – Volume 2)

DUGUÉ Bernard
Information and the World Stage: From Philosophy to Science, the World of Forms and Communications
(Engineering, Energy and Architecture Set – Volume 1)

GESLIN Philippe
Inside Anthropotechnology: User and Culture Centered Experience
(Social Interdisciplinarity Set – Volume 1)

GORIA Stéphane
Methods and Tools for Creative Competitive Intelligence

KEMBELLEC Gérald, BROUDOUX Evelyne
Reading and Writing Knowledge in Scientific Communities: Digital Humanities and Knowledge Construction

MAESSCHALCK Marc
Reflexive Governance for Research and Innovative Knowledge
(Responsible Research and Innovation Set - Volume 6)

PARK Sejin, GUILLE-ESCURET Georges
Sociobiology vs Socioecology: Consequences of an Unraveling Debate
(Interdisciplinarity Between Biological Sciences and Social Sciences Set – Volume 1)

PELLÉ Sophie
Business, Innovation and Responsibility
(Responsible Research and Innovation Set – Volume 7)

2016

ANDRÉ Michel, SAMARAS Zissis
Energy and Environment
(Research for Innovative Transports Set – Volume 1)

BLANQUART Corinne, CLAUSEN Uwe, JACOB Bernard
Towards Innovative Freight and Logistics
(Research for Innovative Transports Set – Volume 2)

COHEN Simon, YANNIS George
Traffic Management
(Research for Innovative Transports Set – Volume 3)

EL FALLAH SEGHROUCHNI Amal, ISHIKAWA Fuyuki, HÉRAULT Laurent, TOKUDA Hideyuki
Enablers for Smart Cities

GIANNI Robert
Responsibility and Freedom: The Ethical Realm of RRI

(Responsible Research and Innovation Set – Volume 2)

GRUNWALD Armin
The Hermeneutic Side of Responsible Research and Innovation
(Responsible Research and Innovation Set – Volume 5)

LENOIR Virgil Cristian
Ethical Efficiency: Responsibility and Contingency
(Responsible Research and Innovation Set – Volume 1)

PELLÉ Sophie, REBER Bernard
From Ethical Review to Responsible Research and Innovation
(Responsible Research and Innovation Set – Volume 3)

REBER Bernard
Precautionary Principle, Pluralism and Deliberation: Science and Ethics
(Responsible Research and Innovation Set – Volume 4)

TORRENTI Jean-Michel, LA TORRE Francesca
Materials and Infrastructures 1
(Research for Innovative Transports Set – Volume 5A
Materials and Infrastructures 2
(Research for Innovative Transports Set – Volume 5B)

VENTRE Daniel
Information Warfare – 2nd edition

YANNIS George, COHEN Simon
Traffic Safety
(Research for Innovative Transports Set – Volume 4)

2015

BRONNER Gérald
Belief and Misbelief Asymmetry on the Internet

2009

VENTRE Daniel
Information Warfare