On the Road to Media PsAIchology?

Mapping the potentials and challenges of artificial intelligence for research in media psychology

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PRELIMINARIES

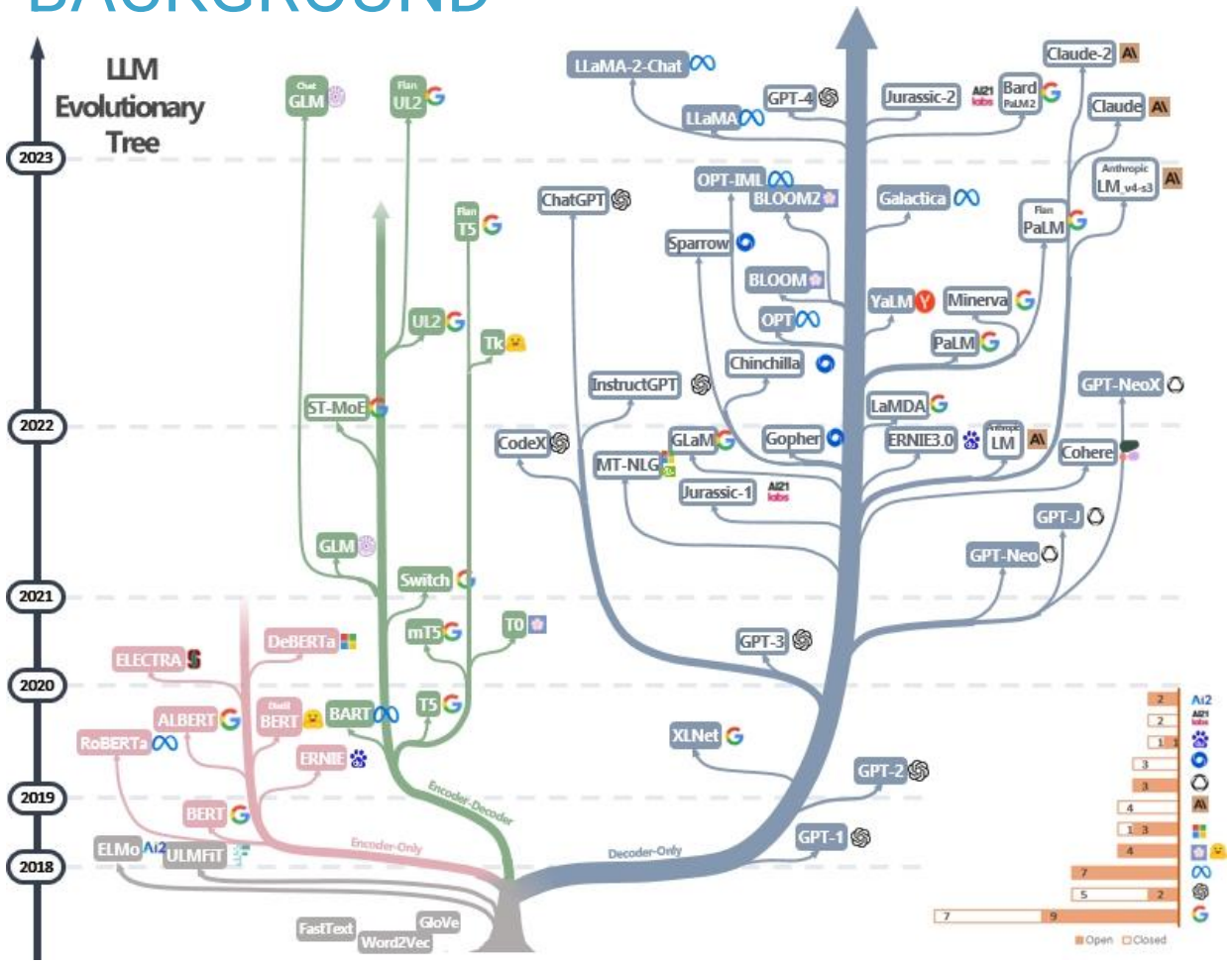
→ This position paper is largely based on: Breuer, J. (2023). Putting the AI into social science – How artificial intelligence tools are changing and challenging research in the social sciences. In A. Sudmann, A. Echterhölter, M. Ramsauer, F. Retkowski, J. Schröter, & A. Waibel (Eds.), *Beyond Quantity. Research with Subsymbolic AI*. transcript. *→ will be published open access soon*

→ All artwork in this presentation via Bing Image Creator (https://www.bing.com/create)

PRELIMINARIES

→ Links & references from this presentation: https://s.unhb.de/mediapsai

BACKGROUND



Cambrian explosion of LLMs?

Source: https://github.com/Mooler0410/LLMsPracticalGuide; also see Yang et al., 2023

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WHAT DO WE MEAN BY AI?

