

# Reflections Towards the Future of Medical Informatics

## A Farewell Lecture after Almost Half a Century of Medical Informatics Activities

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### Summary

**Objective:** To provide guidance on the future development and role of medical informatics, or biomedical and health informatics, in form of reflections.

**Method:** To report on the author's previous activities as a medical informatician, which spans almost half a century. It begins in 1973 when he started to study medical informatics. In 1978, more than four decades ago, his professional work started. He retired at the end of summer semester 2021. This was the occasion to prepare this farewell lecture.

**Results:** In twenty reflections, thoughts are presented on professional careers (R1 – 'places'), on medical informatics as discipline (R2 – 'interdisciplinarity', R3 – 'theses', R4 – 'affiliations'), on research (R5 – 'duality', R6 – 'confusion', R7 – 'connections', R8 – 'collaboration'), on education (R9 – 'community', R10 – 'competencies', R11 – 'approaches'), on academic self-governance (R12 – 'autonomy'), on engagement (R13 – 'Soyuzhes', R14 – 'professional societies', R15 – 'respect', R16 – 'lightstep walk'), and on good scientific practice (R17 – 'time invariants', R18 – 'Zeitgeist', R19 – 'knowledge gain', R20 – 'searching').

**Conclusions:** It has been a pleasure for me to participate in medical informatics activities for almost fifty years. During that time, there have been significant advances, including in medicine and in informatics, and also in medical informatics itself. And now it is the turn of others. While keeping in mind that tradition is not preserving the ashes, but passing on the fire, this report with its reflections may be of some help.

### Keywords

Medical Informatics; Biomedical and Health Informatics; Research; Education; Academic self-governance; Engagement; Good Scientific Practice

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## 1 Introduction

### 1.1 About this Manuscript

When the regular term of a professor ends, and the new professional life phase as a professor emeritus is about to begin, it is a tradition at German universities to give a so-called farewell lecture (in German: Abschiedsvorlesung). My farewell lecture was first presented on September 22, 2021, at TU Braunschweig in German [1]. In addition, I had the opportunity to give this lecture also in English on October 16, 2021, in Athens, Greece, during ICIMTH (International Conference on Informatics, Management, and Technology in Healthcare) 2021. This manuscript is an updated edited written version of the farewell lecture in English.

This English version started from the German version in [1], which I first translated and to some extent modified, supported by the DeepL program [2]. Then, Casimir Kulikowski kindly read the first version and suggested edits to my German-biased English, which developed into the present manuscript.

Please note that the German manuscript is more extensive, especially with the inclusion of a commented poem and nine appendices. Some details related to these appendices in [1] will occasionally be referred to here. As the German manuscript has been published in GMS MIBE, the official journal of the German Association of Medical Informatics, Biometry and Epidemiology (GMDS) – an Open Access journal – the German manuscript and its appendices can be easily accessed.

### 1.2 Objective(s) and Method

One objective of this farewell lecture is to reflect on future developments and on the role of medical informatics as a discipline. The manuscript contains twenty reflections, related primarily, but not exclusively, to medical informatics. These reflections may be of primary interest to readers.

In order to set the context for as well as to explain and elaborate on these reflections, it seemed necessary first to report about my work as a medical informatician. This part of the report might be of less interest to readers. Reporting about my work was both, method and another objective.

Please note that in this farewell lecture I will once again use the term medical informatics in its wide, comprehensive sense ([3], p. 256, and section 2.2 in this manuscript). Others may prefer to call this discipline biomedical informatics, or health informatics, or biomedical and health informatics or yet something else [4, 5–8].

My reflections on the future are presented after almost half a century of medical informatics activities, which I began studying almost fifty years ago in 1973. In 1978, more than four decades ago, my professional career started.

Do I really report on my activities? Actually, this is not possible, because I have always collaborated with others. Many people I have met during these almost five decades have shaped me. I have learned from them and I am still learning today. If I mention achievements here, then these people have helped to achieve them.

