Review of the book

"The $P = NP$ Question and Gödel's Lost Letter"

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Springer, 2010

ISBN: 978-1-4419-7154-8

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1 Summary of the review

This is a cool book about a cool problem in the cool field of computational complexity, or so the cool author would have us believe. Unfortunately, apart from a glibly prose, little attempt has been made to reach those not in the know, thereby leaving the uncool, non-expert out in the cold. In short, if you are a computer scientist working in another field, looking for a concise account covering the current status of one of the most important questions in the field of computational complexity, this book will almost certainly disappoint you.

2 Summary of the book

This book is a reprint of the author's blog which he began writing in 2009. It starts with an imagined scene of Kurt Gödel walking through some snowy woods pondering a problem he cannot solve, then deciding to write a letter to von Neumann, asking if he can solve the problem. This is the so-called lost letter, which does not re-enter the discourse again until the final chapter.

After the very short prologue, the question of whether or not $P = NP$ is discussed, though the problem is never precisely stated, rather it is assumed that the reader knows what the author means. Over the course of 44 chapters, averaging 5 printed pages, a number of questions are examined, including:

- "Is $P = NP$ well posed?";
- "What happens when $P = NP$ is resolved?";
- "How to solve $P = NP$?";
- "Why believe $P \neq NP$?";

Generally speaking, most computer scientist believe, as does the author, that $P \neq NP$, even though there is no formal proof of this as of yet. Throughout the book the author tries to convince the reader to accept his view that from an intellectual standpoint this is a very important question; however, early on in the book he undercuts his own premise by discussing several possible scenarios in which P could be equal to NP, but in ways which are purely of intellectual interest, devoid of any practical significance.

Many of the 44 chapters are devoted to discussions of existing lower bound estimates for the computational complexity of specific algorithms known to be in NP, along with the proof techniques used to establish the lower bounds. (As the author has done considerable work with SAT, this is one of the sub-areas whose current status is described in some detail.) Other chapters discuss proof techniques that might, under the right circumstances be useful to decide whether P is equal to NP or not, but here one gets the feeling that the author is merely guessing as to the eventual usefulness of these techniques.

For the most part, the bounds and proof technologies are merely discussed, without any real attempt to actually demonstrate the claims being made. (We should probably not be surprised at the lack of rigor, giving the folksy, almost humorous prose adopted by the author.)

Some of the chapters open with a few paragraphs talking about one or more of the people who worked on this or that problem in computational complexity, or who have produced results useful in the context the author is currently discussing. These tangents are meant to add a human touch to an otherwise exacting study.

One surprising point is the limited space devoted to quantum approaches, they are discussed in only a single chapter, wherein the author freely admits he is not knowledgeable in this area.

3 What is the book like (style)?

This book originated as a blog and appears to be nothing more than a reproduction of blog posts, with some minor editing. Typical for a blog, it has a casual, colloquial prose boarding on the superficial. Topics are discussed without regard for rigor, or for a consistent depth of treatment. Sometimes an equation is shown, sometimes a theorem is formally stated, but more often than not there is only a hand-waving discussion.

In a blogging context this is certainly fine, but for a book this is hardly sufficient. The casual blog reader might forgive a blogger for using the word, "*cool*", twice in a single blog, since they are unlikely to read the next blog entry until a week or so later; but in the context of a book, reading interjections like, "cool", ten times in ten pages becomes tedious.

Since the author is a university professor, with a long list of publications in journals and conference proceedings, its hard to fathom how he could assume that readers would accept a book pasted together from nothing more than blog entries. Just as a conference proceeding is not simply a printed collection of the slides presented at the conference, a book cannot be created by simply printing off a collection of blog entries. When crossing the medium boundary an author has to remember that every medium has its own style of presentation along with a commensurate set of expectations from the consumer.

4 Would you recommend this book?

No. This book has no clear audience while muddling around using a foreign style out of context. Blog writing is not the same as book writing and a collection of unedited blog entries does not make a book.

Flattening the multidimensional world of the Web, into the one-dimensional book world, requires careful consideration of how to treat the extra dimensions. On the Web, if an author wants to connect with a reader who might not understand every acronym, theorem or concept, then they can insert a hyperlink to a definition. In the one dimensional world of a book, the author is expected to include glossaries, or preliminary chapters providing supporting material. However, the present author does neither, leading one to conclude that this book is not aimed at the non-expert. At the same time it is hard to see how the domain expert looking for an overview of the current state of the art would benefit from this book with its lack of rigor, hand waving arguments and propensity for trivia.

I suspect that many of the readers who enjoyed the blog, did so because it afforded them a chance to interact with other experts from around the world through the discussion pages appended to the blog entries. At several points the author mentions how such lively discussions led him to make changes to his original entry. Whether it would have helped the book to include these discussions is unclear; however, without these interactions which arise from the extra dimensions afforded to a Web based blog, but absent from the printed page, the domain expert has even less reason to be interested in this book.

The reviewer is an analyst and researcher with Inversik Laboratories in Germany.