# **SPRINGER NATURE**



# Die Zukunft des Lesens und Schreibens von Büchern: KI und VR

Dr. Niels Peter Thomas Osnabrück, Oktober 2019



#### The Book World: "Plant an Idea – Grow a Book"



## Problem #1: Managing the Information Overload



(1) The Future of Writing Books

How can we make writing books more efficient? A case study in artificial intelligence

## **The First Machine-Generated Academic Book Ever**

- Published April 1, 2019
- First academic book without an author
- by an algorithm jointly developed by Springer Nature and Goethe Uni Frankfurt, in cooperation with Digital Science
- cross-corpora summarization of existing texts, organized into a coherent similaritybased sequence.
- available for free on SpringerLink



https://link.springer.com/book/10.1007/978-3-030-16800-1

## Great Media Coverage: Springer Nature's Thought Leadership

Seth Redmore @sredmore - Apr 18 I may not be super interested in lithium-ion batteries but prototyping a machinegenerated book is a real breakthrough.

#### A fascinating story: lexa.ly/9o6tyk

#AI #NLP #MachineGenerating

#### Lithium-lon Batteries A Machine-Generated Summary of Current Research

Springer Nature publishes its first machine-generated book Springer Nature published its first machine-generated book in chemistry. The book prototype provides an overview of the latest research in the rapidly growin...  $\mathscr{S}$  eurekalent.org  $\mathcal{O}$  the triangle triangl

#### GIZMODO

The algorithm, which was developed by AI researchers at the Applied Computational Linguistics (ACoLi) lab at Goethe University in Frankfurt, Germany, was not designed to replace authors like John Grisham or J. K. Rowling. As is probably evident by its title, *Lithium-Ion Batteries:* A *Machine-Generated Summary of Current Research* (which can be freely downloaded here) doesn't feature interesting characters, snappy dialogue, or a thrilling plot. As far as we know, Hollywood studios have no plans to option it as next summer's blockbuster. Instead, it's an attempt to distill and condense the extensive research being done on lithium-ion batteries.

#### OUTSELL<sup>®</sup>

Insights Wednesday, April 24, 201

Springer Nature's First Machine-Generated Content Digital Book

Michael Dziekan - E-mail Michael Dziekan about this insight

Machine-based knowledge generation advances the information industry closer to addressing an age-old problem of too much data and too few people to make sense of it all.

#### GE Reports The 5 Coolest Things On Earth This Week

How does it work? The algorithm "was developed to select, consume and process relevant publications" in the field, according to Springer Nature, and generate summaries of peer-reviewed papers. You can check out the results for yourself: "Lithium-Ion Batteries" is available as a free e-book, an important contribution to scholarship if — no offense — not exactly "The Girl on the Train."



"The book did a fairly good job in identifying the numerous materials [that have] been studied in the literature and provided a great summary of the research in each area across the field," says Jun Liu, a chemical engineer at the University of Washington and the Pacific Northwest National Laboratory. "This is very impressive."

#### Erstes wissenschaftliches Buch eines Algorithmus' veröffentlicht heise online

Das nun veröffentlichte Buch sei ein wichtiger Meilenstein, meint Henning Schoenenberger von Springer Nature.

#### Smithsonian.com

ou probably wouldn't pull Lithium-Ion Batteries: A Machine-Generated Summary of Current Research off the shelf anytime soon. But the research book is more interesting than it sounds: Its author, "Beta Writer," is a machine-learning algorithm designed by researchers from Goethe University in Frankfurt, Germany.

- "Advances the information industry"
- "Coolest things on earth"
- "A real breakthrough"
- "More interesting than it sounds"

## Publishers without Authors? Utopia or Dystopia?

• We can create new books automatically, so ....



- Why pay any royalties?
- Do we need acquisitioning editors?
- We can also create journal articles.
- The role of researchers will change.
- The role of publishers will change.

• But of course reality is more complicated...

# The algorithm, and how it works (in brief)



• Is this creative?