# Reflections At The End Of A Century

**Peter Groenewegen**



## Reflections At The End Of A Century:

**Theological Reflection in Eighteenth-Century Russia** Adam Drozdek, 2021-02-04 The book examines the wide panorama of Russian theological reflection found in a variety of sources ecclesiastical books sermons literature poetry theater historical treatises scholarly works and free translations of theology books It presents not only the reflections of authors who remained in the framework of the official Orthodox theology but also dissenters primarily Old Believers and masons who often sought to infuse Orthodox Christianity with a more personal approach

**Reflections at the End of a Century** Morris Slavin, Louis Patsouras, 2002

**The Philosophy of Reflection** Hodgson, 1878 *The Philosophy of Reflection* Shadworth Hollway Hodgson, 1878

**The Art of Reflection** Marsha Meskimmon, 1996 Marsha Meskimmon examines a wide variety of women's self-portraiture from performance to body art in lively and accessible prose She takes the cultural focus from the dominant male self-portraiture to the more marginalized gender bringing women artists' perspectives to the forefront

The Oxford Handbook of German Philosophy in the Nineteenth Century Michael N. Forster, Kristin Gjesdal, 2015-02-05 The Oxford Handbook of German Philosophy in the Nineteenth Century is the first collective critical study of this important period in intellectual history The volume is divided into four parts The first part explores individual philosophers including Fichte Hegel Schopenhauer Marx and Nietzsche amongst other great thinkers of the period The second addresses key philosophical movements Idealism Romanticism Neo-Kantianism and Existentialism The essays in the third part engage with different areas of philosophy that received particular attention at this time including philosophy of nature philosophy of mind philosophy of language philosophy of history and hermeneutics Finally the contributors turn to discuss central philosophical topics from skepticism to materialism from dialectics to ideas of historical and cultural Otherness and from the reception of antiquity to atheism Written by a team of leading experts this Handbook will be an essential resource for anyone working in the area and will lead the direction of future research

Teaching Writing in the Twenty-First Century Beth L. Hewett, Tiffany Bouelle, Scott Warnock, 2021-12-30 A comprehensive guide for students and instructors of composition Includes an overview of the field and discussion of composition purposes and genres digital education modalities instructional environments and instructional media Topics include teaching online composing processes and approaches designing and scaffolding assignments portfolio assignments multimodal assignments and response feedback and evaluation

**Reading and the Making of Time in the Eighteenth Century** Christina Lupton, 2018-08-15 How did eighteenth-century readers find and make time to read Books have always posed a problem of time for readers Becoming widely available in the eighteenth century when working hours increased and lighter and quicker forms of reading newspapers magazines broadsheets surged in popularity the material form of the codex book invited readers to situate themselves creatively in time Drawing on letters diaries reading logs and a range of eighteenth and early nineteenth-century novels Christina Lupton's *Reading and the Making of Time in the Eighteenth Century* concretely describes how book readers

of the past carved up expanded and anticipated time Placing canonical works by Elizabeth Inchbald Henry Fielding Amelia Opie and Samuel Richardson alongside those of lesser known authors and readers Lupton approaches books as objects that are good at attracting particular forms of attention and paths of return In contrast to the digital interfaces of our own moment and the ephemeral newspapers and pamphlets read in the 1700s books are rarely seen as shaping or keeping modern time However as Lupton demonstrates books are often put down and picked up they are leafed through as well as read sequentially and they are handed on as objects designed to bridge temporal distances In showing how discourse itself engages with these material practices Lupton argues that reading is something to be studied textually as well as historically Applying modern theorists such as Niklas Luhmann Bruno Latour and Bernard Stiegler Lupton offers a rare phenomenological approach to the study of a concrete historical field This compelling book stands out for the combination of archival research smart theoretical inquiry and autobiographical reflection it brings into play