→ similar to the term "big data", the term artificial intelligence (AI) is used differently and not always clearly defined

→ oftentimes, AI is used interchangeably with machine learning (ML), or at least the distinction becomes blurry

- → example: AI = ML, prediction methods = part of AI ML, logistic regression = prediction method
  → logistic regression = AI ???
- → AI often also used as a marketing term (esp. by commercial companies/services)

→ however: "'ML' and 'AI' are not terms that should be used interchangeably (…) ML is an important driver of AI, and the majority of modern AI cases will utilize ML. However, (…) there can be cases of AI without ML (e.g., based on rules or formulas)" (Kühl et al., 2022, p. 2241)

Prompt: artificial neural network

RELATIONSHIP STATUS: IT'S COMPLICATED…

Similar to other technologies, AI can be a(n)…

1. *Result/product* of scientific research/work
   - mostly computer science (but for LLMs, e.g., also linguistics)
2. *Object of study*
   - especially important for media psychology: use of AI & interaction with AI (e.g., trust in AI)
3. *Tool*
   - meta-perspective
   - ***focus of this presentation***

Prompt: media psychology

TOOLS FOR RESEARCH

→ resarchers have always used tools for their research

→ these can be physical, such as a microscope, telescope, tweezers or scoop, or digital, such as research software

→ **AI-based tools can also be** (used as) **research tools**

→ **tools are not neutral**: They shape the research process, define possibilities and limits

→ Maslows Hammer: “If the only tool you have is a hammer, it is tempting to treat everything as if it were a nail” (Maslow, 1966, p. x)

Prompt: The variety of scientific tools: From tweezers and shovels to microscopes and telescopes to computers and artificial intelligence

PHASES OF RESEARCH

1. **Idea generation**: e.g., formulation of research questions or hypotheses
2. **Discovery**: searching for and exploring existing literature, data, analysis methods, etc.
3. **Study design & planning**: e.g., deciding what methodology and sample to use
4. **Data collection**: e.g., via experiments, surveys, interviews
5. **Data processing**: cleaning the data, getting it ready for analysis
6. **Data analysis**
7. **Interpreting results**
8. **Reporting, publishing, sharing**

Note: Individual steps and their sequence can be different; other/further is subdivision possible; additional phase, e.g., peer review

Prompt: research cycle

RESEARCH PHASES

→Use and impact of AI similar across scientific disciplines for many phases in the research process

→**Particular potential of AI for media psychology for tasks in study design/data collection and data processing/analysis**

- →Creation of stimulus materials for experimental studies
- →Annotation & classification of media content

IDEA GENERATION & DISCOVERY

Name	Type	Exemplary uses
elicit	science-specific, free-to-use	Adcanced literature search, information extraction from publications
scite_	science-specific, commercial	Advanced literature search, analysis of citations, information extraction from publications, text generation
Research Rabbit	science-specific, free-to-use	Advanced literature search, visualization of relationships between publications and authors
Semantic Scholar	science-specific, free-to-use	Advanced literature search, article summaries
ASReview	science-specific, free and open source	Systematic literature reviews
perplexity	general purpose, commercial	Information & literature search, generation of research questions or hypotheses

PAPER SUMMARIES & RESEARCH SYNTHESES

Name	Type	Exemplary uses
Consensus	science-specific, commercial	Paper summaries, research/evidence syntheses
Explainpaper	science-specific, commercial	Explanation of scientific publications
scholarcy article summarizer	science-specific, commercial	Summaries of scientific publications
ChatPDF	general purpose, commercial	Asking questions about documents (e.g., publications)

STUDY DESIGN & DATA COLLECTION: CREATING STIMULI

→textual stimuli (e.g., for vignette studies) with ChatGPT, Bing Chat, etc.

→images, e.g., with *DALL-E 2*, *Midjourney*, *Stable Diffusion*, *Bing Image Creator* or *Lexica Aperture*

→possible but not yet as far developed as text generation or text-to-image:

- →videos (see, e.g., *Make-A-Video* by Meta)
- →speech (see, e.g., Text-to-Speech AI by Google)
- →music (see, e.g., MusicGen by Facebook Research or MusicLM by Google Research)

DATA PROCESSING & ANALYSIS

→ (assistance for) writing and optimizing code (e.g., Python or R)

- → GitHub Co-Pilot
- → replit Ghostwriter
- → ChatGPT Code Interpreter Plugin
- → StarCoder

→ Note: These tools can, of course, also be used for creating or altering (bespoke) research software

→ transcription of audio content, e.g., using Whisper by OpenAI (or its implementations in R or Python)

DATA ANALYSIS: ANNOTATION & CLASSIFICATION

→AI tools for text mining and natural language processing (NLP)

→recent research (published as preprints) suggests that LLMs…

- → … can be used for identifying hate speech (Huang et al., 2023)
- → … can detect psychological constructs, such as sentiment, emotions, and offensiveness in multilingual text corpora (Rathje et al. 2023)
- → … may outperform human crowdworkers for text annotation tasks (Gilardi et al., 2023)