Yes and No: the algorithm produces no new results, but the unbiased summary of literally all known facts provides a new perspective, researchers confirm

#### **Technological Challenge vs. Publishing Challenge**

#### **TECHNOLOGICAL CHALLENGE**

- Who is the originator?
- Who is accountable, who is responsible?
- Who owns copyright?
- How to organize "peer review"?
- How to select the topics?
- What is publisher's role?

**PUBLISHING CHALLENGE** 

#### How we are integrating machine-generated content



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#### The future of machine-generated books – no utopia any more

Machine-created new knowledge: The algorithms will combine existing knowledge to form new research hypothesis

> We are in the knowledge creation business and have to rethink our role

Researchers work changes, as they can concentrate on the creative part, and will not waste time on literature search

(1) The Future of Reading

How can reading a book be more efficient? Experiments with VR & AR

# Better Reading: How will we read books in the future?

#### Will we read books in print or in electronic form in the future, or is there a third format?



A few years ago, many people in publishing would have assumed that soon we will have a clear tendency for eBooks, but this will probably not happen.



We observe our readers and it seems that mot of us are dual mode readers who prefer a certain format according to the specific reading situation we are in.



## **Benefits of the printed book\***



- No device needed
- No electricity/ battery needed
- Open a book and read without delay
- Insensitive
- No technical know-how necessary
- Can be borrowed, sold, passed on
- More pleasant touch and feel
- Orientation within the book easier

#### **Benefits of the eBook\***



- Search by keyword
- More content immediately available
- Customizeable format (size, layout)
- Saves resources (paper, logistics)
- Fast delivery
- Durability (free from wear and tear)
- Copying is easy
- Multimedia integration possible

# Interesting new empirical research on "reading success"

Reproducible experiments with students show that in some use cases students who read the print version remember better what they have read than those who read an eBook on a flat screen.

Depending on the specific parameters (how much time, what type of text etc.) the results of these experiments are very different.

Experiments in the neurosciences indicate that this effect can be caused by brain processes during reading!



# The evolution of the brain and reading

- Our brain has undergone an evolution of several million years.
- However, reading is a revolutionary new skill. The first alphabets are about 6000 years old, and only for less than 1000 years can the majority of mankind read.
- Human brains are not well prepared for reading.
- We do not have a "reading center", but have to re-use the brain center for spatial orientation for reading.



# If this hypothesis holds, what is the neurological advantage of the printed book?



Orientation within the page: upper left corner is always upper left Orientation within the book: depth (3rd dimension) is perceptual Navigation between pages:

fast turning pages possible.

#### **Two consequences of this insight:**

#### Short term:

- Since this effect is triggered by "hard wired" brain processes, it will not go away with the next generation.
- Springer Nature will continue to offer both formats, print and e.

#### Long term:

- When the "codex form" of the book was specified, it was unknown how the brain worked. It is therefore a coincidence that the printed book resonates so well with the brain.
- Maybe there are other formats that fit the brain even better? This would make reading and learning more efficient! How would such a "third format" look like?

The book presented in the "third format" must perfectly support the way how the brain works:

- 1) Texts must be shown in a fixed location.
- 2) More text should be visible simultaneously.
- **3)** Additional (spatial) structures or colors can support the text (narrative graphs).

Pragmatic constraint: We are looking for a format that is suitable for existing backlist of titles, not only for new books:

4) Keep the concept of pages (for the time being)

Experiments need to prove the benefits of this format over the existing ones.

## 360°-Reading in virtual reality: the experiment

In the VR headset we can display a complete chapter around the reader at the same time. You read by moving/turning your head or body.

Hypothesis: in complex texts where you need to go back to an earlier page, spatial memory finds orientation much faster than in printed and electronic books.

Next step: experimental verification with three different formats.

# **Outlook on the future of reading**

First internal experiments suggest an interesting project!

The basis of the new format is digital. One day, when we have found a better representation, you can use our eBook collections in the new VR app.

We probably won't all be wearing VR headsets in a few years' time - but these experiments will allow us to gain new insights into reading, which we can translate into our eBooks.

We will share our findings with the academic community and seek to work together - cooperation partners are welcome! (niels.thomas@springer.com)



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