**Radiance and Reflection** Jane Hayward, Walter Cahn, Metropolitan Museum of Art (New York, N.Y.), 1982

**Religious Thought in England in the Nineteenth Century** John Hunt, 1896 Summarizes the works and views of theologians and intellectual leaders with brief biographies p 363 396 and discusses the content and significance of important series and lectureships

*Continental Philosophy in the 20th Century* Richard Kearney, 2015-09-29 Continental philosophy is one of the twentieth century s most important and challenging philosophical movements This major volume includes fourteen chapters on its major representatives and schools including phenomenology existentialism and postmodernism

*The Second Half Century of Rock Mechanics, Three Volume Set* Luis Ribeiro e Sousa, Claudio Olalla, N. Grossmann, 2007-08-05 Forty one years ago the International Society for Rock Mechanics ISRM held its 1st International Congress in Lisbon Portugal In July 2007 the 11th ISRM Congress returned to Lisbon where the Portuguese Geotechnical Society SPG the Portuguese National Group of the ISRM hosted the meeting The Second Half Century of Rock Mechanics comprises

*World Christianity in the 20th Century* Noel Davies, Martin Conway, 2008 Provides readers with an overall insight into and analysis of Christianity became a genuinely worldwide faith in the 20th century for the first time Written for 2nd and 3rd year university students and in seminaries the book maps out the development of Christianity towards genuinely becoming a world religion

**18th and 19th Century German Philosophy** Frederick Charles Copleston, 2003-01-01 Copleston an Oxford Jesuit and specialist in the history of philosophy first created his history as an introduction for Catholic ecclesiastical seminaries However since its first publication the last volume appearing in the mid 1970s the series has become the classic account for all philosophy scholars and students The 11 volume series gives an accessible account of each philosopher s work but also explains their relationship to the work of other philosophers

*The Flaneur in Nineteenth-Century British Literary Culture* Isabel Vila-Cabanes, 2018-10-15 The flaneur is a cultural and literary phenomenon usually associated with nineteenth century Paris but the type also exists in the artistic and literary panorama of other major European capitals such as London Berlin and

Moscow Despite massive recent interest in the figure of the flaneur in scholarly studies analyses about the nineteenth century British analogue are often fragmentary appearing in the form of isolated articles However there is an abundant amount of nineteenth century novels sketches and journalistic essays which offer remarkable and hitherto overlooked accounts of the British metropolis and which frequently include the figure of the flaneur as a central character or the topic of flânerie as a theme This book explores a great array of texts making an essential contribution to our knowledge and understanding of the prehistory or rather history of the British flaneur from the early eighteenth century to the early twentieth century with a special focus on the nineteenth century The flaneur is looked at as a figure in which the development and dynamics of the modern metropolis and its impact on the literary discourse are manifested from a formal as well as thematic perspective The Posthuman Condition in 21st Century Literature and Culture María

Ferrández-Sanmiguel, Esther Muñoz-González, Carmen Laguarda-Bueno, 2025-06-18 More than a decade after its first definitions critical posthumanism has become consolidated as a key discourse for the understanding of our contemporary state of being within what has been called the paradigm of posthumanity but also crucially as an ideology and a praxis that guides our engagements with the world around us This double dimension characterizes the contributions to this volume They resort to critical posthumanism in its most recent developments as a set of tools for critical and cultural analysis of our posthuman times as posthumanist concerns manifest in our cultural products This volume studies the most recent evolutions in the field of critical posthumanism as represented in key novels and other screened popular cultural products produced in the first and second decades of the twenty first century Resorting to the analytical tools provided by critical posthumanist theory in cross disciplinary dialogue with other fields such as transhumanism feminist gender and queer theory vulnerability studies new materialism critical animal studies and environmental theory the scholars whose work this volume showcases bear witness to how literature and popular culture have been influenced and impressed by posthumanism Chapters 1 5 7 8 and 12 are available open access under a Creative Commons Attribution 4.0 International License via Springerlink