→however…

- → "Automated Annotation with Generative AI Requires Validation" (Pangakis et al., 2023)
- → classification output can fall short of scientific thresholds for reliability" (Reiss, 2023)

REPORTING & PUBLISHING

Name	Type	Exemplary uses
jenni	science-specific, commercial	Text generation, citation suggestions, plagiarism check
Paperpal	science-specific, commercial	Editing, advanced language & consistency checks
Grammarly	general purpose, commercial	Advanced editing & language checks
Microsoft Editor	general purpose, commercial	Advanced editing & language checks
DeepL Translator	general purpose, commercial	Text translation
DeepL Write	general purpose, commercial	Advanced editing & language checks

Note: The general-purpose tools listed here can also be used for optimizing questionnaire items or textual stimuli

SWISS ARMY KN-AI-VES

→ LLM-based chat bots, such as ChatGPT, Bing Chat, Google Bard, HuggingChat, or Open Assistant can be used for different phases and tasks in the research process

- → Idea generation: e.g., generation of research questions (Dowling & Lucey, 2023)
- → Discovery: literature search → mind the risk of hallucinations (made-up papers)!
- → Study Design & Data Collection: e.g., formulation, optimization and translation of questionnaire items or creation of textual stimuli for experimental studies
- → Data Processing & Analysis: writing, optimizing, or translating code
- → Writing & Publishing: writing and editing of text

POTENTIALS OF AI (TOOLS)

→ **increases in output**

- → notably a “mixed blessing” (keeping up, quality control…)
- → increase in output may require researchers to also rely more on AI-based tools for making sense of the increased output by filtering and summarizing relevant content

→ **reduction of time and costs** (e.g., annotation/classification tasks or translation)

→ **potential reduction of errors and human biases** in the research process

→ **quality improvements**: e.g., higher quality stimulus materials for experimental studies

DIVERSITY & INCLUSION

- →different types of diversity
- →different targets of diversity: research (topics, methods) or population of researchers (backgrounds, socio-demographics, attitudes)
- →How can AI (tools) increase diversity and inclusion?
  - →reduction in resource requirements (esp. with regard to costs) as an opportunity for scholars with less/restricted access to funding
  - →lower degree of (or possibly even no) coding skills required for complex processing and analysis tasks
  - →help with writing tasks for non-native speakers

CHALLENGES, RISKS, & SIDE EFFECTS

- → increasing dependence on commercial providers
- → legal and ethical concerns
  - → data protection/privacy
  - → copyright/intellectual property
  - → terms of service (and other contractual agreements)
- → biases (see, e.g., Ferrara, 2023)
  - → introduction typically through training data
  - → may cause errors
  - → "Biased AI systems produce biased humans" (Glickmann & Sharot, 2022)
- → intransparency & lack of reliability
  - → AI models, such as LLMs, as black boxes
  - → stochastic processes
- → societal dimensions
  - → environmental effects (energy consumption)
  - → working conditions (exploitation of human annotators/coders)
  - → risk of monopolies or oligopolies (as is the case for operating systems, search engines, or social media platforms)

Prompt: risks, challenges, and side effects of AI

WHAT'S NEXT?

→ **further developments of models and tools**, e.g., in the areas of text-to-audio (+ audio-to-text), text-to-video

→ more **multimodal models** (e.g., text + images) and tools that make use of those (e.g., GPT-4 or LLaVA) → useful, e.g., for annotation or classification of social media content

→ AI from object & tool to **subject in the research process**?

- → AI as assistant or coauthor
- → automated peer review
- → ...

Prompt: The future of media psychology research with AI

WHAT CAN WE DO?

→ develop/refine an understanding of what AI is/means, how we can use it, and how it works (currently esp. also for LLMs)

  → develop/increase AI literacy (for ourselves and others)

  → skill of prompt engineering

→ be aware of and able to address/deal with the challenges and risks associated with the use of AI(-based tools) for research

  → also keep in mind that not everything works out (anyone remember Galactica by Facebook?)

→ make use of and support FOSS projects, such as *Open Assistant* by *LAION*, *BLOOM* by BigScience, *HuggingChat* by *Hugging Face,* or *GPT4All* by *Nomic AI*

→ conduct methodological research on stimulus creation with AI tools (and continue/extend research on content annotation & classification: images, videos…)

CONCLUSION

→ AI (and its use) is an important object of study for media psychology, but also a **powerful tool** for media psychology research

→ AI and tools based thereon have a substantial **impact on both the quantitative as well as qualitative dimensions of media psychology research**

→ while AI (tools) can affect all phases of the research process, the **degree of the impact differs between the phases** (e.g., discovery vs. hypotheses and RQ formulation)

→ AI offers **many opportunities for research(ers)** in media psychology: e.g., for stimuli creation or content annotation/classification

→ the use of AI (tools) is also associated with a number of **challenges and risks** that researchers need to be aware of and address in order to use it/them productively

THANK YOU FOR YOUR ATTENTION!

I‘m looking forward to your comments & questions…

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