**Science and Sound in Nineteenth-Century Britain** Edward J. Gillin, 2023-12-22 Sound and Science in Nineteenth Century Britain is a four volume set of primary sources which seeks to define our historical understanding of the relationship between British scientific knowledge and sound between 1815 and 1900 In the context of rapid urbanization and industrialization as well as a growing overseas empire Britain was home to a rich scientific culture in which the ear was as valuable an organ as the eye for examining nature Experiments on how sound behaved informed new understandings of how a diverse array of natural phenomena operated notably those of heat light and electro magnetism In nineteenth century Britain sound was not just a phenomenon to be studied but central to the practice of science itself and broader understandings over nature and the universe This collection accompanied by extensive editorial commentary will be of great interest to students and scholars of the History of Science **Eighteenth Century Economics** Peter

Groenewegen,2002-05-30 This collection of essays amounts to the definitive guide to eighteenth century economics and is a must for any economist s bookshelves This book represents four decades of Peter Groenewegen s research of the eighteenth century     **The Seventeenth-century English Essay** Elbert Nevius Sebring Thompson,1926     Eighteenth-Century Manners of Reading Eve Tavor Bannet,2017-11-09 The market for print steadily expanded throughout the eighteenth century Atlantic world thanks to printers efforts to ensure that ordinary people knew how to read and use printed matter Reading is and was a collection of practices performed in diverse but always very specific ways These practices were spread down the social hierarchy through printed guides Eve Tavor Bannet explores guides to six manners or methods of reading each with its own social economic commercial intellectual and pedagogical functions and each promoting a variety of fragmentary and discontinuous reading practices The increasingly widespread production of periodicals pamphlets prefaces conduct books conversation pieces and fictions together with schoolbooks designed for adults and children disseminated all that people of all ages and ranks might need or wish to know about reading and prepared them for new jobs and roles both in Britain and America

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web 1 if the  $pe$  of the reactants is 430kJ and the  $pe$  of the products is 190kJ what is the  $\Delta h$  2 if the  $pe$  of the reactants is 430kJ and the activation energy is 220 how much total energy will be needed to be added for the reaction to proceed transcribed image text potential energy diagram answer the questions using the graph

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web figure 5 5 1 a potential energy diagram shows the total potential energy of a reacting system as the reaction proceeds a in an endothermic reaction the energy of the products is greater than the energy of the reactants and  $\Delta h$  is positive b in an exothermic reaction the energy of the products is lower than the energy of the

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web answer see below explanation the rate of a chemical reaction  $a + b \rightarrow c + d$  is given in first approximation by  $v = k \frac{[a]^x [b]^y}{[c]^z [d]^w}$  where  $k = \frac{A}{e^{E_a/RT}}$  where  $k$  depends by many factors as solvent geometry type of reaction  $E_a$  is the activation energy  $R$  is the universal constant of gases  $T$  is the absolute temperature

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web mar 17 2016 3 what is the activation energy of a reaction and how is this energy related to the activated complex of the reaction  $E_a$  is the minimum amount of energy for a reaction to occur it is the amount of energy required to create an activated complex 4 what happens when a catalyst is used in a reaction a catalyst changes the reaction

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web aug 8 2022 the energy changes that occur during a chemical reaction can be shown in a diagram called a potential energy diagram or sometimes called a reaction progress curve a potential energy diagram shows the change in potential energy of a system as reactants are converted into products the figure below shows basic potential energy

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web the energy of the reactants is shown on the energy diagram above on the right side of the energy diagram draw a horizontal line segment to indicate the energy of the products draw a vertical line segment to indicate  $\Delta H$  for the reaction and label it with the correct value see attached image

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web all questions are answered herein chemistry tutorial 9 02b potential energy diagrams how to draw and label pe diagrams for exothermic and endothermic reactions and what effect adding a catalyst or inhibitor has on the diagram

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